TERM PAPER REPORT

Enrollment No.: 17103288, 17803004, 17103331
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Name of Supervisor: Mrs. Amarjeet Kaur

In partial fulfillment for the award of the Degree of
Bachelor of Technology
In
Computer Science Engineering

Department Of Computer Science And Information Technology

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY,
NOIDA December 2020

DECLARATION

We hereby declare that this submission is our own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Name and enrollment number:

Bharat Panjwani(17103288)
Shivam Rajpoot(17803004)
Soumy Agarwal(17103331)

Date:
12th December, 2020

CERTIFICATE

This is to certify that the work titled "**Smart Irrigation System"** submitted by "**Bharat Panjwani, Shivam Rajpoot, Soumy Agarwal"** in partial fulfillment for the award of degree of B.Tech of Jaypee Institute of Information Technology, Noida has been carried out under my supervision. This work has not been submitted partially or wholly to any other University or Institute for the award of this or any other degree or diploma.

Name of Supervisor: Mrs. Amarjeet Kaur

Date: 12th December 2020

ACKNOWLEDGEMENT

We are exceptionally obliged to Jaypee Institute Of Information Technology for their direction and consistent supervision and for giving vital data in regards to the undertaking and additionally for their help in finishing the task. We want to offer our thanks towards my folks and individuals from Jaypee Institute Of Information Technology for their kind co-task and consolation which help me in the consummation of this venture. We also take this opportunity to express our deepest and sincere gratitude to our supervisor Mrs. Amarjeet Kaur, DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY for her insightful advice, motivating suggestions, invaluable guidance, help and support in the successful completion of this project.

Name of Students:Bharat Panjwani,Shivam Rajpoot,Soumy Agarwal
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INTRODUCTION

If a good yield of crops is desired,then irrigation system requires constant monitoring especially in remote areas where water is scarce.Farmers usually control the water flow on the crops depending on the need of crops.Such needs depend on the temperature,soil moisture,health of crop and time.

In most of the countries, agriculture plays a vital role in the economy of the nation.Agriculture is considered as the back-bone of Indian economy. Around 70 % of the population still depends on Agriculture. 33% of the National economy comes from Agriculture. Smart irrigation system offers convenience while protecting your landscape investment. This system keeps your lawn and landscape beautiful and healthy.Thus smart irrigation system is used for automatic irrigation, best time complexity, and non-intervention of humans.

The solutions and technologies mentioned above are widely being used in many countries but considering these as indian context it becomes difficult to widely employ these solutions.The reason can be the financial status of the farmers.Therefore, a solution for this also needs to be developed so that farmers can access these technologies in the cheapest way possible. A smart irrigation system, contrary to a traditional irrigation method, regulates supplied water. The feedback mechanism of a smart irrigation system is a moisture sensor and temperature and humidity sensor.

TERM PAPER SUMMARY:

Paper 1:Smart irrigation system using Arduino Uno

Authors: Kavya Monisha K.,Aishwarya D.,Krupaleni K.

This paper introduces us to a smart irrigation system, using Arduino-Uno,checks the moisture level in the soil. If the moisture level in the soil is low, it automatically sends an alert message and turns on the water motor to flow water to the soil. If the moisture level in the soil is sufficient, it switches off the motor.This system reduces the effect caused by insufficient rainfall. This irrigation system prevents excess water flowing into the soil which causes a wastage of water, electricity and damage to the soil, effectively.

There are three modules which will lead to our smart irrigation system. The first module mainly checks the moisture level in the soil. The module uses a soil moisture sensor to measure the volumetric water content in the soil.The second module gets the output of the soil moisture sensor which is connected to a digital pin of Arduino. The second module consists of a LED in the sensor circuit. If the moisture level is sufficient, the LED is in on state and off when the moisture level in soil is low. The third module A Relay of 12v is used to control the small water pump of 220vac. The relay is run by a BC547 Transistor which is further connected to the digital pin 11 of Arduino Uno board.

Soil moisture sensor measures the volumetric water content indirectly by using some other property in the soil,such as electrical resistance, dielectric constant,interactions with neutrons, as an alternative for the moisture content**.**

Paper 2:-IoT solar energy powered smart farm irrigation system

Authors:A.R. Al-Ali,Ahmad Al Nabulsi,Shayok Mukhopadhyay

This paper proposes a system which utilizes a single board system-on-a-chip controller,which has built-in WiFi connectivity, and connections to a solar cell to provide the required operating power. The controller reads the field soil moisture, humidity, and temperature sensors, and outputs appropriate actuation command signals to operate irrigation pumps. The controller also monitors the underground water level,which is essential to prevent the pump motors from burning due to the level in the water well.

Power is supplied from the solar panel, during the hours of sunshine, to the charge controller, which is responsible for delivering power to the smart irrigation system and for charging the battery. At night, or during the time of a day when there is low sunlight, the charge controller powers the smart irrigation system using the battery.The charge controller used in this work is responsible for managing the overall powerflow. It handles the charging of the battery from the solar panel, and handles the supply of power to the load from the battery.
MyRio controller has 10 analog input channels, 6 analog output channels, 40 digital I/O lines, 3 embedded accelerometers, and a Wi-Fiadapter. The controller digital and analog inputs are used to interface with the float switches, soil moisture sensor, humidity and temperature sensor, and flow rate sensors, which are connected to the controller. The bilge pump is responsible for extracting water from the underground water table and storing it in a water tank.The diaphragm pump is connected to the water storage tank, which is responsible for irrigating the farm.

Paper 3:Smart Irrigation and Tank Monitoring System

Authors:Kumar Kunal,Md. Azhar Hussain,Dr. N Srinivasan,J.Albert Mayan

The paper is focused on the smart irrigation of farms as well as monitoring the tank automatically so as to make better irrigation system and tank monitoring which will be beneficial in conserving water and irrigating fields in a smart way.

The framework peruses the moisture substance of the dirt utilizing soil moisture sensor and switches ON the motor when the moisture is underneath as far as possible. Right when the clamminess level rises above the set point, the system switches off the pump.The tank monitoring system uses ultrasonic sensor to measure the level of water inside the tank which is automated and switches on and off the motor comparing to a threshold level which has been set and it also use DHT sensor which prevent the motor in case of leakage as the temperature will increase which switches off the motor going beyond certain level. The system uses GSM modem to communicate with user by sending and receiving text message as status of the integrated system. The status of the moisture, temperature, tank, engine and the dampness level will be shown on a 16×2 LCD show.We uses Relay Circuit board to turn on and off the motor which is used to irrigate the field automatically as soon as the moisture content in the soil goes down a certain fixed level based on the crops requirement and turns off the motor when the field gets irrigated at a defined level.

Paper 4:A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field

Authors:Ashwini B V

Automated Irrigation system using WSN and GPRS Module having main goal is that optimize use of water for agriculture crops[1]. This system is composed of distributed wireless sensor network with soil moisture and temperature sensor in WSN. Gateway units are used to transfer data from sensor unit to base station, send command to actuator for irrigation control and manage data of sensor unit. Algorithm used in system for controlling water quantity as per requirement and condition of filed. It is programmed in microcontroller and it sends command through actuator to control water quantity through valve unit. Whole system is powered by photovoltaic panels. Communication is duplex take place through cellular network. Web application manage the irrigation through continuous monitoring and irrigation scheduling programming. It can be done through web pages.

Paper 5:A Low Cost Smart Irrigation Control System

Authors:Chandan kumar sahu

This paper focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low cost which is usable by Indian farmers. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor. Finally send the information(operation of the motor and direction of water) of the farm field to the mobile message and g-mail account of the user.

