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## INDEX

Sr. No.	Title of The Paper	Page No.
1	Fabrication of Advanced Controlled Washrooms Cleaning System for Rural And Urban Areas -Anil Gawande, Nehal Pand, Kaushal Zade, Devershi Bobade	5-8
2	Review on Failure of Tamping Tool Used in Tamping Machine for Alignment of Railway Track -Ankit V. Katore, R. A. Lekurwale, Dr. D. R. Ikhar	9-13
3	Overview of Ajax Technology on Web Application -Warsha M.Choudhari, Rinku S. Ashtankar, Shalini Kharkate	14-19
4	A Review on Big Data & Security - R. M. Shete, P. M. Gourshettiwar	20-26
5	Awareness of Agile Methodologies for Systems Development -Yoginee S. Pethe, Satyajit S. Uparkar	27-34
6	Utilization of Solar Energy to Operate Appliances via Android Applications -Omkar Sagar, Vikikumar Motghare, Kajal Bharne, Akshay Deotale, Dhanashri Pine	35- 41
7	A View on Issues and Challenges in Internet of Things -Pravin Y. Karmore, Swapnili P. Karmore	42-48
8	IoT Based Advanced Water Quality Monitoring System -Reetesh Golhar, Apurva Sakle, Harshali Warhate, Isha Ninawe, Ankita Bodhale	49-59
9	Design and Fabrication of Portable Concrete Mixture Machine -Sanjay Aloni, Sana M. Ali, Priyanka V. Khante	60-65
10	Design of Microstrip Patch Antenna for Frequency 5.2Ghz -Ankita Thakare, Ayushi Kokate, Rashmi Barahate, Puja Dekate, Shraddha Bhoge, Snehal Kokewar	66-72
11	Remote Gun Targeting System -Akshay M. Ganjapure, Gagan C. Chouriwar, Mangesh A. Selukar, Mayur M. Wagh, Shubham D. Likhar, Tejas M. Jaronde, Piyush M. Dhande	73-76

<b>12</b>	Review On Solar Electric Fencing for Irrigation of Animal Man Conflict  -Prashant Y. Shende, Pragati S. Katakpure, Swati S. Kathane, Snehal M. Raut, Aarti K.Nagose, Prachi S. Ingale	77-80
<b>13</b>	Quaternary Arithmetic Logic Unit Design  -Prashant Shende , Pratiksha R. Hande , Neha M. Chandak	81-85
<b>14</b>	Control and Monitoring of Automatic Aquarium Care, Maintenance and Management using IOT  -Poonam A. Kapse, Sanchalika M. Dubale, Gauri R. Dhage, Pawan P. Mahajan, Harish T. Mahajan	86-89
<b>15</b>	Design and Implementation of Flood Early Warning System for Alerting Population  -Apurva Patil, Prajakta Hadke, Utkarsha Aher, Vaibhav Mathane, Priti C. Golar	90-100
<b>16</b>	Design and Fabrication of Chaff Cutter cum Pulverizer  -Ram Vaidya, Akshay Patil, Aniket Thamke, Sanket Dethe	101-106
<b>17</b>	Comparative Study of ETL, ELT and ETLT Frameworks  -Satyajit S. Uparkar, Yoginee S. Pethe	107-111
<b>18</b>	Gas Cylinder Level Detector & IoT based Booking System  -Yogesh Watile, Manoj Khubchandani, Shakshi Kahlon, Piyush Dhotarkar, Saloni Mehta, Madhura Choudhari, Vaishnavi Tiwari	112-117
<b>19</b>	A Review on Intelligent Recommendation System for Higher Education  -Dr. M. M. Raghuwanshi, Dr. K. R. Singh, Nikita Sawarkar	118-125
<b>20</b>	Electronic Toll Collection (ETC) of Transportations System with active RFID  -Vaishali Pande, Nivedita Hasti, Anjali Rahate, Kunal Tagade, Anup Telrandhe	126-130
<b>21</b>	Application of Annotation Method in Image Retrieval  -Mohini S. Upasani	131-137
<b>22</b>	Sensor based farming without soil using hydroponics system for nutritional and healthy agriculture  -Vaishnavi Suryavanshi, Anuradha Kadu, Dr. Sachin Upadhye	138-144

# **Fabrication of Advanced Controlled Washrooms Cleaning System for Rural and Urban Areas**

**Anil Gawande<sup>1</sup>, Nehal Pande<sup>2</sup>, Kaushal Zade<sup>3</sup> and Devershi Bobade<sup>4</sup>**

**<sup>1</sup>Assistant Professor, <sup>2,3,4</sup>Students  
Department of Mechanical Engineering,  
Datta Meghe Institute of Engineering Technology and Research,  
Sawangi, Wardha  
nehalpandedinesh@gmail.com, kaushal.zade@gmail.com**

## **Abstract**

As we know, there are many cleaning washrooms provided by the authority in the rural and urban areas. Due to the limited number of resources it is not possible to maintain all the cleaning assemblies. Hence we lag to maintain the cleaning of these areas. To overcome this limitation, this paper is an attempt to work on cleaning of washrooms in the rural as well as urban areas. For this a proposed system is design which works on a mechanism by the name- Fabrication of Advanced Controlled Indian toilet sheet cleaning system.

## **I. Introduction**

On the punch line of “Swaccha Bharat Abhiyan”, a system is proposed which will be helpful for cleaning the washrooms where there is no provision of any cleaning assembly. It will be easier to place cleaning assembly with low cost, effective, power optimistic and less maintenance. The system uses rack and pinion arrangement along with washer to clean complete system. In addition, there is also another assembly named as cleaning of dome which works with the help of some motors. This system uses high torque motor to clean complete floor. The proposed system is power saving system and takes a limited time to complete its work. It is also cost optimistic and with the help of limited sources, it is possible to maintain all the things. The proposed system can be utilised at home, schools, colleges, hospitals, companies, factories and in any workplace.

## **II. Literature Review**

I. With the advancement of technology, robots are getting more attention of researchers to make life of mankind comfortable. This paper presents the design, development and fabrication of prototype Smart Floor Cleaning Robot (CLEAR) using IEEE Standard 1621

(IEEE Standard for User Interface Elements in Power Control of Electronic Devices employed in Office/Consumer Environments). Subject robot works in self operated mode as well as in manual mode along with other features like planning for specific time and bag less dust container with auto-dirt disposal mechanism. This work can be very useful in improving life style of mankind

II. Manual work is overcome by the robot technology and many of the related robot appliances are being used widely. Here represents the technology that proposed the working of robot for Floor cleaning. This floor cleaner robot can work in any of two modes i. e. "Automatic and Manual". All hardware and software operations are assisted by AT89S52 microcontroller. This robot facilitates sweeping and mopping task. RF modules have been used for wireless communication between remote (manual mode) and robot and having range 50m. This robot is inbuilt with IR sensor for obstacle detection and automatic water sprayer pump. Four motors are used, two for cleaning, one for water pump and one for wheels. Dual relay circuit used extensively to drive the motors one for water pump and another for cleaner. In previous work, there was no automatic water sprayer executed and works only in automatic mode. In the automatic mode robot control all the operations itself and change the lane in case of hurdle detection and moves back. In the manual mode, the keypad is used to perform the desired task and to operate robot. In manual mode, RF module has been used to transmit and receive the information between remote and robot and display the information related to the hurdle detection on LCD. The whole circuitry is connected with 12V battery.

III. Domestic service robots have long been a staple of science fiction and commercial visions of the future. Until recently, we have only been able to speculate about what the experience of using such a device might be. Current domestic service robots, introduced as consumer products, allow us to make this vision a reality. This paper presents ethnographic research on the actual use of these products, to provide a grounded understanding of how design can influence human-robot interaction in the home. We used an ecological approach to broadly explore the use of this technology in this context, and to determine how an autonomous, mobile robot might "fit" into such a space. We offer initial implications for the design of these products: first, the way the technology is introduced is critical; second, the use of the technology becomes social; and third, that ideally, homes and domestic service robots must accept to each other.

### **III. Block Diagram**

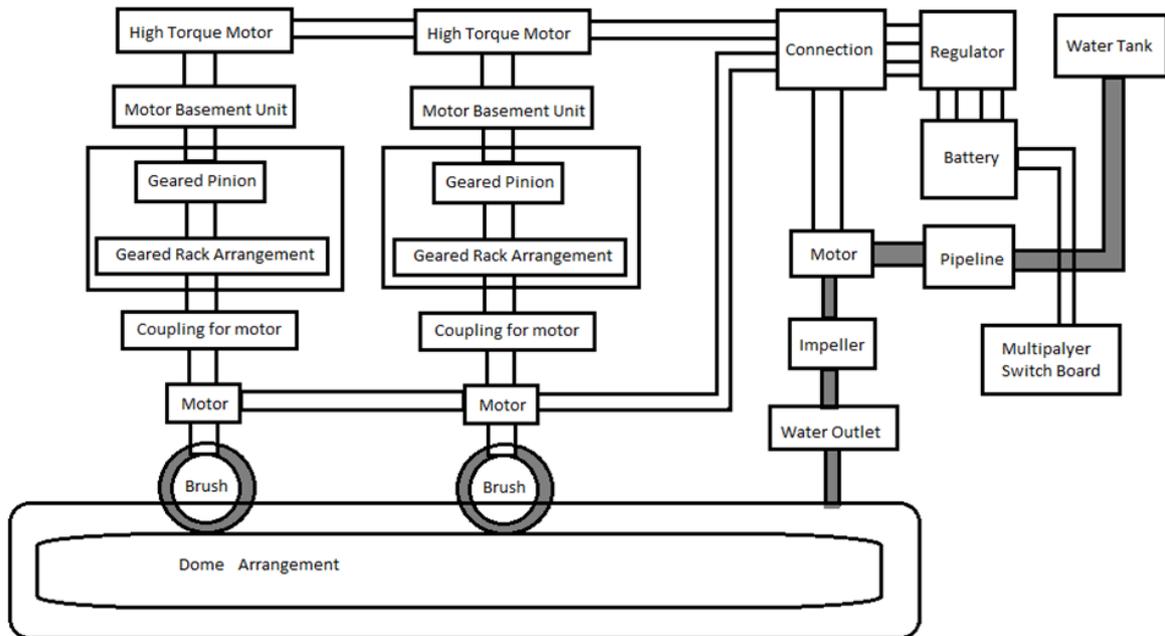


Figure 1: Block diagram of the proposed system

#### IV. Advantages

1. Multi-washers assembly with limited power
2. Washing at floor along with dome
3. Less use of water
4. Optimistic structure design
5. Low cost
6. Shock Resistant
7. Easy to place
8. Maintenance is less
9. Power optimistic

#### V. Applications

1. Washrooms at villages and cities
2. Schools
3. Colleges
4. Hospitals
5. Companies
6. Offices

7. Factories
8. Public health centres
9. Houses and flats
10. Theatres

## **VI. Conclusion**

The proposed system has many advantages as well as vast application areas. Thus the implementation of such a system will be a useful in building a clean and hygienic environment in the society.

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## **Review on Failure of Tamping Tool Used in Tamping Machine for Alignment of Railway Track**

**Ankit V. Katore<sup>1</sup>, R. A. Lekurwale<sup>2</sup>, Dr. D. R. Ikhar<sup>3</sup>**

**<sup>1</sup>M.Tech. Student of (CAD -CAM), <sup>2</sup>Assistant Professor, <sup>3</sup>Associate Professor  
Datta Meghe Institute of Engineering Technology and Research,  
Sawangi, Wardha**

### **Abstract**

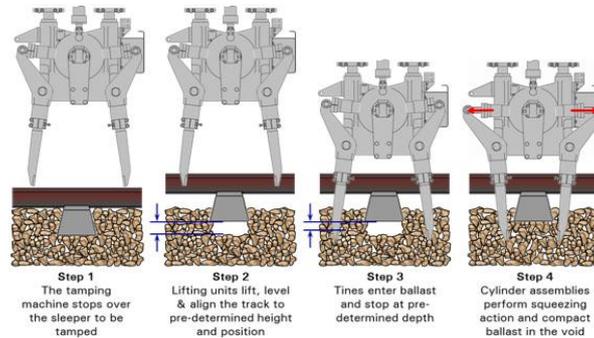
The Tamping arm is joined to main body using a sleeve and a pin and the joint is pivot point. The upward end of arm is connected with hydraulic cylinder and lower one is connected with tamping tool. During the working of Tamping machine, because of self-weight tamping unit penetrates through the bed of ballast up to desired depth, after which the hydraulic cylinder cranks outwards causing the tamping arm to move inwards. This inward movement of arm squeezes the ballast and fill the gap below the sleeper. Due to reactions from the self weight and Hydraulic force, the pivot point that connects the tamping arm with main body fails frequently. The main cause of this failure is the high friction between sleeve and pin due to surface to surface contact. This high friction causes erosion of material and induces play in the fit between the tamping arm and sleeve. There is requirement to replace tamping arm at a small span due to which cost is high due to frequent downtime on railway line. Further literature review is to be done to verify this cause to avoid the failure of Tamping Unit the Failure Analysis is being carried out. For this CAD modelling of the tamping unit is carried out in CAD software Solid works.

**Keywords:** Tamping unit failure, tamping.

### **I. Introduction**

Under repeated loading from rail traffic the track accordingly changes its position, causing misplaced movement from the desired vertical and horizontal aligned position. Ballast tamping is extensive process of re-establishing the geometry and re-arranging the ballast present below the sleeper for keeping the track in preferred position and provide it with a homogenous and align ballast bed. The track profile and its geometry should be measured in regular intervals and at least, the track should be tamped at short maintenance intervals to ensure that trains travel safely with normal speed of track line. When availing low quality

machines or other manual tamping process, geometry of track line is corrected using track jacks and the visual judgments of Track Master. These types of methods are not able to provide the quality or durability required for a modern railway line. Today in every railroad railway, tamping machineries equipped with automatic holding and lifting operation, lining operation and synchronized tamping operation on open track, turnouts, checked rail checked sections and splice joints etc. is strictly essential for maintaining the track at the required standards.



**Figure 1: Basic Tamping Process**

## **II. Aim and Objectives**

- To understand the failure of tamping tool.
- To split the design of existing tool into subassembly.
- To help the company reduce the downtime penalty on railway line due to failure of tamping tool.
- To avoid the complete replacement of tamping the tool

## **III. Problem Statement**

The Tamping arm is connected to the main body using a sleeve and a pin. This joint is a pivot point. The upper end of the arm is connected with hydraulic cylinder and the lower end is connected with tamping tool. During the working of Tamping machine, the Tamping Unit due to its self weight penetrates through the ballast bed to the desired depth, after which the hydraulic cylinder moves outwards causing the tamping arm to move inwards. This inward movement of arm squeezes the ballast and fill the void beneath the sleeper. Due to reactions from the self weight and Hydraulic force,

The Tamping tool fails under the repeated cyclic loads prematurely. There is a need to replace the complete tamping tool in very short intervals due to which cost is high due to frequent downtime on railway line.

#### **IV. Literature Review**

Following Five papers stand the base for the proposed work.

SOFIA LANDER [1]

The study of this research helps evolve the Optram software as decision assist in tamping maintenance. The aim is to analyze Optram's advancement potential for the process and suggest new improvements. Railway import-export is a necessary part of continuous transport system today. Passenger traffic joins one region to other, which make possible larger labor markets and improve people's flexibility with public transports. The market for freight rail transport is growing and challenging to road transport; one freight train can take the equal load of goods as 30 long-distance Lorries (Närings department, 2011). There is an ongoing discourse in media today about the present condition of rail maintenance due to obstacles with late trains, during hard winters. There are lot of components in the railway that affect the present state quality of railways. Most important component is to maintain a track geometry quality which the track is straight on straight railway tracks and curved where it is curved. Minor track deformity can generate vibrations and reduce the comfort and increase wear to the other components. Larger asymmetry can produce sun links and results derailment.

ALBERINO PALOZZI, [2]

In this review, all the tracks related problems and their solution with tamping device are discussed. Ballast tamper specially left an adjacent Switch Machine section, and only reason is that sided Switch Machine arrangement rods are laid between the bind where the ballast tamper packs. Ballast of this region becomes loose or relaxed, and do not support the Track correctly causing the train to bounce at this section (track pumping) which also causes severe vibration, Machine Failures and unscheduled Track Maintenance.

SAUSINE, AZ'EMA [3]

The Ballast tracks are widely used due to flexibility from construction to maintenance. The shear and wear of the track due to heavy train traffics make various indentations in the railway track as a result of differential settlement. The ballast tamping method is used to regain and align the starting profile of the rail track. In this research, we focus on the impact

of tamping method with 3-DDEM simulations based. This article is subjected to, modelling of the tamping method with FEA. Also author has discussed types of maintenance including ballast operation used for rail track deformation.

NADER FARZANEH [4]

Pins and plain sliding bushings are usually use to make pin joints in machinery. At very large loads and low speeds, such bearings works in the regime of boundary lubrication, and are employed to failure by galling, which consist a transfer of material between the bushing and pin. This research contains conceptual and fact-finding results of the stress and lubricant distribution in plain pin and bushing pairs. A FEM study is oversee to calculate the contact stress dispensation at the interface, and comparisons are made to the Hertz contact (HCT) theory. Compared the stresses calculated for a straight pin and bushing with stresses calculated for bushing with lobes and bushing with undercuts. The outcome shows that undercut bushing have a maximum life period than straight or lobed bushing. In this article, author has discussed pin joint failure under various loading conditions with the help of design and FEA.

AUBRY, HUJEUX [5]

The goal of this literature review is a detailed understanding of ballast deterioration and the modelling of a tool to evaluate the effectiveness of the track tamping, as per the ballast condition and the infrastructure stiffness. Detail knowledge will make it feasible to minimize the deteriorating influence of tamping over ballast and it results to increase the life period of track and ballast. This will make it viable to analyze separately the long-period upshot of traffic loading and track tamping on ballast degradation and its consequent behavior. Knowing the ballast degradation permits to apply maintenance strategy in a less aggressive way in order to increase its lifetime and the durability of tamping operations. So, maintenance costs for the railway companies can be decreased.

### **Identified Gaps in the Literature Review**

Most of the researchers till now have presented a Research on tamping machines and tamping tools. There is still a need to modify, optimize and customize the tamping machine and its components due to pure dynamic nature of working and very less amount of work has been observed on it. This work is focused on understanding the failure modes, affecting parameters and design improvement analysis of tamping unit.

## V. Research Methodology

In present study, we will be accumulating all the essential and necessary data of tamping unit to investigate the existing design. Considering the problems identified we will then create modifications in the existing design. Then calculations and FE analysis of the design model will be performed. After that results will be discussed and design will be finalized.

## VI. Conclusion

With the successful completion of this project, the company will be directly benefited as improvement in product life which will reduce the down time of railways due to failure of tamping unit.

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## Overview of Ajax Technology on Web Application

Warsha M.Choudhari<sup>1</sup>, Rinku S. Ashtankar<sup>2</sup>, Shalini Kharkate<sup>3</sup>

<sup>1</sup>Professor, Information Technology, DMIETR Wardha

<sup>2</sup>Professor, Computer Science & Engineering, ITM College of Engineering, Nagpur

<sup>3</sup>Professor, Computer Engineering, Govt. Polytechnic, Gadchiroli

<sup>1</sup>warshaswaradhni@gmail.com, <sup>2</sup>rsashtankar@gmail.com, <sup>3</sup>shalin\_k1@rediffmail.com

### Abstract

Big companies such as Google, Yahoo!, and Microsoft have devoted resources specifically towards the goal of creating web applications that look and behave like desktop applications. With recent advances in JavaScript, web developers have been able to create an unprecedented user experience in web applications. Breaking free of the "click-and-wait" paradigm that has dominated the web since its inception, developers can now bring features formerly reserved for desktop applications onto the web using a technique called Ajax. Ajax is an all-encompassing term surrounding the use of asynchronous HTTP requests initiated by JavaScript for the purpose of retrieving information from the server without unloading the page. These requests may be executed in any number of ways and using any number of different data transmission formats. Combining this remote data retrieval with the interactivity of the Document Object Model (DOM) has bred a new generation of web applications that seem to defy all the traditional rules of what can happen on the web.

**Keywords:** Document Object Model (DOM), HTTP, JavaScript, Web applications.

### I. Introduction

AJAX cannot work independently. It is used in combination with other technologies to create interactive WebPages. Asynchronous JavaScript and XML (Ajax) is a term for the process of transferring data between a client script and the server. JAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS, and Java Script. The advantage of this is that it provides developers with a way to retrieve content from a Web server without reposting the page the user is currently viewing to the server. In concert with modern browsers ability to dynamically change displayed content through programming code (JavaScript) that accesses the browser's DOM, Ajax lets developers update the HTML content displayed in the browser without refreshing the page. Thus, Ajax provides dynamic interaction between a client and a server. In other words, Ajax can make

browser-based applications more interactive, more responsive, and more like traditional desktop applications. Google's Gmail and Outlook Express are two familiar examples that use Ajax techniques.

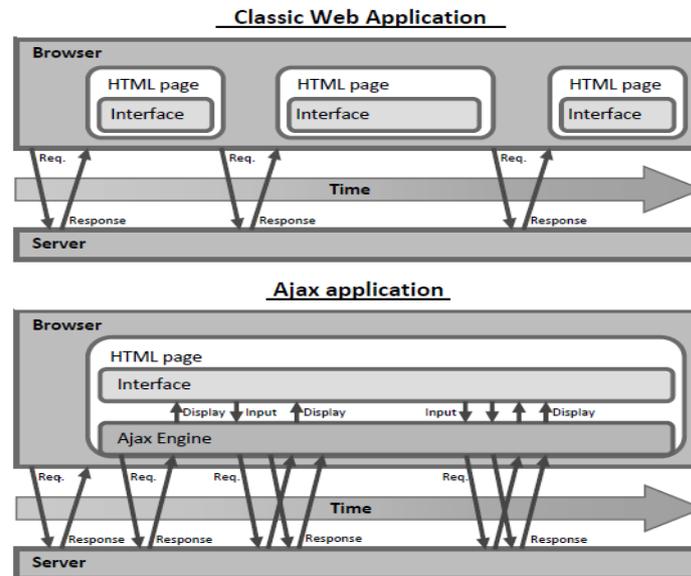


Figure 1: Classic Web application and Ajax Application

## II. Advantages of Web Applications

Following are the major advantages of web applications-

- i. **Web applications are easy and inexpensive to deliver:** With web applications, a company can reduce the costs of the IT department that is in charge of installing the software on the users' machines. With web applications, all that users need is a computer with a working web browser and an Internet or intranet connection.
- ii. **Web applications are easy and inexpensive to upgrade:** Maintenance costs for software have always been significant. Because upgrading an existing piece of software is similar to installing a new one, the web applications. As soon as the application on the server machine is upgraded, everyone gets the new version.
- iii. **Web applications have flexible requirements for the end users:** Just have your web application installed on a server-any modern operating system will do-and you'll be able to use it over the Internet/Intranet on any Mac, Windows, or Linux machine and so on. If the application is properly built, it will run equally well on any modern web browser, such as Internet Explorer, Mozilla Firefox, Opera, or Safari.
- iv. **Web applications make it easier to have a central data store:** When you have several locations that need access to the same data, having all that data stored in one

place is much easier than having separate databases in each location. This way you avoid potential data synchronization operations and lower security risks.

### III. Applications of Ajax

Following are the major applications of Ajax-

- i. **Dynamic Form Data Validation:** suppose a user fills out a form to register with a web site. The validity of data in the form is not checked till the form is submitted. With Ajax, the data added to the form is dynamically validated using business logic in a server application. Thus, a complete form does not have to be posted to the server to check if data in the form is valid.
- ii. **Auto completion:** As a user adds some data to a form, the remaining form gets auto completed.
- iii. **Refreshing data on a page:** Some web pages require that data be refreshed frequently, a weather web site for example. Using the Ajax technique, a web page may poll the server for latest data and refresh the web page without reloading the page. Ajax is based on XMLHttpRequest, JavaScript and XML DOM technologies. JavaScript and XML DOM technologies are relatively old technologies.

### IV. WHAT IS XMLHttpRequest?

A wide range of different optimization and search techniques have been introduced in the field of Search-Based Software Engineering (SBSE), i.e. a software engineering discipline in which search-based optimization algorithms are used to address problems where a suitable balance between competing and potentially conflicting goals has to be found.

Two key ingredients are required:

- i) The representation of the problem;
- ii) The definition of a fitness function.

In fact, SBSE usually applies to problems in which there are numerous candidate solutions and where there is a fitness function that can guide the search process to locate reasonably good solutions. A suitable representation of the problem allows to automatically exploring the search space for the solutions that best fit the fitness function that drives towards the sequence of the refactoring steps to apply to this system (i.e. altering its architectural structure without altering its semantics).

In the software performance domain both the suitable representation of the problem and the formulation of the fitness function are not trivial tasks, since the performance analysis results are derived from many uncertainties like the workload, the operational profile, etc. that might completely modify the perception of considering candidate solutions as good ones. Some assumptions can be introduced to simplify the problem and some design options can be explicitly defined in advance to constitute the population on which search based optimization algorithms apply. However, we believe that in the performance domain it is of crucial relevance to find a synergy between the search techniques that involve the definition of a fitness function to automatically capture what is required from the system, and the anti-patterns that might support such function with the knowledge of bad practices and suggest common solutions, in order to quickly converge towards performance improvements.

### XMLHttpRequest Properties

- **Onreadystatechange:** An event handler for an event that fires at every state change.
- **Ready State:** The ready State property defines the current state of the XMLHttpRequest object.

The following table provides a list of the possible values for the ready State property

State	Description
0	The request is not initialized.
1	The request has been set up.
2	The request has been sent.
3	The request is in process.
4	The request is completed.

**Table 1: Ready State property values**

**Ready State = 0** After you have created the XMLHttpRequest object, but before you have called the open () method.

**Ready State = 1** After you have called the open () method, but before you have called send ().

**Ready State = 2** After you have called send ().

**Ready State=3** after the browser has established a communication with the server, but before the server has completed the response.

**Ready State = 4** After the request has been completed, and the response data has been completely received from the server.

- i. **Response Text:** Returns the response as a string.
- ii. **ResponseXML:** Returns the response as XML. This property returns an XML document object, which can be examined and parsed using the W3C DOM node tree methods and properties.
- iii. **Status:** Returns the status as a number (e.g., 404 for "Not Found" and 200 for "OK").
- iv. **status Text:** Returns the status as a string (e.g., "Not Found" or "OK")

## V. Advantages of Ajax

Following are the advantages of Ajax

- i. **Portability:** AJAX applications use well documented features present in all major browsers on most existing platforms. Though this situation could feasibly change in the future, at the moment, AJAX applications are effectively cross-platform. While the Ajax platform is more restricted than the Java platform, current AJAX applications effectively fill part of the onetime niche of Java applets: extending the browser with lightweight mini- applications.
- ii. **Interactivity:** Ajax applications are mainly executed on the user's machine, by manipulating the current page within their browser using document object model methods. AJAX can be used for a multitude of tasks such as updating or deleting records; expanding Web forms; returning simple search queries; or editing category trees-all without the requirement to fetch a full page of HTML each time a change is made. Generally only small requests are required to be sent to the server, and relatively short responses are sent back. This permits the development of more interactive applications featuring more responsive user interfaces due to the use of DHTML techniques.

## VI. Disadvantages of Ajax

- i. **Browser Usability:** One major complaint voiced against the use of AJAX in Web applications is that it might easily break the expected behavior of the browser's back button. The different expectations between returning to a page which has been modified dynamically versus the return to a previous static page might be a subtle one. Users generally expect that clicking the back button in Web applications will undo their last state change and in AJAX applications this might not be the case. Developers have implemented various solutions to this problem, most of which

revolve around creating or using invisible iFRAMES to invoke changes that populate the history used by a browser's back button.

- ii. **Response time:** Network latency-or the interval between user request and server response-needs to be considered carefully during AJAX development. Without clear feedback to the user, smart preloading of data, and proper handling of the XMLHttpRequest object, users might experience delay in the interface of the Web application. The use of visual feedback to alert the user of background activity and/or preloading of content and data are often suggested solutions to these latency issues.
- iii. **JavaScript:** While no browser plug-in is required for AJAX, it requires users to have JavaScript enabled in their browsers. This applies to all browsers that support AJAX except for Microsoft Internet Explorer 6 and below which additionally require ActiveX to be enabled, as the XMLHttpRequest object is implemented with ActiveX in this browser.

## VII. Conclusion

The main advantages in the field of usability affect user satisfaction and response time which influence the efficiency with which the application can be used. Besides this, new functions enhancing user comfort can be created. They are attached to existing applications and do not replace any regular HTTP transfer but only add visual support and convenience. Thus, they can easily be omitted if the browser does not support.

