Village 3.O

Meghashree V[#1], Namratha Ganesh[*2], Namratha Gopal[#3], Aruna Rao BP[*4]

[#]*Electronics and Communication Department, Visvesvaraya Technological University*

[1]meghashreevs16@gmail.com

[2]vathsalaganesh1970@gmail.com

[3]namrathag23@gmail.com

[4]arunaraobagre@gmail.com

***Abstract*— The project aims to bring the development in the rural areas by mainly considering three areas: Street light management system, Automatic irrigation system and Water management system. LDR sensors are mainly used to sense the light and it is used to switch off and on automatically, also the focus is made to detect fault in the street lights and alerts the base-stations . Depending upon the vehicle movement, intensity of the light is controlled. In case of Automatic irrigation system, soil moisture sensors are used to sense the dryness of soil and controlled amount of water flows into the field. pH sensors are used to segregate the water into two blocks with help of pH value content.**

***Keywords*— rural areas, LDR sensors, base-stations, intensity, soil moisture sensor, pH sensors**

I. INTRODUCTION

Till today 65% of our population is staying in villages. So there is a need to develop our villages and the rural areas for effective implementation. In recent times, there is an immense interest in the development of cities. But as it is perceived in Indian context, villages are the heart of the nation. Hence, for the development to percolate to the grass root level, focus must be devoted to the progress of villages. The proposed model aims at making optimal and sustainable use of all resources, while maintaining an appropriate balance between social, environmental and economic costs. Street light is the most critical element for any rural areas which has to ensure safety and moreover the manpower has to be reduced by making it automated. Also, the power consumption has to be minimized and the fault has to be taken care. In case of Automatic irrigation system, proper watering of plants has to be ensured for the healthy growth of the crops. This has to be automated for controlled watering for the field through the alert to farmers. Furthermore, Water is an essential intake for all the human beings and it has to be ensured that water is pure else cause of health problems is more. By segregating the water that comes from the main source in the village into two blocks, this can be implemented.

NR1 [1]

This paper analyzes the core requirements of street light management system which are representative IoT system. This paper establishes a NIO server to interact with terminals and successfully solves the connection maintenance problem between a large number of terminals, server and proves the stability & high performance of the scheme through experiments. Secondly, a distributed deployment scheme that meets the system management requirements is designed. By deploying terminal servers in different regions and using a database sub-library scheme, it can meet both the management and performance requirements. The solution can ensure strict permission control, unified user management and load balancing of terminals, and can be applied to a variety of IoT systems that require multi-region deployment. Thirdly, optimization schemes are given during the database interaction process. Finally, through two specific performance experiments this paper verifies the stability, usability, high efficiency of the terminal service node, data interaction and the usability of permissions management which indirectly proves the reliability of the overall system architecture.

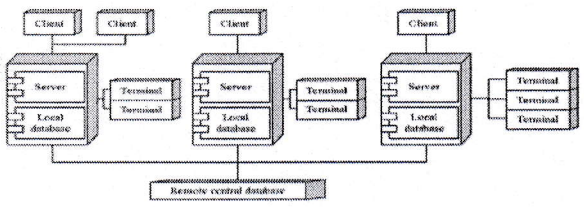

Fig. 1 The deployment of streetlight management system

NR2 [2]

The aim of automated street light management system using IOT is the conservation of energy by reducing electricity wastage as well as to reduce the manpower. Street lights are the elemental part for any roads since it facilitates better night visions, security and exposure to public areas but it consumes a quite large proportion of electricity. This energy wastage can be avoided by switching off lights automatically. The saved energy can be efficiently utilized for other purposes like residential, commercial, transportation etc. This project uses Light Emitting Diodes (LED) that do not consume an enormous amount of electricity to replace the power consuming traditional HID lamps. LED lights along with LDR enables the intensity variation which is infeasible with the HID lamps. This system includes an additional DHT11 Temperature-Humidity sensor. DHT11 is a composite sensor that contains a calibrated digital signal output of the temperature and humidity. It ensures high reliability and excellent long-term stability. This work is implemented using a programmed Arduino board for providing the required intensity of light at various times. It can reduce the energy consumption and maintenance the cost. It can be applied in urban as well as rural areas. The system is extendable and totally adjustable to the needs of the user. The need of the system is to reduce the maintenance cost and to increase the lifespan of the system. Initial cost and maintenance are some disadvantages of this system.

