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Design and development of Agriculture System Based on IoT

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ABSTRACT

Agriculture plays vital role in the development of country. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. Issues concerning agriculture have been always hindering the development of the country. One of The solutions to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence the project aims at making agriculture smart using automation and IoT technologies. This project includes smart irrigation with smart control and intelligent decision making based on accurate real time field data and also smart warehouse management which includes temperature maintenance and humidity maintenance. Controlling of all these operations will be through computer connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi modules with micro-controller.

Key Words: Agriculture, IoT, Wi-Fi

I. INTRODUCTION

Agriculture is the main backbone of Indian economical growth. The most important barrier that arises in traditional farming is climate change. The number of effects of climate change includes heavy rainfall most intense storm and heat waves, less rainfall etc. due to these the productivity decrease to the major extent. Climate change also raises the environmental consequences such as the seasonal change in the life cycle of the plant. To boost the productivity and minimize the barrier in agriculture field there is need to use innovative technology and technique called Internet of things. The technological advances in their areas gather increasing momentum and this means that maintaining as the overview. The most important things of smart farming are environmental measurement and water management. The reason is that the environmental and water management affect plant growth [6]. The paper aims at making agriculture smart using automation and IOT technologies. The highlighting features of this paper include smart irrigation with smart control based on real time field data. Secondly temperature maintenance, humidity maintenance and other environmental parameters. And finally the recommendation to farmer for smart agriculture.

II. BENEFIT OF SMART AGRICULTURE

Smart agriculture with the help of automation and sensor technology, benefits the society in the following ways [3]

- Conservation of water
- Optimization of energy resources.
- Better crop yield
- Pollution prevention
- Eliminate human errors
- Time efficiency, accurate diagnosis of nutrient deficiency
- Automation with low power consumption components

III. LITERATURE SURVEY

The newer scenario of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water[1]. To cope up with this use of temperature and moisture sensor at suitable locations for monitoring of crops is implemented an algorithm developed with threshold values of temperature and soil moisture can be programmed into a microcontroller-based gateway to control water quantity[3]. The system can be powered by photovoltaic panels and can have a duplex communication link based on a cellular Internet interface that allows data inspection and irrigation scheduling to be programmed through a web page[6].

The technological development in Wireless Sensor Networks made it possible to use in monitoring and control of greenhouse parameter in precision agriculture[4]. After the research in the agricultural field, researchers found that the yield of agriculture is decreasing day by day. However, use of technology in the field of agriculture plays important role in increasing the production as well as in reducing the extra man power efforts. Some of the research attempts are done for betterment of farmers which provides the systems that use technologies helpful for increasing the agricultural yield[9].

The system described details about the design and instrumentation of variable rate
irrigation, wireless sensor network and real time in field sensing and control by using appropriate software[7]. The whole system was developed using five in field sensor stations which collects the data and send it to the base station using global positioning system (GPS) where necessary action was taken for controlling irrigation according to the database available with the system.
The system provides a promising low cost wireless solution as well as remote controlling for precision irrigation.

IV. EXISTING SYSTEM

Everything in the farm is totally dependent on humans. In order to perform operations like ploughing fields, spraying seeds, fertilizers we do require humans. Also in order to check the level of water inside the farm humans are required. This is how every activity in a farm is totally dependent on human beings. As now we are using motors to turn ON the bore wells or wells in order to send the water to the farm and later we need to turn OFF the motor after checking the availability of water in the farm. All these activities truly indicate that humans are essential in a farm.

V. PROPOSED SYSTEM

In the field section, various sensors are deployed in the field like temperature sensor, moisture sensor and humidity sensor. The data collected from these sensors are sent to the microcontroller. In control section, the received data is verified with the threshold values. If the data exceeds the threshold value the buzzer is switched ON. This alarm is sent as a message to the farmer and the values are generated in the web page and the farmer gets the detailed description of the values. In manual mode, the user has to switch ON/OFF the microcontroller by pressing the button in the Android Application developed. This is done with the help of WI-FI Module. In automatic mode, the microcontroller gets switched ON and OFF automatically if the value exceeds the threshold point. Soon after the microcontroller is started, automatically an alert must be sent to the user. This is achieved by sending a message to the web page through the WI-FI module and now parameters like the temperature, humidity and the moisture sensors shows the threshold value. The water level sensor is used just to indicate the level of water inside a tank or the water resource.