The rainfall of in our country depends on monsoons. Rainfall controls agriculture, but the agriculture is said to be “the gambling of the monsoon” as the monsoon rainfall are uncertain, irregular and uneven or unequal. So irrigation is essential for agriculture.
In INDIA there are 80% of the total annual rainfall occurs in four months, i.e. from mid June to mid October. So it is very necessary to irrigation for farm field during the rest of the eight months

Paper 6:GSM Based Automated Irrigation Control using Rain gun Irrigation System.

Authors:R.suresh , S.Gopinath , K.Govindaraju , T.Devika , N.SuthanthiraVanitha

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. Whenever there is a change in temperature and humidity of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the micro-controller. India's major source of income is from agriculture sector and 70% of farmers and general people depend on the agriculture. In India most of the irrigation systems are operated manually. These outmoded techniques are replaced with semi-automated and automated techniques.

It is using automatic microcontroller based rain gun irrigation system in which the irrigation will take place only when there will be intense requirement of water that save a large quantity of water.This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. These system covered lower range of agriculture land and not economically affordable. The System Supports excess Amount of water in the land and uses GSM to send message and an android app is been used they have used a methodology to overcome under irrigation, over irrigation that causes leaching and loss of nutrient content of soil they have also promised that Microcontroller used can increase System Life and lower the power Consumption.

This paper is proposed to supports aggressive water management for the agricultural land. Micro-controller in the system promises about increase in systems life by reducing the power consumption resulting in lower power consumption. It is considered to be used at Cricket stadiums or Golf stadiums and also in public garden area for proper irrigation. Automated irrigation system has a huge demand and future scope too. It is time saving, led to removal of human error in adjusting available soil moisture levels and to maximize their net profits in accordance to factors like sales, quality and growth of their product.

Paper 7: IOT BASED SMART CROP-FIELD MONITORING AND AUTOMATION IRRIGATION SYSTEM

Authors:R. Nageswara Rao, B.Sridhar

The proposed method aims at making agriculture smart using automation and IoT technologies. Internet of Things (IoT) enables various applications crop growth monitoring and selection, irrigation decision support, etc. A Raspberry Pi based automatic irrigation IOT system is proposed to modernization and improves productivity of the crop. main aim of this work to crop development at low quantity water consumption, In order to focus on water available to the plants at the required time, for that purpose most of the farmers waste lot time in the fields. An efficient management of water should be developed and the system circuit complexity to be reduced. The

proposed system developed on the information sent from the sensors and estimate the quantity of water needed. A two sensors are used to get the data to the base station the humidity and the temperature of the soil, the humidity, the temperature, and the duration of sunshine per day. The proposed systems based on these values and calculate the water quantity for irrigation is required. The major advantage the system is implementing of Precision Agriculture (PA) with cloud computing, that will optimize the usage of water fertilizers while maximizing the yield of the crops and also will help in analyzing the weather conditions of the field.The paper aims a high precision monitoring the data and control agriculture automation system with IoT technologies. A Raspberry pi and cloud based IOT system to monitoring the real time data come from the crop field. The system mainly focuses moisture variations correlate with temperature changes data by smart sensors and controls irrigation system. In order to providing the cloud based computing to system the precision level has increases as suitable to use the system by farmer.

Paper 8:Automated Irrigation System Using Solar Power

Authors:Jia Uddin, S.M. Taslim Reza, Qader Newaz, Jamal Uddin, Touhidul Islam, and Jong-Myon Kim

This paper proposes a model of variable rate automatic microcontroller based irrigation system. Solar power is used as only the source of power to control the overall system. Sensors are placed on the paddy field and these sensors continuously sense the water level and give the message to the farmer informing the water level. Without visiting the paddy fields, farmers can get the information about the water level. Based on the water level, a farmer can control the motor by sending a message from his cellular phone even from a remote place. However, if the water level reaches to the danger level; the motor will automatically start without confirmation of farmer to ensure the proper water level in the site. This paper proposes a solar power controlled automated irrigation system. Sensors collect the information about the water level of paddy fields and update the farmer as well as the microcontroller. The farmer can switch ON and OFF the motor based on the water level even from distant places using a cell phone. However, if the water level reaches to the danger level, then the motor will automatically start to ensure the proper water level in the paddy field the face differ from criteria used in other locations; and our progression growth model for lentigo maligna delineates the different steps of malignant growth in lentigo maligna.

Paper 9 :-Solar Powered Smart Irrigation System

Authors:S. Harishankar , R. Sathish Kumar , Sudharsan K.P, U. Vignesh

Cost effective solar power can be the answer for all our energy needs. Solar powered smart irrigation systems are the answer to the Indian farmer. This system consists of solar powered water pump along with an automatic water flow control using a moisture sensor. Solar panels are nowadays extensively used for running street lights, for powering water heaters and to meet domestic loads.The cost of these are decreasing day by day hence increasing it's usage.

This paper introduces us the way by which we can develop a system of irrigation with the use of solar energy as source. According to this paper we utilize the solar energy from solar panels to automatically pump water depending on the intensity of sunlight.This will save substantial amount of energy and also efficient use of renewable energy.

The proposed system consists of two modules

1)Solar pumping module

2)Automatic irrigation module

In solar pumping module a solar panel of required specification is mounted near the pump set.Then using a control circuit it is used to charge a battery. From the battery using a converter circuit it gives power to the water pump which is submerged inside the well. Then the water is pumped into an overhead tank for storing water temporarily before releasing the water into the field. In automatic irrigation module the water outlet valve of the tank is electronically controlled by a soil moisture sensing circuit. The sensor is placed in the field where the crop is being cultivated. The sensor converts the moisture content in the soil into equivalent voltage. This is given to a sensing circuit which has a reference voltage that can be adjusted by the farmer for setting different moisture levels for different crops. The amount of water needed for soil is proportional to the difference of these two voltages.

Paper 10:Smart Irrigation Using Low-Cost Moisture Sensors and XBee-based Communication

Authors:By-A. Kumar,K. Kamal,M. O. Arshad,T. Vadamala

Deficiency in fresh water resources globally has raised serious alarms in the last decade. Efficient management of water resources play an important role in the agriculture sector. Unfortunately, this is not given prime importance in the third world countries because of adhering to traditional practices. This paper presents a smart system that uses a bespoke, low cost soil moisture sensor to control water supply in water deficient areas. The sensor, which works on the principle of moisture dependent resistance change between two points in the soil, is fabricated using affordable materials and methods. Moisture data acquired from a sensor node is sent through XBEE wireless communication modules to a centralized server that controls water supply. A user-friendly interface is developed to visualize the daily moisture data.

Moisture sensor is a device that measures the relative moisture of any environment.XBee is a low-cost and low-power wireless technology. XBee operates in the 2.4 GHz band with a data transfer rate of 250kbps and it supports peer to peer, point to point and point to multi-point networking methods with current consumption ranging between 30 to 40mA for data transmission. The current widely used technologies of Bluetooth and WiFi are compared with the XBEE technology and the advantages of XBee over Bluetooth and Wi-Fi are numerous for our application.XBee works over a larger distance then the Bluetooth and with lower power requirements then the Wi-Fi tech. Moisture sensor works on principle of varying voltage, due to varying impedance.

This can be represented using voltage divider equation

$V=R1/ (R1+R2)$

Where R1 is resistance of soil, R2 is resistance comparable to R1, V is potential drop across R1.

Paper11:Smart Irrigation System using IOT and Raspberry Pi

Authors:Ms. Swapnali B. Pawar, Prof Priti Rajput, Prof. Asif Shaikh

With India being one of the largest fresh water users in the world and most of it going to the agriculture, it is imperative to deploy measures that improve energy efficiency and save water at the same time as the fresh water reserves of the world have been depleting at an alarming rate and the time is now or never. In this project we use raspberry Pi to implement IOT based smart system which monitors soil moisture, humidity and temperature and the sensors send an alert to the Pi if there is any change in the values. We are using "ATMEGA318" microcontroller which is on Arduino UNO. Raspberry Pi is used to send data to microcontroller through internet.