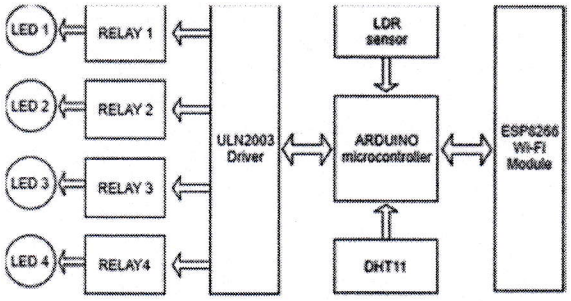

Fig. 2 System architecture

NR3 [3]

This paper aims to develop an energy management methodology applied in the streetlights of a school campus. The study is a street lighting that has the dimming capability to minimize the cost of energy consumption. The LED light will illuminate when an object is detected. Raspberry Pi and Pi camera module are used to control the dimming of the LED lights. Furthermore, it has the capability of detecting objects like people walking in the streets. The object detection was made possible in identifying human from other objects using computer vision technique. The study presented a design on streetlights with object detection and dimming capability. OpenCV library was chosen for object detection and image analysis because of its simplicity yet powerful features, platform independent library that supports open source software and with a good video support. Nevertheless, the dimming capability of the streetlight can clearly reduce power consumption, which gives a great impact to the society and can contribute better effect in the environment.

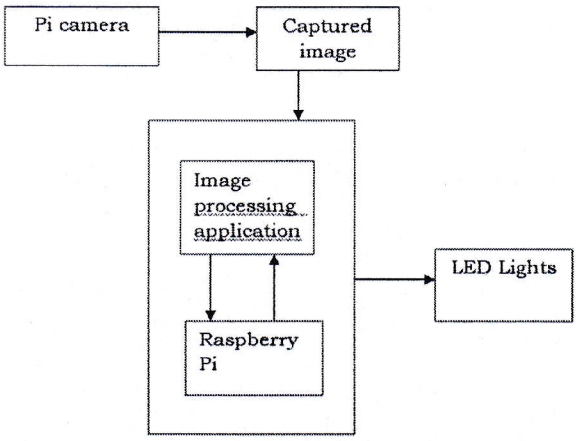

Fig. 4 System Block Diagram

NR4 [4]

This paper presents smart LED street light system which controls intensity of light during rain and fog. The system works first on colour sensor and then LASER beam light is used to detect the fog according to that, the intensity of LED light has been varied. If the beam of LASER light received by the colour sensor is very less then brightness of LED will be increased and when there is no fog or rain the intensity of light will remain low. This system is achieved by using ARDUINO, LED lights and LED dimming control PWM circuit. The mechanism of PWM circuit depends on pulse width modulation and analog to digital convertor features of microcontroller. The system is cost effective and simple in designing as compared to network based wireless sensor systems.

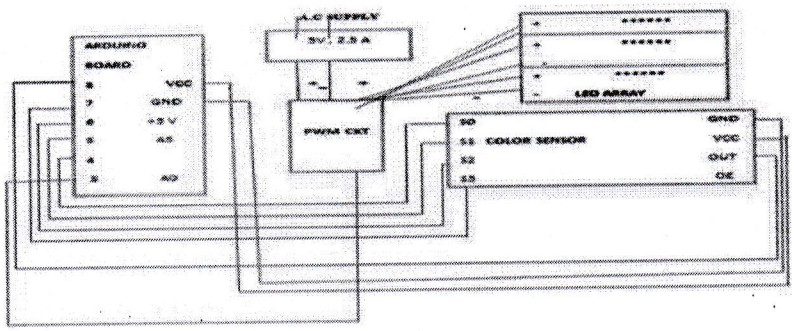

Fig. 4 Circuit Design

NR5 [5]

Currently, many researchers worldwide are focusing on creating a novel service model by integrating IoT (Internet of Things) technologies with ICT (Information and Communications Technologies) to increase energy efficiency by reducing power consumption and greenhouse gas emissions. This paper examines the problems related to the current integrated ESS (Energy Storage System) in a smart grid: high installation costs and low management efficiency. To solve these problems, this paper studies the development of a micro-distributed ESS in an intelligent LED (Light Emitting Diode) streetlight system, and its low-cost installation and high management efficiency in a micro grid. Through the application of this system, the initial installation costs can be reduced by using micro-distributed ESS and IoT-based intelligent energy management, facilitating power monitoring of the street lights and energy efficient demand resource management in the micro grid.