5.1 Proposed Block Diagram

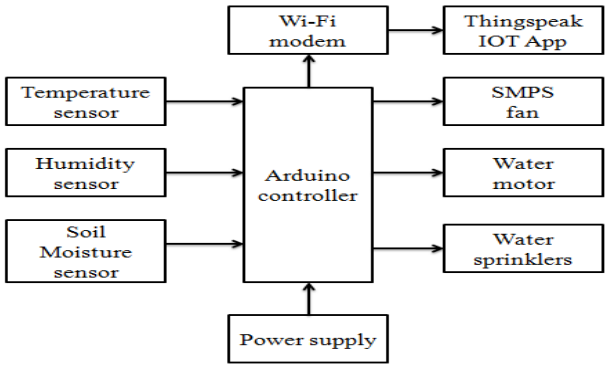


Fig 1 IoT Based Agriculture System Block Diagram

5.2 Schematic Diagram

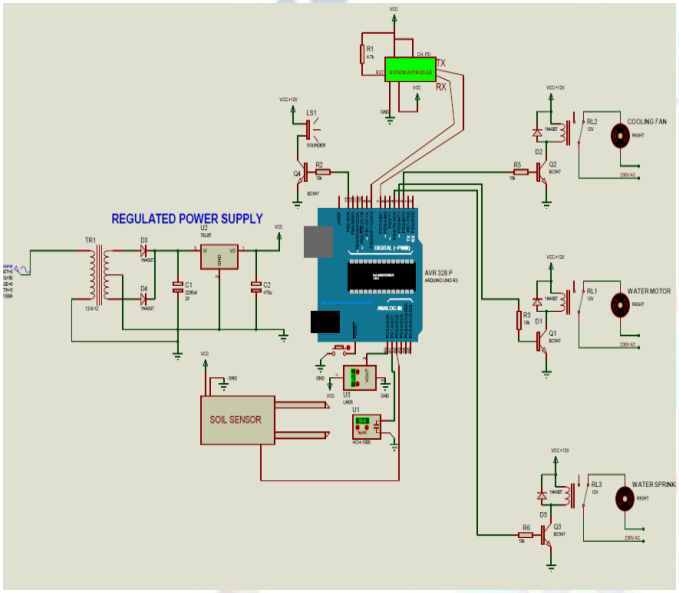


Figure 2: Proposed Circuit Diagram

5.3 Flow Chart

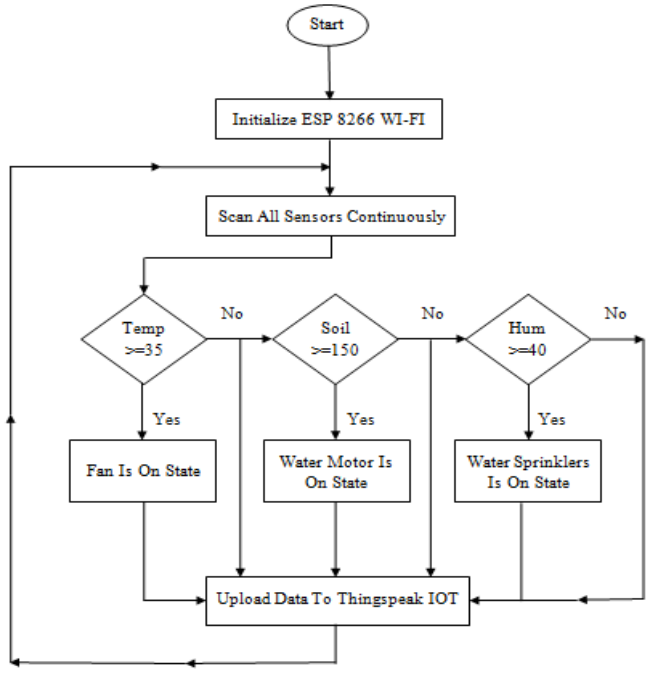


Figure 3: Complete Flow for the proposed Model

5.4 Sensors Required For the Design

To make the system one micro-controller which will process the data coming from the various sensor? Off-course sensors are the heart of the system and in this system use LM35 temperature sensor because this sensor gives the output in degree Celsius and also easy to interface.

5.4.1 Temperature Sensor

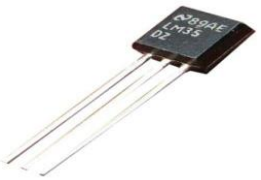


Figure.4 Temperature sensor LM35

Figure 4 Shows Photograph of a LM-35 Temperature Sensor. The change of soil temperature directly impact on soil nutrient absorption and soil moisture keep and sport. [5] The soil temperature plays a certain role on many of the physical processes of soil.

5.4.2 Moisture Sensor

Figure 5. Moisture Sensor