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## **A Review on Big Data & Security**

**R. M. Shete<sup>1</sup>, P. M. Gourshettiwar<sup>2</sup>**

<sup>1</sup>**Assistant Professor, Department of Information technology, DMIETR, Sawangi (M), Wardha.**

<sup>2</sup>**Assistant Professor, Department of Computer Technology, KDKCE, Nagpur, RTMU, Nagpur.**

<sup>1</sup>**prashant.barge@siom.in, <sup>2</sup>shilpa.parkhi@siom.in**

### **Abstract**

Nowadays, attacks bring extreme threat and challenge to the information security, based on analysis of big data technique. The growing popularity and development of data mining technologies bring serious threat to the security of individual's sensitive information. In recent years challenges of Big Data IT are management of large amounts of heterogeneous information and providing its availability. In this paper we will study Big Data protection against unauthorized access and corruption (keeping its confidentiality and integrity) as well as availability maintenance form the key research priorities in this field.

**Keywords:** Information Security; Big Data; Data Mining, Privacy-Preserving Data Mining.

### **I. Introduction**

As a production of factor big data is being intensively integrated with development of various organizations. The consequent security issues concern with personal information which becomes increasingly severe. Using the technology of Big Data collecting and mining increased significantly over the past decade. This is due to the fact that a large amount of data is generated in the daily activities of the various organizations and, hence, the volume of organizational information resources grows dramatically.

The processing of Big Data by its nature exceeds the capabilities of computing resources available to the organizations and conventional information management methods. Decreasing the cost for centralized storage and appropriate handling would allow organizations to collect more information about the various aspects of their business. Information is inevitable in all kinds of entrepreneurial activities, and must be therefore protected as assets. Information security may be assured in various ways, including related policies, processes, procedures, organizational structures, software programs and hardware

equipment able to eliminate many sources of safety jeopardizing such as espionage, computer fraud and deceit, sabotage, vandalism, fire or water.

Requirements for information security should cover three areas: risks to the organization, including its strategy and objectives, its potential vulnerability and the likelihood of adverse events; legislation, statutory, regulatory and contractual requirements that the organization and its contractors must comply with; principles, objectives and business requirements for processing the information, that the organization must develop in order to refrain from business failures and to support its activities. With the depending of Internet applications, social networks and internet of things generates a large amount of data, which we called big data. It makes the analysis and application of the data more complex, and difficult to manage. These data, including text, images, audio, video, Web pages, e-mail, microbe logging and other types, among them, 20% are structured data, 80% are semi-structured and unstructured data. Big data is large and complex, so it is difficult to deal with the existing database management tools or data processing application [1], [2], [3].

Why do we collect and analyze big data?

-Because we can get the benefit from it.

- i.** To Acquire Knowledge. Because of big data holds a large number of unique information, big data analysis can effectively get rid of individual differences, to help people through the phenomenon, more accurately grasp the law behind the things.
- ii.** To Presume the Trend. Using the knowledge, we can more accurately predict the natural or social phenomenon. Google foretold the presence trend of flu around the world, through the statistics of search for flu information.
- iii.** To Analyze Personality Characteristics. Commercial enterprise collect information on all aspects of customers for a long time, to analyze the user behavior law, more accurately portray the individual Characteristics, to provide users with better individualized good and services, and more precise advertising suggested. For example, e-commerce sites now use Big Data technology record customer browsing and purchasing history, to guess his interest, and recommend products for him, this may be his interest.
- iv.** To Discern Truth by Analyzing. In the network, data sources are distinct, type is rich, so the authenticity can't be conferred. At the same time, the spread of information on the Internet is more convenient, so the damage caused by false information on the Internet is greater. Due to the enormous amount of data in the big data environment,

to a certain range, it can help discern truth by analyzing the data. Big data bring the benefits to us, but also bring the questions of data security and privacy protection, since the emergence of big data technology, a large number of security incidents have been occurred, and these incidents sounded the alarm for the society.

## **II. Related work**

### Theoretical Background

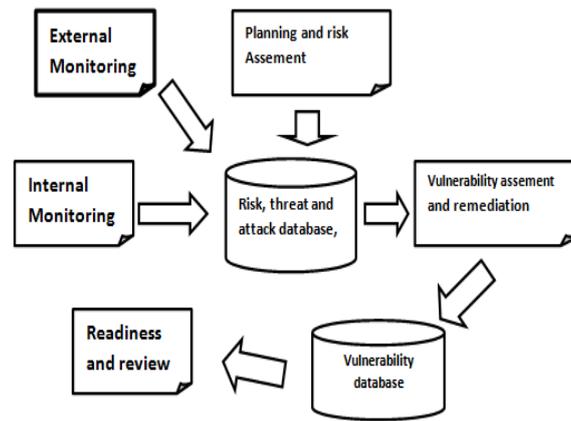
#### **A. Risk Assessment in Information Security:**

Risk assessment must include assessment of the risks size (risk analysis) and its comparison with the determined criteria. This work must be repetitive owing to the possible changes in the conditions of the company operation or with regard to the possible acceptability of risks. The outcome of the risk assessment may involve: limitation of the risk occurrence; acceptance of risk and limitation of its occurrence reduction of the activities related to a given risk; delegation of the risk to another organization (insurance, suppliers). Management of the organization must define information security policy in compliance with the requirements of the organization, applicable laws and regulations. The policy has to be officially approved, published and communicated to all employees and interested parties. At planned intervals, the policy must be reviewed and communicated to all stakeholders, especially if there have been changes that might threaten its suitability, adequacy and effectiveness. Figure 1 shows the overview of risk assessment in information security. Here the external monitoring entails the collecting the information from data sources and gives the intelligence context. The internal monitoring maintains information of awareness of state of organization network where the planning and risk assessment look's out the over information of security program also accomplished by identifying and planning ongoing information security activities that further reduce the risk [2].

The primary goal of vulnerability and remediation is to report the status of vulnerability. Ensuring the proper level of management is involved.

#### **Security Technology in Big Data Environment:**

For the security risks of big data, we need to address the security issues of big data from the following points: data privacy protection technology; data integrity and trusted technology; access control technology.



**Figure 1: Overview of risk assessment in information security**

### **Access Control Technology:**

Big data holds a plenty of information resources, all occupations and trades have great requirement of the data, so we must manage access rights of big data carefully. Access control is an effective means to achieve controlled sharing of data, but in big data environment, the number of users is huge, the authority is complex, and a new technology must be adopted to realize the managed sharing of information. (1) Role Mining Role-based access control (RBAC) is an access control model used widely. By appointing roles to users, roles related to permissions set, to accomplished user authorization, to simplify rights management, in order to achieve privacy protection. In the early, RBAC rights management applied "top-down" mode: According to the enterprise's position to establish roles, When applied to big data scene, the researchers begin to focus on "bottom-up" approaches, that is based on the existing "Users-Object" authorization, design algorithms automatically retrieve and optimization of roles, called role mining. In the big data scene, using role mining techniques, roles can be automatically generated based on the user's access records, efficiently provide personalized data services for mass users. It can also be used to detect potentially dangerous that user's behavior deviates from the daily behavior. But role mining technology are based on the exact, closed data set, when applied to big data scene, we need to solve the special problems: the dynamic changes and the quality of the data set is not higher.

### **How to Achieve Access Control for Big Data:**

Access control is an effective method to realize data controlled sharing; it is divided into discretionary access control, mandatory access control and role-based access control. While in big data environment, it is difficult to preset the role, to realize the role and to predict the

actual authority of each role. Discretionary access control is unable to meet the diversity of the permissions due to the diversity of users, mandatory access control is unable to meet the power of authority, and role-based access control is not able to effectively match the role and the corresponding permissions. Therefore, a new security access control mechanisms must be adopted to protect data in big data environment.

**B. Research in the area of integrity and privacy ensuring in the analysis of Big Data:**

Many scientists have also worked in the field of IS properties investigation for the Big Data mining. Some authors presented the algorithms for Big Data processing ensuring privacy and integrity. The distributed Big Data mining and the use of confidential computation protocols overlap, since for both processes the computation of functions is performed by multiple users of information systems without the need for disclosure of the input data to each other. For distributed Big Data mining it is required the participants of the information exchange to perform function computations together on the basis of their protected data, preserving their integrity and confidentiality. In order to solve the issues emerged one need to develop some algorithms for secure Big Data collection, subsequent processing and analysis. To design such algorithms it is important to identify their requirements in terms of IS and to choose the methods to be used and further program implementation. In addition to the challenges of Big Data confidentiality, it is also necessary to solve the problem of ensuring the data integrity that can emerge with the substitution of data source or data itself. According to IBM, the financial losses caused by Big Data integrity violations are 3 trillion dollars per year. Ensuring data integrity and transmission during the collection, delivery, acquisition, integration, categorization, correlation, analysis and further use, as well as the integrity of the intranet components themselves is critical to make the right management decisions. Thus, the objective of the research is the formulation and substantiation of the specific recommendations for developing the Big Data secure analysis algorithm based on the IS requirements (namely, integrity, availability and confidentiality) with respect to both the analysis itself and the analyzed data (initial, intermediate and received as the result of the analysis). All these issues are particularly critical for network security monitoring systems that process large amounts of data about intranets' IS. Huge data volumes regarding the current state of the intranet and its resources and at the first glance unrelated (disparate) events taking place in it should be handled correctly and efficiently to identify the IS incidents and distinguish intranet areas, that are the most susceptible to the high risk, for their quick elimination. The data are generated from the information considered in the certain context and not only coming from the single domain controllers, proxy servers,

DNS servers, information protection tools (IPTs), but also describing the current configuration of network devices, the characteristics of the network traffic, application and network service performance, activity and specific actions of individual end-users, as well as containing mail correspondence, web content, digital audio and video, business process data, internal documents and analytical data of the corporation for many years of its existence [4]. All the network traffic contains important information, transmitted in user shared environment and requiring to ensure the integrity, availability and, in some cases, confidentiality.

### III. Conclusion

Statistics proved that there is a growing demand for the use of Big Data, it is characterized by the IS challenges unsolved so far. The paper shows that the IS issues for Big Data (namely, privacy, integrity and availability) are the subject of many scientists' research. And a security threat proposes the technology to solve the security threat, finally, study about the applications of big data in information security. Of course, with the development of big data technology, new security threat may appear, we need to find new solutions and technologies to solve it.

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# Awareness of Agile Methodologies for Systems Development

Yoginee S. Pethe<sup>1</sup>, Satyajit S. Uparkar<sup>2</sup>

<sup>1,2</sup> Assistant Professor, Department of Computer Application, Shri Ramdeobaba  
College of Engineering and Management, Nagpur.  
<sup>1</sup>pethey@rk nec.edu, <sup>2</sup>uparkarss@rk nec.edu

## Abstract

Change is the law of nature. As far as software industry is concerned, a software development method once popular may prove to be the worst in the near future. In the rapidly growing world, the concept of the traditional development needs to evolve. When applied to the modern workplace, the traditional methods provide as much harm as they do well. Agile development has emerged as a very popular means of software development lifecycle model in recent times with more and more companies starting to adopt this methodology in their organizations.

However, there are varieties of agile methods and practices which can be adopted according to their relevance to the current environment of an organization. The agile methodology emphasizes on the quality issue and provides a very stable backbone for today's software development. In this paper we discuss the agile manifesto, the agile principles and five of the existing agile methodologies with more focuses on the famous and mostly known agile process.

This paper gives insights into the Agile methodologies like Scrum, Extreme programming, Feature-driven Development, Dynamic Systems Development Method, Adaptive Software Development.

**Keywords:** Agile, Agile principles, Agile methodologies.

## I. Introduction

Agility has become today's buzzword when describing a modern software process. Everyone is agile. An agile team is able to appropriately respond to changes. An agile team recognizes that software is developed by individuals working in teams and that the skills of these people, their ability to collaborate is at the core for the success of the project. The pervasiveness of change is the primary driver for agility. Agility is more than an effective response to change. It encourages team structures and attitudes that make communication more facile. It emphasizes rapid delivery of operational software and de-emphasizes the importance of

intermediate work products. It recognizes that planning in an uncertain world has its limits and that a project plan must be flexible.

## **II. Agile Principles**

Following are the major Agile Principles-

1. The highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity—the art of maximizing the amount of work not done—is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

## **III. Agile Methodologies**

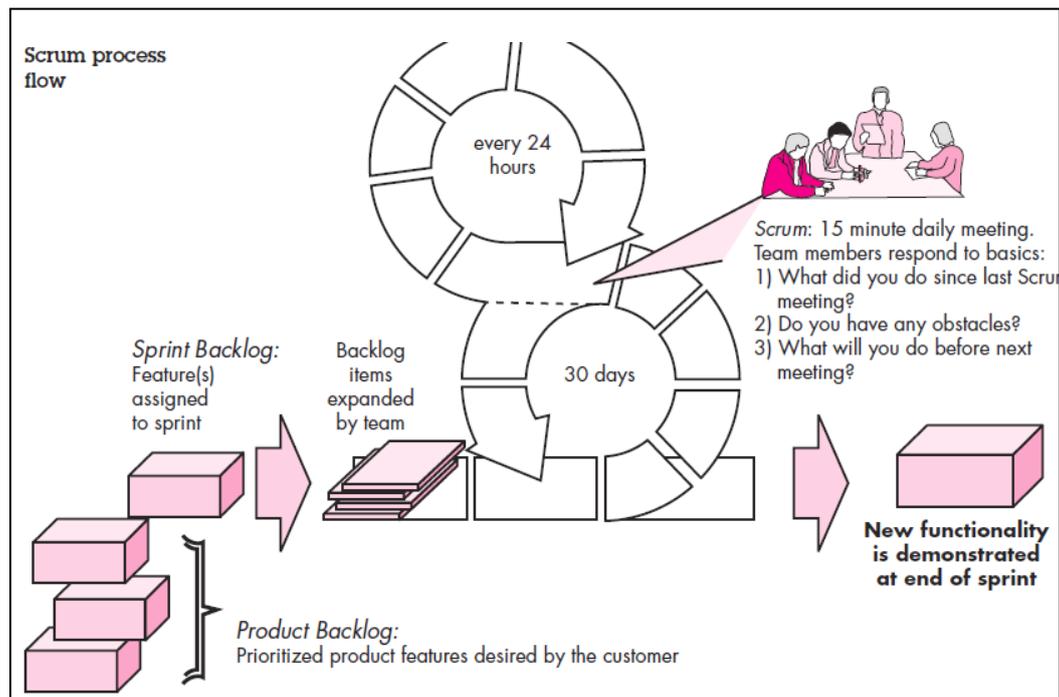
Following are the five major Agile Methodologies

### **1. SCRUM**

Scrum is an agile software development method that was conceived by Jeff Sutherland and his development team in the early 1990s. Scrum principles are consistent with the agile manifesto.

Scrum principles are used to guide development activities within a process that incorporates the following framework activities: requirements, analysis, design, evolution, and delivery. Within each framework activity, work tasks occur within a process pattern called a sprint. The work conducted within a sprint (the number of sprints required for each framework

activity will vary depending on product complexity and size) is adapted to the problem at hand and is defined and often modified in real time by the Scrum team. The overall flow of the Scrum process is illustrated in Figure 1.



**Figure 1: Scrum process**

Scrum emphasizes the use of a set of software process patterns that have proven effective for projects with tight timelines, changing requirements, and business criticality. Each of these process patterns defines a set of development actions:

Backlog is a prioritized list of project requirements or features that provide business value for the customer. Items can be added to the backlog at any time (this is how changes are introduced). The product manager assesses the backlog and updates priorities as required.

Sprints consist of work units that are required to achieve a requirement defined in the backlog that must be fit into a predefined time-box (typically 30 days).

Changes (e.g., backlog work items) are not introduced during the sprint. Hence, the sprint allows team members to work in a short-term, but stable environment.

Scrum meetings are short (typically 15 minutes) meetings held daily by the Scrum team. A team leader, called a Scrum master, leads the meeting and assesses the responses from each person. The Scrum meeting helps the team to uncover potential problems as early as possible.

Demos deliver the software increment to the customer so that functionality that has been implemented can be demonstrated and evaluated by the customer.

It is important to note that the demo may not contain all planned functionality, but rather those functions that can be delivered within the time-box that was established.

## 2. Extreme Programming

Extreme Programming uses an object-oriented approach as its preferred development paradigm and encompasses a set of rules and practices that occur within the context of four framework activities: planning, design, coding, and testing. Figure 2, illustrates the XP process.

The planning activity begins with listening, a requirements gathering activity that enables the technical members of the XP team to understand the business context for the software and to get a broad feel for required output and major features and functionality. Listening leads to the creation of a set of “stories” (also called user stories) that describe required output, features, and functionality for software to be built.

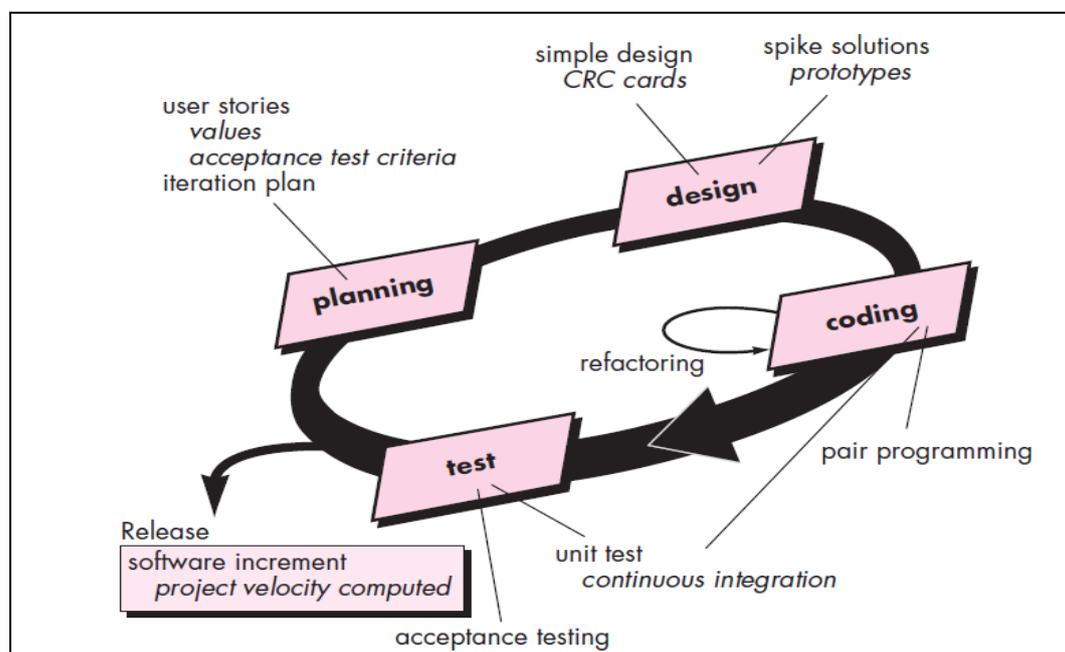


Figure 2: Extreme Programming

Each story is written by the customer and is placed on an index card. The customer assigns a value (i.e., a priority) to the story based on the overall business value of the feature or function. Members of the XP team then assess each story and assign a cost measured in development weeks to it.

If the story is estimated to require more than three development weeks, the customer is asked to split the story into smaller stories and the assignment of value and cost occurs again. It is important to note that new stories can be written at any time. Customers and developers work

together to decide how to group stories into the next release (the next software increment) to be developed by the XP team. After the first project release (also called a software increment) has been delivered, the XP team computes project velocity. Stated simply, project velocity is the number of customer stories implemented during the first release. The design of extra functionality (because the developer assumes it will be required later) is discouraged. XP encourages the use of CRC cards as an effective mechanism for thinking about the software in an object-oriented context. CRC (class-responsibility collaborator) cards identify and organize the object-oriented classes that are relevant to the current software increment. The CRC cards are the only design work product produced as part of the XP process. If a difficult design problem is encountered as part of the design of a story, XP recommends the immediate creation of an operational prototype of that portion of the design called a spike solution; the design prototype is implemented and evaluated. The intent is to lower risk when true implementation starts and to validate the original estimates for the story containing the design problem. XP encourages refactoring, a construction technique that is also a method for design optimization.

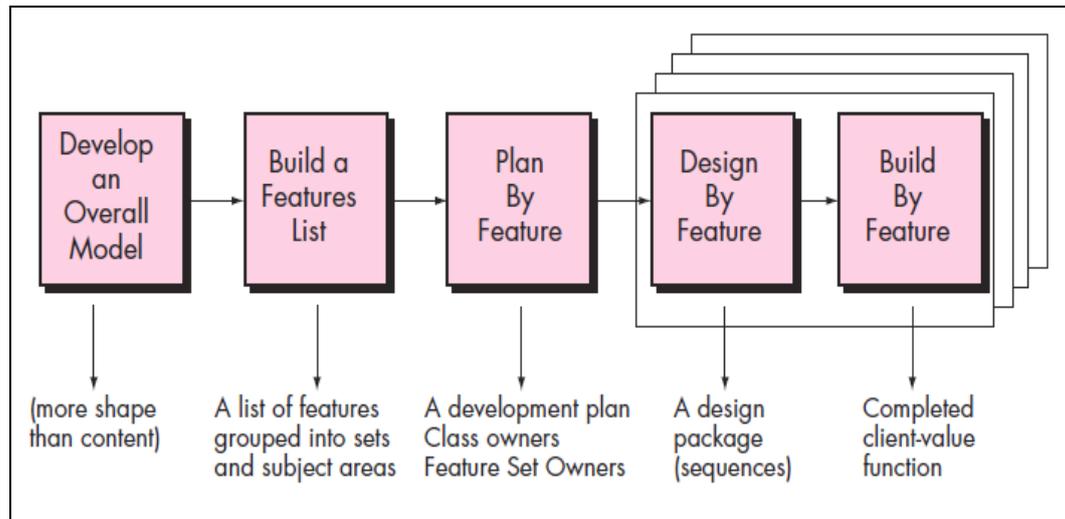
### **3. Feature-Driven Development**

Feature Driven Development (FDD) was originally conceived by Peter Coad and his colleagues [Coa99] as a practical process model for object-oriented software engineering. Stephen Palmer and John Felsing [Pal02] have extended and improved Coad's work, describing an adaptive, agile process that can be applied to moderately sized and larger software projects. Like other agile approaches, FDD adopts a philosophy that emphasizes collaboration among people on an FDD team, manages problem and project complexity using feature-based decomposition followed by the integration of software increments, communication of technical detail using verbal, graphical, and text-based means.

A feature set groups related features into business-related categories and is defined [Coa99] as: **<action><-ing> a(n) <object>**

For example, making a product sale is a feature set that would encompass the features noted earlier and others.

The FDD approach defines five "collaborating" framework activities as shown in Figure 3.



**Figure 3: Feature-Driven Development project lifecycle**

#### **4. Dynamic Systems Development Method (DSDM)**

DSDM [Sta97] is an agile software development approach that “provides a framework for building and maintaining systems which meet tight time constraints through the use of incremental prototyping in a controlled project environment”. It is borrowed from a modified version of the Pareto principle 80 percent of an application can be delivered in 20 percent of the time it would take to deliver the complete (100 percent) application. It is an iterative software process which follows the 80 percent rule. That is, only enough work is required for each increment to facilitate movement to the next increment. The remaining detail can be completed later when more business requirements are known or changes have been requested and accommodated. DSDM life cycle defines three different iterative cycles, preceded by two additional life cycle activities:

Feasibility study—establishes the basic business requirements and constraints associated with the application to be built.

Business study—establishes the functional and information requirements that will allow the application to provide business value, defines the basic application architecture and identifies the maintainability requirements.

Functional model iteration—produces a set of incremental prototypes that demonstrate functionality for the customer.

Design and build iteration—revisits prototypes built during functional model iteration to ensure that each has been engineered in a manner that will enable it to provide operational business value for end users.

Implementation—places the latest software increment into the operational environment.

## 5. Adaptive Software Development (ASD)

ASD has been proposed by Jim Highsmith as a technique for building complex software and systems. ASD focuses on human collaboration and team self-organization. He defines an ASD “life cycle” that incorporates three phases shown in Figure 4.

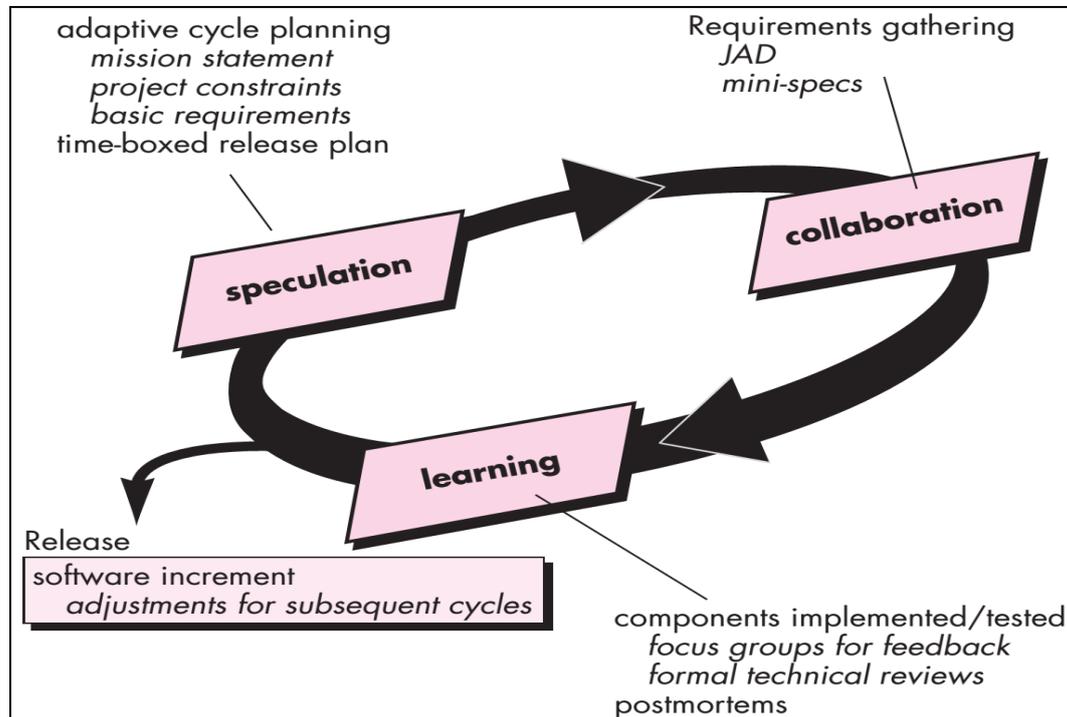


Figure 4: Adaptive Software Development Lifecycle

Following are the details of these three phases-

- i. **Speculation:** During speculation, the project is initiated and adaptive cycle planning is conducted. It uses project initiation information—the customer’s mission statement, project constraints, and basic requirements—to define the set of release cycles. Based on information obtained at the completion of the first cycle, the plan is reviewed and adjusted.
- ii. **Collaboration:** Motivated people use collaboration in a way that multiplies their talent and creative output beyond their absolute numbers. This approach is a recurring theme in all agile methods. It involves communication and teamwork, but it also emphasizes individualism. It is, a matter of trust. People must trust one another to (1) criticize without anger, (2) assist without hate, (3) work as hard as or harder than they do, (4) have the skill set to contribute to the work at hand, and (5) communicate problems in a way that leads to effective action.

- iii. **Learning:** The emphasis is on “learning” as much as it is on progress toward a completed cycle. Software developers often overestimate their own understanding and that learning will help them to improve their level of real understanding.

#### **IV. Conclusion**

Agile has gained popularity in recent times due to its flexibility and openness to requirement changes which making it very suitable for present business needs of small and medium sized projects. However, research is being carried out to make it suitable for large projects and distributed teams. Agile offers a variety of different methodologies each of which has its own set of pros and cons and may be selected by software companies based on their environment, project types, available resources and other constraints. This paper will help software engineers and students to gain insight into Agile methodology and its methods enhancing their knowledge of current software engineering trends and acting as a strong foundation for further knowledge into this area.

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# Utilization of Solar Energy to Operate Appliances via Android Applications

Omkar Sagar<sup>1</sup>, Vikikumar Motghare<sup>2</sup>, Kajal Bharne<sup>3</sup>,  
Akshay Deotale<sup>4</sup> and Dhanashri Pine<sup>5</sup>

<sup>1, 2, 3, 4, 5</sup> Students of Electronics Engineering Department, DMIETR, Sawangi (Meghe)  
Wardha, India

## Abstract

In this paper we are focusing on android application which can control electrical appliances using solar energy. This application is used to control the appliances to turn ON/OFF. The android application indicates whether the appliances are ON or OFF. Android application will link that information with microcontroller through Wi-Fi module and it controls the appliances by android application. When the stored energy level goes below 50%, the system gives indication to user through the message. Though appliances we can run with available energy. In this project we are also focusing on the system to implement the utilization of solar energy. Solar energy is the renewable source of energy which is available free in nature and also reliable. The water and environment is very precious for us. In our system we are implementing solar panel as a source of our system. It also involves the automation and controlling of lightings, ACs, ventilations and security which also includes home appliances such as dryers/washers, ovens or refrigerators/freezers which uses Wi-Fi for monitoring via remote. Home Automation must have compliance with all the household standards and ease of use. This paper focuses on flexible, cost friendly wireless home automation system which would be based on an Android App.