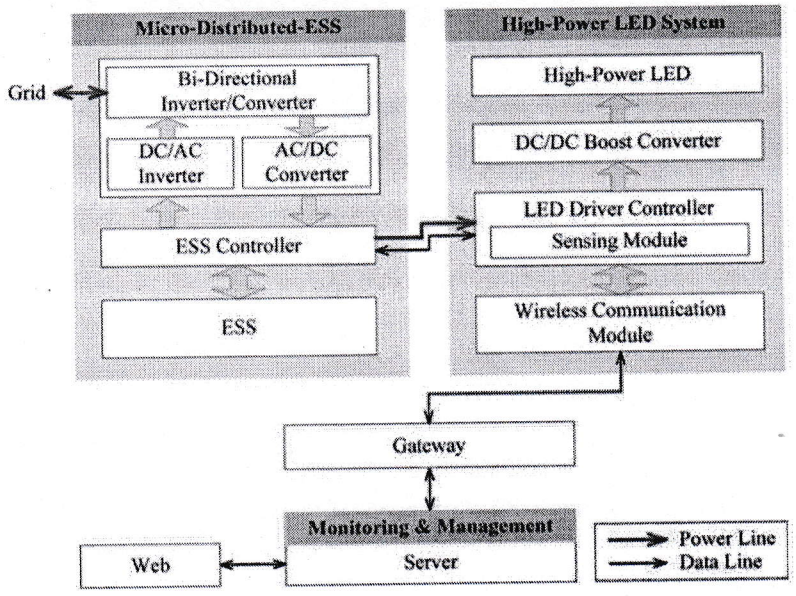

Fig .5 Architecture of the system

NR6 [6]

The main aim of this paper is to develop an automated irrigation system based on sensors which are interfaced to the microcontroller unit using the ARDUNIO board. The sensors used in this paper are temperature and humidity sensor DHT11 sensor and Soil moisture sensor VH400. These sensors are interfaced to the microcontroller unit and the whole unit was placed under the Root zone of the plant. The main motive of using microcontroller is to send an SMS to the mobile phone of an owner who is in the remote location. The microcontroller unit continuously monitors the sensors data and if the sensors data exceeds a particular threshold value then the microcontroller unit sends an alert SMS to the mobile phone of an owner who is in remote location. The sending of SMS is done by using SIM900. The different values for the DHT11 sensor is measured under different climatic conditions and set the threshold value based on those practical values. This system can be extended by using WSN nodes for transmit data and also using data base systems to store the data at the field. The overall system can be powered up using solar cells to maintain the system in low cost.

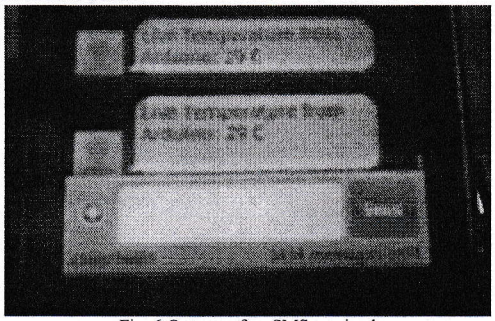

Fig. 6 Outputs of an SMS received

NR7 [7]

The idea behind this project is to optimize the use of water effectively and the motor will be pumped on and off based upon the texture of the leaf. The healthy leaf image will be already stored in the PIC16f877a microcontroller in the SD card. The captured leaf image from the camera is sent via Zigbee through signal conditioning processor to the microcontroller. When comparing both the images, if the captured image mismatches with the stored image in the microcontroller, automatically command will be sent from the controller to turn on the motor and thus irrigates the field. Also, the project aids in giving information about the suitable soil for cultivating the Plants such as Banana, Paddy, Wheat, etc. The automated irrigation system developed is found to be possible and cost effective for utilizing the water resources for agricultural production and also helps in biomass production. This irrigation system permits harvesting and cultivation in places with water insufficiency thereby improving viability. The system is found to be useful since it facilitates the automatic irrigation system and turn on the motor if the leaves are found dry and also provides information about type of soil for cultivating suitable crops.

