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AUTOMATIC IRRIGATION CONTROL AND SOIL MONITORING SYSTEM USING GSM MODULE

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ABSTRACT:

The continuously increasing population in India demands for the rapid improvement in food production technology. Indian, economy is mainly based on agriculture. Water is the main resource for agriculture. Hence efficient water management of fresh water resources has a crucial importance. To save the water and to increase the yield of crop proper method of irrigation must be used. It is well known that irrigation by drip is very economical and efficient. The conventional drip irrigation system is fully controlled and monitored by the farmer. This paper presents a fully automated drip irrigation system which is controlled and monitored by using ARM9 processor. Sensors are used to monitor the moisture content of the soil and depending on that the valves of the system are turned ON or OFF automatically for different interval of time, Temperature is also monitored, this is indirectly being related moisture. pH of the soil is also important factor to be considered as it affects the nutrient availability in the soil. Sensor to detect the pH of the soil is used and depending on the value of the pH, suggestions are given to the farmer to maintain the proper pH. Nitrogen is one of the important macronutrient in the soil. It is a vital nutrient compound for plant growth. Sensor to detect the soil nitrogen content is used and depending upon the available nitrogen content suggestions are given to the farmer to maintain nitrogen level as per requirement. The carbon is also determined because it determines the soil fertility.

KEYWORD: *CARBON CONTENT, MOISTURE, NITROGEN OF SOIL, PH VALUE*

I.INTRODUCTION:

In many agricultural cropping systems irrigations is necessary. In semiarid and arid areas, efficient water applications and management are of major concerns. The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land. Large amount of water goes waste due to improper planning of water usage. The demand for new water saving techniques in irrigation isincreasing rapidly right now. The aim of farmer is to produce “more crop per drop”, hence there is need to find the irrigation techniques which consumes less fresh water. These techniques are helpful in the regions where there is a scarcity of fresh water.

In the modern drip irrigation systems, the most significant advantage is that water is supplied near the root zone of the plants drip by drip due to which a large quantity of water is saved. At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land from time to time. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. Water deficiency can be hazardous to plants before wilting becomes visible. This problem can be perfectly solved if automatic controller-based drip irrigation system is used in which irrigation will take place only when there is intense requirement of water. Irrigation system uses valves to turn ON or OFF automatically. Automatic Drip Irrigation is a valuable tool for accurate soil moisture control in highly specialized greenhouse vegetable production and it is a simple, precise method for irrigation. It also helps in time saving, removal of human error in adjusting available soil moisture levels and to maximize their net profits. Along with water the other important resources to the crop are the nutrients. If the nutrients are available in the right amount for the growth of crops then the yield of the crops also increases. Thus, the productivity can be raised with the proper management of water resources and nutrients.

II.LITERATURE SURVEY:

Experimental Investigation of Remote Control via Android smart phone of Arduino-Based Automated Irrigation System using Moisture Sensor. Author: A.N. Aravindan, Keerthika.D Year of Publish: 2016 Conference: IEEE [1] In this paper, the Android smart phone used as a remote control to make Arduino-based automated irrigation system easy-to-use and an economical. The system design includes a soil moisture sensor that provides a voltage signal proportional to the moisture content in the soil which is compared with a predefined threshold value. On basis of this comparison result the appropriate data are fed to the Arduino Uno processor, which is linked by HC-05 module to an Android phone. Android smart phone allows the user easy remote control for irrigation system to switched on, o the drive motor. System has a potential to be used in the real time precision agriculture application.

A Low Cost Smart Irrigation Control System. Author: Chandan Kumar Sahu, Pramitee Behra Year of Publish: 20115 Conference: IEEE [2] In this paper author present a prototype for fully automation accessing of irrigation motor where Prototype includes number of sensor node placed in different directions of farm yield. Each Sensors are integrated with a wireless networking de-vice and the data received by the \ATMEGA-328" microcontroller which is on a \ARDUINO-UNO" development board. The RASPBERRY-Pi is use for send messages through internet correspondence to the microcontroller process. The objectives of this paper were to control the water motor automatically and select the direction of the ow of water in pipe with the help of soil moisture sensor. Finally send the information (operation of the motor and direction of water) of the farm yield to the mobile message and g-mail account of the user.

WSN based Temperature Monitoring for High Performance Computing Cluster. Author: D. Baghyalakshmi, Jenimah Ebenezer, S.A.V. Satyamurty Year of Publish: 2011 Conference: IEEE [3] In this paper an author has presented the implementation details of WSN based temperature monitoring application. The main feature of authors proposed network is to continuously monitor the temperature in the 128 node High Performance