Figure 5 sensors are used to sense the moisture content in the soil. It works on the principal of electrical conductivity. Resistance of the sensor is inversely proportional to moisture content in the soil.[1] Moisture content of the soil is a major factor determining plant growth. The present work Comprises of development of a soil moisture sensor. Figure 5.4.2 shows the Photograph of a Soil Moisture Sensor. Moisture sensor used as soil sensor [4].

5.4.3 Humidity Sensor

Figure 6.Humidity Sensor

Humidity sensors senses, measure the relative humidity in the air, it therefore measure moisture and air temperature humidity is the ratio of actual moisture in air to the highest amount moisture

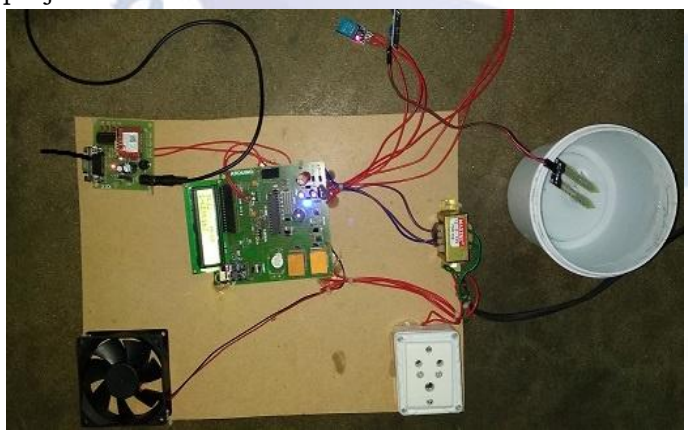
that can be held at that air temperature. Humidity Directly influences the water relations of plant and indirectly affect leaf growth, photo synthesis, pollination and finally economical yield. Leaf growth not only depends on synthetic activities resulting from biochemical process but also upon the physical process of cell enlargement.