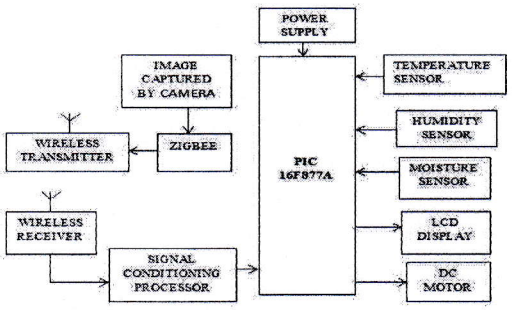

Fig .7 Block diagram of Automatic Field irrigation Setup Using MATLAB

NR8 [8]

Indian farmers are facing a massive problem due to frequent power failures. Solar powered automatic irrigation system can be a suitable alternative for farmers in the present state of energy crisis. This paper proposes an automatic smart irrigation System which uses solar power for irrigation. Solar powered water pump operates automatically based on different soil parameters like Moisture and Temperature. Hence ensures efficient irrigation as it uses solar energy simultaneously whenever a power failure occurs. By implementing the proposed system there are various benefits to both the government and the farmers.

JASC: Journal of Applied Science and Computations ISSN NO: 1076-5131

This can be a solution for the government in the present state of energy crisis. By using the automatic irrigation system one can optimizes the usage of water by reducing wastage and reduces the human intervention. The excess energy produced using solar panels can also be given to the grid with small modifications in the circuit, which can be a source of the revenue of the farmer, thus encouraging farming in India and same time giving a solution for energy crisis. Proposed system is easy to implement an environment friendly solution for irrigating fields. The system was found to be successful when implemented for bore holes as they pump over the whole day. Solar pumps also offer clean solutions with no danger of borehole contamination. The system requires minimal maintenance and attention as they are self-starting. GSM Modem is also implemented to get status of motor to the former by an SMS. Even though there is a high capital investment required for this system to be implemented, the overall benefits are high and in long run this system is economical.

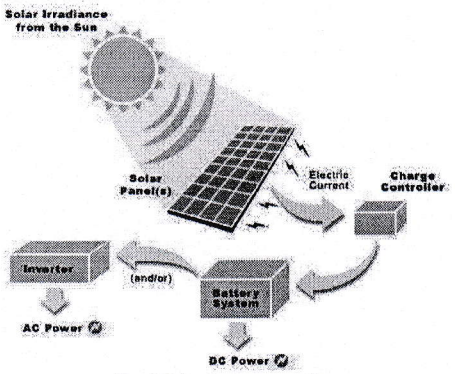

Fig .8 Solar power generation

NR9 [9]

The main objective of this paper is to provide an automatic irrigation system thereby saving time, money & power of the farmer. The traditional farm-land irrigation techniques require manual intervention. With the automated technology of irrigation, the human intervention can be minimized. There will be moisture sensors installed on the field. Whenever there is a change in water content of soil these sensors sense the change gives an interrupt signal to the micro-controller. Soil is recognized as one of the most valuable natural resource whose soil pH property used to describe the degree of acidity or basicity which affects nutrient availability and ultimately plant growth. For capturing the images, the phone camera is used and after processing the captured image the pH value of the soil is determined and accordingly crops or plants are suggested that can be grown in that field. Due to detection of soil pH value the chances of crops destruction becomes less. Installing the automatic irrigation system and determining the pH value it saves time and ensures judicious usage of water and farmers get to know earlier that what crops can be grown in his field. This system works in areas where there is no regular supply of electricity. The system is reducing human intervention therefore less energy of the farmer is required. In future the modules like Artificial Intelligence can be added to automatically learn the pattern of watering the crops.

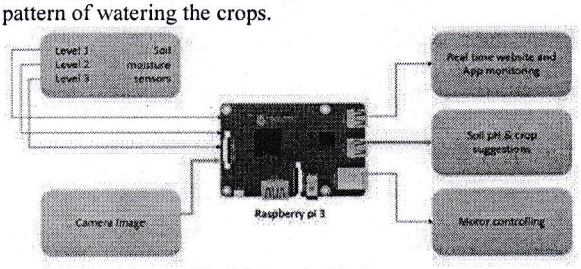

Fig .9 System Architecture

NR10 [10]

Climate change and rainfall has been erratic over the past few decades. Due to this in recent era, climate-smart methods called as smart agriculture is adopted by many Indian farmers. Smart agriculture is an automated and directed information technology implemented with IOT (Internet of Things). IOT is developing rapidly and widely applied in all wireless environments. For this, it is done using remote sensing, microprocessors, IoT, DBMS is proposed. The major objective is to get the real-time data and reduce the water that is lost in the irrigation process and reduce the time spent on the field. For future developments, it can be enhanced by developing this system for large acres of land.