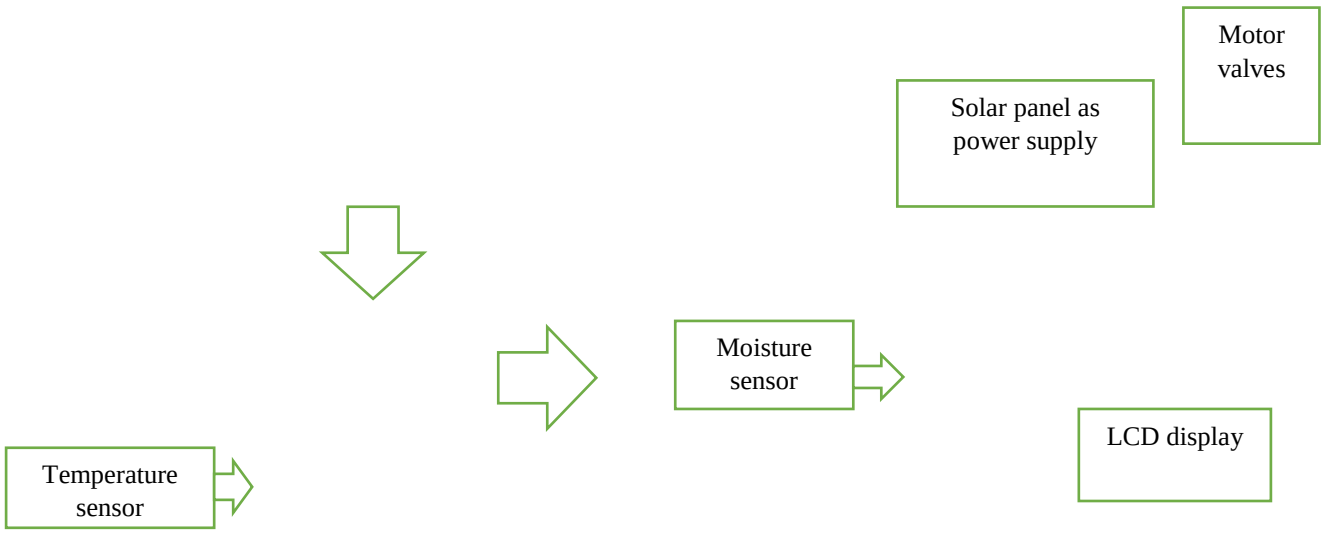
Computing Cluster for its smooth functioning. The wireless sensor node senses and transmits the current value of temperature to the base station. This paper explains about the various steps involved in the experimental implementation and maintenance of the temperature monitoring network for High Performance Computing cluster at Computer centre, IGCAR. The performance analysis of the network is also discussed.

Open source hardware based Automated gardening system Using Low-cost Soil Moisture sensor. Author: A.K. Tripathy, A. Vichare, R.R. Pereira, V.D. Pereira, J.A. Rodrigues Year of Publish: 2015 Conference: IEEE [4] In this paper authors proposed systems main aim is to implement a cost effective automated gardening system. This system helps in solving the above problem by being efficient and using fewer resources. The system uses low cost-efficient soil moisture, light and temperature sensors to decide when and how much water will be provided to the potted plants. Programming languages like embedded C and python is used to conjure the microcontroller. The data would be displayed through a GUI created using processing. The user will also be able to control the entire system remotely as well as monitor the sensor readings.

Mobile Application for Tracking Data from Humidity and Temperature Wearable Sensors. Author: Aileni Raluca Maria Year of Publish: 2015[5] This paper presents a mobile application for healthcare which process data from humidity and temperature sensors. The mobile app is based on cloud computing -SaaS (software as a service) cloud computing model. The cloud computing infrastructure based on sensors is used in this paper for deploying application which provides patients monitoring (moisture, temperature or blood pressure). The data is sent and stored in dedicated server for being analysed later by doctors or caregivers. The advantages of sensor-cloud come also from using of PaaS (platform as a service) and IaaS (infrastructure as a service) models.

PROPOSED SYSTEM:

The mentioned above papers mainly monitors and stores the data and other parameters in cloud and mainly requires the usage of the smart phones, which is difficult for the farmer to offered, in this system we use the gsm module that gives support to basic set of phones, the proposed system block diagram is shown below