Raspberry Pi used here is basically a mini modern day computer that has 1 gb ram, 2 usb ports, display port, ARM V8 and other connectivity options as needed and is capable of doing the any job needed. Relays are optically operated switches. The system also has a webcam which in interfaced to PI via Wi-Fi module. Since Pi cannot drive relays as they need 12 volts, and Pi only has 3.3V or zero, so It uses driver circuits.

Paper 12: Arduino based Irrigation System using IOT

Authors:R. Nandhini, S. Poovizhi, Priyanka Jose, R. Ranjitha, Dr. S. Anila.

In the following research paper, an IOT based automated system is proposed that uses sensors to measure soil moisture, pH, humility and pressure and use it to decide the ideal conditions for irrigation. There is also an intruder detection system which is implemented with the help of PIR sensor where the birds are repelled from entering into the field. It improves the management of water and reduces the chances of under or over irrigation.

Arduino UNO is the brains of the system, managing every aspect of the model. From sensing to informing the farmer. Components will be an Arduino UNO, a soil moisture sensor, pH sensor, DHT11 sensor(temperature and humidity), Pressure sensor, PIR sensor(Passive Infrared Sensor can over 10m at an angle of +-15 degree), Wi-Fi module(ESP8266 because it comes preprogrammed and only needs connecting to an Arduino to activate), and GSM module for notifying the user.

The main objective of this smart irrigation system is to make it more innovative, user friendly, time saving and more efficient than the existing system. Measuring four parameters such as soil moisture, temperature, humidity and pH values and the system also includes intruder detecting system. Due to server updates farmer can know about crop field nature at anytime, anywhere.

Paper 13:Network in Internet Of Things And Smart Grid

Authors:Li Li, Hu Xiaoguang, Chen Ke, He Ketai.

The smart grid system in various developed countries or groups of countries (United States, Japan , the European Smart Grid and how China has been working on one) has been referred to to show its effectiveness and uses. The next part is the recommended use of WiFi WSNs(Wireless Sensor Networks) over ZigBee as WiFi ones have much better bandwidths, form mesh patterns that allow multiple simultaneous signals to travel which are the two major issues in ZigBee. Also the fact that WiFi has better range, backwards compatibility, will be cheaper considering the amount of research going into it, has been around way longer, has better intelligence when dealing with nodes failure as each node can have upto 100 connections so alternate routes are easy to find and can travel through 1 load bearing wall compared to 0 of ZigBee are major factors in play. The last part of the paper deals with how WiFi WSN would be implemented in various fields and why it would be the better choice based on the advantage listed above. First one being that WiFi WSN is much better suited for apartment style IOT Smart Grid because of its ability to transmit data despite of NLOS and better transmission range and rate. Next application being in environment conservation; as of right now most of the data about environmental conservation is gathered from GPS and GPRS both of which have high operation and maintenance fee. Another option is cable network which is again costly and also not practical to implement in a wide area. Though using WiFi WSN in open area would be so much better o install sensors for data collection and transmission. Same goes for sewage treatment. Installing sensors using ZigBee is not possible though using Wifi would be really easy and could be monitored from the control room. This can be implemented on garbage collection and disposal as various steps could just have WSN sensors added and start functioning. Last application is in Smart Agriculture; sensors can be embedded in the soil to read various data including pH, soil nitrogen, moisture, temperature, wind conditions etc. Agriculture has recently become a hotspot for smart IOT based researches. It is possible to remotely diagnose diseases or pests and suggest the remedy to the owner from a remote server; but this requires low power WSN nodes to be based on Wifi.

Paper 14:-Design and Implementation of solar powered smart Irrigation System

Authors:-Dr. Esther T. Ososanya,Dr. Sasan Haghani,Dr. Wagdy H Mahmoud, Dr. Samuel Lakeou

This paper addresses water scarcity and food crisis by designing and implementing a smart irrigation system. It presents the details of a solar-powered automated irrigation system that dispenses the exact amount of water required depending on the soil moisture, hence minimizing the waste of water. A network of sensor nodes is used to collect the humidity and temperature of the soil which is transmitted to a remote station. This data will be analyzed and used to remotely control the amount of water dispensed by solenoid valves. The designed

project is currently operating at the university-owned agricultural experimental research station. The system can be tailored to the type of food or crop being grown. System Design The central power source is a two-axis solar tracking PV system [3, 4, 5, 6] mounted on a galvanized steel-pole. The photovoltaic array converts solar energy into a 2KW DC electrical power. The DC power is converted to AC through a 2.4KW, 115V, 60Hz inverter and provides adequate power to the automated irrigation system. In addition, various voltages are derived from the inverter to provide smaller AC voltages (i.e. 24V, 48V) through step-down power transformers.The DC power is converted to AC through a 2.4KW, 115V, 60Hz inverter and provides adequate power to the automated irrigation system. In addition, various voltages are derived from the inverter to provide smaller AC voltages (i.e. 24V, 48V) through step-down power transformers. After inserting a probe into the soil for approximately 60 seconds a meter indicates if the soil is too dry, moist or wet for plants. The sensor reads the amount of moisture in the soil. The soil moisture sensors used in this project are the solar powered SHT1x sensor series ICs from Sensirion . An energy efficient wireless sensor network is developed using Arduinos microcontroller and XBee modules.Arduinos are better to be utilized since it allows easy interface to standard Wi-Fi shields, USB, I2C, power regulation, etc. The disadvantage of the Arduino hardware is the drain on battery power when it is in operation. Arduino UNO already consumes more than 15mA in idle mode.

Paper 15:A Low Cost Smart Irrigation Control System

Authors:Andre Esteva, Brett Kuprel, Roberto A. Novoa, Justin Ko, Susan M. Swetter, Helen M. Blau & Sebastian Thrun

This paper focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low cost which is usable by Indian farmers. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor. Finally send the information(operation of the motor and direction of water) of the farm field to the mobile message and g-mail account of the user.

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In INDIA there are 80% of the total annual rainfall occurs in four months, i.e. from mid June to mid October. So it is very necessary to irrigation for farm field during the rest of the eight months

Paper 16:Automatic Plant Watering and Monitoring System using NodeMCU

Authors: Jayendra Kumar,Alisha Kumari

This paper aims at achieving automation for the purpose of plant monitoring and irrigation system, using Node MCU. Sensors are used for monitoring the environmental

conditions surrounding the crop, whose outputs are obtained on an Android based mobile application as well as uploaded on the cloud. The updates of the atmospheric conditions such as temperature, humidity and soil moisture can be fetched from anywhere in the world as the data is shared on the cloud platform (Thingspeak). A record of this data can be maintained which could be used for the future reference, i.e., in the next cropping season, thereby, enhancing the planning and development of crop production.

Paper 17:Automatic Water Supply Control System of Graded Constant Pressure by Variable Frequency Speed and Its Application to Pipeline Irrigation

Authors: H Kittler, H Pehamberger, K Wolff, M Binder

In pipeline irrigation system using pressurizing electromechanical pumps, the pumps usually work in constant speed under fundamental frequency power supply (50Hz) and the operation characteristics of pumps could not adapt to the practical changes of pipe network. When the irrigation area is huge or the gradient of field is high, the requirement of irrigation uniformity in the whole field can not be satisfied. Automatic water supply control system of graded constant pressure by variable frequency speed combines the frequency conversion and automation technologies, and is an electromechanical integrated intelligent device with functions of variable frequency speed control and automatic closed-loop control. This system switches pressure graded automatically according to required irrigation sub areas to realize graded and constant-pressure irrigation which could not only greatly enhance irrigation uniformity, but also has functions of saving water and energy as well as protecting the water pumps and the pipe network.

