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Iot Technology in Smart Farming

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Abstract- *Agriculture is the backbone of Indian economy and plays an important role in the overall economic development of a nation. In this paper, we have proposed a novel methodology for smart farming by linking a smart sensing system through wireless communication technology. Our system focuses on the measurement of physical parameters such as soil moisture content, nutrient content ,and pH of the soil that plays a vital role in farming activities. The detailed modeling and strategies of smart farming system are demonstrated in this paper*.

Key words- Smart Sensing System, Wireless communication .

I. INTRODUCTION

Agriculture is the main source of livelihood of many people in different parts of the world. It is the most important occupation of many families in India. Approximately 60% of the land can be ploughed and used to grow crops such as rice, potato, wheat, onion, tomato, mangoes, sugar cane, bean, cotton, and cereals etc. Unfortunately farmers are still reliant on traditional techniques that have evolved hundreds of years ago. Due to this the yield of crops are becoming low. Also there are a number of factors that contribute to the low yield of crops such as proper soil preparation, seed rate, seed cultivar, different sowing time, lack of moisture in the fields, water logging and salinity, lack of application of fertilizers, plant protection, adoption of modern technologies, improper marketing and lack of investments. The major problem faced in many agricultural areas is that lack of mechanization in agriculture activities. our smart farming system reduces the manual work and automates the agricultural activities. The farm irrigation systems in the previous irrespective of the weather conditions or moisture content present in the soil. By incorporating various advanced sensing and controlling techniques, the crop yield has increased to some extent while simultaneously the labor costs have decreased. However, the major drawback of these techniques are that they are complex in design to fit in the cultivation land and expensive. Thus there is a need for wireless technologies and automation in agriculture farming. Many wireless technologies were used in agriculture field such as remote sensing, global positioning system and geographical information system. Hence wherever automation had been implemented and labor being replaced by automatic machineries, the crop yield has improved significantly. A Wireless Sensor Network (WSN) is a wireless network, in which various sensors are interconnected to monitor physical or surrounding environmental conditions. These WSNs are accepted as powerful networks to collect and process data in the agricultural domain with low cost and low power consumption.

II. RELATED WORKS

In [1], a novel cloud computing based smart farming system was proposed for early detection of borer insects in tomatoes.This problem was solved using cloud computing and IOT.

In[2],a novel of new agriculture monitoring system based on WSNs.

In[3], an automated irrigation system using a WSN and GPRS module in which an algorithm was developed with different threshold values to control various parameters.

In[4], the design and implementation of a prototype system which integrates various existing technologies for home monitoring and control that fits with the future smart home concept. In this work the various devices in the home are connected wirelessly using Bluetooth standard to a home server and can be monitored and controlled via the mobile phone using a portable MIDlet application.

In[5], design of greenhouse monitoring and controlling is a complete system designed to monitor and control the humidity inside a green house. It uses an android mobile phone, connected using Wi-Fi to a central server which connects via serial communication to a microcontroller and humidity sensor .

In[6], a networked embedded greenhouse monitoring and control based on simple embedded web servers and connecting sensors and actuators using 1-wire protocol.

III DESIGN AND IMPLEMENTATION

The main aim of our system is to automate the activities of farming by using the principles mechanics, communication, and electronics. We accomplish our goal by using mechanical machineries, sensors, and electronic components. Sensor network nodes are tiny objects which are installed in the different monitoring areas of wireless sensor network, in order to measure various physical data and finish the specified task. Improvement in growth of various crops depends on various environmental

parameters such as light intensity, soil moisture, relative humidity, soil temperature, usage of fertilizers and pH of soil etc. Any minor changes in any of these parameters can cause problems like improper growth of crops and formation of diseases in plants etc. which results in lesser crop yield.

A. CO_2 SENSOR

The CO2 gas sensor measures the gaseous carbon dioxide levels by observing the amount of infrared radiation absorbed by carbon dioxide molecules.It has two settings:low range (0-10,000) ppm and high range (0-100,000) ppm.

fig.1 CO2 sensor

B. THERMO HYGRO SENSOR:

The thermo hygro sensor measures the outdoor temperature and humidity and transfers the obtained data to the raspberry pi 2 model B and further the data is transferred to the PC using Zigbee or Wi-FI modem. This sensor is placed under a pad in front of the mobile robot, so as to avoid direct sunlight; otherwise it may result in incorrect readings.

fig.2 Thermo Hygro sensor

C. HUMIDITY SENSOR:

Humidity is the amount of water vapour present in the air. It indicates the exact amount of water vapour present in the air and these values are displayed on LCD. It converts directly relative humidity to voltage. Fig.3 shows a typical humidity sensor used.