**Keywords:** IOT, Atmega 328, Wi-Fi module, Solar Energy, Mobile application.

## I. Introduction

Solar system is the smart technology choice of 21<sup>st</sup> century. For development in the renewable energy field and the increasing number of new uses of electricity generated a need to modernize the electrical system. Solar system is like any other electrical power generating system, just the equipment use in different than that used for conventional electromechanical generating system. By using PV cell system we generate electricity and this electricity used by our appliances, this paper describes the implementation of controlling various appliances with Android phone.

In the large area of application i.e. monitoring and control in the industry, household equipment i.e. home automation, water monitoring, health monitoring etc. data acquisition plays very important role. Recent years there is requirement to do the long distance monitoring. Hence remote monitoring based on web is known as internet of things (IOT) framework is a choice. In which work has been designed, implemented to control & monitoring of household equipment. Where the data monitoring is possible by web browser & can be access via web browser devices i.e. computer, laptop or small mobile phone [1]. This IOT that allows is objects to be sensed & controlled remotely across existing network infrastructure, creating opportunities for much direct integration of physical world into computer-based systems, & resulting in improved efficiency, accuracy & economic benefit. In it research we have integrated Solar based system to implement home automation [2]. Objective of research is Home automation using IOT within integration of Solar based energy system. Integration of sensing systems, connected to Internet, is likely to optimize energy consumption as a whole. It's expected that IOT devices would be integrated into all forms of energy consuming devices (switches, power outlets, bulbs, televisions, etc.) [3]. Android phone is used for application program to transmit the commands using Bluetooth or Internet connection [4].

## **II. Solar Energy Electric Power System**

Solar energy that is properly installed and adequately sized will not really require much in way of management. For those times of marginal sun or very large power requirements, it is important to understand relationship between your battery charge level, amount of charge that they are receiving and power being withdrawn from system [5].

To make its relationship clear, and for those who might think solar energy is complicated, the designed and wrote its simulation to demonstrate basic operation of a solar energy electric power system. Only for three things need to be considered these are levels of charge on battery bank, amount of charging power coming in, amount of power being used [6].

## **III. Solar System Simulations**

This solar energy electric power system simulation is representative of small four Kilowatts solar energy system. Solar panel array is eight 100 watt panels or 800 watts total. Within an average solar day of 5 hours, 800 watts times 5hours equals 4000 watts or 4 Kilowatts (4KW). Battery bank capacity is 1000 Amp hours at 12 volts. Simulation might run at 5 different speeds including real time (1 second =1 second sim. time). At fastest speed, it might

be a real challenge to keep things under control. Default speed of 1 second =1 minute of Simulator time is a good starting speed. Click drop down to change speeds. If you like these things to move along a little faster try 1 second = 10 minutes speed [7].

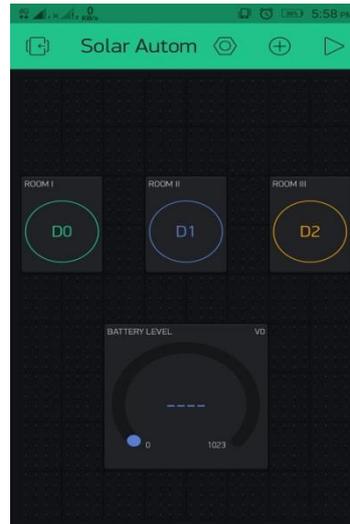
In a real solar energy electric power system, a single quality of multi-function meter is capable of displaying all readings of first 4 meters in simulator. To better see what is happening, Simulator displays all these readings of first 4 meters in simulator. To better see what is happening, simulator displays all these readings at same time. AC meter is added so it might easily seen that power appliances use does not go into batteries [8].

#### **IV. System Implementation**

The modules used in our project are communication module, user interface module and display module. The communication module describes how the connections are made with the microcontroller for Wi-Fi communications. For smart living concept, Wi-Fi technology has been one of the major technologies. It is a wireless technology developed to replace cables on devices like mobile phones and PCs. By using Wi-Fi, wireless devices are able to communicate with each other. Nowadays lot and lots of smart living applications have been developed which are based on Android and Wi-Fi. Android system provides SDK and APIs for developers to build new applications. Many smart living are constructed under Android system with Wi-Fi integrated into Android system.

#### **V. Android Application**

Android application (apps) is most widely used by all smart mobile phones. The android applications built in PHP language. A signal is generated on clicking a specific buttons on the android application which shows the ESP8266 to is to do actions according to the predefined program. A software development kit (SDK) is typically a set of software development tools that allows the creation of applications for certain software framework, hardware platform, software package, computer system, operating system, or similar platform. It may be something as simple as the implementation of one or more application programming interfaces (APIs) in the form of some libraries to interface to particular Programming language or to include sophisticated hardware that can communicate with a particular Embedded. A typical Android app is designed for a smart-phone even for a tablet PC running on the Android OS.



**Figure 1: Android application snapshots**

Receiving the message send from the android application and understanding and sending the commands to relay unit is described by messaging module. The android application is act as a user interface, through which the user can easily control the devices. The Figure 1 shown above is the simple snapshots of our android application i.e. user interface module. The liquid crystal display is used to denote the commands sent by the android application. The figure shown above has different room features on the screen of android application the devices will turn ON/OFF the particular device. We can also turn ON/OFF all the devices at the same time by pressing all devices ON/OFF button.

The ESP8266 Wi-Fi module is a self-contained SOC with internet TCP/IP protocol stack that can give any micro-controller access to your Wi-Fi network the ESP8266 is capable of either hosting an application or off-loading all Wi-Fi networking functions from another application processor.

## **VI. Proposed System**

As shown in the design, a low cost smart home system for remotely controlling also for monitoring the smart home environment is represented. The system consists of an app which is developed using Android platform and by using Ethernet based micro web-server. The micro-controller acts as a main controller that hosts and performs the actions which are necessary to be carried out [9][10].

All the actuators/relays and sensors are directly interconnected to the main controller. Using the Smart home app, from a remote location it is possible to control and monitor the smart

home environment. The app will communicate with the micro web-server via the internet. Any internet connection via Wi-Fi or 3G/4G network can be used device [11]. This all automation and controlling of the home appliances and the alert systems can be done just with the human's voice using the voice/speech recognition.

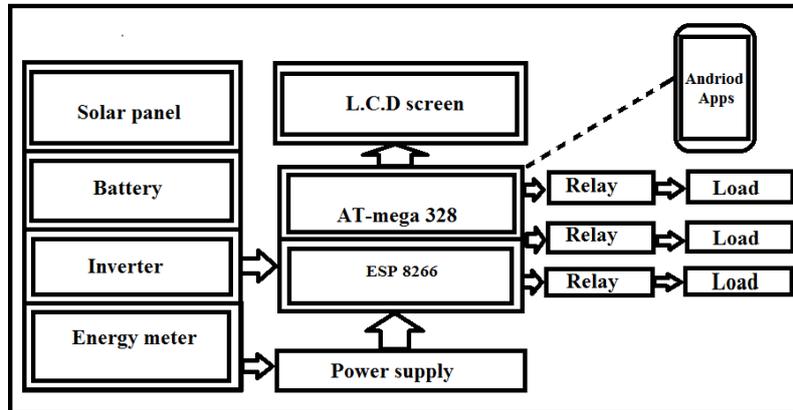


Figure 2 : Block diagram of Proposed System using Wi-Fi Via Android apps

## VII. Proposed Methodology

In today's world everyone has shortage of time and in this era of technology there should be a mobile app that could be used to control the home appliances with the help recognition. This project will use the home appliances and will be powered with the Bluetooth and the Wi-Fi making an inter connectivity between the devices and creating an internet of things [12].

In this proposed project a mobile apps is created and it includes all the features of controlling the home appliances with the help of speech recognition and interconnectivity of devices [12][13].

The mobile app that is created, contains all the commands like switching on/off AC, fan, Washing machine, etc. thus this concept basically contains the smart appliances in a home that can be controlled by Wi-Fi and Bluetooth and connected wirelessly with the mobile phones. The mobile app in the mobile phone will be containing the options to give different commands to the appliances and controlling it with our mobile app [14].

The main page of the app will be having the login page that will be used to authenticate the user using the IP address and the password. After successful login the user will be able to control all the appliances with the mobile app and the voice recognition [15].

There will be switches provided in the app to control the appliances of the home and these switched can be customized manually or using voice by the user [16].

### VIII. Conclusion

In this paper, an internet based smart home system that can be controlled remotely upon user authentication is proposed and implemented. The Android based smart home app communicates with the micro web-server via internet. Any android supported device can be used to install the smart home app, and control and monitor the smart home environment. A low cost smart home system has been developed which does not require a PC as all processing is handled by the microcontroller. The system also uses the Google speech recognition engine thus eliminating the need for an external voice recognition module. Prospective future works include incorporating SMS and call alerts, and reducing the wiring changes for installing the proposed system in pre-existing houses by creating a wireless network within the home environment for controlling and monitoring the smart home environment.

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## A View on Issues and Challenges in Internet of Things

Pravin Y. Karmore<sup>1</sup>, Swapnil P. Karmore<sup>2</sup>

<sup>1</sup>Dept. of Computer Application Shri Ramdeobaba College of Engineering & Management, Nagpur

<sup>2</sup>Dept. of Computer Science, S. B. Jain College of Engineering, Management & Research, Nagpur

<sup>1</sup>karmorepy@rknc.edu<sup>2</sup>, swapravin@gmail.com

### Abstract

From last four decades, the Internet has gained a tremendous growth, evolving from a network of a few thousand hosts to a platform linking billions of “things” globally that includes individual users as well as enterprise groups of various sizes, through computers, computerized and the applications running on them. The growth of the Internet day by day increasing as per the demand of end users and it gradually becomes the cause of a new pervasive paradigm in computing and communications. This new paradigm improves the conventional Internet into a smart Internet of Things (IoT) formed around intellectual interconnections of various objects in the physical world, such as cell phones, habitats, vehicles and habitat occupants. It makes use of low-cost information gathering and distribution devices, such as wired and wireless sensors and RFID tags, that make easy fast-paced communications among the objects themselves as well as the objects and users at any time and in any place. These devices support different communication protocols and standards, such as IEEE 802.15.4, Bluetooth, RFID, ZigBee, etc. This paper contributes to understanding the concept, architecture and challenges in Internet of Things.

**Keywords:** Internet of Things, Network, Internet, Sensors, Users, etc.

### I. Introduction

Internet of Things will accompany in a wide range of smart applications and services to deal with many of the challenges individuals and organizations face in their everyday lives. Such as, intelligent transportation systems to reduce traffic jams; remote healthcare monitoring systems to manage costs and the shortage of health care staff; to improve the quality and reduce the cost of their respective goods and services using smart distribution in supply chains; and so on.

Figure 1, depicts the components of IoT, it represents intelligent end-to-end systems that enable smart solutions, and, as such, it covers a diverse range of technologies, including

sensing, communications, networking, computing, information processing, and intelligent control technologies. Internet of Things has two components: an Internet application and work with thing's information.

The idea of Internet of Things was first proposed by MIT's Auto-ID centre [1]. In Tunis World Summit on the Information Society in 17 November 2005, International Telecommunication Union released ITU Internet Reports 2005: The Internet of Things, which formally proposed the concept of the Internet of things. As the report indicated, the age of ubiquitous communication on the Internet of Things is coming, all things in the whole world will interconnection through the Internet of things for data interchange [2]. In January 2009, IBM proposed the concept of "Smarter Planet" [3], the Internet of Things became an integral part of them. Obama made a positive response on this idea, and then, causing widespread concerned. In China, Chinese Academy of Sciences Wuxi micro-sensor network project incorporated R & D centre is the core of the current unit of study on the Internet of things. On the August 7, 2009, premier Wen Jiabao in Wuxi, Jiangsu investigation and study, he give a high concert of this centre [4]. Internet of things intends to get all the real world "objects" connected to the network, and then connects the real world with the virtual world. In this case, the objects and their status in the real world will be reflected in the virtual world [5]. The Internet of Things involves many heterogeneous technologies. Among them, RFID (radio frequency identification) and wireless sensor technology are most mature. RFID became the enable technology that used widely [6].

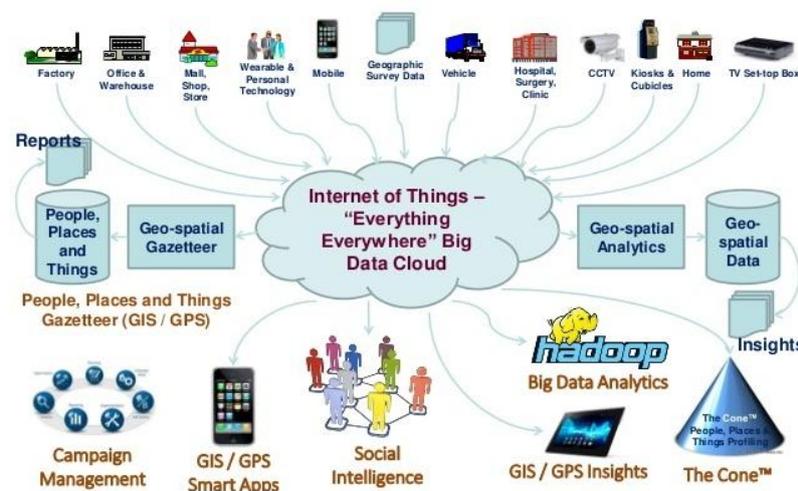


Figure 1: Internet of Things

In a 2005 report the International Telecommunications Union (ITU) suggested that the "Internet of Things will connect the world's objects in both a sensory and intelligent manner"

[9]. By combining various technological developments, the ITU has described four dimensions in IoT: item identification (“tagging things”), sensors and wireless sensor networks (“feeling things”), embedded systems (“thinking things”) and nano-technology (“shrinking things”).

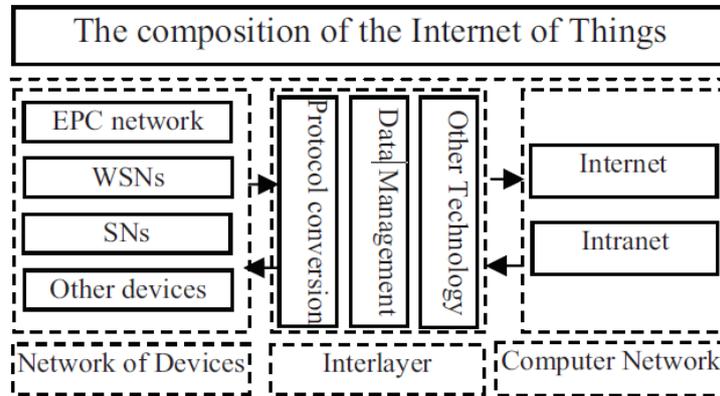


Figure 2a: Composition of Internet of Things

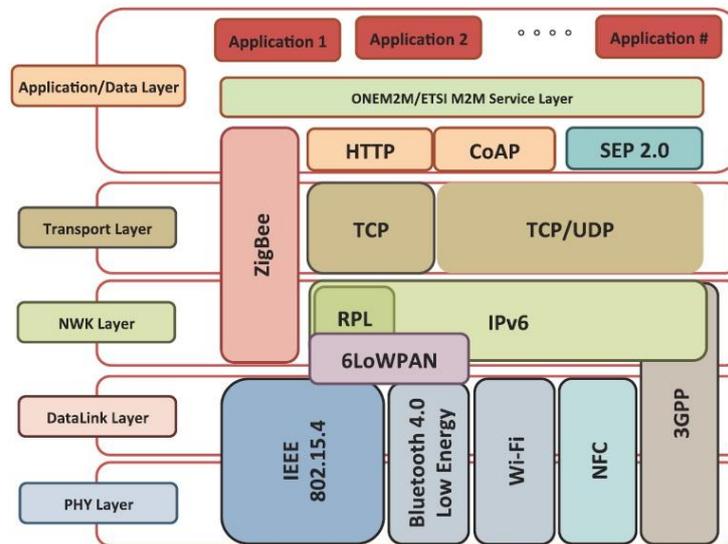


Figure 2b: Layered structure of IoT

## II. The Structure of the Internet of Things

The Internet of Things is a new form of network based on internet. It can be seen as a much larger network which composed by the network of devices and current computer network through a series of intermediate technologies. As depicted in Figure 2a According to the composition and function of the Internet of Things, we can divide it into five layers, as Figure 2b depicts. They are Perception Layer, Data Management Layer, Network Layer, Business

Logic Layer and Application Layer. Perception Layer is also known as Device Layer, it is in the bottom of the whole architecture. The main function of this layer is object identification and data capture. It includes a variety of heterogeneous devices, such as RFID devices, wired and wireless sensors, mobile phone, PDA and other devices. These devices support different communication protocols and standards, such as IEEE 802.15.4, Bluetooth, RFID, ZigBee and 6LoWPAN.etc. As shown in Figure 3.



**Figure 3: IoT Communication**

### **III. Applications of IoT**

Internet of Things has prospective for economic, social as well as environmental impact. Using IoT, we are able to get accurate information about location, status and things, which impacts on the socio-environment and helpful to take smarter decisions and proper action taking. IoT has a wide variety of application domains, such as logistics, transport, smart environments (i.e. building, infrastructure and homes), defence, to energy, power and agriculture. Internet of Things represents intelligent end-to-end systems that enable smart solutions, and, as such, it covers a diverse range of technologies, including sensing, communications, networking, computing, information processing, and intelligent control technologies.

As per the Fleisch, IoT is applicable in every step in every value chain [7]. According to him, there are seven main value drivers. As the drivers identified by Fleisch are [10]:

- i. Simplified manual proximity trigger – things can communicate their identity when they are moved into the sensing space of a sensor. Once the identity is known and communicated, a specific action or transaction can be triggered.
- ii. Automatic proximity trigger – an action is triggered automatically when the physical distance of two things drops below (or passes) a threshold. The identity of the thing is known, which when combined with the physical location and action allows for better processes.
- iii. Automatic sensor triggering – a smart (or cooperative) thing can collect data via any type of sensor including temperature, acceleration, orientation, vibration and humidity. The thing senses its condition and environment, communicates the information which enables prompt (and global) decision making.
- iv. Automatic product security – a thing can provide derived security (information) based on the interaction between the thing and its cyberspace representation (e.g. a QR-code containing a specific URL pointing to relevant information).
- v. Simple and direct user feedback – things can incorporate simple mechanisms to provide feedback to a human present in the environment. Often these feedback mechanisms are in the form of audio (audible beep) or visual (flashing light) signals.
- vi. Extensive user feedback – things can provide rich services to a human (often the thing is linked to a service in cyberspace through a gateway device such as a smart phone). Augmented product information is a good example of extensive user feedback.
- vii. Mind changing feedback – the combination of real world and cyberspace might generate a new level of changing behaviors in people. One possibility is changing the driving behavior as sensors in the vehicle communicate driving patterns to an outside agency.

Fleisch's seven identified drivers are applicable to real world IoT applications. Chui et. al. provide another view of possible IoT application classification [8]. They define two broad categories for IoT applications: Information and Analysis and secondly Automation and Control.

## **V. Challenges**

There are a number of challenges with IoT and they should overcome for the betterment of society. These challenges are related to its applications, policy of use and technical aspects.

One significant aspect in IoT is the large number of things being connected to the Internet, each one providing data. Finding ways to reliably store and interpret the masses of data through scalable applications remain a major technological challenge [10]. Louis Coetzee draw a number of key challenge areas:

- i. Privacy, Identity Management, Security and Access control. IoT presents significant challenges in terms of who can see what with which credentials (recalling that the entities are no longer only people, but might be any form of IoT “appliance”. The recent Stuxnet worm presents an excellent example of a malicious “software actor” that has the potential to effect major physical changes in industrial processes. How does one guard against this type phenomenon in the IoT world?
- ii. Standardisation and Interoperability: How do we make sure that the hugely diverse technology platform continues to act in a platform manner i.e. ensuring that we do not have to re-invent the wheel every time we develop a new application or, indeed, a sensor that needs to plug into the IoT.
- iii. Data deluge: The IoT shares many of the key challenges similar to large scale data initiatives as identified in the e-Infrastructure domain. How do we deal with the data stream of billions of “actors”? How do we ensure the data remains usable for future generations?

## **VI. Conclusion**

Internet of things is a large network that integrates the existing devices, networks and services into the internet. The Internet of Things is coming which brings us into a new era in which everything from tires to toothbrushes can be identified and connected and things can exchange information and make decisions by themselves. Various application areas are identified and presented, providing guidance for future utilization of IoT concepts. Successful update of IoT is not without challenges. These challenges span business, policy and technical. However the security and privacy are issues to be resolved and the relevant organizations and society should join together. People's life can benefit from the Internet of Things. There still are many technical issues need to be addressed and a long way to go to make a real global the Internet of Things.

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## IoT Based Advanced Water Quality Monitoring System

Reetesh Golhar<sup>1</sup>, Apurva Sakle<sup>2</sup>, Harshali Warhate<sup>3</sup>, Isha Ninawe<sup>4</sup>, Ankita Bodhale<sup>5</sup>

<sup>1</sup>Professor, Department of Electronics and Telecommunication Engineering, DMIETR, RTM Nagpur University, Wardha (M.S.), India.

<sup>2,3,4,5</sup>BE Student, Department of Electronics and Telecommunication Engineering, DMIETR, RTM Nagpur University, Wardha (M.S.), India

<sup>1</sup>Reetesh.golhar@gmail.com, <sup>2</sup>sakleapurva@gmail.com, <sup>3</sup>harshuu1209@gmail.com, <sup>4</sup>ishaninawe13@gmail.com, <sup>5</sup>ankibodhale4@gmail.com

### Abstract

In today's world, Internet of Things (IoT) and Remote Sensing (RS) techniques are being used in different areas of research for monitoring, collecting and analyzing data from remote locations. Drinking water is a very precious commodity for all human beings as drinking water utilities face a lot of new challenges in real-time operation. These challenges originate because of limited water resources, growing population, ageing infrastructure etc. therefore there is a need for better methodologies to monitor the water quality. Any imbalance in water quality would severely affect the health of the humans, animals and also affect the ecological balance among species. The WHO (world health organization) estimated, in India among 77 million people is suffering due to not having safe water. WHO also estimates that 21% of diseases are related to unsafe water in India. In order to ensure the safe supply of drinking water the quality needs to be monitored in real-time. The conventional method of measuring the quality of water is to take the samples manually and send it to laboratory for analysis. This technique is time overwhelming and not economical. Also it is not feasible to take the water sample to the laboratory after every hour for measuring its quality. To overcome from these problems a new system is proposed in this work. This water quality measuring system will measure the essential qualities of water in real time. In this paper we intend to present the design and development of a low cost system for real monitoring of water quality in an IoT environment. The system consists of several sensors which are used for measuring physical and chemical parameters of water. The parameters such as temperature, pH and turbidity of the water can be measured. The measured values from the sensors can be processed by the core controller. Using this system a person can detect pollutants from a water body from anywhere in the world.

**Keywords:** Water Quality Monitoring, IoT, Arduino, Sensors, Microcontroller

## I. Introduction

21st century is century of pollution, global warming, insecurity and vulnerable health factors. Water pollution is the major problem in front of world today, which is nothing but the contamination of water bodies. Water pollution occurs when contaminants are discharged directly or indirectly into water bodies. Water pollution affects plants and creatures living in these bodies of water. Also human health is affected by polluted water. Water Pollution is a major global problem which requires ongoing valuation and modification of water resource guiding principle at the levels of international down to individual wells. It has been surveyed that water pollution is the leading cause of deaths and diseases worldwide. The records show that more than 14,000 people die daily worldwide. In India predictable 580 people die of water pollution related illness every day.

In many developing countries, dirty or contaminated water is being used for drinking without any proper former treatment. One of the reasons for this happening is the unawareness of public and administration and the lack of water quality monitoring system which creates serious health issues. Also natural phenomena such as volcanoes, algae tints, rainstorms, and earthquakes also change the quality and ecological status of water. As water is the most important factor for all living organisms it is very important to protect it. And water quality monitoring is one of the first steps required in the rational development and management of water resources. Thus in this paper we describe the design of Wireless Sensor Network (WSN) that helps to monitor the quality of water with the help of information sensed by the sensors immersed in water, so as to keep the water resource within a standard described for domestic usage and to be able to take necessary actions to restore the health of the degraded water body.

Using different sensors, this system can collect various parameters from water, such as temperature, pH and turbidity. The rapid development of wireless sensor network (WSN) technology provides a novel approach to real-time data acquisition, transmission and processing. The clients can get ongoing water quality information from faraway. The water quality parameter pH show water is acidic or basic. Pure water has 7 pH values, less than 7 values indicate acidity and more than 7 indicate alkalinity. The normal range of pH is 6 to 8.5. In drinking water if the normal range of pH doesn't maintain it causes the irritation to the eyes, skin and mucous membranes. Also, it causes the skin disorders. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Water temperature, indicates how water is hot or cold.

By focusing the above issues, we have to develop and design a low cost water quality monitoring system that can monitor water quality in real time using IOT environment. In our proposed system water quality parameters are measured by the different water quality monitoring sensors such as pH, turbidity, and temperature. These sensor-values are processed by the microcontroller. The processed data can be monitored through a browser application using a special IP address. Furthermore, with the help of IOT environment, we can provide facility to access data remotely from all over the world.

## **II. Relation with IOT**

The Internet of Things (IOT) is an important topic in technology industry, policy, and engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems and sensors which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the “IOT revolution” from new market opportunities and business models to concerns about security, privacy, and technical interoperability. The large-scale implementation of IOT devices promises to transform many aspects of the way we live. For consumers, new IOT products like Internet -enabled appliances, home automation components, and energy management devices are moving us toward a vision of the “smart home”, offering more security and energy -efficiency. Other personal IOT devices like wearable fitness and health monitoring devices and network - enabled medical devices are transforming the way healthcare services are delivered. This technology promises to be beneficial for people with disabilities and the elderly, enabling improved levels of independence and quality of life at a reasonable cost. IOT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and bridges move us closer to the idea of “smart cities”, which help minimize congestion and energy consumption. IOT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing the availability of information along the value chain of production using networked sensors. However, IOT raises many issues and challenges that need to be considered and addressed in order for potential benefits to be realized. A number of companies and research organizations have offered a wide range of projections about the potential impact of IOT on the Internet and the economy during the next five to ten years.

### III. System Architecture

This section explains the block diagram of proposed water quality monitoring system. It explains the connection between each component used.

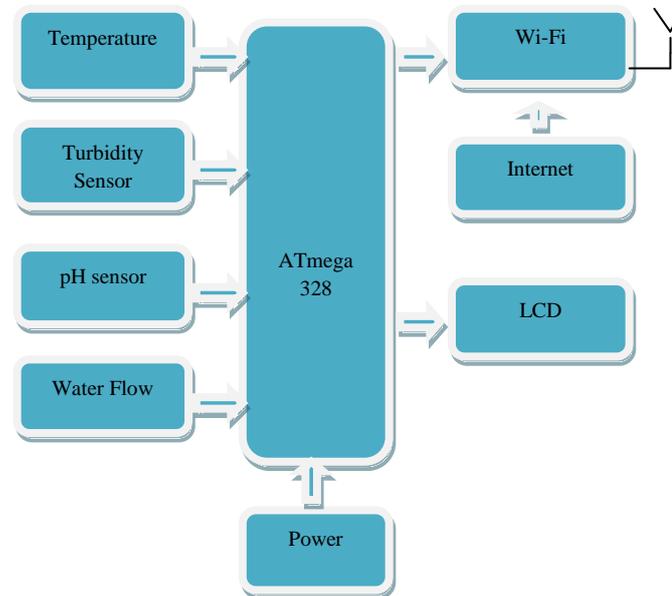


Figure 1: Overall System Architecture

This figure consists of several sensors like pH, temperature, conductivity, turbidity and water level sensors; these are connected to the ATmega 328. The core controller are accessing the values and processing them to transfer the data through internet. Arduino is used as a core controller. The information will be uploaded continuously from the WSN through Microcontroller and Wi-Fi.

Arduino can sense the environment by receiving input from a different sensor (temperature, PH, Turbidity) and send the data to cloud enabled system. The microcontrollers on the board is programmed using Arduino programming language based on wiring and Arduino development based on processing. We control and upload this data to cloud and users can access this data through Blynk application by installing it into their phones. From this system a person from anywhere can monitor the information at any time.

#### a. Arduino

Arduino is an open source computer hardware and software company, project and user community that designs and manufactures single-board microcontrollers and

microcontroller's kits for building digital devices and interactive objects in the physical world. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an Integrated development environment (IDE) based on the Processing language project.

#### **b. Microcontroller ATmega 328**



**Figure 2: ATmega 328 chip**

The ATmega 328 is a single-chip microcontroller created by Atmel in the mega AVR family. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB IPS flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, 6-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. AVR 4 times faster than 8051 and it has inbuilt ADC. Memory size is large as compared to 8051.

