SMART GREENHOUSE MONITORING SYSTEM

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Abstract : Agriculture is the major occupation sector of our country where 70% of India's revenue comes from agriculture. The advancement in the field of embedded technology is a boon in the field of electronics and is mind-blowing. Embedded technology plays a vital role in designing of circuits such as sensors that together form a network for various application domains. The objective of this project is simple design, easy installation process, microcontroller based circuit for specific tasks to monitor and record the temperature readings, sunlight from the natural environment are continuously absorbed and controlled in order to optimize them to achieve maximum plant growth and yield and to implement growth of crops in cost friendly manner. It involves interfacing of various sensor networks with other components to monitor the intensity of light, aeration and water draining process effectively in a greenhouse by actuating the required parameters of the subsystem.

IndexTerms **- Embedded system, agriculture**

I. INTRODUCTION

India is an agricultural dependent country where 70% of the population depend on agriculture for their livelihood. In this project we are proposing the model which prevents spoilage of crops due to heavy or uneven rainfall, drought and other natural calamities by providing an artificial environment. This objective is achieved with Embedded System design using GSM technology for communication purpose. The actual concept of this project is inhibiting the growth the crops by covering the field automatically, save the collected rain water and use automated sensor network that decides and controls the entire environment by updating the user. This method greatly reduces the human purpose, time constraints and operates effectively in real time environment. WSN is a collection of sensor and actuator nodes linked by a wireless medium to perform distributed sensing and acting tasks. The sensor network collect information and provide a network with the Computer system, which is referred as a base station. According to the data gathered, the base station decides the next process and further the actuator performs required operation in the system. In this process users control the data obtained from the sensor network through communication networks from a single place. There are many situations in which the application of the WSN is preferred, for instance, environment monitoring, product quality monitoring, and others where supervision of big areas is necessary. To achieve this we are interfacing bidirectional dc motor and GSM module with ARM7 LPC2148.

II. METHODOLOGY

In hydroponics green farming using IOT the plant growth is cultivated without soil. The nutrients for the plant are supplied to the roots in a solution which can be either static or flowing through wood chips, glass wool or sand interface. In this method the pH and the electric conductivity of the nutrient medium is monitored constantly and is well maintained and the system is further connected to the sensor automation network which would be turned when the user provides the sensor parameters through mobile app which would be further updated to cloud that makes the computer take its own decision using IOT technology. The farmer is updated back regarding the changes happened in the environment and hence a greenhouse farming is developed artificially using hydroponics, sensor network and IOT techniques [1].

In [2] this paper for the greenhouse management a free standing structural house is utilized here the entire structure is created by highly resistant glass and the roof is triangle sized and the sidewalls monitor the air circulation effectively the arduino microcontroller AT mega 328 is used for controlling different parameters of plants in a certain environmental conditions the LDR device is used to verify the light intensity of the environment. A wheat stone bridge network is developed to check the output voltage from

which a parameter voltage you fed to LDR considering various output voltage values from the bridge it is plotted on a graph using MATLAB software is chosen and the light intensity is maintained the humidity is maintained by the humidity sensor.

In paper [3] several subsystems such as lighting system, cooling system, heating system, carbon di-oxide generation system, watering system and fertilization system comprise the greenhouse management these systems are activated based mainly on the temperature, relative humidity light, wind speed and direction, water level inside greenhouse this climatic control for crop rotation effectively is influenced by the operation of several sensors forming a sensor network. The greenhouse monitoring and control system consists of WSN, gateways and a management subsystem which includes 14 sensor nodes, one actuator node and two sink nodes which are constantly operated during several cold climate condition of heavy snows and the coldest winter the system consists of directional antennas to provide long range wireless link between WSN and the subsystem which is half a kilometre far away from greenhouse. The former is alarmed when the condition is not feasible for the plant through message communication.

For the need of intelligent agriculture, light sensor on outdoor farms are used to monitor the environment here actual measurements are noted and the best sensor is selected on the basis of analysis the method of comparison is to set sensor with the same function a particular environment at the same time and plot the collected data in a chart to reveal and analyse differences. The temperature sensor uses Thermally Sensitive Resistance (TSC) Which is very sensitive to changes and the obtained resistance value is converted to temp value. The humidity sensor measures the light sensor measure the brightness of the environment using a camera IC the carbon-di-oxide sensors used to detect carbon dioxide concentration carbon dioxide sensors uses non-dispersive infrared (NDIR) and exploit the principle that the observation of specific wavelengths of infrared light by a gas is proportional to the concentration of gas [4].