Paper 18: Study on precision water-saving irrigation automatic control system by plant physiology

Author: Yandong Zhao; Junfu Zhang; Jinfeng Guan

Precision water-saving irrigation automatic control system by plant physiology this paper described is one of the Olympic games facilities projects, which takes standards of water plant physiologically need and soil water content as the basis. Through the combination of independent research and development of irrigation monitoring controller and wireless data transmission, implement a drip irrigation, sprinkler irrigation, micro-irrigation, and low-pressure pipelines, such as different modes of irrigation automatic control. On this basis, the system monitors by GSM remote wireless communication make all irrigation incidents automatically enter into the database, and generate a variety of reports to the irrigation data for statistical analysis. This paper describes system structure on two aspects of hardware and software design, it is characterized by a flexible mode of operation, reliable control and data transmission, low-cost, remarkable water-saving effect. National road precision water-saving irrigation project's preliminary trial implies that this new type of precision water-saving irrigation control system with independent intellectual property rights has a higher value for promotion.

Paper 19: Design of Solar Powered Automatic Irrigation System

Authors:Piyali Das; Chichanben Patton; S Farishta Devi; Wanmedemora Ch Marak; Taba Yake

This study was conducted with few objectives of design a microcontroller based solar powered automatic irrigation system (AIS) model. To quantify the paddy field water content of and as well to provide adequate water supply in the right paddy- field areas. In agricultural areas this may help for the production of crops as well can prevent the wastage of energy. To provide an efficient design to the farmers is the main objective of this paper.

Paper 20: Automatic Agricultural Land Irrigation System by Fuzzy Logi

Authors: Zohaib Mushtaq; Syeda Shaima Sani; Khizar Hamed; Amjad Ali; Aitizaz Ali; Syed Muhammad Belal; Abid A. Naqvi

Water is an important component for agriculture. Conventional methods for irrigation system like canal, wells and rainfall are time consuming and seasonal. By using automated land irrigation system with hybrid power (Solar & Grid), water, time and energy. Therefore, maximum area can be irrigated in less time. The crux of this research is to design and simulate a fuzzy controller using MATLAB for automatic land irrigation. This controller is mathematically designed and simulated in MATLAB. It consist of inputs/outputs values with membership functions. Input involve agricultural land water level categorization and time. Output of designed controller consist of tube well operation and power source. Software and calculated evaluation have been done on input controlling outputs. We calculate outputs to get minimum percentage error difference between calculated and simulated results. We got 1.9% error in Tube well operation and 1.15% error in power source. The use age of such automatic land irrigation system will not only increase crops production and also decrease expenses and solve frequent disconnection problem of tube well from grid due to load shedding.

Paper 21:**A Study On Smart Irrigation Systems For Agriculture Using Iot**

Authors: Dr. J. Jegathesh Amalraj, S. Banumathi, J. Jereena John

The proper utilization of water needs to be considered as most urgent issue in the current scenario of water decreasing and drying up of rivers and tanks. To come across from this issue the use of sensors such as temperature and moisture at appropriate locations for monitoring the crops implemented. An algorithm developed and implemented with threshold values. The threshold values are applied in the temperature and soil moisture by using micro controller based gateway to monitor water quantity. The system can be powered and have communication link on cellular interface that allows data monitoring and irrigation scheduling through a web page. The innovative system with new technologies in agriculture helps to provide betterment for farmers in increasing the agricultural yield. A remote sensing and control irrigation system using distributed wireless sensor network was developed. The irrigation rate was measured in the field and linear moving of irrigation system used to maximize the productivity with minimal use of water was developed by author. Wireless sensor networks and its development make possible to monitoring and control parameters in precision agriculture. A day by day decrease in yields of agriculture needs research in agriculture field. The author proposed novel system where five in field sensors used and it collects all the data and send it to the base station using global positioning system. This system provides benefit in cost and remote controlling regarding irrigation in a precision manner. The usage of technology in agricultural field helps to reduce extra man power efforts. The researchers measured soil related parameters such as temperature and humidity. The sensors were put down to the soil and the communication received from the sensors to the relay nodes with the help of communication protocol. The author developed IoT based system where sensors transmission done by hourly basis. The main drawback of this system is they used asynchronous receiver transmitter interface to receive the signals from sensors, but the sensors were placed in the down of the earth causes attenuation of signals. The authors proposed system which helps the farmers to view their farm details from remote locations. The system predicts the disease appeared in the plant which reduces the agricultural commodity from the diseases.

Paper 22: STUDY PAPER ON SMART IRRIGATION SYSTEM

Authors: Mr. Dhanaji Baravade, Miss. Mayuri Mali, Miss. Simran Mulla

The proposed system is designed by keeping in mind the low cost devices readily available in the local market.The experimental setup is deployed in the good quality farm land admeasuring 1 acre which is planted with 5000 sugarcane plants of good quality. The experimental setup .The full term of sugarcane crop is assumed to be of 15 months (450 days) as an average case. It is also assumed that the raining period is of 150 days during which watering by means of traditional or drip irrigation system is avoided. The fertilizers are provided by using manpower at the rate of Rs. 50 per bag and total 40 bags are used during

full term of the crop.

The user friendly smart phone based application is designed to control the supply of water and water soluble fertilizers.
The functions which can be controlled using android based smart phone application are as follows.

1. Decide the quantity of water per turn
2. Decide the quantity of fertilizer to mix in the water tank
3. Schedule of the water supply and fertilizer supply
4. Switch ON / OFF the electric motor to fill the water tank and send the status via SMS
5. Read the water/fertilizer level sensor, and send the status via SMS

The usage of drip irrigation has showed that the water, electricity and manpower can be reduced considerably. However, due to the manual work involved in the actual farm, the drip irrigation is used by a few farmers only. The smart mobile phone based automatic drip irrigation system can encourage many more farmers to install and use the drip irrigation system for increasing their productivity at lesser expenses. The experimental setup has proved that proposed system can save water, electricity and manpower to a great extent. The cost of one time setup is also affordable and is easy to maintain. More sensors can be added in the system to further automate the irrigation and fertilization based on the moisture and temperature level in the farm

Paper 23: SMART IRRIGATION SYSTEM

Authors:G.Ravi kumar, T.Venu Gopal, V.Sridhar, G.Nagendra

The key objective of the paper is to monitor the soil's moisture content during its dry and wet conditions with the aid of a moisture sensor circuit, calculate the corresponding relative humidity and irrigate it based on its nature using a PC based LabVIEW system, NI myRIO, IOT, GSM and an automatic water inlet setup which can also monitor and record temperature, humidity and sunlight, which is constantly modified and can be controlled in future to optimize these resources so that the plant growth and yield is maximized.

A record of soil moisture, temperature, rainfall is maintained in a database for backup. This backup is used for weather forecasting and directs the farmers regarding the type of crop to be cultivated in future. IOT gives the whole information to the operator about the irrigation. In this paper, we experiment for different soils suitable for different crops in various climatic parameters that govern plant growth and allow information to be collected at high frequency and with less labor requirements.

Cost effective solar power can be the answer for all our energy needs. Solar powered smart irrigation systems are the answer to the Indian farmer. This system consists of solar powered water pump along with an automatic water flow control using a moisture sensor. It is the proposed solution for the present energy crisis for the Indian farmers. This system conserves electricity by reducing the usage of grid power and conserves water by reducing water losses.