### **IV. Overview of water quality sensors**

Following are the details of four sensors-

- 1. Temperature Sensor:** This is a pre-wired and waterproof version of the DS18B20 sensor. Handy for when you need to measure something far away, or in wet conditions while the sensor is good up to 125°C the cable is jacketed in PVC so we

suggest keeping it under 100°C. Because they are digital, you don't get any signal degradation even over long distances. Power supply range: 3.0 V to 5.5 V.

Power supply range: 3.0V to 5.5V

Measuring temperature: -55<sup>0</sup>C to +125<sup>0</sup>C

Fahrenheit equivalent: -67<sup>0</sup>F to +257<sup>0</sup>F



**Figure 3: Temperature Sensor**

- 2. Turbidity Sensor:** Turbidity is the or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality. The world health organization, establishes that the turbidity of drinking water should not be more than 5 NTV and should ideally be below 1 NTV (Nephelometric Turbidity Units). The artificial light source emits a light through samples. The scattered light is then recorded on a photo detector.

Operating voltage is DC 5V and operating temperature range between 10<sup>0</sup> - 90<sup>0</sup> and output method is analog in the range 0 to 4.5V.



**Figure 4: Turbidity Sensor**

- 3. pH Sensor:** pH stands for power of hydrogen, which is measure of the hydrogen ion concentration. The total pH scale ranges from 1 to 14, with 7 is said to be acidic and

solution with a pH greater than 7 are basic or alkaline. The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode. The difference in electrical potential relates to the acidity or pH of the solution. The analog pH meter specially designed for arduino controller and has built in simple, convinient and practical connections and features. Module power is 5V and measuring range in between 0-14 pH.



**Figure 5: pH Sensor**

- 4. Flow Sensor:** YF-S201 Water Flow Sensor can be used to measure the flow of liquids in both industrial and domestic applications. This sensor basically consists of a plastic valve body, a rotor and a Hall Effect sensor. The pinwheel rotor rotates when water / liquid flows through the valve and its speed will be directly proportional to the flow rate. The Hall Effect sensor will provide an electrical pulse with every revolution of the pinwheel rotor. This water flow sensor module can be easily interfaced with Microcontrollers, Arduino Boards.

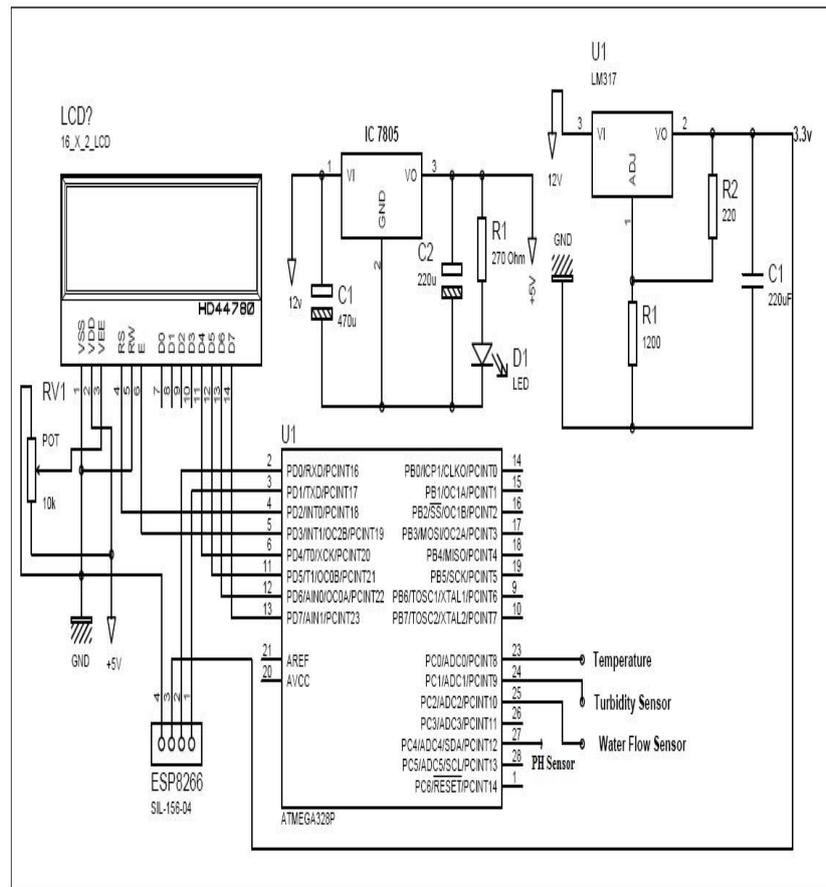
Working voltage is 5 to 18V DC and maximum current drawn 15mA at 5V. working flow rate is 1 to 30 liters/minute and working temperature range is -25 to 80.



**Figure 6: Flow Sensor**

### V. Circuit Diagram

The whole design of the system is based mainly on IOT which is newly introduced concept in the world of development. There is basically two parts included, the first one is hardware & second one is software. The hardware part has sensors which help to measure the real time values, another one is Arduino. Following Figure 7 is the overall circuit diagram of the system.



**Figure 7: Overall Circuit Diagram**

The hardware part consist sensors like turbidity, flow, pH and temperature. Turbidity sensor is used to measure cloudiness of water. Cloudiness is caused by suspended solids (mainly soil particles) and plankton (microscopic plants and animals) that are suspended in the water column. Moderately low levels of turbidity may indicate a healthy. Water Flow Sensor can be used to measure the flow of liquids in both industrial and domestic applications. PH stands for Power of Hydrogen, which is measure of the hydrogen ion concentration. Temperature sensor used to monitor the temperature of water. The outputs of sensors are given to the

ATmega 328 controller. It converts the analog values to digital one, & LCD shows the displays output from sensors, Wi-Fi module gives the connection between hardware and software.

The software system of this project is developed by embedded C Language. The PCB is design at first level of construction and component and sensors mounted on it. BLYNK app is installed in the android version to see the output. When the system gets started dc current given to the kit and Arduino and Wi-Fi gets on. The parameters of water are tested and their results are given to the LCD display. The app will provided with hotspot gives the exact value as on LCD display shows on kit. Thus like this, when the kit is located on any specific water body and Wi-Fi is provided we can observe its real time value on our android phone anywhere at any time.

## VI. Result and Discussion

We have identified a suitable implementation model that consists of different sensor devices and other modules, their functionalities are shown in figure. In this implementation model we used ATmega 328 with Wi-Fi module. Inbuilt ADC and Wi-Fi module connects to embedded device to internet. Sensors are connected to arduino board for monitoring, ADC will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameters will be evaluated.

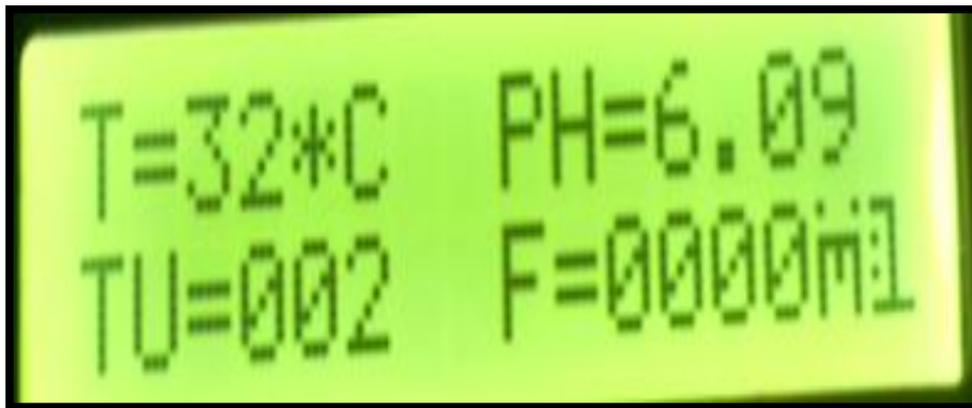
After sensing the data from different sensor devices, which are placed in particular area of interest. The sensed data will be automatically sent to the app, when a proper connection is established.



**Figure 8: IoT based water quality monitoring system**



**Figure 9: Internal structure**



**Figure 10: Output reading**

From above reading it is conclude that quality of water is good. Because water temperature is normal and pH of surface water within the range 6 to 8.5 and turbidity is less than 10.

## **VII. Conclusion**

In this paper, we discussed the approach to water quality monitoring. The proposed system consists of several water quality parameter sensors core controller and an IoT module. These devices are low cost, more efficient and capable of processing, analysing, sending and viewing the data on cloud and also through WIFI to mobile device. This can implement is suitable for environment monitoring, ecosystem monitoring, etc. and the data can be viewed anywhere in the world.

In future, the parameters like Total Dissolved Solids (TDS), conductivity, hardness, chloride, ammonia, iron, fluoride etc are also considering for water quality measurement.

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## **Design and Fabrication of Portable Concrete Mixture Machine**

**Sanjay Aloni<sup>1</sup>, Sana M. Ali<sup>2</sup>, Priyanka V. Khante<sup>3</sup>**

**<sup>1</sup>sanjayaloni@rediffmail.com, <sup>2</sup>asna9806@gmail.com, <sup>3</sup>pkhante30@gmail.com**

### **Abstract**

The aim of our paper is design and fabrication of portable concrete mixture machine. Mixer widely used to make a concrete mixture which used to building construction and other industrial application such as concrete block, pipe, sheets, etc. As for all materials, the performance of concrete is determined by its microstructure. To determine the mixing method best suited for a specific application, factors to be considered include: location of the construction site. the concrete mixture machines which are currently available in the market is heavy and having big capacity of concrete mixing. Continuously and easy handling, we have fabricated this concrete mixture machine.

### **I. Introduction**

A concrete mixer is also commonly called a cement mixer, is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready mix concrete, and more so for precast concrete. portable concrete mixer sometimes called a mini mixer. A concrete mixer is compressed primarily of a motor, rotating drum. Inside the drum of material use to make concrete mixing together evenly and remaining soft application and forming. To supply continuously the ready mix its necessary that the concrete mixer should be in good condition of working, but it has been observed that the shaft and blade of mixer get failed after some uses of time. So in this project I am trying to identify the different causes of blade and shaft failure. In this project with the title “design and fabrication of portable concrete mixer machine”, we were planning for design and fabrication of a concrete mixer. This project brought advantages over manual mixing and expensive mechanized concrete mixer. In this project Drum is stationary and blade is revolving inside the drum. We used 0.5 HP motor to blend the Concrete properly. We used a pulley and belt arrangement to transmit the power from a motor to shaft on which blades are fixed and this shaft is revolving inside the stationary drum, concrete mixer. It mixes the cement, aggregate and sand properly

and increases the productivity. It takes a less time to mix the concrete. Also it produces quality and homogeneous mixture in less time and effort.

## **II. Literature Review**

“Concrete Mixing Methods and Concrete Mixers: State of the Art”, Journal of Research of the National Institute of Standards and Technology by Chiara F. Ferraris, talks about, the efficiency parameter of a mixer are affected by the order in which the various constituents of the concrete are introduced into the mixer, the type of mixer, and the type and magnitude of forces on the shaft and the direction they acted in. and used to improve the mixing quality, to reduce the stirring resistance, to reduce the failure of shaft and blades and power consumption.

## **III. Design and Specification**

Following are the design and specification required for the proposed system-

### **(i) Drum:**

A concrete mixer is a device that homogeneously combines cement, conglomeration such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. Cement, sand and other aggregates are loaded in a hydraulically operated hopper and then poured in the mixing drum for final mixing and then can be unloaded by tilting the drum.

### **Specification:**

Parameter: Drum

Quantity = 1

Material type = MS

Dimension = D-610mm, H-880mm

### **(ii) Electric motor:**

An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this conversion of mechanical energy into electrical energy and is done by an electric generator, which has much in common with a motor.

### **Motor specification:**

Electric motor=0.5 HP

RPM of motor = 400

Shaft dia = 20mm

Pulley dia = 8.89mm

**(iii) Shaft:**

Shaft of concrete mixer is mounted concentrically at the centre of the Drum. Electric Motor, Metal Bucket/ the mixing trough, Shaft Pulley, Motor Pulley, set of blades mounted on the shaft, Bearings, Shaft, Supporting flat belt.

**(iv) Pulley:**

A pulley is wheel on axle or shaft that is design to support moment and change of direction of belt. A pulley is a simple machine that is used to lift heavy objects.

**Specification:**

parameter = Pulley

Quantity = 3

Material type = MS

Dimension = 3inch, 5inch, 9inch

**(v) Chain:**

A series of linked metal rings use for fastening sequencing of atoms of the same type. A chain type of ring connected to fitted into one another and use for various purpose.

**Specification:**

Parameter = Chain

Quantity = 1

Material type = Cast iron

Dimension = 1916mm

**(vi) Blade:**

The blade is flat cutting edge of knife saw, or other tool the flat wide section of an implement or device such a propeller a long, narrow leaf of grass or another similar plant.

#### IV. Fabrication

Figure 1, is about the 3D CAD views of the Portable concrete mixers, whereas Figure 2, is about the front view and side view of the proposed model.

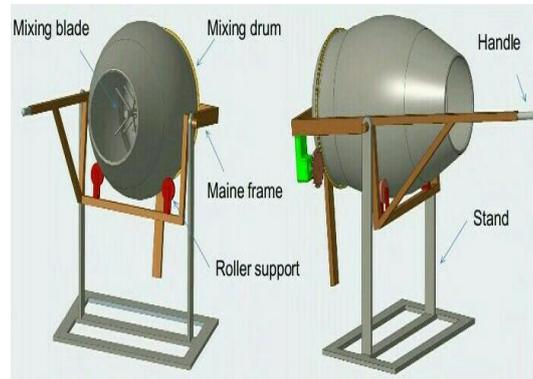


Figure 1: 3D-Cad model of Portable concrete mixer

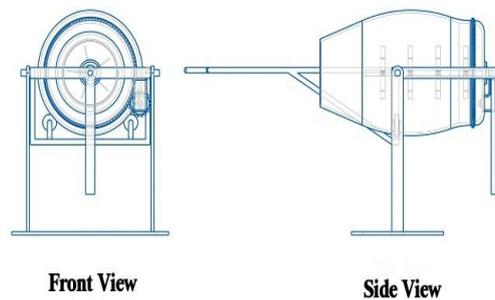


Figure 2: Different views of model

#### V. Working

A portable concrete mixer is a device that homogeneously combine concrete, aggregate such as sand or gravel, and water to form concrete a powered device that mixer concrete with water and aggregate, such as sand or pea gravel, to make concrete. Concrete mixers range from the very large commercial mixing truck to the smaller, portable concrete mixer sometimes called a mini mixer. A concrete mixer is comprised primary of motor, a rotating drum, and the materials used to make concrete spin around, mixing together evenly and remaining soft for application and forming. Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready –mix concrete, and more so for precast concrete. This has resulted in new technology for concrete production. They are easily carried from slab to slab and used in making cement for column construction

and plastering. Composition of material in proper to use construction, small slab, flooring.  
Mini concrete mixer features are-

- i. 360 degree for easy and complete discharge.
- ii. Easy to tow
- iii. Easy to carry from slab to slab
- iv. Heavy duty drum & heavy duty M. S. BLADES

The machines are designed keeping in the current labour problem. The rising labour costs and unavailability is hindering you to meet your goals & timelines. Let's clarify the difference between cement and concrete. Concrete is made by combining the three ingredients in a mixer, whether that mixer is stationary or driving down the road, and water is absorbed by the cement, which then binds the aggregate together, creating concrete. Batch mixers are becoming more important for high quality concrete production. They introduce very high turbulence into the mix and achieve about 95% homogeneity at only around 30 seconds mixing time per batch.

## **VI. Methodology**

The methodologies are based on the following two designs

- Pre-models
- Main design

Raw material selection as specification of machine.

Motor selection according to specification.

Fabrication of individual parts and assembly.

Trial and Error finding.

Rectification. Result and conclusion.

## **VII. Future Scope**

The steel sheet can be added as a coat to the inside portion of the mixing drum to avoid it from corrosion and improve its life.

## **VIII. Conclusion**

The overall conclusion can be stated as -

1. Mixing is a complicated process that is affected by the type of mixer, the mixing cycle as defined by the duration, the loading method, and the energy of mixing.

2. For most machine shafts, however, analysis should be relatively straightforward. That's because the failure typically provides strong clues to the type and magnitude of forces on the shaft and the direction they acted in, the failed parts will tell exactly what happened.

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## Design of Microstrip Patch Antenna for Frequency 5.2 Ghz

Ankita Thakare<sup>1</sup>, Ayushi Kokate<sup>2</sup>, Rashmi Barahate<sup>3</sup>, Puja Dekate<sup>4</sup>,  
Shraddha Bhoge<sup>5</sup>, Snehal Kokewa<sup>6</sup>

<sup>4</sup>pujadedkate1997@gmail.com, <sup>6</sup>snehalkokewar1996@gmail.com

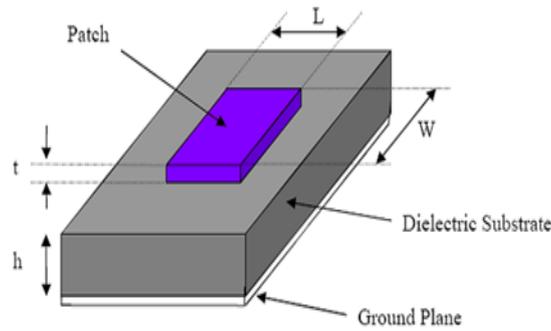
### Abstract

Wireless technology is one of the main areas of research in the world of communication system. The study of communication system is incomplete without an understanding of the operation and fabrication of antenna. In this paper we are representing a simple Microstrip Antenna for WLAN Application. The antenna has operating band at 5.2GHz which is reserved for WLAN application. The study of antenna design, analysis and characterization has been performed using CST electromagnetic simulation software. The Microstrip Patch Antennas are low profile, small size, low cost and light weight which can meet the demand of the miniaturization. These micro strip antenna is also work with dual band and triple band frequency and we also discuss the design model and antenna parameter with their advantages and disadvantages.

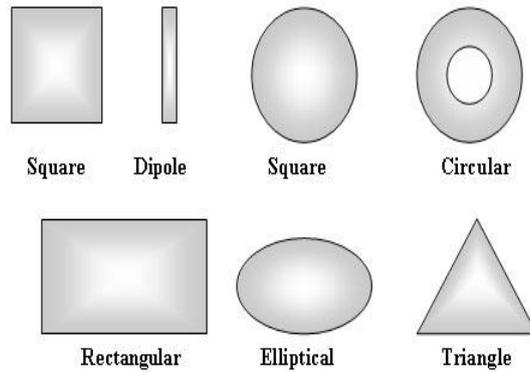
### I. Introduction

Microstrip antenna is one of the useful antennas at microwave frequencies. Microstrip received considerable attention in 1970 although the idea of micro strip antenna can be traced in 1952 and a patent in 1995. Microstrip antenna consists of radiating patch on one side of a dielectric substrate which has a ground plane on the other side. Microstrip antenna as shown in Figure 1, consists of very thin ( $t \ll \lambda_0$ ), where  $\lambda_0$  is the free space wavelength. For rectangular patch the length 'L' of element is usually considered.

The strip(patch) and ground plane separated by dielectric sheet called substrate. There are numerous substrate that can be used for the design of microstrip antenna and dielectric constant are usually in the range  $2.2 \leq E \leq 12$ . The microstrip antenna may have square, rectangular, circular, triangular or elliptical shape. Theoretically, microstrip antenna can be of any other continuous shape. Use of regular shapes of a well define geometry not only simplifies analysis but also helps in performance prediction. The two most common geometries, rectangular and circular, are widely employed.



**Figure 1a: Rectangular micro strip patch antenna**



**Figure 1b: Shapes of microstrip patch antenna**

The size of the microstrip antenna is inversely proportional to its frequency. At frequencies lower than for an AM radio at 1MHz, the microstrip patch would be the size of a football field. For a microstrip antenna designed to receive an FM radio at 100MHz, its length would be the order of 1 meter which is still very large for any type of substrate.

Parameter	Bakelite	F R 4	R O 4 0 0 3	T a c o n i c	R T D U R O I D
Dielectric Constant	4 . 7 8	4 . 3 6	3 . 4	3 . 2	2 . 2
Loss tangent	0.03045	0 . 0 1 3	0 . 0 0 2	0 . 0 0 2	0 . 0 0 0 4
Water absorption	0.5-1.3%	< 0.25%	0 . 0 6 %	< 0 . 2 %	0 . 0 2 %
Tensile strength	6 0 M P a	< 3 1 0 M	1 4 1 M p a	-	4 5 0 M P
Volume resistivity	3 * Mohm.cm	8 * Mohm.cm	1 7 0 0 * M o h m . c m	1 * M o h m . c m	2 * M o h m . c m
Surface resistivity	5 * M o h m	2 * M o h m	4 . 2 * M o h m	1 * M o h m	3 * M o h m
Breakdown voltage	20-28kv	5 5 k v	-	-	> 6 0 k v
Peel strength	-	9 N / n m	1 . 0 5 N / n m	1 2 N / n m	5 . 5 N / n m
Density	1 8 1 0 k g /	1 8 5 0 k g /	1 7 9 0 k g /	-	2 2 0 0 k g /

**Table1: Properties of different substrates for microstrip patch antenna design**

## II. Literature Survey

(1) Research Paper on: “**Design of rectangular stacked microstrip antenna for Dual-band**” [1].

A dual-band characteristic of single layer stacked rectangular microstrip antenna is experimentally studied. The variations of the length and width of the stacked rectangular patch antenna has been done and found dual resonance with increasing lower resonance frequency and almost constant upper resonance frequency with increases of the length & width of rectangular microstrip antenna. The VSWR has been measured with the help of network analyzer.

(2) Research Paper on: “**Analysis of stacked rectangular microstrip antenna**” [2].

A stacked microstrip antenna with C-type feed is designed in order to enhance the bandwidth. The effect of the various parameters, such as the rotation feed angle ( $\theta$ ), the variations of relative permittivity of parasitic patch, the distance of the feed point from the centre ( $r$ ), and the separation between two stacked patches, have been discussed. Some designs give a good return loss under -40 dB and wide VSWR bandwidth, such as case#2 with  $\epsilon_r = 4.26$  case#4 with  $r = 6.2\text{mm}$ , case#5 with 6.8,  $2h = 2\text{ mm}$  case#1, and case#2 with  $h_2 = 8.2\text{ mm}$ . The simulated data are obtained using the IE3D simulator with method of moments (MOM) commercial code. An infinite ground plane has been considered for simulations; however, and due to a software constrain, substrate dimensions are infinite.

(3) Research Paper on: “**Gap-coupled stacked microstrip antenna for dual band operation**” [3].

Theoretical investigations of a gap coupled stacked microstrip antenna is presented using equivalent circuit concept. It is found that the antenna operates with dual frequency band characteristics with resonances at 4.76 GHz and 6.79 GHz. The dual nature of the antenna is realized by adding coplanar V-shaped parasitic elements around the radiating edges of the fed patch and stacking a rectangular patch above them. The lower and upper frequency bands are achieved as 443 MHz and 287 MHz respectively. The radiation patterns show shifts of towards left and 120 towards right for lower and upper resonance frequencies respectively.

### III. Design Parameter

To design rectangular microstrip patch antenna following parameters such as dielectric constant ( $\epsilon_r$ ), resonant frequency ( $f_0$ ), and height ( $h$ ) are considered for calculating the length and width of the patch.

Width of patch ( $W$ ):

$$W = \frac{c_0}{2f_r} \sqrt{\frac{2}{\epsilon_r + 1}}$$

Effective dielectric constant of antenna():

$$\epsilon_{reff} = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2} \left[ 1 + 12 \frac{h}{W} \right]^{-1/2}, W/h > 1$$

Effective electrical length of antenna:

$$L_{eff} = \frac{c}{2f_0 \sqrt{\epsilon_{reff}}}$$

The extended length of antenna():

$$\Delta L = 0.412h \frac{(\epsilon_{reff} + 0.3) \left( \frac{W}{h} + 0.264 \right)}{(\epsilon_{reff} - 0.258) \left( \frac{W}{h} + 0.8 \right)}$$

Length of the patch is:

$$L = L_{eff} - 2\Delta L$$

### IV. Parameter Calculation for Different Frequency Band

To design a microstrip patch antenna for frequency 5.2GHz

- Width=22.8mm
- Effective-dielectric constant=2.115mm
- Effective length=19.83mm
- Length extension=19.128

To design a microstrip patch antenna for frequency 3.8GHz

- Width=31.2mm

- Effective-dielectric constant=2.135mm
- Effective length=27.01mm
- Length extension=0.3540mm
- Actual length=26.302mm

To design a microstrip patch antenna for frequency 2.4GHz

- Width=47.5mm
- Effective-dielectric constant=2.3368mm
- Effective length=40.625mm
- Length extension=0.81mm
- Actual length=39mm

To design a microstrip patch antenna for frequency 0.9GHz

- Width=131.7mm
- Effective-dielectric constant=2.184mm
- Effective length=112.08mm
- Length extension=0.3551mm
- Actual length=112.08mm

#### **For ground plane**

- For 5.2GHz:

Length=23.148

Width=26.82

- For 3.8GHz:

Length=30.322

Width=51.52

- For 2.4GHz:

Length=43.02GHz

Width =51.52

- For 0.9GHz:

Length=119.01

Width=17.19

## **V. Feed Techniques**

Micro strip patch antenna can be fed in a variety of ways. These feeding methods can be classified under the categories of contacting and non-contacting feed. In the contacting method, the RF power is fed directly to the radiating patch using a collecting element such as a micro strip or a coaxial line. In the non-contacting scheme, electromagnetic coupling is done to transfer the power between the feed line and the radiating patch. Some of most popular feed techniques include microstrip line, coaxial probe, aperture coupling and proximity coupling. The first two of these techniques fall into the category of contacting schemes, and the last two are non-contacting schemes.

## **VI. Simulation Results**

CST MICROWAVE STUDIO (CST MWS) is a specialist tool for 3D EM simulation of high frequency components. CST MWS unparalleled performance is making it first choice in technology leading R&D departments. CST simulation tools are used in leading industry across the field such as automotive aerospace communication, defence etc. in order to design analyse and optimize performance reliability compatibility and signal power integrity.

CST MWS enables the fast and accurate analysis of high frequency (HF) device such as antennas, filters, couplers, planer and multi-layer structures and SI and EMC effects.

## **VII. Advantages and Disadvantages**

Some of their principal advantages of micro strip patch antennas are given below:

- Light weight and low volume.
- Low profile planar configuration which can be easily made conformal to host surface.
- Low fabrication cost, hence can be manufactured in large quantities.
- Supports both, linear as well as circular polarization.
- Can be easily integrated with microwave integrated circuits (MICs).
- Capable of dual and triple frequency operations.
- Mechanically robust when mounted on rigid surfaces.

Microstrip patch antennas suffer from a number of disadvantages as compared to conventional antennas. Some of their major disadvantages are given below:

- Narrow bandwidth
- Low efficiency
- Low Gain

- Extraneous radiation from feeds and junctions
- Poor end fire radiator except tapered slot antennas
- Low power handling capacity.
- Surface wave excitation.

### **VIII. Conclusion**

In this paper we study a design of microstrip patch antenna for frequency 5.2GHz. As most of the communication system nowadays required a small, compact antennas for communication. So the purposed antenna was design to reduce size and cost of devices operating at 5.2GHz frequency.

## Remote Gun Targeting System

Akshay M. Ganjapure<sup>1</sup>, Gagan C. Chourihar<sup>2</sup>, Mangesh A. Selukar<sup>3</sup>, Mayur M. Wagh<sup>4</sup>,  
Shubham D. Likhar<sup>5</sup>, Tejas M. Jaronde<sup>6</sup>, Piyush M. Dhande<sup>7</sup>

<sup>1, 2, 3, 4, 5, 6</sup> B.E. Final Year Students, <sup>7</sup>Assistant Professor,  
Datta Meghe Institute of Engineering & Technology Sawangi (Meghe), Wardha

### Abstract

The border security is totally depending on soldier, still today. In highly secured area the soldier detected the enemy and targets its. If the soldier is not able to detect the enemy then enemy could easily enter the secure area. So for increasing the security level microcontroller based remote gun targeting system is introduced. The basic purpose of this remote gun targeting system is to secure the border manually which will reduce the human effort. Current system is capable to detect any PIR radiation in the range of border and automatically target its position. The introduced system is based on PIR sensor. The PIR sensor senses the temperature differences and then these signals are coded by microcontroller and transmitted toward the receiver on watch tower.

### I. Introduction

The prior concept of Remote Gun targeting System is to detect and target the living object or any movement in highly secured area such as border. The remote gun targeting is primary base on sensors, microcontroller and zigbee transmitter and receiving unit with targeting gun. Until then, border is done by Iron Spike wires, and a watch tower from which a person continuously flashing the light over the border area day and night. Those persons are fully responsible for border security. Remote Gun targeting System will not fully remove the responsibility from their soldiers, but shares the maximum responsibility and will reduce human mistake on the border. The sensors will sense any metal. The signal of sensor is provide to microcontroller, in response, microcontroller generates the code and it will transmit that code using zigbee transmitter to the control room where the zigbee receiver receives the code. The microcontroller at receiver side control targeting gun and motor drivers circuit as per received code and targeting gun at receiver will target the living object. The remote gun targeting system will enhance the border security, which may reduce the human efforts to large extents. In future the system can further implement with the help of face recognition and Bluetooth technology and so that system will work more efficiently [1].