This architecture aims at making a plat form of required devices or sensor for precision agriculture. Water well management system introduces a prototype based implementation using Texas instrument cc2530ZNP kit ultra-low power microcontroller MSP430tm and beagle bone board one of the cc2530ZNP module has been programmed as end device where the module needs to be water resistance and float in the well where the accelerometer measures the movement. The module has been programed such that if the floating module moves it triggers and sensor start to send information using zigbee the information is convert at by co-ordinator by performing the intelligent calculation and sensor to running computer through gateway. The end user gathers information about the current status of the water level in the well and other necessary monitoring parameters for managing water users are able to access information and control sensors using remote device through internet [5]

In this [6] paper the main processing unit of the system is the greenhouse controller. The system manages and optimizes all the input and output. The moisture sensor reading is an input data transmitted to control panel wirelessly utilising XBee network. The data collected from the sensor network is sent to the report server for monitoring and analysis. This architecture has several XBee nodes deployed in the greenhouse area. It captures the physical phenomenon such as humidity, temperature, moisture condition is measured as to detect the water level in the polybag of the crops. The sensed data from various places of crop field area is transmitted to control system. The central system displays the collected data in graphical from for end user utilization. The sensor node will send the moisture data at interval of an hour to the nearest router. Multiple routers in a network will allow wide coverage of network with mesh network capability node using serial interface collector is interfaced to the main CPU through GSM module the former is updated and the CPU accepts the response from the former and sends packets to server using GPRS.

In this [7] paper the overall functioning of the system include mobile phone receiver, data collecting and GPRS communication system. The greenhouse regional placed site controller, monitors humidity and temperature with database acquisition and integrity, remote manager in the greenhouse environment does data monitoring and pooling all greenhouse field collected data. The system works using the standard monitoring results of a particular greenhouse environment, collecting the database the former keeps on

updating the parameters of the controller through the android platform. The remote manager receives the input data delivered from the android system and operates the controlling system in accordance with it. Here the mobile terminal station is the transmitter and the remote manger is the receiver system.

In [8] this paper the soil samples are sent to the soil testing labs for test where the nutrient level is estimated by set of observations on colour change of the soil solution based on reaction with the reagent substrate. In order to avoid inaccuracy in the result standalone device is used which follows same methodology of measuring the soil macronutrients as carried out in laboratories, the colour change of the sample is detected accurately by the usage of photodiodes, light emitting diodes, Analog to digital converter (ADC) and FPGA. The result is more precise in this methodology. The result found from our proposed system has good level of agreement with the laboratory results.

For effective agricultural production accurate measurement of soil nutrient level is necessary, which includes site-specific crop rotation management, where nutrient application level are applied based on the requirement. Soil fertility refers to the ability of the soil to supply essential plant nutrients and soil water in adequate amounts and proportions for plants growth, fitness of seed bed and penetration level of the roots by providing nutrients and suitable structure of the soil and reproductivity in the absence of toxic substances which may inhibit plant growth. Soil fertility can be calculated by parameters like pH level, temperature, moisture, percentage of nitrogen, phosphorus and oxygen, with the help of electro chemical sensor we are able to obtain the values of nitrogen, phosphorus, temperature, ph. The farmer should know these electrochemical sensors we are making one device who can measures the all parameter which result to calculate fertility in terms of crops [9].

This [10] method aids in developing a research on the technology of agriculture using internet of things for real-time environment control of citrus soil moisture and nutrients as well as the research on the application of the fertilizer and irrigation supply system. The results obtained include single point multilayer citrus soil temperature and humidity detection wireless sensor nodes and citrus precise fertilization and irrigation management system. These are applied on citrus base in the three gorges reservoir area. The results showed that the system could help the grower to scientifically fertilize or irrigate, improve the precision operation level of citrus production, reduce the labour cost and reduce the pollution caused by chemical fertilizer.

III. CONCLUSION

Greenhouse forming technology is a great advent in the field of agriculture the further upgrading that is brought in the greenhouse management is smart greenhouse automation which means the required parameters for crop rotation and plant growth is selected automatic functioning and hence the user easily monitors his crop one of the drawback of greenhouse automation methodology used in the above paper is it the user will have to instantly set the sensor parameters or generate permission through communication links for the control device to take decision this would sometimes affect the plant if the user is unavailable at the time interval set or if the system results in any small error the user will have to reach the greenhouse to automate the system. Few of these drawbacks are over come in our paper which would overcome the problem the problem in certain situations.

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