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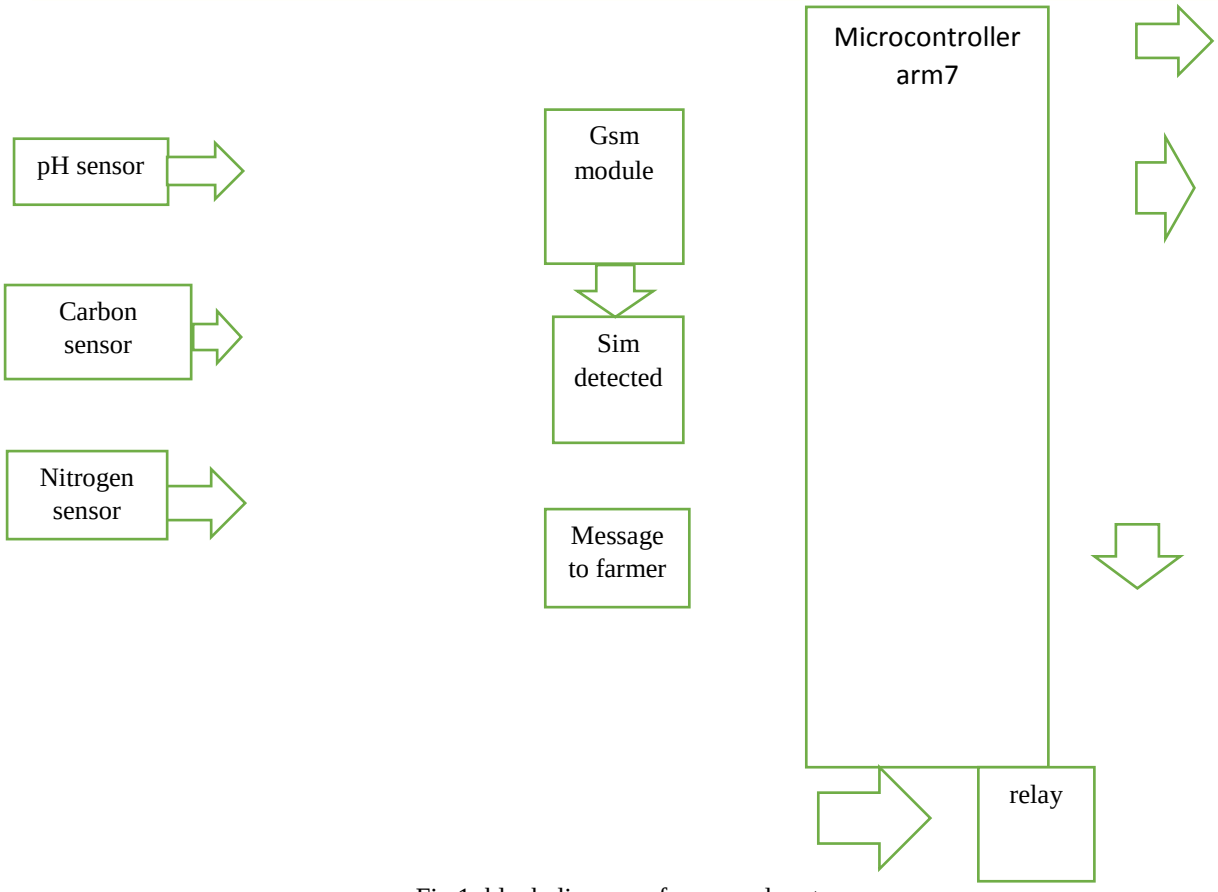

Fig 1: block diagram of proposed system

In the proposed system the main aim is to increase the yield of the crop by which the farmer can have larger profit by selling the crops,

To increase the yield of crops the main quantities are carbon, nitrogen, pH balance and effective irrigation system.

The major components required are

- Moisture sensor
- pH sensor
- carbon sensor
- nitrogen sensor
- Temperature sensor
- motor and a valve
- LCD display
- Gsm module
- Microcontroller

a. Moisture sensor:

The moisture sensor is continuously monitoring the soil, if the moisture is less (soil is dry), then the motor valve is turned on and water is supplied to the land, the threshold value is programmed in the software once the threshold value is reached then the value is automatically turned off. The above method mentioned uses water efficiently.

b. pH sensor:

The pH monitoring sensor is used to observe the pH in the soil, if the pH is maintained in the soil during the crop cultivation then the yield increases, during the cultivation the pH suddenly decreases the zinc(200mg) along with the water can be added this manure increases the pH in the soil, to decrease the pH in the soil We add limestone (200g) along with water to ensure that pH decreases.

c. Carbon sensor:

The organic carbon increases the soil fertility which in turn increases the yield of crop in the soil, to increase the soil fertility we add the natural manure that is cow dung. If water is added in excess quantity the carbon reduces.

d. nitrogen sensor:

The three main components that are require to increase the crop yield are potassium, nitrogen and magnesium. In the proposed system we monitor the nitrogen in the soil, if the nitrogen value requires for the crop is less than the warning message is passed to the farmer's phone.

e. Temperature sensor:

The temperature of the land is measured using the temperature sensor(LM35), the temperature is indirectly related to the moisture, when the temperature increases the evaporation rate increases due to which the water content decreases in the soil, this will again turn on the motor valve so that the water level is maintained.

f.Motor and valves:

The motor is used to pump the water from the tank to the field, the motor used is sprinkler motor, the valve is controlled using the microcontroller and the relay.

g. LCD display:

The LCD display is used to display the pH value along with the manure to be added to increase or decrease the pH, it also displays the carbon value by which we say that the land is fertile or not.

h. GSM module:

The gsm is the mobile network system that is used in India, this network is dedicated for the mobile communication. The proposed supports 2G and 3G system, to send the message to farmer mobile

i.Microcontroller:

A microcontroller is a small computer on a single integrated circuit. In modern terminology, it is similar to, but less sophisticated than, a system on a chip or SoC; an SoC may include a microcontroller as one of its components**.**

ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

1. The proposed is system is cost efficient
2. It increases the profit for farmers.
3. The manures used are natural so it does not have any harmful particles in it.
4. Water wastage is less.
5. The power supply for the project is from solar energy which is cheap and freely available.

DISADVANTAGES:

1. The solar energy is available only in the morning so, the kit must also have an alternative battery for operation.
2. The farmer must have a phone.
3. The software code is programmed; hence it must be changed for every crop with requirement.

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