## **II. Origin of the Proposed Topic**

To enhance the border security, as soldier has to watch border area continuously and there is danger of life to. So this project will remove the load from soldier and border security will increase

## **III. Literature Review**

From ages it has been a desire of humans to achieve the ultimate in security and make his loved ones and loved things secure. It is this desire that prompted him to make the boundaries and secure them too from all unseen and unknown sources. For this it has been always necessary to maintain a huge sum of people to guard and raise alarms in cases of emergencies. To accomplish this we propose a mechanism which will employ image processing in which a camera (webcam) will be continuously observing the „area under surveillance“. This data will be then processed by a MatLab code which will be running on a PC and will be able to detect a particular colour (Say Red) in front of a white back ground (depicting snow). Depending on this processed data the information about the intruder location will be sent to a micro-controller (89c51) via the Serial/Parallel port of the PC and then a motor controlled gun will be used to point in the direction of the intruder. This mechanism will be online i.e. the gun will continuously be pointing in the direction of the intruder. Further depending on range (distance from the gun) (fixed range in this project) the gun can be activated and a Laser pointer will be switched ON depict “shooting the target” [2].

War is an organized armed conflict that is carried out by states, nations, national and social groups. This ultrasonic proximity detector comprising independent, battery or AC powered transmitter and receiver section make use of a pair of matched ultrasonic piezo ceramic transducers each operating at around 40 kHz. This circuit is used to get reflected signals of 40 KHz from the a missile to feed that to a program to the microcontroller to switch on appropriate load while the program is executed at the microcontroller end. When the AVR microcontroller receives the signal from ultrasonic receiver it activates the door gun by triggering the gate of MOSFET through a transistor. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. Then this is converted to DC using a Bridge rectifier. The ripples are then removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the operation of the microcontroller and other components. The ultrasonic proximity detector comprising independent, battery or AC powered transmitter and receiver sections make use of a pair of matched ultrasonic piezo ceramic transducers each operating at around 40 kHz each. This

circuit is used to get reflected signals of 40 KHz from the object (here a missile) to feed that to a program to the microcontroller [3].

#### IV. Working

As shown in Figure 1, the Atmega16 microcontroller is the heart of “ Manual gun targeting system”. Two pairs of zigbee trans-receiver is used for serial communication between control room and robot side. Camera shows the live video, this is all seen on control room. At control room operator is present , the responsibility of that operator is that to see live video and detect enemy. If in case enemy is detected over the screen then operator immediately gives quick response to it. To shoot on target the signal is send through zigbee transmitter to receiver and at robot side zigbee receiver send this signal to microcontroller. Microcontroller gives a command to motors to turn on and gun will move in desired direction and shoot the enemy .Similarly for movement of robot , motor driver is connected to the wheels this will helps in movement of robot. 12v DC power supply is provided. For communication between laptop and zigbee trans-receiver USB TTL is used. For live data night vision camera is mounted over robot side. For the movement of gun and robo servo and Johnson motor is used. Metal detector is mounted over the front end of robo, while moving it will detect land mines and other explosive material.

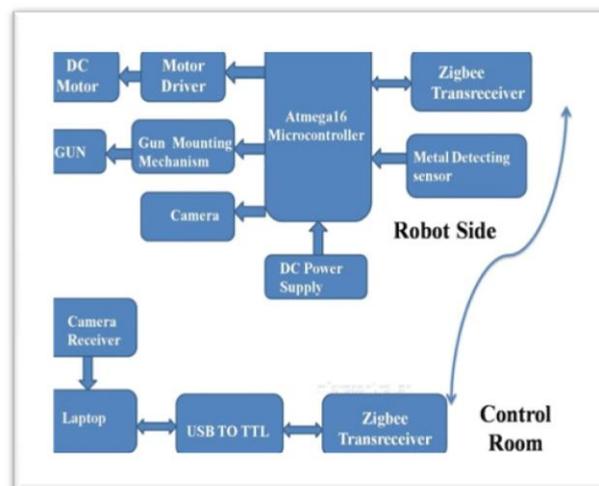


Figure 1: Design Model of the system

#### V. Conclusion

The remote gun targeting system is feasible for highly secure area such as border the system consist of microcontroller unit, metal detector, targeting gun. This system helps produce the responsibility and efforts of soldier in border security. This system can further implemented by using Bluetooth technology and face recognition system.

The system is economical. The remote gun targeting system is not taking full responsibility of security. The remote gun targeting system can be easily implemented for the home security also. This system shows better result in highly secured region.

## VII. Future Scope

Following are some highlighted future scopes -

1. By using controller microcontroller we can implement the intelligent system in future.
2. In Future it can be used as an advanced tracking system along with high intensity camera to track a real target(say a Missile or Tank).
3. The advantage of this unit is that to run the system we can use video camera and other sensors to see the live moving target from anywhere in the world.

Further developments could relax these restrictions by allowing range detection from the video image and implementing tracking and prediction of a moving target. Target acquisition occurs via processing of an image stream from a single webcam, making use of foreground segmentation and SURF feature detection, together with a calibrated pinhole model to convert from pixel distances into real-world Cartesian coordinates. We also show results for ballistic light tests conducted on the foam missiles, so which allow the calculation of the desired launcher pose given a target location.

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## **Review on Solar Electric Fencing for Irrigation of Animal Man Conflict**

**Prashant Y. Shende<sup>1</sup>, Pragati S. Katakpure<sup>2</sup>, Swati S. Kathane<sup>3</sup>, Snehal M.Raut<sup>4</sup>, Aarti K. Nagose<sup>5</sup>, Prachi S. Ingale<sup>6</sup>**

**<sup>1, 2, 3, 4, 5, 6</sup> Department of Electronics & Telecommunication Engineering, DMIETR, Wardha, Maharashtra, India**

### **Abstract**

This paper introduces fundamental concepts of electric fence technology, presents a new design method for a livestock electric fence energizer circuit. India, with vast agricultural lands has different crops ranging from paddy to tomato. But few crops are destroyed due to animal attack and hence a protection is required to save the crops from animal. In this proposed work, we design and implement Fencing Perimeter Protection for agriculture. It is the modern day need to save the crop from wild-life animal. It works on Solar Energy with backup facility to run uninterruptedly during the nights as well as cloudy days when any object is sensed by PIR or IR sensor, immediately controller sends the message to the authorized person through the IOT technology, and it is interfaced with the controller. If the object touch to the wire then the shock given to them and buzzer will on continuously until the object pass away from the wire. Its applications suits remote areas provide an economical and practical solution to achieve maximum protection of field or particular areas.

**Keywords:** IOT, sensor, fence, agriculture, buzzer

### **I. Introduction**

Electric fences can be used to protect farmhouses, farmlands, forest bungalows, etc. from animals. In a way, these simulate the job of a cowboy or forest guard. Already popular in countries where manpower is expensive, electric fences are slowly becoming popular in India as well. Nowadays the use of electric fence for control and content livestock are having a large application in almost all countries of the world. Electric Fence was starting to use in the thirties and nowadays is used in all world in little and big farms. Brazil, like the major exporter of beef cattle is a great consumer of this technology. Big farms with large areas of control need electric fences energizers of large capacity to keep high voltage in all its extension. There are in Brazil many manufacturers of this kind of equipment, but these manufacturers use empiric rules to design this kind of equipment. This work intends to be a

starting point to change this reality involving the academic researchers in the study of this problem. The electric fence presents the following parts: Energizer, Wire, Isolation and Ground[1].

Agriculture in India is the broadest economic sector and plays a significant role in the overall socio-economic factor of India. The increasing news articles in television and newspaper on wild animals raiding agricultural crops during harvest season shows that these animals can destroy a farmer's livelihood. In such areas Electric fencing system can be employed in which the animals experience a high voltage low current shock for a very short time. Because of the small magnitude of current there is no threat to the animal's life at the same time the large magnitude voltage scares away the animals.

Usually, PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. A photoelectric sensor, or photo eye, is a device used to detect the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver. They are used extensively in industrial manufacturing. There are three different functional types: opposed (through beam), retro-reflective, and proximity-sensing (diffused)[2].

The practices employed by farmers to deter elephants are also wide ranging. These generally include active traditional deterrents such as shouting, drum beating, bursting firecrackers, torch lighting, and setting fire to raw jute or tires fixed at the end of bamboo sticks. Usually, farmers guard their crops on their own, however during peak raiding season two to three neighboring farmers form groups to ride animal back. Additionally, forest department officials may aid in mitigating human elephant conflict by firing shots in the air due to that more problems are faced by the officer

## **II. Literature Review**

An electric fence was first use in Texas in 1888. Electricity from a generator using an overshot wheel. There is a possibility of electric fence posing the risk of fire when bushes or trees grow in close proximity. Electric fence was based on GSM technology so the circuit cover certain distance, this circuit is more expensive for farmers [3]. There have been numerous attempts to modify farming practices to prevent retaliatory killings that appear to have focused on different predators who may exhibit different hunting behaviors, across

contrasting landscapes, with potentially different kinds of fences, and ultimately different outcomes. Hence, the objective is to eliminate predation of livestock and thus reduce provocations between humans and animals that often lead to retaliatory killing [4]. Zarco-González et al. (2012) found that various aspects of the livestock farmland landscape and farming practices, in part, explained the high rate of livestock predation by pumas and the retaliatory killings carried out by farmers. Interviews were conducted with 52 livestock owners to assess levels of livestock predation and retaliatory killing of pumas, in addition to livestock management practices such as the degree of livestock supervision and night time shelter. Additionally, topographic data was collected on the areas surrounding livestock grazing sites such as distance to human settlements, roads, vegetation, and steep cliffs, and in-field verification of killings.

### III. Block Diagram

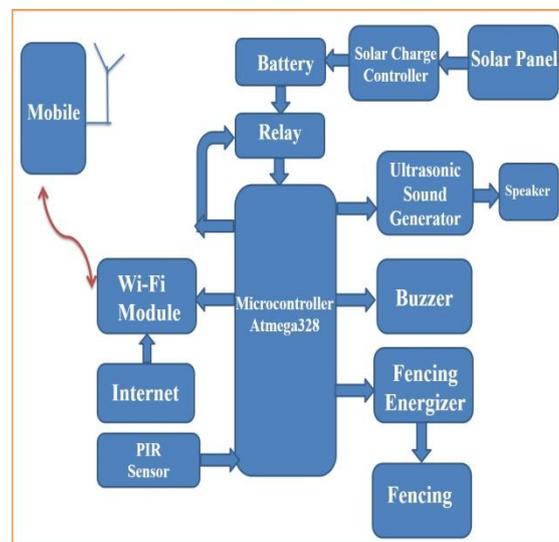


Figure 2: System Block Diagram

Above is the block diagram of our proposed work in which we are using microcontroller which is the heart of our proposed work and we are going to interface different type of component with the microcontroller. PIR sensor is used for monitoring the Motion of animals and people which is fed to microcontroller. Here ATmega 328 microcontroller which is use for monitoring and controlling the system, ATmega328 microcontroller is the brain of system use for programming. Here is 16x2 LCD display use for showing the current status of system. Using relay, the energizing system is ON/OFF automatically.

For running whole system, they required power-supply, 12V DC battery is used for supplying the circuit. 7805 IC is voltage regulator IC. It converts 12V input into 5V regulated power

supply, that 5V is connected to microcontroller, PIR sensor, relay. The energizing block which converts input 6V DC into 4000V DC. Using solar panel which converts solar energy into electrical energy and output from solar panel is connected to battery. Here we use battery for storing the charge and output of battery which is connected to energizing circuit through microcontroller.

#### **IV. Advantages**

It significantly reduces man-animal conflicts. It has low maintenance and it can be operated from all over the world through internet. It is not harmful for the animals.

#### **V. Applications**

Electric fence systems have application in Agriculture, Industrial and Forestry and this proven technology has now been Plantation sectors, with increasing crime in urban areas adapted for domestic security applications, too.

#### **VI. Conclusion**

The proposed work "Solar electric fencing for irrigation of animal-man conflict is designed such that it can be installed on any surface. It is much easy and cost effective than increasing the height of the wall. The proposed work is easily expandable and can be used by farmer to increase the security of the land from animals, and compatible with all types of additional security gadgets.

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## Quaternary Arithmetic Logic Unit Design

Prashant Shende<sup>1</sup>, Pratiksha R. Hande<sup>2</sup>, Neha M. Chandak<sup>3</sup>

<sup>1</sup>Assistant Professor, <sup>2,3</sup>Students,  
Department of Electronics & Telecommunication, DMIETR, Wardha, India  
<sup>2</sup>pratiksha.hande2@gmail.com, <sup>3</sup>chandakneha120@gmail.com

### Abstract

The arithmetic logic unit (ALU) is the core of a CPU; the adder is the elementary unit of an ALU. The adder has to satisfy area and speed requirements. The delay in an adder is dominated by the carry. Arithmetic operations like addition, subtraction and multiplication still suffer from the problems including limited number of bits, propagation and time delay, and circuit complexity. The Carry free arithmetic operations can be achieved using a higher radix number system such as quaternary Signed Digit (QSD). We have proposed fast arithmetic logical unit based on quaternary signed digit number system where the carry propagation are eliminated, hence it reduce the propagation time in comparison with radix 2 system, each digit can be represented by a number from -3 to 3. In any n digit QSD number, each digit can be represented by a number from the digit set [-3,-2,-1, 0, 1, 2, 3]. Operations on a large number of digits can be implemented with constant delay and less circuit complexity.

**Keywords:** Xilinx ISE, QSD, ALU, BSD, VHDL

### I. Introduction

Arithmetic operations are mostly used and play important role in various digital systems like computers and signal processors. Performing this Arithmetic logic unit using QSD number representation has charm the interest of many researchers. Recent advances in technologies for integrated circuits make large scale arithmetic circuits suitable for designing. But still arithmetic operations suffer from the well known problems including limited number of bits, propagation time delay, and circuit complexity. This work implements a high speed QSD arithmetic logic unit which is capable of carry free addition, borrow free subtraction and multiply operations. The QSD addition or subtraction operation employs a fixed number of terms for any operand size. The designed high speed multiplier consist of partial product generators and adders which is proposed is implemented. This project also proposes a new

algorithm for converting binary to QSD and QSD to binary. The behavioural model of the design is done using VHDL Hardware description language.

## **II. Objectives**

Following are the main objectives of the work -

- The main motive is to design a carry free arithmetic and logic depending upon the Quaternary signed digit number system. This number system allows representation of any several number integers.
- By using this feature, we can design an adder without carry generation. To get the results in a fix delay of the number of digits execution of quaternary addition and multiplication is very necessary.
- This focuses on the quaternary addition and multiplication. As a result, it reduces the propagation time as compared to radix system with a constant delay.

## **III. Literature Review**

The limitations are given to the speed while performing the arithmetic operations has to face the delay in propagation. In this paper the arithmetic circuitries consists of adder-subtractor, multiplier are efficient. They are formed by using QSD number system. The delays are faced due to increasing the quantity of bits [1].

Carry free arithmetic operations can be achieved by higher radix number system that is QSD system. In this paper it was proposed that comparing to the binary adder QSD adder is better in the terms of number of gates, higher number of bits of addition. QSD number uses 25% less space that BSD [2].

With a help of QSD system the carry free addition, borrow free subtraction and multiplication can be performed. In this paper the operation speed will be increased with the adequate design for adder block for performing addition or multiplication. For the more improvement of QSD adder the higher number of gates may be tolerated [3].

## **IV. Working Details**

Xilinx ISE(Integrated synthesis environment) is a software tool produced by Xilinx for synthesis and analysis of HDL designs, enabling the developer to compile or synthesis their designs, performing timing analysis, examine RTL designs, Simulate designs reaction to various stimuli, and configure the device targeted with the programmer.

It was superseded by VIVADO design suite. The operating system includes RHEL, SLED, MICROSOFT WINDOWS and FREEBSD. The size available is 6.1Gb. Platforms are available in 32 bits and 64 bits. It is available in English language thus it is more user friendly. The Xilinx ISE is primarily used for circuits, synthesis and designs.

### V. Detail description of QSD ALU

The conventional ALU can be defined as, the combinational digital electronic circuit in which multiple the arithmetic and logical operation takes place on integer binary numbers. To obtain the fast arithmetic and logical operations the high speed QSD ALU is used.

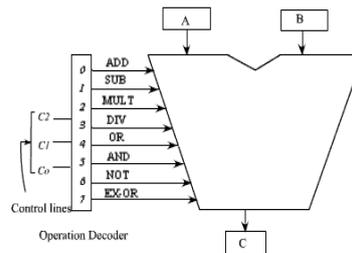


Figure 1: QSD ALU

The another advantage of using QSD ALU is, it provides less operational delays and less circuit complexity with high production.

Here two number systems are used one Signed digit number system and QSD number system.

Signed digit number system: In this type of number system, the digit is prefixed with a minus sign just show that the digit negative.

QSD number system: This number system are represented using 3-bit 2's complement notation. Every number is represented by,  $D = \sum xi 4^i$ , where, xi can value from the set (-3,-2,-1,0,1,2,3) , obtain perfect decimal representation.

The QSD ALU consists of QSD adder, QSD multiplier and Logic unit

#### (i) QSD Adder

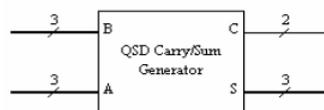


Figure 2: Intermediate carry and sum generator

Sum	QSD represented number	QSD coded number
-6	$\overline{22,1\overline{2}}$	$\overline{1\overline{2}}$
-5	$\overline{23,1\overline{1}}$	$\overline{1\overline{1}}$
-4	$\overline{10}$	$\overline{10}$
-3	$\overline{11,0\overline{3}}$	$\overline{1\overline{1}}$
-2	$\overline{12,0\overline{2}}$	$0\overline{2}$
-1	$\overline{13,0\overline{1}}$	$0\overline{1}$
0	00	00
1	01,1 $\overline{3}$	01
2	02,1 $\overline{2}$	02
3	03,1 $\overline{1}$	1 $\overline{1}$
4	10	10
5	11,2 $\overline{3}$	11
6	12,2 $\overline{2}$	12

**Table 1: The intermediate carry and sum between -6 to 6**

The QSD adder gives carry free addition. In order to obtain carry free addition two steps are involved. From which the initial stage gives an intermediate carry and sum from addend and augends. While the another step combines the intermediate sum of the digit with the carry of lower significant digit. By including two rules for prevention repelling of carry, we can procure a carry free addition. Those two rules are, the magnitude of the intermediate sum must be less than or equals to 2 and magnitude of carry must be less than or equals to 1.

**(ii) QSD Multiplier**

The two methods involved in multiplication action are as follows:

- 1) Parallel.
- 2) Iterative.

To produce the multiplication operation, it can be implemented in both the ways by using QSD partial products generator or by using QSD as a base component

The partial product,  $M_i$ , can be obtained by multiplication of n-digit input with a input of single digit. The original component of the partial product generator is single digit multiplication unit. For the execution of n digit we required a several n single digit multipliers.

**(iii) Single digit QSD multiplier:**

The output of single digit multiplier gives M as its result and C as a carry. That carry C gets combined with M of the next digit.

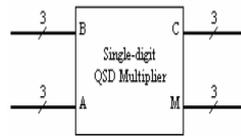


Figure 3: Single digit QSD multiplier

The range of output is 3 to - 3

### VI. Logic Unit Design

Logic unit design includes the Inverter, MAX and MIN function execution which is as similar to that of OR and AND functions respectively.

INVERTER	
IN	OUT
0 (00)	3 (11)
1 (01)	2 (10)
2 (10)	1 (01)
3 (11)	0 (00)

Table 2a: Inverter table

		MAX			
		A			
		0 (00)	1 (01)	2 (10)	3 (11)
B	0 (00)	0 (00)	1	2	3
	1 (01)	1	1	2	3
	2 (10)	2	2	2	3
	3 (11)	3	3	3	3

Table 2b: MAX table

		MIN			
		A			
		0 (00)	1 (01)	2 (10)	3 (11)
B	0 (00)	0	0	0	0
	1 (01)	0	1	1	1
	2 (10)	0	1	2	2
	3 (11)	0	1	2	3

Table 2c: MIN table

### VII. Conclusion

Using higher radix number system like QSD, the carry free can be generated. The Proposed fast arithmetic logical unit based on quaternary signed digit number system where the carry propagation chain are eliminated, hence it decrease the propagation time in comparison with radix 2 system, each digit can be represented by a number from -3 to 3.

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## **Control and Monitoring of Automatic Aquarium Care, Maintenance and Management using IOT**

**Poonam A. Kapse<sup>1</sup>, Sanchalika M. Dubale<sup>2</sup>, Gauri R. Dhage<sup>3</sup>,  
Pawan P. Mahajan<sup>4</sup>, Harish T. Mahajan<sup>5</sup>**

<sup>1,2,3,4,5</sup> **Department of Electronics Engineering, DMIETR, Sawangi (Meghe), Wardha**  
<sup>1</sup>**poonamkapse.18@gmail.com**

### **Abstract**

In modern days many people have fish as their pets in home. Everyone loves fishes and required aquarium for their home. But maintaining aquarium is difficult Again it is difficult to check the conditions of an aquarium manually rimus. Here we present an IOT based system will provide real time status on user's parameters such as turbidity, temperature done. Also automatic feeding system operated by servo motor mechanism is there which will detect the dead fish which user will be able to see live operation occurring in system is to replace manual maintenance of fish aquarium with an automated system by using IOT.

**Keywords:** Internet of Things, Sensors, Arduino Platfo

### **I. Introduction**

Fish keeping is a popular trend nowadays. People from all the age groups like to keep fish at homes, offices etc. for decoration purpose or as a hobby. Commercial fish farming and ornamental fish farming has become very popular. Therefore it is important to automate aquarium/pond. A to check the conditions of an aquarium manual Here, we present a IOT connected system which monitor and control the whole aquarium using electronics and will communicate or transmitting real time status to user Smartphone. The project is anatomised system to take care of fishes. It will monitor the physical changes in the water and will maintain it to the ideal conditions, with required changes. The aquarium will perform all the operationally like temperature control, pH control, monitor lighting, feeding, water renewal etc. It will be a manual effort required in maintenance of aquariums by automating the aquarium management process.

### **II. Proposed System**

The aim of this project has been chosen to minimize the problems of fish keepers or aquarists by shifting it from manual to the automatic mode. There will be a temperature sensor, water

level sensor, oxygenator feeder, an LCD and outlet pump for water Alteration. The basic functionality and main principle of the system is to sense the changes via sensors. It will monitor the physical changes in the water and will main conditions, with required changes. Monitoring eating activity of the fishes along with making are provided with the correct amount of for Processes and operations like temperature, feeding, changing water etc. will be shown on the mobile app.

They all will be interfaced with the ongoing our system will connected with module which is communicated with smart phone. Therefore it is important to automate agued system which will monitor and control the whole aquarium Smartphone application. It contains water quality manage temperature, level of water will be monitored. And automatic changing done. Also automatic feeding system operated by servo motor mechanism which will feed fishes on time. Mechanism is there which will detect the dead fish.

In addition camera will be connected to aquarium system using ill be able to see live operation occurring in system with the help of Smartphone .The aim of our project is to replace manual maintenance of fish aquarium with an automated system by using IOT. Internet of Things, Sensors, Adriano Platform Aquarium Controller by using Smartphone. Fish keeping is a popular trend nowadays. People from all the age groups like to keep fish at their homes, offices etc. For decoration purpose or as Commercial fish farming and ornamental fish and therefore it is important to automate aquarium/pond. As it is difficult to check the conditions of an aquarium manually.

Here, we present a IOT connected system which monitor and control the whole aquarium using electronics and will communicate or transmitting real. The project is an automated system to take care of fishes. It will monitor the physical changes in the water and will maintain it to the ideal conditions, with required changes. The atrium will perform all the operations automatically like temperature control, pH control, monitor lighting, feeding, water renewal etc. It will reduce the manual effort required in maintenance of aquariums by automating the aquarium management process.

### **III. Block Diagram of the Proposed System**

In the proposed system microcontroller ATMega328 is centralize unit of system. It is a three port device each port having 8 input and output pins. Following Figure 1, describes the is the block diagram of the proposed system.



**Figure 1: Block Diagram of the proposed system**

It is interface with all other devices in our system such as-

- Oxygenator- it is use to maintain proper oxygen level to whole aquarium.
- Temperature sensor - it is a water proof temperature sensor and will use to sense the temperature of water.
- Food controller- will provide necessary amount of food to the fishes.
- Battery -We will use in absence of main power supply.
- Water level sensor- is use to control water level while changing the water of aquarium.
- Turbidity sensor- is use detecting the impurity and PH value of the water.
- Dead fish detector- will detect dead fish by using IR sensor.
- Camera- is also connected to our aquarium which will give real time status of the aquarium to the owner, with the help of Wi-Fi module.
- Relay- it is use as ON/OFF switch for water pump.
- Display- it will show the real time status of aquarium.
- Food level detector- will detect the level of food in food container.

#### **IV. Related To Work**

Propose of this paper is that, by referring some paper it is observer or conclude that all the implementation is not occur in one system i.e. temperature, turbidity, water level, etc also automated feeder is not provided in several paper. By overcome that problem we propose this paper related smart aquarium system. It does the feeding itself every day, keeps the

temperature of the aquarium under control, and also keeps the turbidity level under control. This system connected with Wi-Fi module which is communicated with smart phone.

### **V. Problem Definition**

In large scale aquariums monitoring are done manually A person may do mistakes due to the human nature. It is difficult to maintain aquarium for working people. Unacceptable changes in the levels of water parameter values affect the life of aquatic animals.

This motivated us to build a system which automates the manual work to maintain the aquarium with minimum persons required using internet technology. So we design automatic system that maintains fishes needs like food, water impurity, and cleaning of aquarium.

### **VI. Advantages**

- Reduce maintenance time improve aquarium health.
- The food will not spoil aquarium water.
- Avoids to beg someone to take care of your fishes.
- One can keep eye on the fishes

### **VII. Applications**

- It is use in aquarium.
- Commercial fish farming.
- Ornamental fish farming.

### **VIII. Conclusion**

The primary goal behind this paper was to automate maximum aquarium work that currently done manually. Keeping this goal along with IOT in vision our proposed model contains a infrastructure containing different sensors, protocols and a mobile application using which anyone can collect various real-time parameters. These parameters are analysed and critical conditions are highlighted and notified to the user. This can help the user who cannot manually know about the exact problem by just looking at the water by displaying it in an understandable manner. The user will then exactly do the necessary required actions which will help in keeping the aquatic animals healthy and safe. Also with the help of parameters the emergencies can be handled efficiently.

# Design and Implementation of Flood Early Warning System for Alerting Population

<sup>1</sup>Apurva Patil, <sup>2</sup>Prajakta Hadke, <sup>3</sup>Utkarsha Aher, <sup>4</sup>Vaibhav Mathane, <sup>5</sup>Priti C Golar

<sup>1, 2, 3</sup>BE Scholars, <sup>5</sup>Assistant Professor,  
Department of Information Technology,  
St. Vincent Pallotti College of Engineering and Technology, Nagpur, India  
<sup>5</sup>priticgolar@gmail.com

## Abstract

In India flood is one of the colossal debacle which influences the human, creatures and soil. It isn't conceivable to control the flood however by utilizing the innovation we can diminish the quality of flood and its impacts on human and creature life. We introduce a model of the flood early cautioning system. The framework screens sensor systems introduced in flood guards. Sensors are dispersed in waterways with the goal that progressions of the water level can be adequately observed. The database and application server is actualized as an online application to enable clients to see constant water-related information and in addition verifiable information. The application server is additionally ready to send notices to the mindful experts if there should be an occurrence of emergency. The GSM arrange is utilized to associate the general framework units through SMS. This monitoring framework is a quicker and less expensive method for disturbing the significant partners and subsequently helps keep the loss of lives and harm to properties. This paper depicts nonspecific outline and usefulness, the computational work process, the individual modules, their joining by means of the Common Information Space middleware, and the main after effects of the framework.

**Keywords:** Early Warning System, Flood Modelling, Flood Simulator, Water Level Meter

## I. Introduction

Recent disastrous floods the world over have generate countless gone for the advancement of more grounded and "more intelligent" flood security frameworks. Numerous undertakings, among which are Flood-site, Flood Control 2015, and International Levee Handbook [1], endeavour to unravel a portion of the flood control issues. A standout amongst the most difficult issues is the plan of Early Warning Systems (EWS) for flood aversion and calamity administration. Everybody knows about harm caused by streak floods. That execute a bigger number of individuals worldwide than some other catastrophic event in a normal year, streak

floods slaughter in excess of 5,000 clueless individuals and cause a great many dollars of property harm.