They proposed to utilize the solar energy from solar panels to automatically pump water from bore well directly into a ground level storage tank depending on the intensity of sunlight. While conventional methods include pumping of water from bore well into a well and from

this well onto field using another pump, our system uses only a single stage energy consumption wherein the water is pumped into a ground level tank from which a simple valve mechanism controls the flow of water into the field. This saves substantial amount of energy and efficient use of renewable energy. A valve is controlled using intelligent algorithm in which it regulates the flow of water into the field depending upon the moisture requirement of the land. In this system we use a soil moisture sensor that detects the amount of moisture present in the soil and depending upon the requirement of level of moisture content required for the crop the water flow is regulated thus, conserving the water by avoiding over flooding of crops.

Paper24: Internet of Things and Nodemcu

Authors: Yogendra Singh Parihar

NodeMCU is open source platform, it's hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip.The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol.[12] More details can be found on ESP8266 Documentation. NodeMCU uses an on-module flash-based SPIFFS(Serial Peripheral Interface Flash File System) file system. NodeMCU is implemented in C and is layered on the Espressif NON-OS SDK. The firmware was initially developed as is a companion project to the popular ESP8266-based NodeMCU development modules, but the project is now community-supported, and the firmware can now be run on any ESP module.[13] Generally, we can find NodeMCU Dev boards of make Amica,DOIT,Lolin & D1 mini /Wemos etc. in market. Amica produces NodeMCU ESP8266 Development Boards v1.0(Version2) with designed hardware specifications.

NodeMCU is an Arduino like device. It's main component is ESP8266. It has Programmable pins. It has built in WiFi. It can get power through micro-usb port. It's cost is low. It can be programmed through multiple programming environments.ESP8266 NodeMCU require 2.5V to 3.6V Operating Voltage, On-board 3.3V- 600mA regulator, 80mA Operating Current, 20 μA Current during Sleep Mode. Power to the ESP8266 NodeMCU is supplied via the on-board Micro USB connector. ESP8266 NodeMCU is equipped with 32 Kb RAM, 80 Kb DRAM and 200 Kb Flash Memory. ESP8266 NodeMCU has Pin D0 to Pin D10 Digital Pins, 12 PWM Pins, A0 Analog Pin. It has 5 Ground Pins, 3 number of 3.3 V Pins, 1 Vin Pin for adding 1 external supply of +5V which is not connected to USB. The ESP8266 NodeMCU has total 17 GPIO pins. These pins can be assigned to all sorts of peripheral duties, including one 10-bit ADC channel,Two No. of UART interface which are used to load code serially, four PWM pins for dimming LEDs or controlling motors, SPI and I2C interface to hook up all sorts of sensors and peripherals, I2S interface for adding sound to project. ESP8266 has pin multiplexing feature (Multiple peripherals multiplexed on a single GPIO pin). Meaning a single GPIO pin can act as PWM/UART/SPI NodeMCU has a RST button to Reset the ESP8266 chip, one FLASH button to Download new programs and one Blue LED that is user programmable. More details of NodeMCU may found on NodeMCU documentation webpage.

Paper 25:Measurement of Temperature and Humidity by using Arduino Tool and DHT11

Authors:Deeksha Srivastava, Awanish Kesarwani, Shivani Dubey

Temperature and humidity are very important parameters of the environment in various industries like medicine, food, paper mills, textile, metrological, semiconductors, services etc. In recent years, optical fiber sensors have attracted more attentions in sensing and measurement areas due to their many advantages over their conventional electronic counterparts. Similar works in this particular area make use of the Short Message Service (SMS) facility so as to alert the user as seen in the paper [1].The temperature-humidity sensor could be also used in tissue culture lab use this particular mechanism and use a GSM module to send a message which displays the present status of the temperature and humidity and displays the message "Tissue Culture lab parameters exceeded". But majority of times such an alerting message could easily go unnoticed, the user or the person in charge is sleeping in case if the intended person in sleeping.so it is better to log the data in a remote computer in case of such an event so that he can keep an track of the data

Paper 26: AUTOMATION OF IRRIGATION SYSTEM USING IoT

Authors: Pavankumar Naik,Arun Kumbi

This paper on "Automatic Irrigation System on Sensing Soil Moisture Content" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In this paper only soil moisture value is considered but proposed project provided extension to this existed project by adding temperature and humidity values.

This proposed paper is arduino based remote irrigation system developed for the agricultural plantation, which is placed at the remote location and required water provides for plantation when the humidity of the soil goes below the set-point value. But in this we did not aware about the soil moisture level so to overcome this drawback proposed system included with extra feature soil moisture value and temperature value which displayed on the farmer mobile application.

Irrigation Control System Using Android and GSM for Efficient Use of Water and Power" this system made use of GSM to control the system which may cost more so to overcome that proposed system used arduino yun board which already consist of in build wifi module [13]. "Microcontroller based Controlled Irrigation System for Plantation" In this paper old generation with lesser memory microcontroller is used to control the system but proposed system made use of arduino yun board which is user friendly and it helps to dump the programs easily."A wireless application of drip irrigation automation supported by soil moisture sensors" in this paper irrigation is carried out using soil moisture values but extend to this proposed system displays temperature and humidity values.

Paper 27:An IOT based Smart Irrigation System using Soil Moisture and Weather Prediction

Authors:Dr. S. Velmurugan , V. Balaji , T. Manoj Bharathi, K. Saravanan

In the system uses arduino technology to control watering and roofing of the green house. It uses statistical data acquired from sensors (like temperature, humidity, moisture and light intensity sensors) compared with the weather forecast for decision making. Kalman filter is used to eliminate noise from the sensors. Agriculture System (AgriSys) uses temperature, pH, humidity sensors and the hybrid inference to input the data from sensors. The system monitors the sensors information on LCD and PC. Muhammad (2010),Proposed a simple approach to "Automatic Irrigation control problem using Artificial Neural Network Controller". The proposed system is compared with ON/OFF controller and it is shown that ON/OFF Controller based System fails miserably because of its limitations. On the other hand ANN based approach has resulted in possible implementation of better and more efficient control. These controllers do not require a prior knowledge of the system and have inherent ability to ANN based systems can save a lot of resources (energy and water) and can provide optimized results to all types of agriculture areas.

The soil moisture is a critical parameter for developing a smart irrigation system. The soil moisture is affected by a number of environ- mental variables, e.g., air temperature, air humidity, UV, soil temperature, etc. With advancement in technologies, the weather forecasting accuracy has improved significantly and the weather fore- casted data can be used for prediction of changes in the soil moisture. This paper proposes an IoT based smart irrigation architecture along with a hybrid machine learning based approach to predict the soil moisture. The proposed algorithm uses sensors' data of recent past and the weather forecasted data for prediction of soil moisture of upcoming days. The predicted value of the soil moisture is better in terms of their accuracy and error rate. Further, the prediction approach is integrated into a standalone system prototype. The system prototype is cost effective, as it is based on the open standard technologies. The auto mode makes it a smart system and it can be further customized for application specific scenarios. In future, we are planning to conduct a water saving analysis based on proposed algorithm with multiple nodes along with minimizing the system cost.

Paper28:**AN IoT BASED SMART IRRIGATION SYSTEM**

Authors:Priyadharsnee K, Dr.S.Rathi

An IoT based irrigation system is for efficient agricultural management system which enables farmers to contend with challenges they face. There are many applications in IoT, which addresses the major problems like soil moisture detection, water conservation management, crop growth monitoring, etc., This project enables better and smarter irrigation through temperature, humidity and other sensors networked to communicate with the user. For farmers and growers, Internet of Things has provided extremely productive ways to cultivate soil with the use of cheap, easyto-install sensors and an abundance of insightful data they offer.