JASC: Journal of Applied Science and Computations ISSN NO: 1076-5131

Also, the system can be integrated to check the quality of the soil and the growth of crop in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. Also, the system can be further improved by adding machine learning algorithms, which are able to learn and understand the requirements of the crop ,this would help the field be an automatic system. The observations and results tell us that this solution can be implemented for reduction of water loss and reduce the man power required for a field.

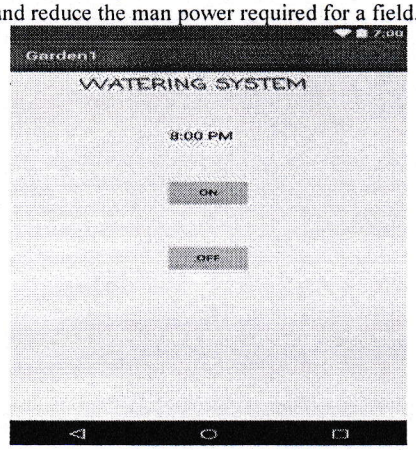

Fig .10 Android application

NR11 [11]

This project focuses on monitoring the use of water by considering one block of house in a flat system, where at the partition of pipeline from where the water gets diverted to various part of a block. The sensors will sense the flow of water to each pipe which ultimately tells the usage of water at one block ideally. This water usage data would be sent to cloud using the IOT (Internet of things) space. This cloud data would be sent to the concern resident's person's mobile app (application) reporting the water used and alerting the user to limit the water use if it gets extended to the limit usage set by municipal government or corporation. If the limit gets extended the user have to pay accordingly. This will be real time operation. The objective of doing so is for limiting and minimizing the usage of water for an average of per person. And secondly, the cloud data will be used as statistic data for use of water at every seasons that is winter, summer and monsoon so that measuring steps for water management can be taken with the appropriate statistics, yielding an avenue for predictive measure.

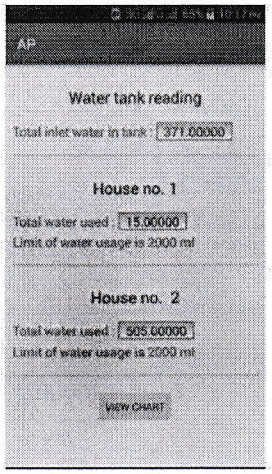

Fig .11 Mobile Application GUI at download of application

NR12 [12]

In this paper, a focus is made on the sustainable water management system based on Internet of Things (IoT), which automates the water distribution and storage as well as regulation of water wastage. An IoT system designed for sustainable water management is proposed for the Gudipadu Cheruvu village. The proposed system helps to reduce human intervention in water management which is adaptable in both the urban and rural scenarios incorporating the sustainability factor. The base structure deployed in Gudipadu Cheruvu has helped in overcoming the hardship of the community in terms of accessing water.

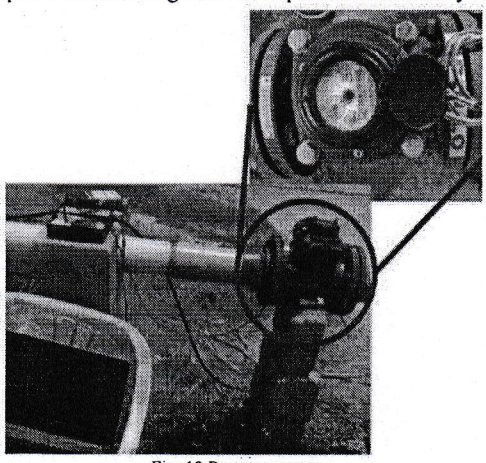

Fig .12 Prototype setup

NR13 [13]

Water flow is generally managed through locks and manually controlling these gates often turn out to be a long-winding process. Due to recent technological progress and increased connectivity in rural areas, a system of IoT devices proved to be alternative for managing the water grid. A new Low Power Wide Area Network (LPWAN) technology called LoRa is explored in this study for the communication of these IoT devices. The LoRa devices can communicate within a range of 2-4 kms while running on batteries in previous years. The water grid management system proposed in this paper involves different sensors deployed at various strategically chosen locations to measure the quality of water by generating real time data. The system also provides an alert mechanism which notifies the different level of authorities through email and SMS in case of any issues. Furthermore, it provides a solution for handling the locks that have been employed in and around the village to control the flow of water in a timely manner. The sensors attached with a micro controller in the LoRa module will communicate to the cloud environment through the LoRa gateway. A web page provides the interface to the residents and to the authorities to gauge the water quality after analyzing the data using the prediction algorithm. In particular, low power devices like LoRa and its implementations in various fields are very exciting because of the specific use cases and the longevity these devices offer. The prediction model run on the cloud for the sensor data shows a high level of accuracy in predicting the portability of water. Furthermore, the designed system can be rebuilt with Ericsson AppIoT framework to improve its security and scalability.