Amid floods particularly in streak floods the general population's advantage like streets, spans, ranches, houses and autos are annihilated. Such a significant number of individuals end up destitute. Furthermore, the administration sends fire fighters, police and other emergency mechanical assembly to help the influenced; that more often than not takes a very long time for influenced groups to recuperate and be re-fabricated and business to return to regularly.

Sensors are disseminated in streams with the goal that progressions of the water level can be adequately checked. The database and application server is executed as an electronic application to enable clients to see continuous water-related information and additionally recorded information. The application server is additionally ready to send notices to the dependable experts in the event of emergency. The GSM arrange is utilized to associate the general framework units by means of SMS.

Flood cautions are regularly utilized by individuals in recognizing the level of water amid blustery seasons. The vast majority of the flood alerts accessible in the market laud high cost and complex use. To address such issue with the absence of early cautioning gadget for floods in the group the fundamental thought is the straightforwardness of the gadget wherein anybody can basically utilize and control it.

New advances deliver straightforward and minimal effort apparatuses that can be utilized to take care of such issues. In this work, some of these instruments are utilized, for example, ESP8266 board that fills in as a Wi-Fi module. This board has minimal effort, effortlessness in programming and the capacity to interface with different gadgets. Another device is the GSM shield, which is a prepared board manages GSM systems without extra interfacing circuits. By every one of the information got, the neighbourhood experts could foresee the level of flood affect toward the region of this model secured.

A flood cautioning is the point at which an official declaration is given (by TV, Radio, Text Message or Phone, Email or different means) of a looming flood or an as of now flood that has just happened. So we require a framework that gives us a notice as well as it disclose to us surmised date or month that there is probability of Flash-flood so the general population move to safe spots or possibly they plan before some harm happens.

The point of this task is to plan a framework which will screen and control the water level in the dams and furthermore suggest the concerned specialist when the water level surpasses the breaking point. A sensor is associated with the miniaturized scale controller that measures the

estimation of water in the dams or streams and sends that data to the smaller scale controller. These sensors are put in various edge levels are associated with the controller. On the off chance that the level crossed the sensors at level-1, the data is passed to the controller and after that the controller check for the safety measures directions and forward it to web server. This undertaking manufactures a model that will distinguish the ebb and flow water level over the watershed of River and its encompassing regions through sensors. The land region of the waterway was sub-partitioned into regions where sensors were introduced. Every sensor connotes a notice level. Once a sensor is set off, a yield flag will be handed-off to a miniaturized scale controller which fills in as a switch that triggers the associated Wi-Fi modem to send ready SMS message to the server. At that point, the server will consequently send an instant message to the numbers put away in the database. Likewise, the PC will then naturally hand-off the alarm motion by transferring a notice post on a site or to web-based social networking destinations like Facebook and Email. The procedure rehashes as the water level keeps on rising and triggers another sensor.

## **II. Literature Survey**

These disastrous occasions and uneven natural continues changing and impacting our lives, hurting property and the lifestyle we live in an extensive variety of courses in light of the fact that most of the fundamental needs of the people depends on upon the cultivating and agri business which at last depends on upon great climate. It is extremely hard to screen distinctive climate parameters through wired and simple gadgets in a horticulture zone and regions close waterway zone amid certain perilous and basic circumstances. Investigates done of the distinctive condition monitoring applications works for various parameters like temperature, moistness, wind, sun based radiations, water stream, water level, vibration and light, and so on. A solid computational model which could keep the occasion of flood not totally but rather halfway in creating and poor nations is our principle concern. In this review paper distinctive research works depicting to foresee and avoid floods by and large sent utilizing remote sensor arrange (WSN) are talked about. There are distinctive models, diverse vitality effectiveness models, and distinctive systems administration game plan of remote sensor systems. These models inspire us in setting up a most proficient model for anticipating and forestalling flood.

Octavian A. Postolache, J. M. Dias and P.M.B Silva Girao [3] in 2009 actualized shrewd sensor arrange for indoor and outside air quality monitoring. In this framework sensor hubs are introduced in various rooms and it comprise of tin dioxide sensors which were hardwired

or remotely associated with the focal unit. It additionally estimated the grouping of temperature and stickiness for exactness. In this examination, the idea of numerous info single yield (MISO) neural systems was actualized to make up for the impact of temperature and dampness on the centralization of gas display. IEEE 802.11n (Wi-Fi) innovation was utilized for correspondence between sensors.

In the year 2012, Dr. Boyina. S. Rao, Deepa. K, Abarna. I, Arthika. S, Hemavathi. G and Mohanapriya D [4] presented Controller Area Network (CAN) for natural monitoring. They utilized a mix of both CAN and Zigbee innovation for successful sensors", correspondence. In this financially savvy framework, sensors were associated with the microcontroller ATMEL 89S52 through CAN Interface lastly assembled information were sent to the PC server utilizing Zigbee Communication. Would protocol be able to gives higher information rate for correspondence, thus used in this framework?

In the usage of monitoring and estimating frameworks utilizing the Zigbee radio innovation is spoken to by adaptability in topology, excess and heartiness of the remote sensor arrange [1], [4]. The Zigbee work systems having number of sensors in the system can work over years, with no need of changing the first battery. The Zigbee innovation has likewise been utilized as a part of numerous other distinctive sorts of emergency conditions like fire discovery in backwoods, remotely sending web data to framework in calamity regions for medicinal reactions and numerous more [1].

There are a few applications done by scientists on the robotization of climate stations in various zones which likely screens, checks and controls the nursery impact [2] and give climate conjecture to focal and neighbourhood associations [6]. So crafted by the mechanization of climate station is helpful in various application territories, for example, for agribusiness, angling, avoidance of life and framework. So in the overview paper we talk about different frameworks for the robotization of climate station in stream zone utilizing Zigbee and Wi-Fi innovations i.e. IEEE 802.15.4 and IEEE 802.11 separately. This frameworks conquer the issue of low transmission speed and the presence of a solitary purpose of disappointment amid the correspondence between Zigbee/IEEE 802.15.4, and furthermore emergency administrations couldn't react to false crises so their chance can be better used to battle or oversee genuine crises [7]-[9].

With the headways in sensor innovations, the size and cost of sensors are radically decreasing empowering applications like flood identification and flood monitoring effectively deployable in flood happening districts. Additionally remote correspondence innovations have quickly developed in the course of recent years with the approach of 3G, 4G,

6LoWPAN and LoRaWAN advances and simple accessibility to clients. So there came a term begat by Kevin Ashton called "Web of Things (IoT)" into general use because of these headways in implanted frameworks and correspondence advances. Here in the following segments we talk about utilization of these IoT gadgets for flood location and early flood cautioning frameworks which would empower us to make a compelling flood-cautioning framework.

### **A. Flood Detection**

Basha et al. [2] displayed a short depiction about usage of the sensor arrange in Honduras for an early discovery of flood and caution the general population in danger of their lives. They have broken down the centrality of utilizing minimal effort sensor arranges in creating nations, sensor systems for flood recognition and the accessible current operational frameworks for flood location. This paper talked about the flood discovery issue of caution groups in occasions of debacles which rapidly ends up complex because of its multifaceted nature. They examined the flood location issue in Honduras and proposed an answer. Utilizing remote sensor organize (WSN), they separated the arrangement into four assignments (occasion forecast, expert notice, group caution, and group clearing). They have led diverse tests to approve the proposed arrangement. They checked the ease of use of the 144 MHz radios for correspondence. They additionally tried it with the different correspondence ranges essential for the framework.

To impart at these reaches dependably, the radio receiving wires require viewable pathway high noticeable all around, which requires reception apparatus towers and confines the capacity to test this part of the framework in the US. This paper says that remote sensor system can be an ideal innovation to be conveyed for battling with the flood in poor and creating nation. In the exploration paper [9], Ancona et. al have proposed utilized of minimal effort viable and thick spatial matrix of rain checks over a zone of flood location with a capacity to give tests of information in brief time-interims. Subsequently when the rain guage sensors demonstrate that the precipitation is over the set limit levels for a specific given zone, at that point a powerful caution or cautioning might be given relying on the level of hazard to the general population living in the hidden zones. This notice framework requires co-appointment of all the meteorological offices and also different associations in this area with the most vital of them – individuals who are forced to bear this framework and furthermore at the gigantic dangers of their lives. In the following segment, we talk about of utilization of IoT in Flood Warning System advancement.

## **B. Flood Warning**

Seal et al. [7] introduced a flood gauging model outlined utilizing Wireless Sensor Networks. This model predicts riverine floods utilizing basic and quick counts with the utilization of various variable powerful straight relapse strategy which is straightforward and basic yet financially savvy in its execution. It uses low equipment assets and still furnishes with ongoing forecasts and solid precision, subsequently having highlights which are attractive in any certifiable calculation.

The model is autonomous of the quantity of parameters, i.e. any sort and any number of parameters might be included or evacuated construct the with respect to site necessities. The ascent in water level is spoken to by utilizing a polynomial from which the surpassing of the flood line soon can be resolved. In this paper a period multiplier work is utilized just to choose the time interim between two progressive readings.

The focal hub is specified in this model however it isn't taken into account. This model is just predicts the flood circumstance and cautions individuals about flood by ringing an alert however it has no part in avoidance of the flood occasion. We perceive how WSN is being successful for correspondence of flood notices. However even with these correspondence approaches, it is essential that ongoing accumulation and investigation of sensor information be done as such that the debacle notices might be given to individuals in danger with powerful time to reaction help activities.

## **C. Early Flood Warning System**

Basha et al. [2] depicted engineering of a framework and sending of how to meet the plan prerequisites. It permits show driven control for advancing the expectation ability of the framework. This engineering is created in Honduras and is utilized to watch and examine the waterway flood expectation. The creators have utilized a brought together type of the expectation display, with a system execution and component testing. Conveyed on the banks of waterway in Massachusetts, they got the successful aftereffects of the tests on-field. In this framework exceptionally fe number of hubs are conveyed crosswise over waterway bowl and an interesting heterogeneous correspondence framework is utilized for perusing constant detecting of information, self-monitoring for disappointment and adjustment of estimation plans is done to catch debacle occasions.

They proposed a model as appeared in Figure 1 [2] and an effective calculation for flood forecast that utilizations information from the hubs of a spatially dispersed sensor arrange. They have utilized Sacramento Soil Moisture Accounting (SAC-SMA) as in reference which is a productive model distinguishing flood effortlessly. Be that as it may, SAC-SMA is

expensive technique unquestionably not reasonable for a creating nation to be sent for flood recognition. This approach is utilizes less difficult calculations when contrasted with the traditional ways to deal with flood displaying and expectation, using realtime information from numerous sensor hubs. This expresses the benefit of this model over SAC-SMA show. Considering the model executed by Basha et. al as a kind of perspective, it turns out to be certain that for creating and poor nations very influenced by flood circumstances consistently, a minimal effort flood cautioning framework can be produced and can be effortlessly deployable with late accessible advances of Wi-Fi, ZigBee and so forth. Besides, it additionally winds up important to plan and chronicle the total detected information with appropriate security for advance forecast of flood circumstances in coming years. IoT and distributed computing serves the best in this part as a medium to store and investigate the sensors' information adequately.

Ancona et.al in their paper have talked about the need of simple to-utilize graphical interfaces and IoT based Platforms for this reason. A portion of the illustrations incorporate Thinspeak, ThingsWorx, Eclipse, Artik, AWS IOT, Google Cloud, Salesforce, Xively and so on.

#### **D. IoT Hardware Resources**

Broadly utilized equipment assets right now by the business ventures are Arduino, Raspberry Pi, Intel Joule, Beaglebone Blue and Green, Dragan Boards, ESP8266, Humming Board, Intel Galileo sheets and so forth. This IoT equipment will connect the sensors and the cloud stages for successfully actualizing the flood monitoring, discovery and flood cautioning or ready frameworks in the next years to come.

### **III. Implementation**

New advances deliver basic and minimal effort devices that can be utilized to take care of such issues. In this work, some of these apparatuses are utilized, for example, ESP8266 board that fills in as a Wi-Fi module. This board has ease, straightforwardness in programming and the capacity to interface with different gadgets. Another apparatus is the GSM shield, which is a prepared board manages GSM systems without extra interfacing circuits. By every one of the information got, the neighbourhood experts could foresee the level of flood affect toward the territory of this model secured.

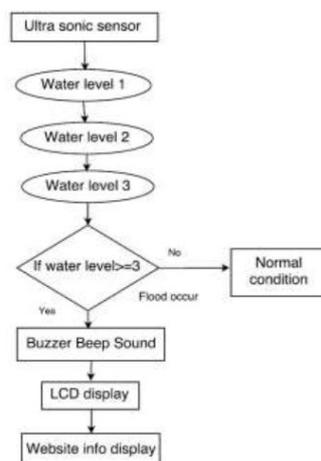
A flood cautioning is the point at which an official declaration is given (by TV, Radio, Text Message or Phone, Email or different means) of an approaching flood or an as of now flood that has just happened. So we require a framework that gives us a notice as well as it reveal to

us surmised date or month that there is probability of Flash-flood so the general population move to safe spots or if nothing else they get ready before some harm happens.

The current framework does not have enhanced usefulness where each individual doesn't have web Connection so it might be hard to get notice about climate .There is a need to build up a framework that can without much of a stretch distinguish or perceive the flood. These would take care of numerous ongoing issue happen amid floods and it likewise help to spare others life. The issue with at present created framework is that it doesn't bolster remote monitoring and furthermore utilizes an attractive sensor which get actuated when it reach to third level then it will show that level with LED and bell gets ON.

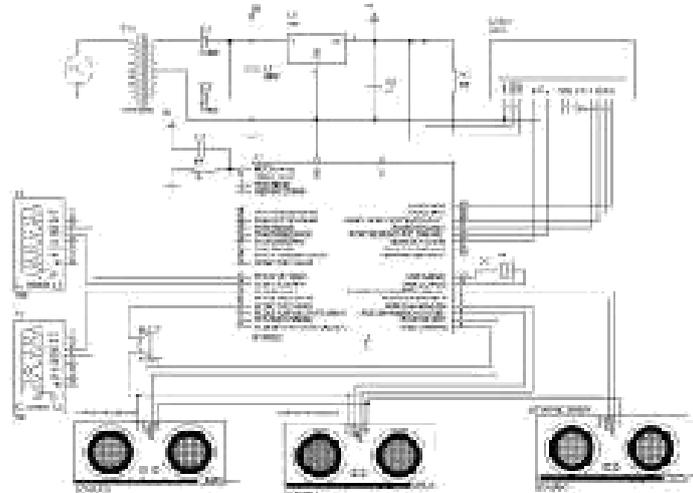
The motivation behind this undertaking is to diminish the harm cause by the floods. In this venture, we are building up a framework which check the water level of dam, waterway and furthermore hint the concerned specialist when the water level surpasses the breaking point and a site which will consistently screen the flood inclined zone and furthermore screen the site and give additionally check to the safety measures directions and forward it to web server.

Flooding is caused by the deficient limit inside the banks of the waterways to contain the high stream brought down from the upper catchments because of overwhelming precipitation. It is additionally caused by gathering of water coming about because of substantial spells of precipitation over zones, which have poor waste qualities. Our framework have input field as ultrasonic sensor which check the water levels. The flow of the system is shown in figure 1. To begin with check the water level 1 at that point move to water level 2 at that point check the water level 3. In the event that water level is more prominent than equivalent to 3 at that point flood happen and the data showed on LCD and additionally in site in graphical configuration.



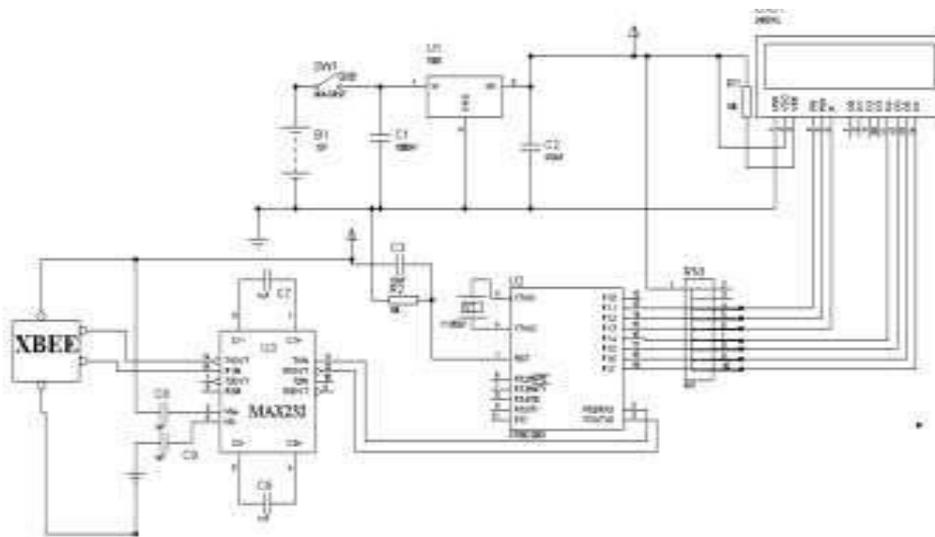
**Figure 1: Flowchart of the System**

Flooding is emphasized by disintegration and silting prompting wandering of the waterways in fields and lessening in conveying limit of the stream channel. It is additionally bothered by seismic tremors and avalanches, prompting changes in stream course and blocks to stream. Synchronization of floods in the principle waterways and tributaries and impediment of stream because of tidal impacts prompt real floods.



**Figure 2: Circuit Diagram for Ultrasonic Sensors and Tanks**

The thought behind every contactless strategy is to quantify separate amongst handset and liquid. As said previously, we transmit short ultrasonic heartbeat and we measure travel time of that heartbeat from handset to fluid and back to handset. Ultrasonic heartbeat will skip from fluid level since in light of the fact that difference in thickness of ultrasonic heartbeat travel medium (ultrasonic heartbeat first go through air and bob of fluid with higher thickness than air). Since water has higher thickness, larger part of heartbeat will bob off.



**Figure 3: Flood LCD Circuit**

So the primary capacity of the sensor is to give the data about the appearance of the water. At that point data is given to the flag conditioner whose principle work is to make approaching sign from sensor reasonable for interfacing with the another IC. In this framework the flag conditioner that is upsetting enhancer changes over the little flag into abnormal state Signal. Along these lines by utilizing this hardware we will give the data to the waterway sided individuals or the pioneer of town individuals, single as well as we can send back rubs to the quantity of people who inhabit the stream side. That implies in the wake of gating the message they will leave the waterway side rapidly join the protected place or far from the risk zone. This flood ready framework is essentially valuable to get thought regarding flood in gauge, to do the detecting of the approaching water level for recognition of flood is finished by actualizing ultrasonic sensors which are the low level medium level and abnormal state sensors.

#### **IV. Conclusion**

The total flood alert gadget is made out of two sections— body and siren framework. Sensors and remote correspondence conventions have been utilized to make a database and application server. The defenders were additionally ready to send a Short Message Service (SMS) flag of what the momentum flood water level was in a private unit to the metropolitan host of the territory. At whatever point monitoring the substantial geographic waterway bowls, dams, supplies and so on. These sensors can reach out to screen the Real time information and furthermore verifiable information.

Regarding every year support cost, this undertaking just devours less spending plans in battery utilization and media transmission administrations. This additionally enables diminishing the foot to print of administrator for on location monitoring. From the information recorded by sensor, the pattern of water level whether the ascents of water level that prompts flood or not can be anticipated. Due to utilizing microcontroller, the recurrence of information taken additionally can undoubtedly be checked and even balanced the postponement of information taken.

The caution is enacted by exchanging on a siren. This monitoring framework is a speedier and less expensive method for disturbing the pertinent partners and thus help keep the loss of lives and harm to properties. Moreover the information being utilized to arrange can be made more precise so exactness will increment further.

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## **Design and Fabrication of Chaff Cutter cum Pulverizer**

**Ram Vaidya<sup>1</sup>, Akshay Patil<sup>2</sup>, Aniket Thamke<sup>3</sup>, Sanket Deth<sup>4</sup>**

**<sup>1</sup>Professor, <sup>2,3,4</sup> Students**

**Mechanical Engineering Department, DMIETR, Sawangi (M), Wardha India**

**<sup>1</sup>ramvaidya@gmail.com, <sup>4</sup>sanketdethe54@gmail.com**

### **Abstract**

Chaff cutter is a hay or straw cutting machine which is used in uniform chopping of the chaff for livestock or raw material to agro industries. The various types of fodder can be processed in this machine are forage grass, green grass, dry corn straw, and wheat stalk etc. The final products can be used to feed cattle, goats, deer, and horses. It can also process cotton stalk, bark, and small branches. Chaff cutters have developed gradually from the basic machines into commercial standard machines that can be driven at various speeds so as to achieve various lengths of cuts of chaff with respect to animal preference type. New chaff cutter machines consist of portable tractor driven chaff cutter where chaff cutter can be in the field and load trolleys.

**Index words:** Chaff, Uniform chopping, agro industries, Tractor driven chaff cutter.

### **I. Introduction**

A chaff cutter is a mechanical device used to cut the straw or hay into small pieces so as to mix it together with other forage grass and fed to horses and cattle. This improves the animal's digestion and prevents animals from rejecting any part of their food. A pulverizer or grinder is a mechanical device used for the grinding of many different types of materials. The chaff cutter cum pulverizer is a machine which is used for the combine operation of cutting the straw and pulverizing the necessary animal foods such as corn, wheat, millet etc.

### **II. Literature Review**

1) Author: Sanjay Patil –“Design & Modification of Chaff Cutting Machine”-Chaff cutter is a hay or straw cutting machine which is used in uniform chopping of the fodder for livestock or raw material to agro industries. The various types of fodder can be processed in this machine are forage grass, green grass, dry corn straw, and wheat stalk. The final products can be used to feed cattle, goats, deer, and horses.

2) Author: Chinmay Bandiwadekar- “Review Paper on Design & Development of Chaff Cutting Machine”- In recent past a human powered processing machine has been developed for fodder cutting. Machine consists of a human powered flywheel or a bicycle drive with speed variation mechanism. Hence, the effort for the process was extensive and unsafe. To overcome these obstacles we have designed a new cutting mechanism which is safer and effort reducing with minimum power consumption.

3) Author: Nilesh Sankpal- “Design and Modification of Chaff Cutter Machine”- Chaff Cutter Machine is hay or straw cutting machine which is used for uniform chopping of fodder for livestock to agro industries. In this paper, design and development of Chaff Cutter Machine is presented. The machine is developed gradually from basic machines into commercial standard machine that can be electrical driven to achieve various length of cut of chaff as per the preference. The new chaff cutter machine is modified for its compactness and to avoid blockage of grass.

### **III. Objectives**

Following are the objectives of the proposed work–

- To perform Chaff Cutting and Pulverizing operation at a single base.
- To reduce the cost of machine.
- To provide well cut and pulverized food to the respective animals.
- To make machine more compact.
- To reduce operating cost of machine.
- To make machine feasible for every farmer.

### **IV. Methodologies**

Following are the methodologies used for the proposed work–Problem detection in chaff cutting process–The existing machines are observed and studied properly to detect the problems faced by the user.

- i. Introduction to New cutting technology– The research work in this domain was studied and new methods were developed to achieve desired goal.
- ii. Single base operation– The efforts are made to combine Cutting and pulverizing operation and new multipurpose cutting mechanism is introduced.
- iii. Safety– Highest priority is given to safety of the operator.

## V. Construction and Working of Chaff-Cutting Machine

### A) Power Source – Electric Motor



Figure 1: Electric motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric generator, which has much in common with a motor.

The Electric motor is the heart of machine that provides rotational power to the cutting assembly.

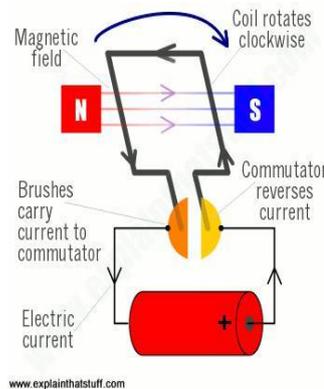


Figure 2: Working principle of electric motor

### B) V-BELT

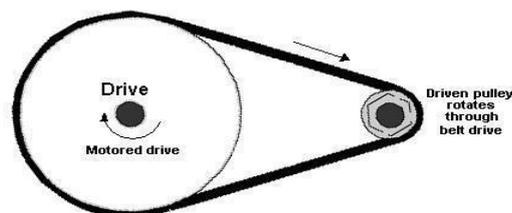


Figure 3: V-belt drive

The V-Belt is used to transmit the power from one pulley to another. The V-Belt has been in existence since the early 1920's. Through the years, many modifications are done in the use of material of V-belt construction and in cross-sectional shape as well. Originally, V-belts came

into existence to replace the flat and round belts on automotive drives to ensure greater reliability. V belt drive arrangement is used to transmit power from motor to shaft which is connected to cutter mechanism. The use of V-belts in multiple, allowed drives with a much variable range of horsepower capacity than ever before obtainable using single belt drives.

Advantages of V-Belt are

- Operates smoothly.
- Permit a wide range of driven speeds, using standard Electric motor.
- Can transmit power around corners or out of plane Drives.
- Clean and require no lubrication.
- Highly efficient.
- Noise generation is very less.

### C) Shaft

A Shaft is a rotating element, usually circular in cross section. Line shaft is used to transmit power from one shaft to another, or from the machine which produces power, to the machine which absorbs power. The various members such as v-pulleys, gears etc. are mounted on it.

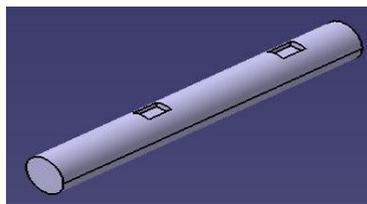


Figure 4: Shaft

### D) Chaff Cutting Mechanism

This is the main section of the chaff cutting machine. The fine and uniform chopping of the chaff is done in this Section.

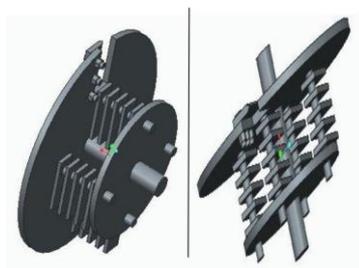


Figure 5: Cutting Mechanism

Cutter blade is the main part in chaff cutting machine which has consists of two blades i.e. one is cutting blade and other is pulverizing blade.

- a) Main blade: They have sharp edge; they used to cut grass into number of small steps. So that they can easily rotated in chaff cutting housing & get crushed in powder form by centrifugal blade
- b) Centrifugal blade: It is used to crush grass in powder form which throws the powder at the exhaust with high speed.

### E) Supporting Frame

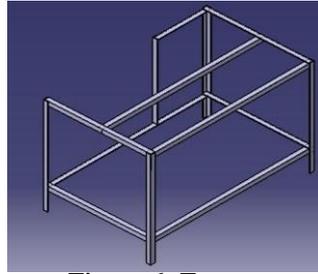


Figure 6: Frame

The Schematic diagram of supporting frame is as shown in Figure 6. The frame is built so rigid such that it can resist the load of different parts of machine.

### F) Assembly

The proposed design of the Chaff Cutter Cum pulverizer is as shown in Figure 7.

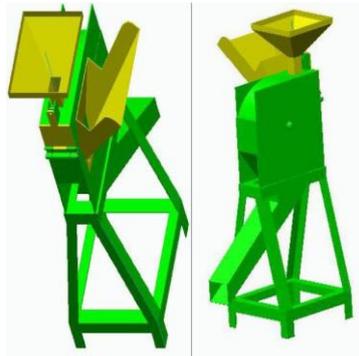


Figure 7: Assembly

## VI. Procedure

The working procedures are as follows-

- A) Supply power source to Electric motor:** The single phase AC motor is used to supply power Source to machine. Start the power supply to rotate the Motor.
- B) Power transmission through belt-pulley drive which are mounted on shaft:** For transmitting power we choose belt & pulley as power drive. This belt-pulley

arrangement is coupled to cutting blades by using coupling shaft. Hence rotation of cutting blades occurs.

**C) Feeding of food material:** We feed fodder through hopper. Two openings are provided to feed the material. The material such as chaff should be feed through the horizontal feeder and material such as dry corn should be feed through vertical hopper.

**D) Collect fodder from output tube:** The rotation of cutting blades causes cutting of supplied feed material like grass, dry corn straw into powder form. This light weight particles thrown away by centrifugal force of cutting blade towards outlet tube. So place container for collecting fodder in front of output tube and collect the well cut animal food.

## VII. Conclusion

Following conclusion can be drawn from the proposed work-

- We have replace different sources of chaff cutter by 1 H.P single phase motor which require low electricity & easily available anywhere so it's beneficial to farmer.
- By using different types of blades we can obtain different types of chaff for animal.
- By using this machine we can cut the sugarcane waste so that it can be utilized as a fodder for animal as well as grind various feeding materials such as dry corn straw, grass, soyabean, wheat stalk, with ease and thus reducing the manual work of farmer and increases the fodder production.