An IoT based irrigation system aims to utilize the features of embedded system to make agriculture simple. Having sensors connected with controller, the system reads the soil moisture, temperature and electrical conductivity of the soil and then the sensed data are processed in the controller.
The microcontroller is the decision maker of this system. It checks for moisture value and the temperature. initially the threshold moisture and temperature value must be defined. When the sensed moisture value goes above the threshold value, the controller checks for the temperature.Only if the sensed temperature value is higher than the threshold value, irrigation is done and the user is acknowledged. This is because all crops can withstand in the dry soil moisture condition if the temperature is moderate. This would conserve the water used for irrigation. Sending SMS to the user about the field enables the user to remotely monitor the agriculture area. The SMS include the warning and suggestion to the affected system.

Paper29:**Smart Irrigation System using IOT**

Authors:Arif Gori, Manglesh Singh , Ojas Thanawala, Anupam Vishwakarma, Prof. Ashfaque Shaikh

This paper aims at reducing the wastage of water and the labor that is used to carry out irrigation manually. The proposed system aims at detecting the moisture content of the soil using sensors that are placed directly into the soil. This sensors sense the water level of the soil and if the water level is not adequate then the user will be notified through a message that will be sent to the application which would be installed on the user's mobile phone. The Arduino board, a microcontroller, controls the digital connection and interaction between objects in the proposed system, enabling the objects to sense and act . Also, with its powerful on-board processing, various sensors and other application specific devices can be integrated to it. In the system, sensors detect the water and moisture level and send readings to a fixed access point, such as a personal computer, which in turn can access irrigation modules installed in the field or the physical module in the water tank, wirelessly over the internet. A wireless application of drip irrigation automation supported by soil moisture sensors Irrigation by help of freshwater resources in agricultural areas has a crucial importance. Traditional instrumentation based on discrete and wired solutions, presents many difficulties on measuring and control systems especially over the large geographical areas. If different kinds of sensors (i.e. humidity, and etc.) are involved in such irrigation in future works, it can be said that an internet based remote control of irrigation automation will be possible.

The smart irrigation system implemented is cost effective for optimizing water resources for agricultural production. The proposed system can be used to switch on/off the water sprinkler depending on the soil moisture levels thereby making the process simpler to use. Through this project it can be concluded that there can be considerable development in irrigation with those of IOT and automation. Thus this system is a solution to the problems faced in the existing process of irrigation.

paper30:SMART IRRIGATION SYSTEM BASED ON SOIL MOISTURE USING IOT

Authors:S Nalini Durga, M Ramakrishna

The system has three major parts; humidity sensing part, control section and the output section. The soil humidity was detected using YL-69 soil sensor (a resistance type sensor). The control unit was achieved using ATMega328 microcontroller based on arduino platform. The output is irrigation system which is controlled by the control unit by switching it on and off depending on the soil moisture contents. Two stages of design were undertaken; hardware and software.

The main working principle behind this system is in connecting the soil moisture sensor, which was previously embedded into the plant, to the Arduino microcontroller, which is also connected to other electronic components. Measurement of soil moisture is done by the sensor which forwards the information and parameters regarding the soil moisture to the microcontroller, which controls the pump. If the level of soil moisture drops below a certain value, the microcontroller sends the signal to the relay module which then runs a pump and certain amount of water is delivered to the plant. Once the enough water is delivered, the pump stops doing its work. Power supply has a task to power the complete system and the recommended voltage should respect the input supply range for the microcontroller, that is, from 7V to 12V.

An automatic plant watering system using Arduino microcontroller UNO R3 is programmed such that it gives the interrupt signals to the motor via the motor driver module. Soil sensor is connected to the A0 pin to the Arduino board which senses the moisture content present in the soil. Whenever the soil moisture content values goes down, the sensor senses the humidity change, giving signal to the microcontroller so that the pump (motor) can be activated. This concept can be used for automatic plant watering system. The circuit comprises an Arduino UNO board, a soil moisture sensor, a 5V motor pump, a Motor driver L293D (IC1), motor driver IC to run the water pump. You can power the Arduino board using a 5V to 9V wall wart or plugin adaptor or solar panel. You need a separate 5V to 9v battery for the pump motor.

Paper 1

Title	Smart irrigation system using Arduino Uno
Authors	Kavya Monisha K.,Aishwarya D.,Krupaleni K.
Year	2018
Summary	This paper introduces us to a smart irrigation system, using Arduino-Uno,checks the moisture level in the soil. If the moisture level in the soil is low, it automatically sends an alert message and turns on the water motor to flow water to the soil. If the moisture level in the soil is sufficient, it switches off the motor.This system reduces the effect caused by insufficient rainfall. This irrigation system prevents excess water flowing into the soil which causes a wastage of water, electricity and damage to the soil, effectively.

Paper 2

Title	IoT solar energy powered smart farm irrigation system
Authors	A.R. Al-Ali,Ahmad Al Nabulsi,Shayok Mukhopadhyay
Year	2016
Summary	This paper proposes a system which utilizes a single board system-on-a-chip controller,which has built-in WiFi connectivity, and connections to a solar cell to provide the required operating power. The controller reads the field soil moisture, humidity, and temperature sensors, and outputs appropriate actuation command signals to operate irrigation pumps. The controller also monitors the underground water level,which is essential to prevent the pump motors from burning due to the level in the water well.

Paper 3

Title	Smart Irrigation and Tank Monitoring System
Authors	Kumar Kunal,Md. Azhar Hussain,Dr. N Srinivasan,J.Albert Mayan
Year	2017
Summary	The framework peruses the moisture substance of the dirt utilizing soil moisture sensor and switches ON the motor when the moisture is underneath as far as possible. Right when the clamminess level rises above the set point, the system switches off the pump.The tank monitoring system uses ultrasonic sensor to measure the level of water inside the tank which is automated and switches on and off the motor comparing to a threshold level which has been set and it also use DHT sensor which prevent the motor in case of leakage as the temperature will increase which switches off the motor going beyond certain level. The system uses GSM modem to communicate with user by sending and receiving text message as status of the integrated system.

Paper 4

Title	A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field
Authors	Ashwini B V
Year	2015
Summary	Automated Irrigation system using WSN and GPRS Module having main goal is that optimize use of water for agriculture crops[1]. This system is composed of distributed wireless sensor network with soil moisture and temperature sensor in WSN. Gateway units are used to transfer data from sensor unit to base station, send command to actuator for irrigation control and manage data of sensor unit. Algorithm used in system for controlling water quantity as per requirement and condition of filed. It is programmed in microcontroller and it sends command through actuator to control water quantity through valve unit.It can be done through web pages.

Paper 5

Title	A Low Cost Smart Irrigation Control System
Authors	Chandan kumar sahu
Year	2015
Summary	This paper focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low cost which is usable by Indian farmers. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor. Finally send the information(operation of the motor and direction of water) of the farm field to the mobile message and g-mail account of the user.

Paper 6

Title	GSM Based Automated Irrigation Control using Rain gun Irrigation System.
Authors	R.suresh , S.Gopinath , K.Govindaraju , T.Devika , N.SuthanthiraVanitha
Year	2015
Summary	The main objective of this paper is to provide an automatic irrigation system thereby saving time, money & power of the farmer. With the automated technology of irrigation the human intervention can be minimized. Whenever there is a change in temperature and humidity of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the micro-controller. In India most of the irrigation systems are operated manually.These outmoded techniques are replaced with semi-automated and automated techniques.

Paper 7

Title	IOT BASED SMART CROP-FIELD MONITORING AND AUTOMATION IRRIGATION SYSTEM
Authors	R. Nageswara Rao, B.Sridhar
Year	2014
Summary	The proposed method aims at making agriculture smart using automation and IoT technologies. Internet of Things (IoT) enables various applications crop growth monitoring and selection, irrigation decision support, etc. A Raspberry Pi based automatic irrigation IOT system is proposed to modernization and improves productivity of the crop. main aim of this work to crop development at low quantity water consumption, In order to focus on water available to the plants at the required time, for that purpose most of the farmers waste lot time in the fields. An efficient management of water should be developed and the system circuit complexity to be reduced.