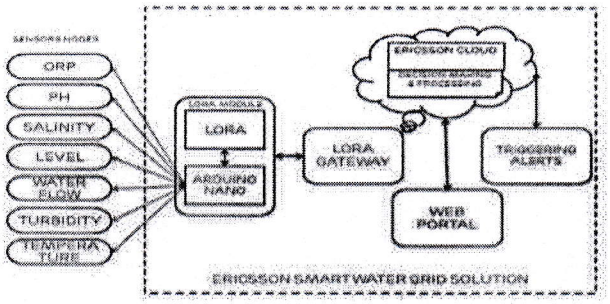

Fig .13 Overview of proposed project

JASC: Journal of Applied Science and Computations ISSN NO: 1076-5131

II. CONCLUSIONS

The study presented a design on street light management, automatic irrigation and water management. The study on street light proved that the man power is minimized and power consumption can be reduced. The study on automatic irrigation with several features like automatic switching on and off of the water pump based on the respective sensors output which helps in preserving the soil structure and nutrients, conserving water, time and provides gardening flexibility. The study on water management proved that it helps in avoiding health issues.

REFERENCES

[1] Boyu Sun, Min Dong, Kaihong Yang and Sheng Bi , "A design of high-performance streetlights management system" IEEE conference paper 2019,South China University of Technology.

[2] Fathima Dheena PP, Greema S Raj ,Gopika Dutt and Vinila Jinny S , "IOT Based Smart Street Light Management System" Proceedings of 2017 IEEE International Conference on Circuits and Systems (ICCS2017).

[3] Juvy Amor Galindo and Meo Vincent Caya, "Development of Street Lighting System with Object Detection" A platform of Electrical, Electronics, and Computer Engineering, Mapua University, Manila, Philippines ©2018 IEEE.

[4] Akansha kaul, Tina chaudhary and Nathi Ram Chauhan, "Design and Control of Street Light Intensity for Fog and Rai" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE) , Vol. 6, Issue 7, July 2017.

[5] Sanguk Park, Byeongkwan Kang, Myeong-in Choi, Seonki Jeon and Sehyun Park , "Sustainable Cities and Society" Sustainable Cities and Society 39 (2018) 801–813. Published by Elsevier Ltd.

[6] U N V P Rajendranath, Dr. V. Berlin Hency, "Smart Irrigation system" IEEE Sponsored 2nd International Conference on Innovations in Information, Embedded and Communication systems (ICIIECS) 2015.

[7] Janani P, Dr.N.Saravana Kumar , "Automatic Field Irrigation setup using matlab" International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 5, Issue 2, February 2016.

[8] A Sumalatha, G Eswar Kumar , "Energy Efficient Solar Powered Automatic Irrigation System" International Journal of Engineering and Management Research, Volume-7, Issue-3, May-June 2017.

[9] Sanjay Kumawat, Mayur Bhamare, Apurva Nagare , Ashwini Kapadnis, "Sensor Based Automatic Irrigation System and Soil pH Detection using Image Processing" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 04 | Apr -2017.

[10] P.Suganya,Aditya Subramanian, Yagneshwaran. B, Farheen Khan, S.R. Sushmitha, "Automatic Irrigation System using IoT " International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 04 Issue: 10 | Oct -2017.

[11] Chanda Rajurkar, S R S Prabaharan and S.Muthulakshmi, "IoT Based Water Management" International Conference on Nextgen Electronic Technologies, IEEE 2017.

[12] Sreekanth Narendran, Preeja Pradeep and Maneesha Vinodini Ramesh , "An Internet of Things (IoT)based Sustainable Water Management" Amrita Centre for Wireless Networks & Application (AmritaWNA), IEEE 2017.

[13] M Saravanan , Arindam Das and Vishakh Iyer , "Smart Water Grid Management using LPWAN IoT Technology" IEEE 2017.