Fig.3 Humidity Senso

D. UV SENSOR:

The ultra violet sensor monitors ultra violet rays and based on the intensity converts photo-current to voltage. It is equipped with an internal amplifier and easily interfaced to external circuits such as analog to digital converter. The UV sensor detects (280-390) nm light most effectively. Fig.8 shows a typical UV sensor.

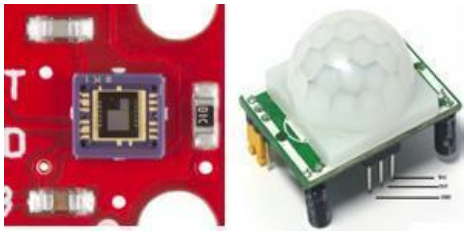

Fig. 4 UV Sensor Fig.5 pH Sensor

E.MOISTURE SENSOR:

The Moisture Sensor detects the moisture of the soil around the sensor, which is ideal for monitoring the plants or the soil moisture. This sensor uses the two probes to pass current through the soil, and then it reads that resistance to get the moisture level. Excess water makes the soil conduct electricity better; while dry soil conducts electricity poor. Fig. 6, shows a typical moisture sensor used.

Fig.6 Soil moisture sensor Fig.7 pH sensor

G. pH SENSOR:

The pH value of soil is an important factor in determining which crops will grow. Also by monitoring these values carefully, necessary amount of nutrients can be supplied to the plants to have a healthy growth.

III. EXPERIMENTAL ANALYSIS

After analyzing the problems analysed by farmers discussed in the related works section ,we started making use smart farming techniques, which could overcome all above problems faced in farming.to overcome the knowledge deficit problem of not knowing the exact soil moisture contents. In fig 1 Monitored data from thermo hygro sensor and same in fig.2 and 3 by humidity sensor and soil moisture sensor.

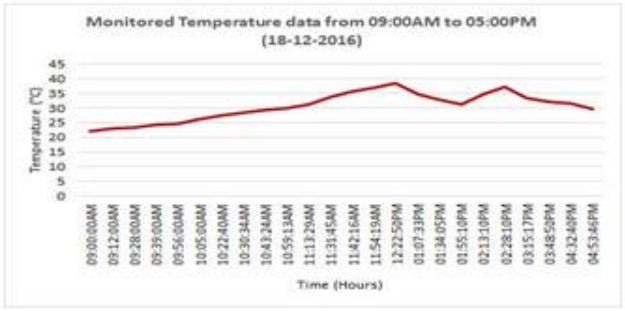

Fig.1 Monitored data from Thermo hygro sensor

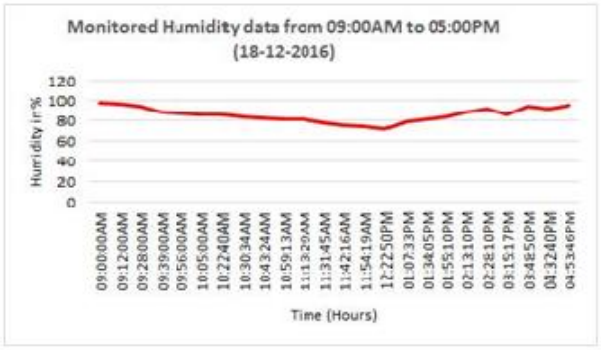

Fig.2 monitored data from humidity sensor

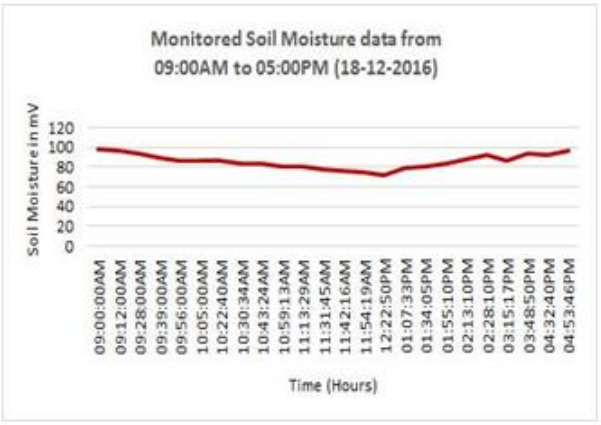

Fig.3 Monitored data from Soil moisture sensor

V. CONCLUSIONS

In this paper ,design and implementation of various sensors to monitor different environmental parameters that are suitable for crop yield .we are developing a user friendly smart farming system which will liberate agricultural productive force greatly, change mode of production ,and realize a qualitative leap in agricultural activity.

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