Paper 8

Title	Automated Irrigation System Using Solar Power
Authors	Jia Uddin, S.M. Taslim Reza, Qader Newaz, Jamal Uddin, Touhidul Islam, and Jong-Myon Kim
Year	2015
Summary	This paper proposes a model of variable rate automatic microcontroller based irrigation system. Solar power is used as only the source of power to control the overall system. Sensors are placed on the paddy field and these sensors continuously sense the water level and give the message to the farmer informing the water level. Without visiting the paddy fields, farmers can get the information about the water level. Based on the water level, a farmer can control the motor by sending a message from his cellular phone even from a remote place. However, if the water level reaches to the danger level; the motor will automatically start without confirmation of farmer to ensure the proper water level in the site. This paper proposes a solar power controlled automated irrigation system

Paper 9

Title	Solar Powered Smart Irrigation System
Authors	S. Harishankar , R. Sathish Kumar , Sudharsan K.P, U. Vignesh
Year	2016
Summary	This paper introduces us the way by which we can develop a system of irrigation with the use of solar energy as source. According to this paper we utilize the solar energy from solar panels to automatically pump water depending on the intensity of sunlight.This will save substantial amount of energy and also efficient use of renewable energy.

Paper 10

Title	Smart Irrigation Using Low-Cost Moisture Sensors and XBee-based Communication
Authors	A. Kumar,K. Kamal,M. O. Arshad,T. Vadamala
Year	2018
Summary	This paper presents a smart system that uses a bespoke, low cost soil moisture sensor to control water supply in water deficient areas. The sensor, which works on the principle of moisture dependent resistance change between two points in the soil, is fabricated using affordable materials and methods. Moisture data acquired from a sensor node is sent through XBEE wireless communication modules to a centralized server that controls water supply. A user-friendly interface is developed to visualize the daily moisture data.

Paper 11

Title	Smart Irrigation System using IOT and Raspberry Pi
Authors	Ms. Swapnali B. Pawar, Prof Priti Rajput, Prof. Asif Shaikh
Year	2019
Summary	In this project we use raspberry Pi to implement IOT based smart system which monitors soil moisture, humidity and temperature and the sensors send an alert to the Pi if there is any change in the values. We are using "ATMEGA318" microcontroller which is on Arduino UNO. Raspberry Pi is used to send data to microcontroller through internet. Raspberry Pi used here is basically a mini modern day computer that has 1 gb ram, 2 usb ports, display port, ARM V8 and other connectivity options as needed and is capable of doing the any job needed. Relays are optically operated switches.

Paper 12

Title	Arduino based Irrigation System using IOT
Authors	R. Nandhini, S. Poovizhi, Priyanka Jose, R. Ranjitha, Dr. S. Anila.
Year	2016
Summary	In the following research paper, an IOT based automated system is proposed that uses sensors to measure soil moisture, pH, humility and pressure and use it to decide the ideal conditions for irrigation. There is also an intruder detection system which is implemented with the help of PIR sensor where the birds are repelled from entering into the field. It improves the management of water and reduces the chances of under or over irrigation.

Paper 13

Title	Network in Internet Of Things And Smart Grid
Authors	Li Li, Hu Xiaoguang, Chen Ke, He Ketai.
Year	2017
Summary	The smart grid system in various developed countries or groups of countries (United States, Japan , the European Smart Grid and how China has been working on one) has been referred to to show its effectiveness and uses. The next part is the recommended use of WiFi WSNs(Wireless Sensor Networks) over ZigBee as WiFi ones have much better bandwidths, form mesh patterns that allow multiple simultaneous signals to travel which are the two major issues in ZigBee. Also the fact that WiFi has better range, backwards compatibility, will be cheaper considering the amount of research going into it, has been around way longer, has better intelligence when dealing with nodes failure as each node can have upto 100 connections so alternate routes are easy to find and can travel through 1 load bearing wall compared to 0 of ZigBee are major factors in play.

Paper 14

Title	Design and Implementation of solar powered smart Irrigation System
Authors	Dr. Esther T. Ososanya,Dr. Sasan Haghani,Dr. Wagdy H Mahmoud, Dr. Samuel Lakeou
Year	2018
Summary	This paper focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low cost which is usable by Indian farmers. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor.

Paper 15

Title	A Low Cost Smart Irrigation Control System
Authors	Andre Esteva, Brett Kuprel, Roberto A. Novoa, Justin Ko, Susan M. Swetter, Helen M. Blau & Sebastian Thrun
Year	2019
Summary	This paper focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low cost which is usable by Indian farmers. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor.

Paper 16

Title	Automatic Plant Watering and Monitoring System using NodeMCU
Authors	Jayendra Kumar,Alisha Kumari
Year	2017
Summary	This paper aims at achieving automation for the purpose of plant monitoring and irrigation system, using Node MCU. Sensors are used for monitoring the environmental conditions surrounding the crop, whose outputs are obtained on an Android based mobile application as well as uploaded on the cloud. The updates of the atmospheric conditions such as temperature, humidity and soil moisture can be fetched from anywhere in the world as the data is shared on the cloud platform (Thingspeak). A record of this data can be maintained which could be used for the future reference, i.e., in the next cropping season, thereby, enhancing the planning and development of crop production.

Paper 17

Title	Automatic Water Supply Control System of Graded Constant Pressure by Variable Frequency Speed and Its Application to Pipeline Irrigation
Authors	H Kittler, H Pehamberger, K Wolff, M Binder
Year	2019
Summary	In pipeline irrigation system using pressurizing electromechanical pumps, the pumps usually work in constant speed under fundamental frequency power supply (50Hz) and the operation characteristics of pumps could not adapt to the practical changes of pipe network.Automatic water supply control system of graded constant pressure by variable frequency speed combines the frequency conversion and automation technologies, and is an electromechanical integrated intelligent device with functions of variable frequency speed control and automatic closed-loop control. This system switches pressure graded automatically according to required irrigation sub areas to realize graded and constant-pressure irrigation which could not only greatly enhance irrigation uniformity, but also has functions of saving water and energy as well as protecting the water pumps and the pipe network.

Paper 18

Title	Study on precision water-saving irrigation automatic control system by plant physiology
Authors	Yandong Zhao; Junfu Zhang; Jinfeng Guan
Year	2014
Summary	Precision water-saving irrigation automatic control system by plant physiology this paper described is one of the Olympic games facilities projects, which takes standards of water plant physiologically need and soil water content as the basis. Through the combination of independent research and development of irrigation monitoring controller and wireless data transmission, implement a drip irrigation, sprinkler irrigation, micro-irrigation, and low-pressure pipelines, such as different modes of irrigation automatic control. On this basis, the system monitors by GSM remote wireless communication make all irrigation incidents automatically enter into the database, and generate a variety of reports to the irrigation data for statistical analysis.

Paper 19

Title	Design of Solar Powered Automatic Irrigation System
Authors	Piyali Das; Chichanben Patton; S Farishta Devi; Wanmedemora Ch Marak; Taba Yake
Year	2019
Summary	This study was conducted with few objectives of design a microcontroller based solar powered automatic irrigation system (AIS) model. To quantify the paddy field water content of and as well to provide adequate water supply in the right paddy- field areas. In agricultural areas this may help for the production of crops as well can prevent the wastage of energy. To provide an efficient design to the farmers is the main objective of this paper.

