SMART AGRICULTURE USING IoT

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Abstract—**Due to population growth and demand for resources, water shortage is a major threat to agriculture. Determination of soil fertility also plays a vital role. Also, the major challenge lies in trapping the field animals such as Rats, Snakes etc. Hence this project proposes an innovative smart solution using "SMART AGRI App" which runs on IoT platform and addresses all the above mentioned issues. The user has to feed the data about the land area and the type of crop planted in the app. With the given data we can calculate the amount of water, fertilizers, pesticides needed for the given land area. The Ethernet Shield is used to collect the data and transmit it to the SMART AGRI APP. The App provides the information about the soil fertility, humidity, water overflow, field animals. Using the water level sensor the water level in the tank can be calculated and based on the data from humidity and moisture sensor the land can be irrigated automatically and can detect the overflow in the water tank. Thus, smart irrigation system helps to improve the crop yield and thereby meet the demand. This project remotely measure and monitor water moisture levels in the soil to ensure that crops are getting optimal water resources and automatically trigger sprinkler systems to address low moisture levels in the soil to prevent crop damage or loss. This idea will improve the crop yield and manage them.**

Keywords- Arduino Uno, IR sensor,Ethernet Shield, Gsm, Humidity and Moisture sensor, Motor driver

I. INTRODUCTION

The main objective of this project is to improve the crop yield and thereby meet the demand. This project remotely measure and monitor water moisture levels in the soil to ensure that crops are getting optimalwater resources and automatically trigger sprinkler systems to address low moisture levels in the soil to prevent crop damage or loss. This idea will improve the crop yield and manage them.

II. OBJECTIVE

Plants have had and still have a key role in the history of life on earth. They are responsible for presence of oxygen needed for human survival on this planet. At the same time agriculture is also important to human beings because it forms the basis for food security. It helps human beings grow the most ideal food crops and raise the right animals with accordance to environmental factors. Agriculture plays a vital role in India's economy. Over 58% of the rural households depend on agriculture as their principal means of livelihood. Agricultural export constitutes 10% of the country's exports. So the farmer's and even the nation's economy will be ruined if there are no proper yields due to lack of knowledge of the soil nature, timely unavailability of water. Thus the government should take steps for a better and profitable irrigation. It is a smart farming stick based on IOT (Internet of things) technology which has brought revolution to each and every field of common man's life by making everything smart and intelligent. Aim of this project is to propose a novel smart IOT based agriculture stick assisting farmers in getting live data (soil moisture, humidity, water level) for efficient environment monitoring which will enable them to do smart farming and increase their overall yield and quality of products. The smart agriculture being proposed via this project is integrated with Arduino technology, mixed with various sensors and live data feed can be obtained online from mobile app.

III. AVAILABLE TECHNOLOGY

A. A Control System in an intelligent farming by using Arduino technology by Putjaika and Narayut (2016)

Even now different developing countries using the traditional ways and backward techniques in agriculture sector. A little technological advancement has increased the production efficiency significantly. And to increase the productivity the inventive approach is introduced. Smart farming with Internet of Things (IoT) has been designed. By developing a motor vehicle which can be operated on both automatic and manual modes which can be used for various agriculture activities like cutting, spraying, and weeding etc. The controller will monitor the temperature, humidity, soil fertility, and water management to the field. By using green energy and smart technology the agriculture sector will find a better way to increase the productivity

B. Multidisciplinary Model for Smart Agriculture using IoT by Hemlata Channe, Sukhesh Kothari and Dipali Kadam (2015)

Climate changes and rainfall has been regular over the past decade. Due to this, climate-smart methods called as smart agriculture is adopted by many Indian farmers. Smart agriculture is an automated and directed information technology implemented with the IoT (Internet of Things). IoT is developing rapidly and widely applied in all wireless environments. The sensor technology and wireless networks integration of IoT technology has been studied and review. A combined approach with internet and wireless communications, Remote Monitoring System (RMS) is done.

C. An Effective Method for Crop Monitoring Using Wireless Sensor Network by N. Shakthipriya (2014)

In India about 70% of population depends upon farming and one third of the national capital comes from farming. The highlighting features of this concept includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, weather forecasting, water management, canal controlling in both automatic and manual modes and all these data are stored and displayed in a mobile sensors, Wireless Fidelity etc.

D. Automatic Control of Agricultural Pumps based on Soil Moisture Sensing by Beza Negash Getu, Hussian A. Attia (2015)

Water is always a needy part of everyone's life. Due to environmental situation, water management and conservation will play a vital for human survivals. Recently, there were huge needs for consumer based humanitarian projects that could be rapidly developed using Internet of Things (IoT).This proposes an IoT based water monitoring system that measures water level in real-time . The prototypes are based on the level of the water can be an important parameter when it comes to the flood especially in disaster areas.