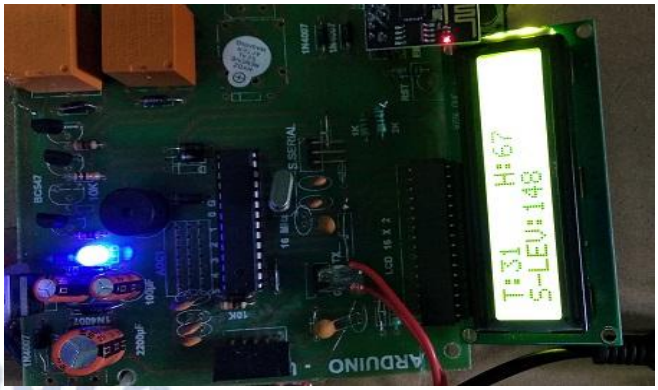
5.5 Working of the Proposed Design

Initially the sensors like temperature, soil moisture, humidity capture the data from the field and is sent to the controller. Now the controller compares the received data with that of pre-existing data and if the values are beyond the threshold point the corresponding devices is in ON state. Initially temperature inside the farm is compared with that of the pre-defined value in the micro controller and if it is beyond the threshold point the fan gets ON. Later soil moisture inside the farm is compared with that of the pre-defined value in the micro controller and if it is beyond the threshold point the water motor gets ON. Later humidity inside the farm is compared with that of the pre-defined value in the micro controller and if it is beyond the threshold point the sprinklers gets ON and the values obtained from the sensors are sent to the thing speak IOT web page through Wi-Fi module and is represented in a graphical format. After reaching the desired level these devices automatically turns OFF. Usually it takes 15 seconds to upload data of each and every sensor and this is a cyclic process.

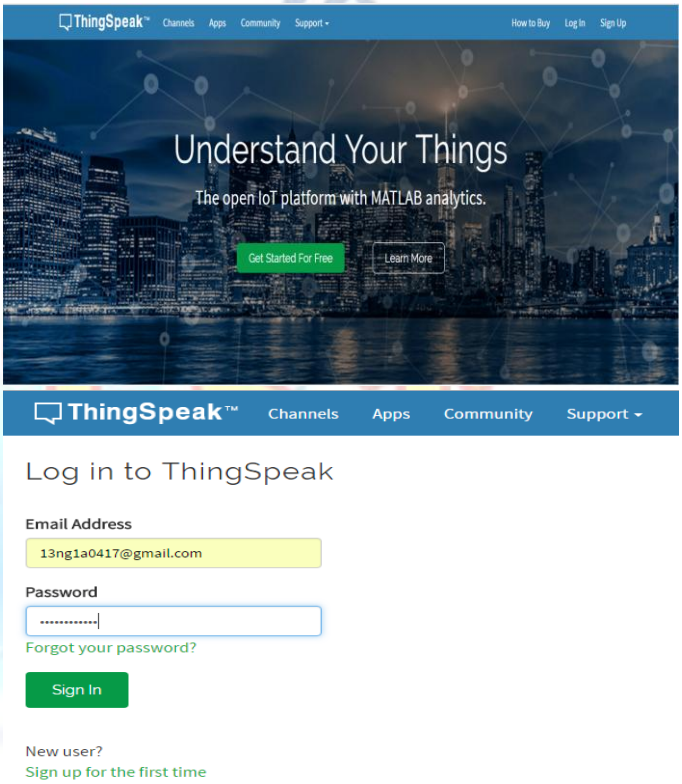
VI. Results

Step 1 This is the Hardware Equipment of the project.