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## Comparative Study of ETL, ELT and ETLT Frameworks

Satyajit S. Uparkar<sup>1</sup>, Yoginee S. Pethe<sup>2</sup>

<sup>1,2</sup> Assistant Professor, Department of Computer Application,  
Shri Ramdeobaba College of Engineering and Management, Nagpur  
<sup>1</sup>uparkarss@rknc.edu, <sup>2</sup>pethey@rknc.edu

### Abstract

In the current era of big data analytics most of the organizations are reframing their data warehouses to cope with the needs to their internal as well as external end users. The traditional way of ETL (Extract, Transform and Load) requires changes in process to remove the deadlocks and the time consuming procedures. This can be achieved by the new trends of ELT (Extract, Load and Transform) frameworks. To solve the run time problems in this domain the recent trend of ETLT (Extract, Transform, Load and Transform) is a better option, which can switch over from one platform to another one, without redesigning it. This paper focuses on the comparative study of the pro and cons of these three frameworks.

Key words: big data analytics, ETL, ELT, ETLT

### I. Introduction

For the last twenty to twenty five year of time period in most of the organizations, ETL (extract, transform, load) has been the traditional approach for data warehousing and analytics. Since the volume of data has been increased from Gigabytes to Terabytes, the concept of data warehouse are now reached to data lakes. For these data lakes, the ELT (extract, load, transform) approach had changed the old paradigm. There is need to understand what's actually happens when the "T" and "L" are switched? On the other hand it is important to identify actually how it leads to new possibilities in many modern data projects. There are differences in how raw data is managed, when processing is done, and how analysis is performed. The researcher and the data scientist want to establish new opportunities to utilize these both the scenario by switching from one paradigm to another as and when required.

The 3 stages – Extract, Transform, and Load are defined as:

- **Extract** is the process of reading data from unstructured data pool and sending it into a temporary staging data repository. The extract function reads data from a specified source database and extracts a desired subset of data.

- **Transform** is the process of converting the extracted data from its previous form into the form it needs to be in so that it can be placed into another database. Transformation occurs by using rules or lookup tables or by combining the data with other data. The transform function works with the acquired data - using rules or lookup tables, or creating combinations with other data - to convert it to the desired state.
- **Load** is the process of writing the data into the target database. Loading the structured data into a data warehouse to be analyzed and used by business intelligence (BI) tools.

ETL is used to send data from one database to another, to form data marts and data warehouse and also to convert databases from one format or type to another. In other words, load function is used to write the resulting data (either all of the subset or just the changes) to a target database, which may or may not previously exist.

ELT should be used, instead of ETL, in the following cases:

- There are big volumes of data viz gigabytes, terabytes.
- The source database and the target database are the same.
- The database engine is well adapted for similar kind of processing, such as PDW, which is great at loading massive amounts of data very quickly.

The integration of ETL with ELT can be utilized to exploit the strengths of each approach as to achieve optimum performance and scalability. The objective is to move certain transformation processing onto the data warehouse platform as to take advantage of the inherent parallelism and the relational integration of data. This architectural shift is critical to the scalability of the Enterprise Data Warehouse.

## II. Literature Survey

To achieve the objectives of this study, the contribution of following research work stands beneficial:

The comparative study between ETL and ELT frameworks [1] has been elaborated using the processing of a data set. Based on various parameters like Data Read, Data Load, Runtime, Throughput memory and CPU utilization, comparative figures for ETL and ELT frameworks has been discussed.

A roadmap for implementing a complete prototype using conventional database technology in the form of hierarchical materialized views using ELT approach has been developed [2]. The paper talks about the need t to have fresher data for business insights at near real-time.

An application oriented approach of ELT Maestro [3] overcomes the short coming of the traditional ETL. It also provides the path to remove the inefficiency, and realize the potential performance and cost savings.

In Hadoop, ETL process becomes Extract, Load and Transform (ELT) targeting processing time reduction; however, in practice, during data loading step it was clear the existence of useless and redundant fields and transformation process improves if data is cleaned first, thus, we propose: Extract, Cleaning, Load and Transform (ECLT). [4]

A comparative approach ELT, ETLT and a novel ETQ has been discussed [5]. According to this paper, researchers have same opinion that semantic integration is one of mainly rigorous challenges for semantic web.

White paper of Informatica [6] and Intel [7][8], talks about the emerging trends of data mining approaches in the domain of business analytics. The necessity for new frameworks a are discussed in Roi Avinoam's blog [9].

The outcomes of the above review can be summarized in the following Section.

### **III. Comparative study based on 10 Pros and Cons:**

To summarize the three approaches, we've grouped the differences into 10 criteria:

#### **1. Time - Load**

ETL: Uses staging area and system, extra time to load data.

ELT: All in one system load only once.

ETLT: Take comparative less time to load.

#### **2. Time - Transformation**

ETL: Need to wait, especially for big data sizes - as data grows, transformation time increases

ELT: All in one system, speed is not dependant on data size

ETLT: Take comparative less time to transform.

#### **3. Time - Maintenance**

ETL: High maintenance - choice of data to load and transform and must do it again if deleted or want to enhance the main data repository.

ELT: Low maintenance - all data is always available

ETLT: Take comparative less time for maintenance.

#### **4. Implementation Complexity**

ETL: At early stage, requires less space and result is clean.

ELT: Requires in-depth knowledge of tools and expert design of the main large repository.

ETLT: Requires domain knowledge of tools and expert design of the main large repository.

### **5. Analysis and Processing Style**

ETL: Based on multiple scripts to create the views - deleting view means deleting data.

ELT: Creating adhoc views - low cost for building and maintaining.

ETLT: Creating switch views – high cost for building and maintaining.

### **6. Data Limitation or Restriction in Supply**

ETL: By presuming and choosing data a priori.

ELT: By HW (none) and data retention policy.

ETLT: No Data limitation or Restriction in Supply.

### **7. Data Warehouse Support**

ETL: Prevalent legacy model used for on-premises and relational, structured data

ELT: Tailored to using in scalable cloud infrastructure to support structured, unstructured such big data sources.

ETLT : Hybrid approach for both the approaches.

### **8. Data Lake Support**

ETL: Not part of approach

ELT: Enables use of lake with unstructured data supported

ETLT: Hybrid approach for both the approaches.

### **9. Usability**

ETL: Fixed tables, Fixed timeline, Used mainly by IT.

ELT: Ad Hoc, Agility, Flexibility, Usable by everyone from developer to citizen integrator.

ETLT: Hybrid approach for both the approaches.

### **10. Cost-Effective**

ETL: Not cost-effective for small and medium businesses.

ELT: Scalable and available to all business sizes using online SaaS solutions.

ETLT: Restricted to domain specific criterion.

#### IV. Conclusion

ETL is outdated. It helped to cope with the limitation of the traditional rigid and data center infrastructures which with the cloud are no longer a barrier today. In organizations with large data sets of even only a few terabytes, load time can take hours, depending on the complexity of the transformation rules.

ELT is an important part of the future of data warehousing. With ELT, businesses of any size can capitalize on the current technologies. By analyzing larger pools of data with more agility and less maintenance, businesses gain key insights to create real competitive advantages and excel in their business.

ETLT ingest massive amount of data without specifying a schema on write. This means that there is no need to predefine the data schema before loading to data operating system. Offload the transformation of raw data by parallel processing at scale.

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## Gas Cylinder Level Detector & IoT based Booking System

Yogesh Watile<sup>1</sup>, Manoj Khubchandani<sup>2</sup>, Shakshi Kahlon<sup>3</sup>, Piyush Dhotarkar<sup>4</sup>, Saloni Mehta<sup>5</sup>, Madhura Choudhari<sup>6</sup>, Vaishnavi Tiwari<sup>7</sup>

<sup>1</sup>Assistant Professor, <sup>2,3,4,5,6,7</sup> B.E. Students,  
Department of Electronics & Telecommunication, DMIETR, Wardha, India  
<sup>1</sup>ywatile@gmail.com, <sup>2</sup>khubchandanimanoj12@gmail.com,  
<sup>3</sup>shakshikahlon@gmail.com, <sup>4</sup>dhotarkarpiyush@gmail.com  
<sup>5</sup>salonimehta33@gmail.com, <sup>6</sup>madhuchoudhari5@gmail.com,  
<sup>7</sup>vaishnavitwari65@gmail.com

### Abstract

Technological Innovation in recent years had led to automation. Automation has become the essence of human life style. Many of the traditional approach have been outdated. Accepting this technology will lead to a comfortable life. The present LPG booking system consists of online procedure system where the consumer needs to follow certain steps to send request to the distributor for refill. The Interactive Voice Response System (IVRS) is being introduced for distributing and booking of LPG all over India. This LPG distribution system IVRS enables consumers to book their LPG refill on phone 24X7. This process is not user friendly as some times line is busy due to which there is delay in providing gas cylinder. There is also delay in informing to the gas agencies as consumers have no idea about status of gas level. This paper proposes a fully automated booking system using IOT with automatic gas level detection making this system user friendly. In this proposed work the load cell is responsible for automatically detecting the gas level. According to the status of the gas cylinder the output is generated and is fed to the aurdino Uno which sends request for refill to the webpage of gas agency through IOT after necessary processing. The response is taken from the consumer with the help of android application. There is also possibility of mishap due to gas leakage which causes hazardous accidents which costs human life. A gas leakage sensor has been implemented to overcome such kind of accidents.

**Key Words:** Liquefied Petroleum Gas, Internet of Things

## **I. Introduction**

India has become the second largest domestic LPG consumer in the world. Out of this LPG consumption by household has reached nearly to 19 million turn. There were several standards for the implementation of the gas leakage detection system. The existing systems provide an alarm system which is mainly meant to detect any Gas leakage in the house and commercial premises.

The objective of the proposed system is to automatically detect the gas level and automatic booking of the gas cylinder using IOT. It automatically measures the weight of gas cylinder. For this purpose we are using load cell (sensor). Load cell is a type of transducer which converts the mechanical pressure into electrical output. The output is further given to the aurdino Uno. But the obtained output signal is in few mili volts and input voltage (recommended) required to aurdino Uno is in the range of (7-12) volts. Hence this output signal is first amplified and then fed to aurdino Uno. After the further processing in the aurdino Uno the signal is send to the GSM (global system for mobile) module. GSM module consists of a SIM card for GPRS connection. GPRS is responsible for sending data to the cloud. This data is fetched from the cloud by the gas agency on their website. Then by fetching the data the gas agency will automatically place the order of the consumer according to the consumer number. And the consumer does the booking with the help of android application. This application has very simple design in which the consumer is able to book by clicking on 'PLACE THE ORDER' tab.

This proposed system also works on monitoring liquid petroleum gas (LPG) leakage to avoid major fire accidents and it also facilitates safety precautions as security is our prior issue. The system detects the leakage of the LPG using gas sensor and alerts the consumer about the gas leakage by sending message on the android application. By making this system centralized we can save the time and in future the system will work with home automation using IOT.

## **II. Objective**

The main objective of this proposed work is to automatically book the gas cylinder thus reducing manual work and making it user friendly. This research work also focuses on making this system time efficient. Further the problems related to Gas leakage is also taken care of through gas leakage monitoring system. Hence providing security against accidents caused due to gas leakage.

### III. Literature Review

In the year 2016, R. Naresh Naik, P. Siva Nagendra Reddy, S. Nanda Kishore, K. Tharun Kumar Reddy, “Arduino Based LPG gas Monitoring & Automatic Cylinder booking with Alert System”. This project uses the GSM Modem to alert the person about the gas leakage via SMS and status of automatic cylinder booking [4].

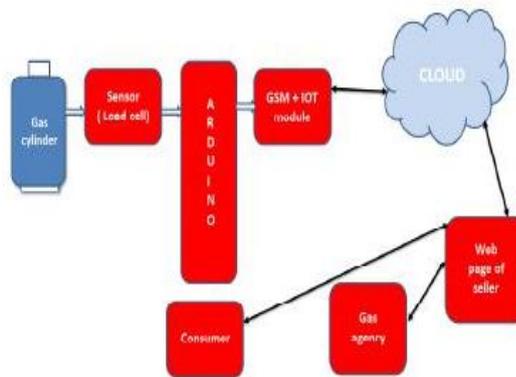
In the year 2014, Hitendra Rawat, Ashish Kushwah, Khyati Asthana, Akanksha Shivhare, designed a system. They provided security issues against thieves, leakage and fire accidents. In those cases their system sends SMS to the emergency number provided to it.

In 2013, few people developed the design proposed for home safety. This system detects the leakage of the LPG and alerts the consumer about the leak by buzzer. This project was developed using microcontroller ARM version 7 processor and simulated using Keil software.

In the year 2011, A. Mahalingam, R. T. Naayagi, N. E. Mastorakis, “Design and Implementation of an Economic Gas Leakage Detector”. This project developed system to detect the gas leakage and providing immediate alarm or intimation to the user. [3]

### IV. System Overview

The following block diagram includes Load cell, wifi module, i.e. ESP8266, LCD Display, Gas sensor (MQ6), Arduino Uno and ATMEGA 328.



**Figure1: System block diagram**

It comprises of ATMEGA-328 advanced microcontroller. The system is to automatically detect the gas level and automatic booking of the gas cylinder using IOT. It automatically measures the weight of gas cylinder using load cell (sensor). The electrical output of load cell is further given to the aurdino uno. After the further processing in the aurdino uno the signal is send to the GSM (global system for mobile) module. GSM module consists of a SIM card for GPRS connection. GPRS is responsible for sending data to the cloud. This data is fetched

from the cloud by the gas agency on their website. Then by fetching the data the gas agency will automatically place the order of the consumer according to the consumer number. And the consumer does the booking with the help of android application.

## **V. Working Area Details**

The Hardware and Software specification are given below-

### **1) Hardware**

The project is based on embedded system. An embedded system is a computer system with a dedicated function within a large mechanical or electrical system, often with real-time computing constraints.

#### **i) Load Cell**

Load cell is transducer which transforms force or pressure into electrical output. Magnitude of this electrical output is directly proportion to the force being applied. Load cells have strain gauge, which deforms when pressure is applied on it. Then strain gauge generates electrical signal on deformation as its effective resistance changes on deformation. A load cell usually consists of four strain gauges in a Wheatstone bridge configuration. Load cell comes in various ranges like 5kg, 10kg, and 100kg and more, here we have used Load cell, which can weight up to 40kg.

#### **ii) HX711 Module**

The electrical signals generated by Load cell is in few mill volts, so they need to be further amplify by some amplifier and hence HX711 Weighing Sensor comes into picture. HX711 Weighing Sensor Module has HX711 chip, which is a 24 high precision A/D converter (Analog to digital converter). HX711 has two analog input channels and we can get gain up to 128 by programming these channels. So HX711 module amplifies the low electric output of Load cells and then this amplified & digitally converted signal is fed into the Arduino to derive the weight.

#### **iii) AURDINO UNO**

The Aurdino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started "Uno" means one in Italian and is named to mark the upcoming release of Aurdino 1.0. The Uno and version 1.0 will be the reference versions of Aurdino, moving forward.

#### **iv) GSM Module**

Here we have used a normal GSM Module with a SIM card for GPRS connection. In this project, GPRS is responsible for sending data to the Sparkfun server. Many projects had used Wi-Fi module to send data to different servers over internet. But this time we have used GPRS.

## **2) Software Description**

### **i) (DREAMVIEWER) HTML**

When we will write a normal document using a word processor like Microsoft Word/Office, your text is saved in a file with a special format. It is not simply saved as the string of words you typed since the document needs to preserve things like the font you chose, the size of the text, which words are in bold, which italics, and so on. In the same way, web pages are simply strings of words put in a special format that web browsers are able to display. While the format of Word documents is simply called "Word format" (or "doc format"), loosely speaking, one might say that web pages are formatted using "HTML".

### **ii) CSS**

Cascading Style Sheets, or CSS, allow you to specify things like the font you want on your page, the size of your text, whether the page is to have 2 columns, whether your text is to be in bold or italics, and so on. In other words, it is the part that lets you control the appearance of your web page. You may be used to the Microsoft Word "doc" format, where everything from the text you type to the appearance of the document is specified in a single file, transparent to you. On the web, the raw information is specified in HTML and most of the appearance is determined by the CSS.

### **iii) Java Script**

Java script and PHP are three of the most commonly-used programming languages on the Internet. They are used by websites to carry out more complicated operations. Programs written in JavaScript run in the web browser itself, so if your website has a JavaScript program, the program will be automatically fetched by your visitor's browser and executed on his/her computer. PHP and Perl programs, on the other hand, run on the computer where your website is located, that is, on your web host's computer. After the PHP or Perl program does what it needs to do, it sends the result to the visitor's web browser, which merely displays the results

As an IDE then, Android Studio's job is to provide the interface for you to create your apps and to handle much of the complicated file-management behind the scenes. The programming language you will be using is Java and this will be installed separately on your machine. Android Studio is simply where you will write, edit and save your projects and the files that comprise said projects.

## **VI. Applications**

Following are some applications-

- It can be used for home automation.
- It can be used to maintain all details regarding transactions.
- It can come under the policy of "Digital India".

## **VII. Future Scenarios**

Following are some future scenarios-

- This system has great scope in the field of home automation.
- As this system is fully automatic it reduces man power.
- This project avoids the accident or the fire which is caused due to leakage of LPG gas.

## **VIII. Conclusion**

Following are the conclusions of the proposed work-

- This project can provide safe, secure and efficient way of Home automation.
- By using "Gas cylinder level detector and IOT based booking system" gas cylinder can be automatically booked with the help of android application.

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## **A Review on Intelligent Recommendation System for Higher Education**

**Dr. M. M. Raghuwanshi<sup>1</sup>, Dr. K. R. Singh<sup>2</sup>, Nikita Sawarkar<sup>3</sup>**

**Department of Computer Technology, YCCE, Nagpur**  
**<sup>1</sup>m\_raghuwanshi@rediffmail.com, <sup>2</sup>singhkavita19@yahoo.co.in,**  
**<sup>3</sup>nikita.sawarkar20@gmail.com**

### **Abstract**

Education domain is very vast and the data is increasing every day. Extracting information from this data requires various data mining techniques. Educational data mining combines various methods of data mining, machine learning and statistics; which are appropriate for the unique data that comes from educational sector. Most of the education recommendation systems available help students to choose particular stream for graduate education after successful schooling or to choose particular career options after graduation. Counselling students during their course of graduate education will help him to comprehend subjects in better ways that will results in enhancing his understanding about subjects. This is possible by knowing the ability of student in learning subjects in past semesters and also mining the similar learning patterns from the past databases. Most educational systems allow students to plan out their subjects (particularly electives) during the beginning of the semester or course. The student is not fully aware about what subjects are good for his career, in which field he is interested in, or how would he perform. Recommending students to choose electives by considering his learning ability, his area of interest, extra-curricular activities and his performance in prerequisites would facilitate students to give a better performance and avoid their risk of failure. This would allow student to specialize in his domain of interest. This early prediction benefits the students to take necessary steps in advance to avoid poor performance and to improve their academic scores. To develop this system, various algorithms and recommendation techniques have to be applied. This paper reviews various data mining and machine learning approaches which are used in educational field.

**Keywords:** Choice based credit system, Machine Learning, Recommendation system.

### **I. Introduction**

India's higher education system is ranked as third largest education system in the world; with Unites States and China being the first two [21]. The University Grants Commission (UGC)

is the central governing body which is responsible for advising the Government, coordinate between the centre and the state and defining and enforcing its standards. Although India has many prestigious colleges like IITs, IIMs, IIITs, JNU and many more; the country still lags behind internationally [1].

The traditional education system in India, also known as teacher centric education system, the focus is all on the teacher and the student's participation is discouraged. The teacher is in full charge of the activities carried out in classroom, which ensures that classroom remains orderly and students can concentrate more. This approach makes the students independent of taking their decision as collaboration with each other is discouraged. However, the communication skills of the students may get hamper in this system as they are not allowed to talk or work together for any activity. Moreover, the biggest con this approach has is that students are not allowed to express their opinions, ask questions and direct their own learning.

The outcome based education system, also known as student centric education system, shares the focus on both teacher and student. The students and teacher participate actively in the discussion or in the learning equally. Unlike teacher centric education system, this approach encourages student's collaboration and group activities which generates student's interest in learning. Since students are also involved, they are free to express themselves, ask questions and learn independently; which does not hamper their communication skills. However, it is the difficult task for teacher to manage all students' activities at once, which can be difficult when students are working on different stages of the same activity. This educational system is based round goals or outcomes. By the end of the learning process, each student should have achieved the goal. The role of faculty, adapts into instructor, trainer, facilitator, and/or mentor based on outcomes targeted.

Recently, the University Grants Commission (UGC) has proposed Choice Based Credit System (CBCS) to have a uniform grading system across India and abroad. As the name indicates, CBCS allows students to have a choice to choose from prescribed courses; referred as core, elective, minor or soft skill courses. This system permits students to study at their own pace and the assessment is entirely based on credits the students earn. The CBCS is the one step taken ahead to redefine higher education by developing the curriculum keeping pace with liberalization and globalization in education sector. This system aims at taking measures to enhance the quality of higher education in India by improving and bringing innovation in curriculum, teaching learning process and examination and evaluation schemes. The CBCS is already being implemented in top institutions in India and abroad. In most of the existing

systems, students are supposed to plan out their subjects at the beginning of the program (with the help of career counsellor) or at the beginning of the semester without accessing the students interest and his performance evaluation [9].

## **II. Choice Based Credit System in Engineering**

The CBCS can be seen as a “cafeteria” approach wherein students can select the subjects of their choice, understand them and learn at their own speed [1]. The subjects are three types of main courses namely the Core, elective and Foundation courses. The non-credit courses are also included in the program which are assessed either “satisfactory” or “unsatisfactory” and do not include in the performance evaluation. The core subjects are compulsory for each student to get the degree while elective subjects are those which a student can choose from a pool of subjects and are included for the final result of the student. The three categories of elective courses include discipline specific elective (DSE) course, dissertation/project, and generic elective course. The discipline specific elective courses are offered by the main discipline or subject of study, which can also include discipline related elective courses. The dissertation or project course is designed for the student to acquire specialized knowledge to a project. This course is generally studied by the student himself with guidance from faculty allotted. Generic elective course is chosen from undisciplined course to give the student an exposure to other disciplines. Foundation courses are offered to students to enhance their knowledge in subjects such as Environmental Science, Communication Skills and others which are mandatory for all disciplines [1].

The basic features of CBCS includes following [1][9]:

1. A semester pattern is followed in which a year is divided into two semesters: Odd and Even. The progress of student is calculated on the basis of courses taken on each semester. Each semester consists of academic training of fifteen to eighteen weeks; though there can be flexibility in this depending on the hours of teaching. Generally, 90 hours per semester are allotted for teaching.
2. Each course/subject is assigned a credit. The student earns this credit by passing in that particular discipline/subject. However, the student has liberty of earning these credits by his own pace and taking his own time.
3. The student is given freedom of choosing the number of subjects per semester and earns credits for those subjects. The remaining subjects can be compensated in the next semester. The credits can be earned in other college too. This gives the student a provision for credit transfer.

4. A continuous evaluation of student is done by teachers and student himself through assignments, tests and end semester examination.
5. A 10-point grading system has been introduced by UGC instead of marks. The CBCS is in compliance with the global grading systems.

### **III. Issues Related to CBCS**

CBCS is more advantageous over conventional methods of teaching [9]. However, some limitations are faced in practical applications. In most of the existing systems, the students are supposed to plan out their subjects in the beginning of the program; which can be done with the help of program counsellor. The students or the counsellor plans out the subject of the semester at the beginning of the program or at the beginning of each semester. However, student's performance or interest is not accessed before planning out the subjects. This affects the student's performance and the risk of failure. The student is not aware about what he has to choose to set his career path. That is, there is a lack of a mentor who can guide the student as to what should be his next steps towards his goals. The student himself is not aware of his capabilities and his career goals.

Though currently existing education recommendation system helps students to choose a graduating stream after junior college or after schooling, they do not provide for counselling or mentoring students during the course of education.

If a continuous mentor is available to a student throughout the program, then it is easier for him to plan his career more efficiently and improve his learning ability.

### **IV. Related Work**

Data mining techniques and machine learning algorithms are of use when massive amount of data is to be classified and analyzed. In the past few years, some efficient works have focused on the use of machine learning algorithms and data mining techniques in the context of educational environment.

A multidimensional approach to the recommendation system is proposed in addition to the typical information of user and items [4]. It makes recommendations based on multiple dimensions, profiles, and aggregation hierarchies.

Building a recommendation system in educational sector requires proper organization of data. One way of pre-processing this educational data is use of clustering algorithm. K-means clustering algorithm has shown good outcomes to predict student's results. A lot of work has been done in the field of predicting student's performance [14] [15] [16].

A novel approach which uses recommender system techniques for educational data mining, especially in predicting student performance, also proposes how to map the educational data to items in recommender systems. To validate this approach, recommender system techniques are compared with traditional regression methods such as logistic regression by using educational data and the results claimed that the proposed approach have better efficient prediction outcomes.

Mining educational data can aid the students in selecting their course major. However, more research is required as to which data mining techniques and machine learning algorithms can give precise results to support student's selection.

To reduce the risk of failure, a course enrolment recommender system have been developed which reminds students of their duties, warns them against difficult courses, and recommends them potentially beneficial courses [6]. It helps students to plan their subjects at the beginning of each semester. In addition to these existing systems, a collaborative recommendation system was engaged using association rules algorithm to recommend university elective courses to a target student based on what other similar students have taken.

An intelligent recommendation system for course selection of graduate courses provided a solution to the student's biggest bewilderment of choosing their correct field after the higher secondary examination [4]. This system provides for an effective counseling and guidance to the 10+2 students. Another intelligent system, acts as a course coordinator which is not achieved by the faculties of particular college or universities. This system helps students to select their course majors [7].

#### **How these issues can be resolved?**

The course recommendation system plays a significant role in managing the curriculum and counselling students on academic matters, with a view to fostering their academic progress. The students can plan the subjects of higher semester based on their performance in lower semester. This would help in his better performance as the student would choose only those elective subjects in whose core subjects he has performed well. Better selection of electives would lead to a better and clear choice of career and thus can help in comprehending the subjects. The selection of electives can be based on marks supported by various other contributing factors such as student's personal interest in the domain of subject, his extra circular activities in the campus, understanding of the core subject and so on.

The prediction of selection of electives for upcoming higher semester will be based on past learning of the data. Mining scoring patterns can help to discover learning abilities of

students from past databases; which would help in better prediction. Students can consider this prediction and choose electives accordingly to specialize in his particular domain of interest. The advantage of this early prediction can benefit student in taking necessary steps towards having and reaching his goal and thus avoiding poor performance. Moreover, the academic scores of the student would also improve as he would study willingly for his subject of interest.

The selection of electives and how the student performs in those throughout the course of programs shows a great impact on his career path. Choosing path of interest shows an influence in one's performance.

Based on the choice and prediction of electives, a career path can be recommended to the student. Having known career options in advance, the student can take necessary steps in developing his personality towards that particular field. The future career options may include pursuing higher educational courses like post graduation in engineering or management; having a job in specialized area; entrepreneur etc. The main problem faced by students in universities is to take the right decisions for their career [1] [9]. The election of subjects plays a key factor in shaping the future of students.

The current system forces students to enroll for the subjects prior to the beginning of semester. These courses include professional courses, elective courses, compulsory courses and skill courses. The compulsory courses do not leave a choice, however the students have liberty of choosing their elective subjects according to their interest. Being ignorant as a student, they face difficulties in having a conclusion as to which subjects are going to be helpful in their path of career as well as suits their interest. This takes the chances of misshaping the career of students.

### **How machine learning will help in solving these issues?**

Recommendation systems are intelligent agents that provide it's users with item recommendation or suggestions [4] [5]. There exists a dependency between user and item-centric activity. This can be explained with a very simple example of a customer buying a specific book. The customer can be interested in similar books on the basis of authors or the kind of book (inspirational, spiritual, romantic, fantasy, sci-fi, comedy). Studying the user history, we can recommend the customer similar kinds of books.

Collaborative filtering recommendation system makes the aggregation of customer's preferences and recommends them to other customers with similar behavioural pattern.

Content based recommendation systems make use of unsupervised machine learning algorithms to induce a classifier to distinguish between interesting and uninteresting items for the customer.

Knowledge based recommendation system collects data about customers and their products chosen to reason what meets the customer's requirements by making use of discrimination tree, decision support tools and case based reasoning. In an education environment, recommendation systems act as an intelligent agent or a continuous mentor to the students, having as starting point previous actions from other students with approximately the same characteristics which includes academic performance of the student, his extra-curricular activities and other personal information.

Building a recommender system requires utilization of many machine learning algorithms. These systems requires learning from past user data or history. The system "learns" from this data to give predictions by filtering only useful data from pool of information. These predictions are generally co-related to suit user's interest and their needs which are learnt from past data.

The user history provides for "training" the system. The system learns from it to give predictions on test data. For this learning, various data mining and machine learning algorithms are used; for example SVM, Clustering algorithms, decision trees, Apriori algorithm, K-means, K-Nearest Neighbors etc.