Paper 20

Title	Automatic Agricultural Land Irrigation System by Fuzzy Logic
Authors	Zohaib Mushtaq; Syeda Shaima Sani; Khizar Hamed; Amjad Ali; Aitizaz Ali; Syed Muhammad Belal; Abid A. Naqvi
Year	2018
Summary	Water is an important component for agriculture. Conventional methods for irrigation system like canal, wells and rainfall are time consuming and seasonal. By using automated land irrigation system with hybrid power (Solar & Grid), water, time and energy. Therefore, maximum area can be irrigated in less time. The crux of this research is to design and simulate a fuzzy controller using MATLAB for automatic land irrigation. This controller is mathematically designed and simulated in MATLAB. It consist of inputs/outputs values with membership functions. Input involve agricultural land water level categorization and time. Output of designed controller consist of tube well operation and power source.

Papae 21

Title	A Study On Smart Irrigation Systems For Agriculture Using Iot
Authors	Dr. J. Jegathesh Amalraj, S. Banumathi, J. Jereena John
Year	2019
Summary	The proper utilization of water needs to be considered as most urgent issue in the current scenario of water decreasing and drying up of rivers and tanks. To come across from this issue the use of sensors such as temperature and moisture at appropriate locations for monitoring the crops implemented. An algorithm developed and implemented with threshold values. The threshold values are applied in the temperature and soil moisture by using micro controller based gateway to monitor water quantity. The system can be powered and have communication link on cellular interface that allows data monitoring and irrigation scheduling through a web page. The innovative system with new technologies in agriculture helps to provide betterment for farmers in increasing the agricultural yield. A remote sensing and control irrigation system using distributed wireless sensor network was developed. The irrigation rate was measured in the field and linear moving of irrigation system used to maximize the productivity with minimal use of water was developed by author. Wireless sensor networks and its development make possible to monitoring and control parameters in precision agriculture.

Paper 22

Title	STUDY PAPER ON SMART IRRIGATION SYSTEM
Authors	Mr. Dhanaji Baravade, Miss. Mayuri Mali, Miss. Simran Mulla
Year	2015
Summary	The proposed system is designed by keeping in mind the low cost devices readily available in the local market.The experimental setup is deployed in the good quality farm land admeasuring 1 acre which is planted with 5000 sugarcane plants of good quality. The experimental setup .The full term of sugarcane crop is assumed to be of 15 months (450 days) as an average case. It is also assumed that the raining period is of 150 days during which watering by means of traditional or drip irrigation system is avoided.

Paper 23

Title	SMART IRRIGATION SYSTEM
Authors	G.Ravi kumar, T.Venu Gopal, V.Sridhar, G.Nagendra
Year	2017
Summary	The key objective of the paper is to monitor the soil's moisture content during its dry and wet conditions with the aid of a moisture sensor circuit, calculate the corresponding relative humidity and irrigate it based on its nature using a PC based LabVIEW system, NI myRIO, IOT, GSM and an automatic water inlet setup which can also monitor and record temperature, humidity and sunlight, which is constantly modified and can be controlled in future to optimize these resources so that the plant growth and yield is maximized.

Paper 24

Title	Internet of Things and Nodemcu
Authors	Yogendra Singh Parihar
Year	2018
Summary	NodeMCU is open source platform, it's hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip.The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol.[12] More details can be found on ESP8266 Documentation. NodeMCU uses an on-module flash-based SPIFFS(Serial Peripheral Interface Flash File System) file system. NodeMCU is implemented in C and is layered on the Espressif NON-OS SDK. The firmware was initially developed as is a companion project to the popular ESP8266-based NodeMCU development modules, but the project is now community-supported, and the firmware can now be run on any ESP module.[13] Generally, we can find NodeMCU Dev boards of make Amica,DOIT,Lolin & D1 mini /Wemos etc. in market. Amica produces NodeMCU ESP8266 Development Boards v1.0(Version2) with designed hardware specifications.

Paper 25

Title	Measurement of Temperature and Humidity by using Arduino Tool and DHT11
Authors	Deeksha Srivastava, Awanish Kesarwani, Shivani Dubey
Year	2018
Summary	Temperature and humidity are very important parameters of the environment in various industries like medicine, food, paper mills, textile, metrological, semiconductors, services etc. In recent years, optical fiber sensors have attracted more attentions in sensing and measurement areas due to their many advantages over their conventional electronic counterparts. Similar works in this particular area make use of the Short Message Service (SMS) facility so as to alert the user as seen in the paper [1].The temperature-humidity sensor could be also used in tissue culture lab use this particular mechanism and use a GSM module to send a message which displays the present status of the temperature and humidity and displays the message “Tissue Culture lab parameters exceeded”

Paper 26

Title	AUTOMATION OF IRRIGATION SYSTEM USING IoT
Authors	Pavankumar Naik,Arun Kumbi
Year	2019
Summary	This paper on "Automatic Irrigation System on Sensing Soil Moisture Content" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In this paper only soil moisture value is considered but proposed project provided extension to this existed project by adding temperature and humidity values.

Paper 27

Title	An IOT based Smart Irrigation System using Soil Moisture and Weather Prediction
Authors	Dr. S. Velmurugan , V. Balaji , T. Manoj Bharathi, K. Saravanan
Year	2017
Summary	In the system uses arduino technology to control watering and roofing of the green house. It uses statistical data acquired from sensors (like temperature, humidity, moisture and light intensity sensors) compared with the weather forecast for decision making. Kalman filter is used to eliminate noise from the sensors. Agriculture System (AgriSys) uses temperature, pH, humidity sensors and the hybrid inference to input the data from sensors. The system monitors the sensors information on LCD and PC. Muhammad (2010),Proposed a simple approach to "Automatic Irrigation control problem using Artificial Neural Network Controller". The proposed system is compared with ON/OFF controller and it is shown that ON/OFF Controller based System fails miserably because of its limitations.

Paper 28

Title	AN IoT BASED SMART IRRIGATION SYSTEM
Authors	Priyadharsnee K, Dr.S.Rathi
Year	2016
Summary	An IoT based irrigation system is for efficient agricultural management system which enables farmers to contend with challenges they face. There are many applications in IoT, which addresses the major problems like soil moisture detection, water conservation management, crop growth monitoring, etc., This project enables better and smarter irrigation through temperature, humidity and other sensors networked to communicate with the user. For farmers and growers, Internet of Things has provided extremely productive ways to cultivate soil with the use of cheap, easyto-install sensors and an abundance of insightful data they offer.

Paper 29

Title	Smart Irrigation System using IOT
Authors	Arif Gori, Manglesh Singh , Ojas Thanawala, Anupam Vishwakarma, Prof. Ashfaque Shaikh
Year	2018
Summary	This paper aims at reducing the wastage of water and the labor that is used to carry out irrigation manually. The proposed system aims at detecting the moisture content of the soil using sensors that are placed directly into the soil. This sensors sense the water level of the soil and if the water level is not adequate then the user will be notified through a message that will be sent to the application which would be installed on the user's mobile phone. The Arduino board, a microcontroller, controls the digital connection and interaction between objects in the proposed system, enabling the objects to sense and act . Also, with its powerful on-board processing, various sensors and other application specific devices can be integrated to it.

Paper 30

Title	SMART IRRIGATION SYSTEM BASED ON SOIL MOISTURE USING IoT
Authors	S Nalini Durga, M Ramakrishna
Year	2015
Summary	The system has three major parts; humidity sensing part, control section and the output section. The soil humidity was detected using YL-69 soil sensor (a resistance type sensor). The control unit was achieved using ATMega328 microcontroller based on arduino platform. The output is irrigation system which is controlled by the control unit by switching it on and off depending on the soil moisture contents. Two stages of design were undertaken; hardware and software.

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