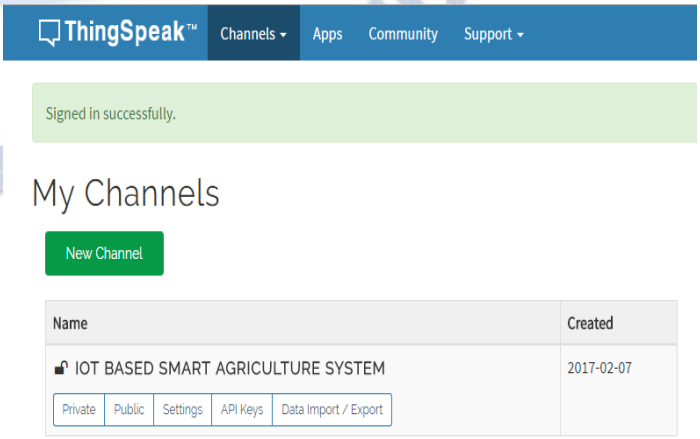




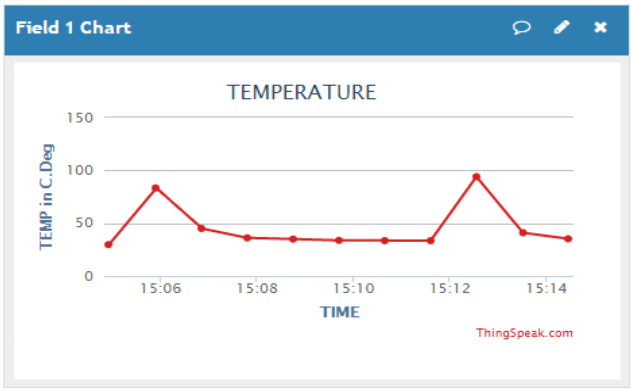
step 2 Initially we have to sign up in thingspeak iot web page by using an email id and later we have to create channel on it based upon our project title.

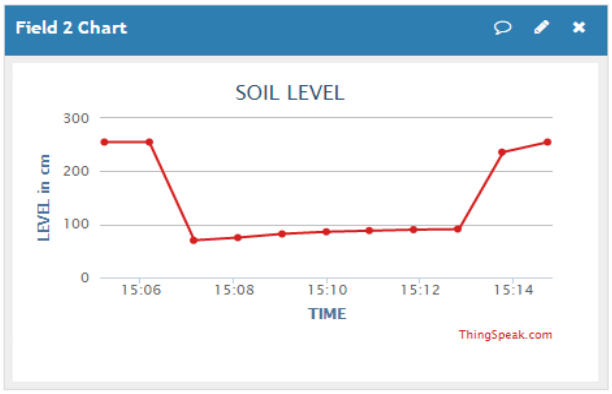


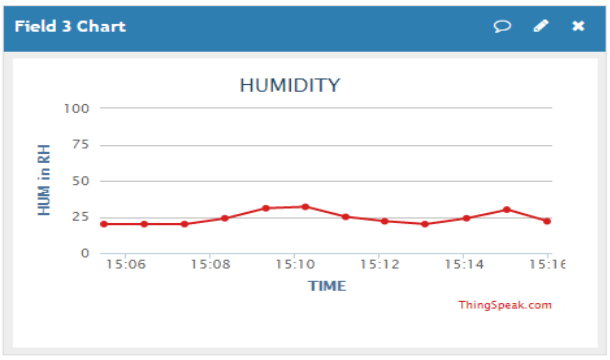
Step 3 This is an IOT ThingSpeak web page. we have to login the thingspeak by using an email address and we can connect to the Aurdino which is present in the equipment through WI-FI module.



Step 4 After successfully log in to the Thingspeak. Now you can observe your channel name IOT BASED SMART AGRICULTURE SYSTEM which you had created before.







Step 5 We can observe the temperature, soil moisture and humidity levels in the field which can be useful for the growth of the plant. This is observed in the thingspeak website as the observed data is loaded into the database of the thingspeak by using Wi-Fi module which is connected to the Arduino.

VII. Conclusions

The main advantage is that the system's action can be changed according to the situation (crops, weather conditions, soil etc). By implementing this agricultural, horticultural land, parks, gardens, golf courses can be irrigated and this is cheaper and efficient when compared to other type of automation system. In large scale applications, high sensitivity sensors can be implemented for large areas of agricultural lands. Also with this kind of implementation we can be able to reduce the soil erosion and wastage of water.

Future Scope

By using remote control humanoid with GPS system here it will be much useful for farmers where they can perform different tasks like plucking weeds and also for spraying pest controllers. One of the future scope includes the rapidly growing technology in IOT, Raspberry pi.The raspberry pi is a very small computer (that of the size of a credit card) and is a very cost effective technology. One can plug it into a computer monitor or TV and use standard key board and mouse to operate it. It can also be used to protect the field from bird and animal scaring by keeping vigilance etc. For the fore coming days, we have an idea to monitor the water level with flow level and can be displayed in the Web Portal and intimate in Twitter

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