## V. Conclusion

This paper reviews various research carried out in the field of educational data mining, to improve and predict student's performance. The subject of focus is to improve student mentoring system which would help student to excel in his area of interest and to predict a definite career path.

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## **Electronic Toll Collection (ETC) of Transportations System with active RFID**

**Vaishali Pande<sup>1</sup>, Nivedita Hasti<sup>2</sup>, Anjali Rahate<sup>3</sup>, Kunal Tagade<sup>4</sup>, Anup Telrandhe<sup>5</sup>**

**<sup>1</sup>Aisstant Professor, <sup>2,3,4,5</sup> B.E. Students,  
Department of Electronics Engineering, DMIETR Wardha, India**

### **Abstract**

This paper focus on an automatic toll collection system using RFID technology. The technology uses a active tag that are mounted on the vehicle each tag has contain a unique identity code. In this system we used the concept of Radio Frequency at toll plaza The RFID reader (receiver) is connected when the vehicle reaches the toll plaza the connection between the vehicle and toll plaza is automatically created so there is no need to stop a vehicle at the toll plaza. It provides ease of payment to vehicle user at toll plaza. The amount of toll tax is automatically deducted from ID. And the user receive an SMS on this mobile after pass the toll plaza so the RFID technology reduce the man effort reduced time wasting and reduced congestion at toll plaza.

**Keywords:** Active RFID, authentication, automatic transmission, GSM, multiple tag reader.

### **I. Introduction**

Active RFID technology is used for transmitting the unique ID code to receiver Electronic Toll Collection Technology is very useful and advance technology. Security of barcode technology is less. In the RFID tag more information is store. The line of slight is not required for communication through radio wave. In previous system the toll plaza is under manually operated so, congestion, wastage of time and wastage of fuel these are the problems created in toll plaza is under manually operated so, this process is speed up at toll plaza. We will make a device i.e. RFID based automated electronic toll collection system. In this system accuracy is high for the toll plaza and vehicle owner. In active RFID technology system fuel loss is avoid, time is saving and reduce, toll payment is easy, toll gate entry for illegal vehicle is reduce. In active RFID technology using GSM for the message on the vehicle owner about the detail of payment after crossing the toll plaza.

## II. Proposed System

In this system we focus on automatic toll collection system. Every vehicle will be attached with a RFID tag which contains a unique ID of user. The RFID tag continuously transmits the information in each 3 seconds when vehicle reaches at the toll booth. Then the RFID reader read the given signal. And pass over to the controlling device. i.e. microcontroller then by the programming microcontroller 328 works, it first check the authority of the vehicle or user if the vehicle is authorized then specific tax for particular vehicle is automatically deducted from moving vehicle, which is pass through the toll plaza. Here it is assume that the owner maintain a ID for deduction of money. The Microcontroller stored all the required information of the user in database and, then after the deduction of money a user receives an SMS on his/her mobile about the detail of payment then also toll gate will be open by using active RFID. We reduced the time consumption at toll plaza also reduced the vehicle congestion at toll plaza.

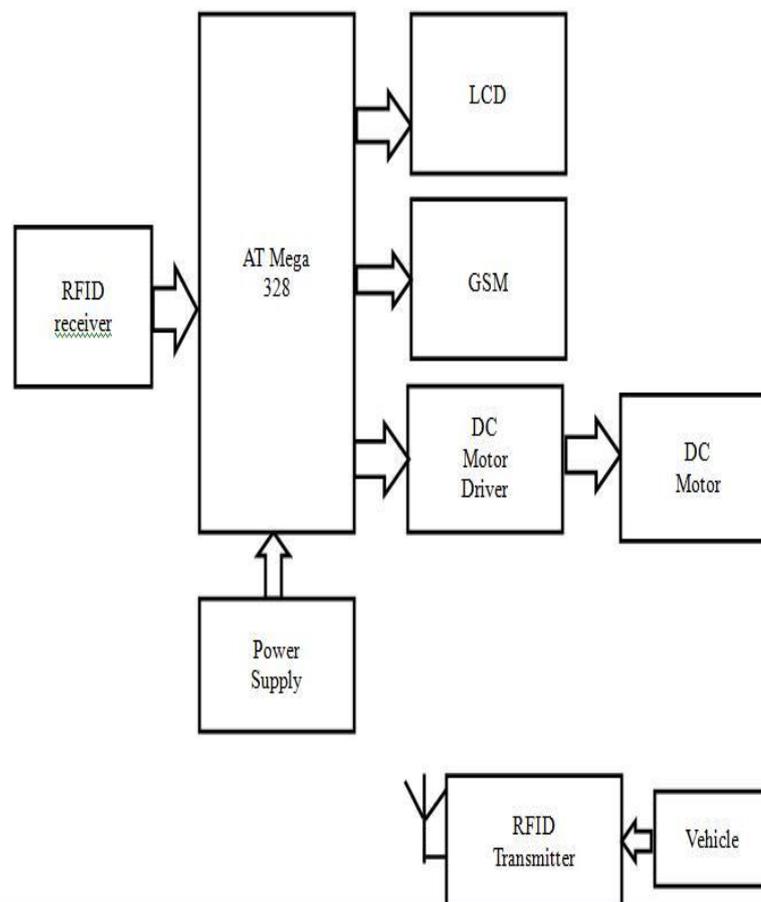


Figure 1: Block Diagram automatic toll collection system.

The working procedure of the system is explained by the following Flow chart

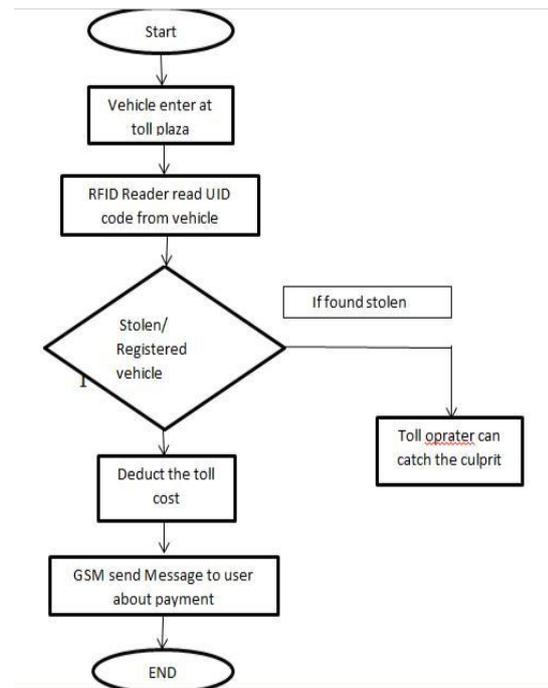


Figure 2: Flow chart of the system

### III. Hardware Components

The hardware specification of the system is as follows-

- i) **RFID Tag:** RFID stand for Radio frequency identification. The RFID tag is mainly divided into two type, active tag and passive tag. Active tag comes with internal power supply and passive tag required UID (unique identification) code to RFID reader when they are comes in contact with each other.
- ii) **RFID Reader:** A radio frequency identification reader (RFID reader) is a device used to gather information form an RFID tag. The concept of radio wave is used to transfer data from the RFID tag to RFID reader can read multiple tag at once.
- iii) **GSM:** In this system we used SIM 900 GSM module it is used to send the message of amount deduction on the registered mobile number, when the vehicle crosses the toll plaza.
- iv) **Microcontroller:** It is the most important component in over system. In this system we used AT Mega 328 Microcontroller. It is single chip Microcontroller created by Atmel in the mega AVR family the power consumption of this microcontroller is very low and Arduino Uno is used as development board for this controller by using we can easily dump a program in Microcontroller.

v) **Motor Driver:** In this system motor driver is used to open and close the toll gate, after the authentication of the vehicle. We used L293D motor driver IC in this system L293d can drive small and quit big motor as well. Motor driver are basically a current amplifier which takes a low current signal from the microcontroller and gives out a proportionally higher current signal. This can control and drive the DC motor.

#### **IV. Software Specification**

The software specification of the system is as follows-

i) **PCB Artist:** For designing a PCB layout we used PCB artist software PCB artist is just one of many PCB layout software tool. This is freely available on internet. We used software, has a version of 3.1.

ii) **Arduino IDE software:** The Arudino software is a programming tool. The programs written using Arduino software are called sketches. We used Arduino IDE software has a version 1.6.10. it is connect to the Arduino.

#### **V. Advantages**

Following are some advantages of the system-

- Communication through Radio wave so, line of sight is not required.
- RFID reader read multiple tag signals at once.
- Every tag has unique identity.

#### **VI. Applications**

Following are the two applications of the system-

- Automatic collection of vehicle toll tax.
- This system also used in advanced vehicle parking.

#### **VII. Conclusion**

After implementing this system we easily detect the vehicle identity. By utilizing this system in toll plaza it will reduced the complete processing time by few second which is very important as well as help to reduce vehicle congestion at toll plaza.

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# Application of Annotation Method in Image Retrieval

Mohini S. Upasani

Assistant Professor, Department of Computer Application,  
Shri Ramdeobaba College of Engineering and Management, Nagpur  
upasanims@rk nec.edu

## Abstract

Visual information plays major role in understanding surroundings and communication. The invention of cheaper digital cameras, high end technologies results in digitization of all kinds of materials. Every day, people upload images of their day-to-day activities on social networking sites. This leads to dramatic increase in digitization of documents in all sectors.

Different methodologies like TBIR, CBIR can be used for retrieval of digitized information. Since users are not serious about choosing appropriate tags, or assigning tags to the images, create inconsistency, ambiguity in image database which degrades the performance of TBIR system.

CBIR uses low level features like color, shape and texture. But both, TBIR and CBIR can't capture semantics in image. This need formed the driving force behind the emergence of Annotation technique for image retrieval.

Image annotation consists of associating, to each image, a group of words that describes the visual contents of the image by means of a system without human intervention. It facilitates conceptual image indexing and categorization to assist text-based image search which can be semantically more meaningful than search in the absence of any text. It is a good way to reduce the semantic gap and can be used as an intermediate step to image retrieval.

**Keywords:** social networking, digitized information, image annotation, image retrieval.

## I. Introduction

Text based and image based search methods can be used for retrieval of documents or images. Text based search engines like Google uses Information retrieval technique to access data from documents. While Image search engines uses text as well as contents for image retrieval. But all these techniques has some disadvantages. These problems can be resolved using automatic annotation. Automatic object annotation and identification plays vital role in image retrieval [1].

The complete paper is organized as follows: Part I of this paper introduced TBIR, CBIR models used in image search engines. Part II contains my study on TBIR, CBIR survey and need of automation for image retrieval. Part III contains various Annotation Techniques. Part IV include comparative study between various methods. Part V gives idea about some application areas. Part VI is based on conclusion and future scope.

## II. Image Retrieval Models

The following section is based on the two models-

### i) Search by Metadata (TBIR model)

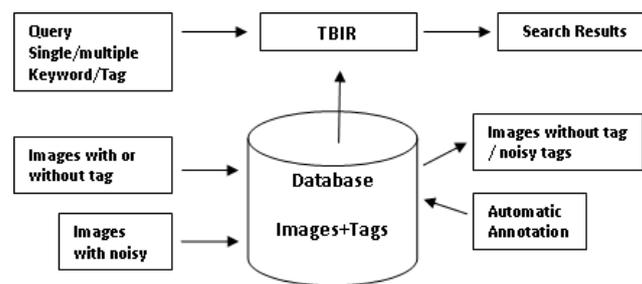


Figure 1: TBIR Model

User provides a query to text search engines, and then images that have similar keywords / tags or annotations are returned. Analysis of Google images is given in the following table.

Keyword in Query	Number of Images Retrieved	Images With Tags	Images Without Tags	Images Related to Query	Images Unrelated to Query	Remark
House near seashore	144	08	136	05	139	Simply pictures of house are retrieved.
Tajmahal	121	94	27	101	20	Group photos of visitors nearby to 'Tajmahal' are retrieved.

Table 1: Data Analysis Report of TBIR

Since users are not serious about choosing appropriate tags, or assigning tags to the images, create inconsistency, ambiguity in image database. Actual image is rarely examined using TBIR. This degrades the performance of TBIR system. So some automation is needed.

## ii) Search by Example (CBIR Model)

These systems rely completely on the contents of the image. Low level descriptors like color, shape, texture can be used as content descriptor. The image is analyzed; features are extracted and stored to retrieve similar images. For example, the color histogram serves as an effective representation of the color content of an image. But this procedure will not usually return similar images in the results.

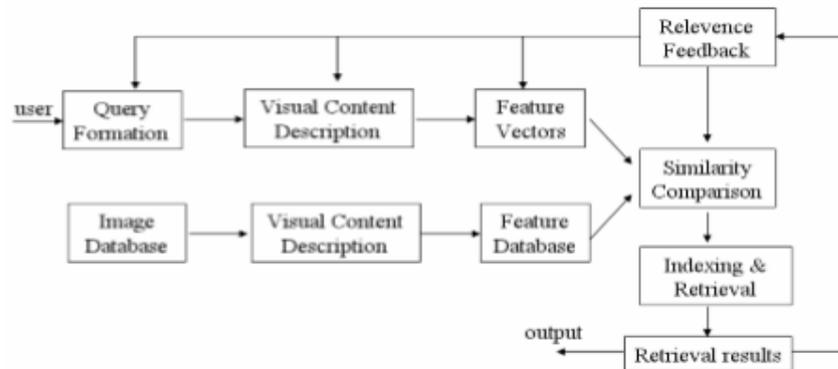


Figure 2: CBIR Model



Figure 3: Image from TinEye.com



Figure 4: Different Images with Same Histogram

## III. Annotation System

Associating textual information to images is done in two ways: Annotation and Classification.

**i) Annotation:** It is a method of associating, to each image, a group of words that describes the visual contents of the image.

**ii) Classification:** Images are assigned to a predefined particular group and then require object recognition in a category.

Following table shows object and its annotation.

No.	Object name	Material	Stained	Surface properties
1.	Christmas bear	Cloth	Pluriform	
2.	Lab-keys	Metal, cloth		Composite, shiny
3.	Apricot	Fruit	Uniform	
4.	Round candle	Candle, metal		Composite, shiny
5.	Nut	Wood	Uniform	Ribbed
6.	Pot	Pottery	Uniform	Smooth
7.	Shell	Shell	Uniform	Rough
8.	Green box	Plastic	Uniform	
9.	Shoe	Cloth, plastic	Pluriform	composite
10.	Women statue	Stone	Pluriform	

**Table 2: Annotation Example**



**Figure 5: An annotation example from Corel Stock Photo Library. beach, sand, sky, water**

Annotation is also helpful in image indexing and categorization to assist text-based image search. It produces semantically more fruitful results and treated as a powerful technique for image retrieval in absence of a text [2][3].

As base of image annotation is image content, it is helpful in removing semantic gap between TBIR and CBIR and thus can be used as an intermediate step to image retrieval.

**Annotation Techniques-**

Annotation can be performed 1) Manually or 2) Automatically

**i) Manual Annotation:** User enter some descriptive keywords when the images are loaded/registered/browsed [9]. Keywords can be selected on the basis of semantic content of images. Automatic image content annotation explores the visual characteristics of images and associates them with image contents and semantics. This annotation later on can be used as a textual request for image searching and retrieval [3] [4]. But effort intensive and monotonous

process. And users can forget the annotations they have used after a long period of time. Manual annotation is a boring task. As large amount of information is available, manual annotation is not practically feasible. So, most of the images on web are therefore available without adequate annotation.

**ii) Semi Automatic Annotation:** Semi Automatic Annotation requires some sort of user participation in the image annotation process. Machine learning algorithms can be used for user supported image annotation [5]. In semi automatic annotation, The user has to provide the feedback while examining retrieval results. The system returns the refined retrieval results based on the users feedback [6].

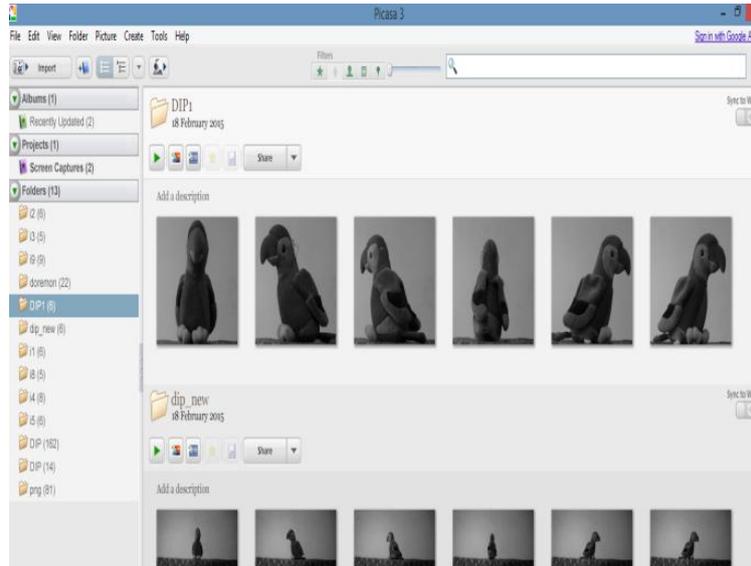
**iii) Automatic Annotation:** The main idea of Automatic Image Annotation is to automatically learn semantic descriptors from large number of image samples, and use the concept models to label new images. Once images are annotated with semantic labels, images can be retrieved by keywords.

In approach [7] of automatic image annotation method, unevenly shaped “blob” regions can be created using image segmentation algorithms. Global” features are used for automated image annotation. Annotator has to select the word for annotation of image with the some probability.

In [8], author suggested the relevance model where Image can be seen as collection of blobs. A training set of images are used for automatically annotating images. Training set of images with annotated keywords is required to predict the probability of deriving the label for the blobs in the image.

In [10], suggested approach improves the existing annotations of images by refining the conditional probability so that more accurate annotations will have higher probabilities.

In [11] approach, authors suggested semantic approach for automatic image annotation using fusion of classifier and features to improve the results of annotation.



**Figure 7: Picasa Tool used for Organization, Automatic Annotation of images**

#### IV. Comparative analysis of Image Annotation Techniques

Following table shows the comparative analysis of Image Annotation Techniques-

Image Annotation Techniques	Advantages	Disadvantages
Manual	Reliable if annotated properly	Tedious, Boring , Requires a lot of time & efforts, Costly
Semi-automatic	Efficient than manual Annotation, More accurate , Useful for dynamic database	Requires User interfaces refinements to improve the feedback process
Automatic	Speed Reduce time complexity	Need of efficient algorithms. Otherwise Produces more general (less detailed) Annotation.

**Table 2: Comparative Analysis of Image Annotation Techniques**

#### V. Application Areas

While taking a photo using mobile temporal / spatial and artist (photographer) information gets recorded. Also mobile store personal, social information of contacts, emails and friends. But due to constraints of hand-held device like mobile, the annotation algorithm needs to be as simple as possible. Semi-Automatic annotation can produce fruitful results for mobile phone data.

Automatic annotation is a useful technique for uploading images on web, library management, data centres, determining geographical maps.

## VI. Conclusion & Future Scope

Semi-automatic annotation technique performs better than other annotation techniques in terms of accuracy as user is participating in annotation process. Machine learning algorithms integrated with semi-automatic annotation can make the annotation method more intellectual. We can also use ontology based system for automatic image annotation.

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## **Sensor based farming without soil using hydroponics system for nutritional and healthy agriculture**

**Vaishnavi Suryavanshi<sup>1</sup>, Anuradha Kadu<sup>2</sup>, Dr. Sachin Upadhye<sup>3</sup>**

**Department of Computer Application,  
Shri Ramdeobaba College of Engineering and Management, Nagpur  
<sup>1</sup>suryavanshivr@rk nec.edu, <sup>2</sup>kaduad@rk nec.edu, <sup>3</sup>upadhyesd@rk nec.edu**

### **Abstract**

Due to cement forest, highly polluted environment, drastic uses of chemicals, wastage of industrialization those are harming the soil which is used for farming. As per today's necessity organic farming is widely used to overcome the problem of cultivation. Basically Hydroponics is used for organic farming where utilization of water and space are minimum. Methodology which is used for growing the plants is Hydroponic system which completely used water and nutrients without using the soil. The Water level sensor and pH sensor are used to provide the input to the Appurtenance for the crop. The hydroponic system is best because it reused the nutrients and water. It only uses the 10% of water for almost 400 plants than use for normal agriculture. In Hydroponic methodology the sensor plays an important role. Different sensor based automatic technologies are inexpensive like water sensor, humidity and temperature sensor which is based on mobile application. An automatic sensor not only takes readings but also stores that reading for future use. Now a days arduino micro-controllers and also mobile application which are compatible with a wide variety of sensor that can be used for automated monitoring. Paper is described in seven sections excluding the introduction part. Sections are accessible work, architecture, proposed method, experimental discussion, performance analysis, future scope and conclusion and last references.

**Keywords:** Sensor based, hydroponics system, nutritional values, multimedia application.

### **I. Introduction**

Various problems lead in urban area due to development conversion between housing and industry from agriculture land. On the corner of the city agriculture land is very limited. For food which is basic need urban society is depended on agriculture procedure. For this certain problem famous cultivation technique use by people is hydroponic. It is the technique of nutrient solution. Oxygen, water and nutrition are substitute of soil which flow into the plants. Various techniques are being cultivated for number of vegetables, nuts, spices and

fruits which all are grown in different environment wide range of essentials. The chemical fertilizers are harmful for all living beings which are drastically used for farming. So organic farming is essential for providing the friendly environment. For considering the human health an organic farming is implemented all over the world. To achieve this organic way of cultivation new technique is implemented. Hydroponic technique is important for organic farming. Nutrient Film Technique (NFT) is one of the hydroponic techniques. For successfully achieving hydroponic cultivation nutrient solution is prominent. At small place hydroponic greenhouse cannot be implemented as it requires a wide area to monitor a large numbers of green house at separate location. In that greenhouse one or more nutrition tank can be implemented but it becomes very difficult to monitor on different area. Monitoring can be easily done by using the sensor. Farming without soil project began at early of 1933 with 12 nutritional element solutions. Hoagland solution first developed by Dennis Robert Hoagland university of California with different crops and farming methods.



**Figure 1: Farming without soil**



**Figure 2: Seeding process**

## **II. Accessible Work**

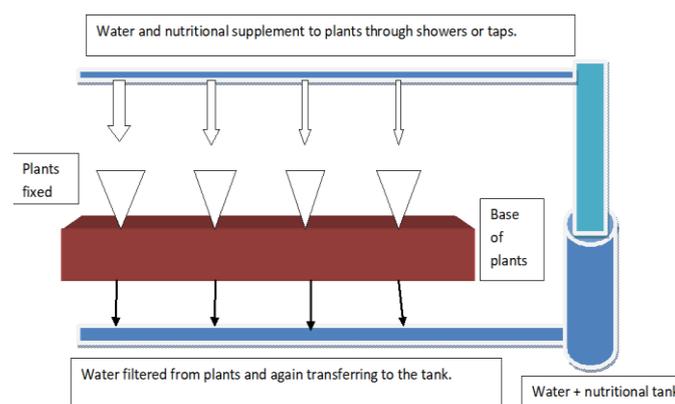
Basically this technology was successfully implemented in Japan. Later on UAE worked on this technology and now in India it is widely used like Noida, Bhopal, Ludhiana, Amritsar,

etc. Hiroshi Yoshioka, Mebiol Research and Development center's vice president shown a miniature garden of micro greens is blooming across on a transparent polymer film. In Noida greenhouse technique is used for farming without soil it had sterilized system for healthy plant less fertilizer wastage. Cocopeat, vermiculite, perlite which are used for affordable farming and take 20-25 days for seeding and three months for fruiting. Humid temperature is provided in green house for horticulture (vegetables and fruits). The cocopeat are crushed coconut jute, vermiculite and perlite are crushed stone for water absorbing. These three affordable materials gives moisture to the plants. In Punjab raw leaf, coconut fiber is mixed for farming with calcium nitrate, magnesium sulphate, mixture of micro nutrient, potassium nitrogen and phosphorus salt for planting fruits like strawberry, tomatoes, oranges, etc. Iron and zinc for leafy vegetables like spinach, basil, mint, etc. Cocopeats for brinjal, bitter gourd, pumpkin, etc. floating bed can be wood or thermocol which is cutted in small circular shape and can be one of the techniques for farming, air pump is inserted for oxygen. Cocopeats bag are used for potatoes, sweet potatoes, ginger, etc. This technique is applied in maximum regions.



**Figure 3: Underground farming without soil**

### III. Architecture



**Figure 4: Water and nutrition supplement to plants.**



**Figure 5: Water and nutrient supplement through pipe**

In Figure 5, it is shown the supply of water and nutrition. Base of plants is made of coconut jute vermiculite, perlite. Or the second method is of coco peat, coconut jute and raw leaves. Plants seeds are fixed in the base. To the end of every row, 1 tank is attached; on above and below the base plants pipes are attached. Tank has nutritional liquids and water in proper ratio motor is fixed to supply the liquid to plants by showering. That base will consume the water needed to it and excess liquid will filtered which will be collected in pipes below. Filtered liquid will again get mixed with tank liquid. And this process will get continued.



**Figure 6: Farming in greenhouse**

Figure 6, describes that this farming is done in a greenhouse where sensors are provided for maintaining indoor and outdoor temperature. It is secured with two to three doors for preventing the plants from heavy sunlight, external temperature and friendly or enemy insects. One sticky paper is attached on second last door of entrance. In case any insects entered it will get stick on sticky paper, and then with help of that necessary supplements can be added or more precautions can be taken.

#### **IV. Proposed Methods**

Following are the two different proposed methods for farming-

##### **i) Hardware Configuration**

Hydroponic outdoor system used wireless sensor network in nutrition tank we can place the sensor which is basically implemented in green houses. The sensors are water temperature sensor, temperature and humidity sensor, pH sensor, EC sensor. Water temperature sensor measures temperature of water which is provided to plants after every interval. Temperature and humidity sensor measures value outside and inside of greenhouse. Level of nutrition is measured by EC sensor which is soluted in water. pH sensor measure the value of level of acid. Water level sensor measure the water height in nutrition tank. In every greenhouse for every row of plants we can fix alarm for notifications of sensors. We can also implement red light facility for any danger.

##### **ii) Software Configuration**

One of the advanced techniques is mobile application where we can develop or install different mobile applications which are interconnected with sensors, notification of every sensor can be displayed on mobile application and alarm or red light can be activated. Receiver collects data sensors are temperature and humidity sensor, water temperature sensor, EC sensor, pH sensor of each hydroponic module on the node coordinator will be collected. Data sensors notification will be read by the application and can be stored in database for later activations. It can be monitored on local area network. It can be also sent through WLAN by using router.

#### **V. Experimental Discussion**

Following are the two sensors used in the system-

**i) EC sensor:** Electrical Conductivity meter sensor which performs the analog function providing water, containing nutrition with different condition of EC. In a box of nutrition and water sensor can be placed and output can be displayed on monitor. That monitor shows the measurement of meter and TDS meter.

**ii) pH sensor:** On different temperature pH sensor can be placed to check the moisture in plants. It can be displayed on monitors or on mobile applications and through that advanced technology like notification and alarm can be activated.

## VI. Performance Analysis



Figure 7: Performance

In between traditional methods and advanced technological method growth rate can be calculated as for 400 plants 40 -50 thousand money can be invested which can be build in 12x12 room. Because of highly sensing devices less number of water and fertilizer is used. Volume of water for per room is 10% than normal agriculture.

In Figure 8, structure in explained for requirement of materials.

1 is Place is described as it needs minimum space for farming without soil.

2 is Water and money, which shows that process of farming without soil needs less amount of water and money.

3 is output is maximum.

As this whole process is environment friendly, less or no pesticide is used, and because highly nutritional value fruits and vegetables are fresh to consume for healthy life.

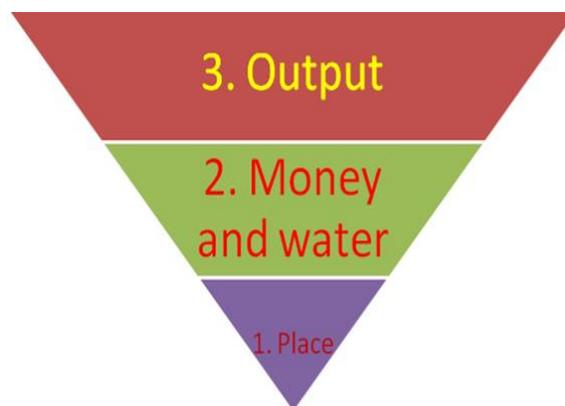


Figure 8: Structure

## VII. Future Scope and Conclusion

In advanced level farming without soil can be implemented in office, residential area. We can supply rich nutrients, pure processed water for getting more nutritional and healthy agriculture. Hydroponic system can also be implemented under water but to maintain its

moisture we have to develop highly sensible sensor and more progressive mobile application. Instead of supplying nutrition tank for each module in greenhouse, it can be merged in fewer amounts of tanks for minimum budget. Cheaper utensils like plastic bottles; it also can reused polybags for minimizing the budget.



**Figure 9: Fruits without pesticide**

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