IV. PROPOSED TECHNOLOGY

In this project, the user has to feed the data about the land area and the type of crop planted in the app. With the given data we can calculate the amount of water, fertilizers, pesticides needed for the given land area. The Wi-Fi module is used to collect the data and transmit it to the SMART AGRI APP. The App provides the information about the soil fertility, humidity, water overflow, field animals. Using the water level sensor the water level in the tank can be calculated and based on the data from humidity and moisture sensor the land can be irrigated automatically and can detect the overflow in the water tank. Thus, smart irrigation system helps to improve the crop yield and thereby meet the demand. This project remotely measure and monitor water moisture levels in the soil to ensure that crops are getting optimal water resources and automatically trigger sprinkler systems to address low moisture levels in the soil to prevent crop damage or loss. This idea will improve the crop yield and manage them.

V. COMPONENTS USED

A. Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328.It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

B. Ethernet Shield

The Arduino Ethernet Shield connects your Arduino to the internet in mere minutes. Just plug this module onto your Arduino Board, connect it to your network with an RJ45 cable (not included) and follow a few simple steps to start controlling your world through the internet. As always with Arduino, every element of the platform – hardware, software and documentation – is freely available and open-source. This means you can learn exactly how it's made and use its design as the starting point for your own circuits. Hundreds of thousands of Arduino Boards are already fueling people's creativity all over the world, everyday. The transistor is the fundamental building block of modern electronic devices, and its presence is ubiquitous in modern electronic systems.

C. Soil Moisture Sensor

Soil Moisture Sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

D. Infrared Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually, this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose.

E. Humidity Sensor

DHT11 is a Humidity and Temperature Sensor, which generates calibrated digital output. DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results. DHT11 is a low cost humidity and temperature sensor which provides high reliability and long term stability. It is digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity..

F. Servo Motor

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight packages.

G. Voltage Regulator

A voltage regulator is necessary to maintain a constant output dc voltage by providing line regulation and load regulation. For this purpose, we can user A zener-regulator, transistorized regulator or three terminal IC regulator. A switched mode power supply (SMPS) is used to provide large load current with negligible power dissipation in the series pass transistor..

H. Gsm

GSM (Global System for Mobile communication) is a digital mobile network that is widely used by mobile phone users in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies: TDMA, GSM and code-division multiple access (CDMA).

I. Motor Driver

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction.

VI. WORKING PRINCIPLE

The system will detect the difference between the outside temperature and the temperature near the mud below side of the plant. By exact calculations it will start the water supply from the water source. The whole system will be monitored via mobile application. All the sensors will be connected to a system which will be 24/7 online. Due to this the system will have the server with webpage which can be controlled from local network.

VII. BLOCK DIAGRAM

A. Block Diagram of Setup

B.   *Blynk app setup*

(1)
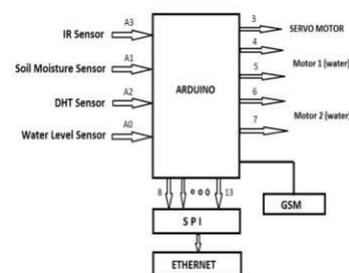
c.   *Smart agri app setup*
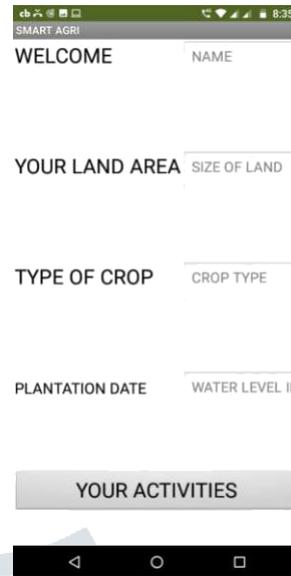
VIII.   RESULT

Prototype Of Agricultural Land

(2) Prorotype of Tank

(3) Prototype of Borewell

IX. RECOMMENDATIONS

This project can be used in various other ways, due to its cheap and cost efficient design. It can be used as a home automation controller, by adding a few more 240 volt relays. It can remotely perform jobs. This work can be improvised by using a float switch in a tank, so that the system automatically shuts the pump down, once the reservoir is full. This work can be conjunction with a solar panel, so that the entire system is eco-friendly.

X. CONCLUSION

Thus the smart agriculture using IoT will revolutionized the world of farming and it will increase the productivity as well as improve the quality and can save lives of farmer. There is an urgent need for a system that makes the agricultural process easier and burden free from the farmer's side. With the recent advancement of technology it has become necessary to increase the annual crop production output of our country India, an entirely agro centric economy. The ability to conserve the natural resources as well as giving a splendid boost to the production of the crops is one of the main aims of incorporating such technology into the agricultural domain

of the country. To save farmer's effort, water and time has been the most important consideration.

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