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Using wireless sensor network for monitoring and controlling of farm

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***Abstract*— Agriculture is most important business for any country. Agriculture has to face many complications like changing soil quality, water shortage, changing climate, etc. Due to the increasing in population demand for cereals and other crops for daily usage by the customers is also increased so there is a need for smarter implementation of irrigation and also develop farming methods that lessen human efforts and alter the basic eco systems this is less harmful to other creatures too. India is one of highest farming dependent county and generating countries all over the world. At the same time, India is facing the challenge of farmers committing suicide because of crop failure and liability. Most of the land in India are reserved for farming. Still there exists several places that uses primitive methods for irrigation, fertilization etc. This paper discusses the design and development of an IoT based module that assist farmers to improvise their methods of farming and also make the best use of their land for a better income. The main goal line of this IoT module is to sense agriculture parameter and advice farmers to properly grow and treat the crops. Also, in this assignment we are going to implement a irrigation control i.e. motor control through android app. To avoid animal intrusion flasher are also going to implement in the field. This will reduce human efforts.**

***Keywords*—** WIFI, Database, LM-35, Xbee, Bluetooth, ESP 32.

I. INTRODUCTION

Nowadays mobile phones are fetching commonly used in daily scenario and among the beneficiaries of this are farmers. Farmers are using mobile phones in attaining their farming business and daily life. At the same time, Wireless Sensor Networks (WSNs) are also displaying a result in developed part of our world. WSNs potential in sensing various ecological condition, their affordability and applicability motivated to do research in this field. Therefore, the objective of project is to investigate and identify how the use of mobile phones with the support of WSN enable farmers where in their farm various sensors will be installed so that depending upon the sensed value we can control the devices in the filled. Advantage of this system will be it will provide monitoring and controlling of farm devices so that human effort will be reduce.

Module is implemented which will observer the surrounding environment in the farm like temperature, humidity and animal motion with the help of microcontroller PIC24F16KA102 as controlling unit and displayed the result on JHD162A LCD display. This paper deliberates the design of a wireless sensor node for a farm monitoring system. The system let farmers to monitor the surrounding environment & also the animal movement. This system made up of sensors, a wireless transceiver and a main control system. It monitors the nearby temperature, humidity and animal motion before sending the data to a base station. With the wireless device, farmers are able to monitor the animal motion within the range of 1.5 km. To ensure the device performance properly, this paper also discuss the verification method to determine the accuracy of the calculated data compared to commercial devices.

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From observed results, it is found that the wireless sensor node give measurement with 95% to 99% accuracy as compared to other devices [1].

Poultry farm is small business with high output so to make environment which observe the poultry farm is essential so there to check temperature, water level, smoke, gas and food delivering mechanism through smart device like Raspberry Pi and to send it GPRS is used. Various environmental parameters like temperature, humidity, ammonia gas, existence of unwanted thing have a big role in operations of Poultry [2].

We can get updates regarding the internal environmental condition of poultry farm by accessing the data using a web page. A combination of hardware and software is used which will inductee the action automatically to control the environmental parameters according to fixed standards, if there are any changes in parameters which exceed/reduce the presets system will act spontaneously and help to take actions to control the environmental parameters. Sensors are used to monitor temperature, water level, smoke and food dispensing [2].

IV. Implementation

Above figure 1 show implementation of required project. Firstly, we have to sense value form physical sensor like here for sensing where AD8232 ECG sensor is used for sensing ECG, MAX 30100 pulse oximeter & heart rate sensor is used for sensing SP02 level in blood and heart rate.

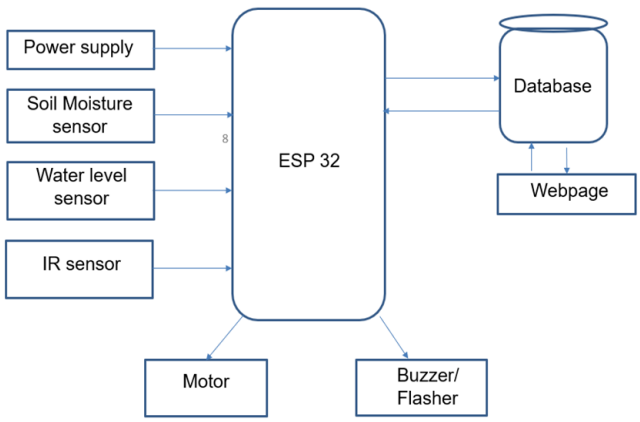

Figure1: Block Diagram

A. *ESP 32 Wroom*

ESP 32 acts as heart of project where it senses value will be transfer to ESP32 to monitor and display it over webpage. ESP32 has Wi-Fi support using which we can directly send the manipulated value to the cloud service such as ThingSpeak, Adafruit IO etc to show data in real-time. Using this we can generate the graph of sensed value. It also supports Bluetooth feature. There are many ESP32 modules available. Those sensed value from ESP32 will be send to Webpage by using ESP webserver supported by ESP32. This sensed value will be sent to ESP32 Wroom this will manipulate data and using AP mode of ESP 32 this sensed value will be send to database their data will be there for future use. Then this data will display on webpage created by html & CSS.

B. *Sensors*

In this project as we have to sense value of different circumstances of farming. For that IR Sensors, DHT 11 Temperature and Humidity Sensor, Soil Moisture Sensor are used [10,11]. IR sensor is used to create a boundary around field if any object crosses the boundary, then buzzer gives alarm, Soil moisture sensor is used to sense moisture level in the field [2,5]. This sense value is transmitted to ESP32 for further operation [4,7].

1. IR Sensor

IR sensor is an electronic device, that produces the light in order to sense some object of the environments. IR sensor measure the heat of an object also notices the motion. These types of radiations are unseen to our eyes, but infrared sensor can notice these radiations [1]. There are different types of infrared transmitters available depending on their wavelengths, output power and response time. An IR sensor consists of an IR LED and an IR Photodiode, composed they are called as Photo Coupler or Opto-Coupler.

2. DHT11–Temperature and Humidity Sensor

The DHT11 is a commonly used for measuring temperature and humidity [9,12]. The sensor has a committed NTC to measure temperature and also have 8-bit microcontroller to give output values of temperature and

humidity in the form of serial data. The sensor is also factory adjusted and hence give easy interfacing with other microcontrollers. The sensor can measure temperature value from 0°C to 50°C and humidity value from 20% to 90% having accuracy of ±1°C and ±1%. So, if we measure in this range then this sensor might be the correct choice for you.

3. Soil Moisture Sensor

Volume of water content in soil is measured by soil moisture sensor. Since the straight gravimetric measurement of free-soil moisture requires extra work of removing, drying, and balancing of a sample, soil moisture sensors calculate the volumetric water content not directly but by using some other things of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a substitution for the dampness content [14,15]. The relation between the distinguished property and soil moisture must be adjusted and may vary subject on environmental issues such as soil type, temperature, or electric conductivity [3,6,8].

4. Webpage

The final display of web page shown in "figure 2" through this web page doctor can monitor the health condition of patient and can medicate him/her remotely. That's the main goal of this project.

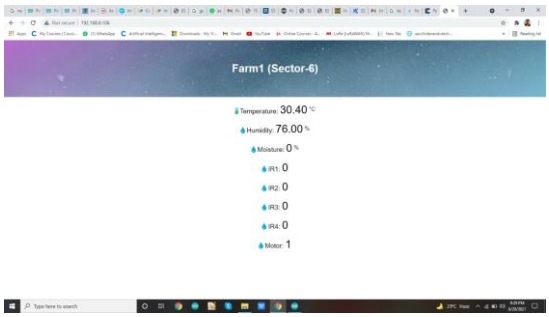

Figure 2: Webpage

Fig. 3: Graph on Adafruit.io

III. Conclusions and Future Scope

In this way by implementing proposed efforts required for farmer to monitor the farm may reduce if this system is implemented in farm field. While developing this project we come across new technology to complete the task like HTML, CSS, Adafruit.io & etc. All these technologies used to automate the entire traditional system.

The future scope of the work is as follows-

- As here in model soil moisture, & temperature observed but in future we can be displayed on webpage to generate decorative graph in webpage.
- We can add a display sensed data on display
- We can also add feature so that it will be fully automation system.

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