International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 05 | May-2016 www.irjet.net p-ISSN: 2395-0072

CROP MONITORING BASED ON WSN USING GSM

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Abstract - *The purpose is to monitor and control the water flow to an irrigation system using mobile phone. This can be achieved by the use of soil moisture sensor, which senses the water content in the soil. This sensor output is given to a Microcontroller based control system for further data processing. The aim is to provide an efficient solution for automatic control of Irrigation motor with soil moisture sensor. Now a day's technology is running with time, it completely occupied the life style of human beings. Even though there is such an importance for technology in our routine life there are even people whose life styles are very far to this well known term technology. So it is our responsibility to design few reliable systems which can be even efficiently used by them. This basic idea gave birth to the GSM controlled soil moisture sensor. Here the automation process is done through the Microcontroller based technology.*

Key Words: **WSN, Irrigation, GSM, Sensors, Precision agriculture.**

I. INTRODUCTION

Agriculture continues to play a major role in Indian Economy. Agriculture Sector is changing the economic environments of the population due to liberalization and globalization. Irrigation system in India has given apriority in economic development. Many new Concepts are being developed to allow agricultural automation to flourish and deliver its full potential. To take full advantage of these technologies, we should not just consider the implication of developing a new single technology but should look at the wider issues for complete development of a system. In this project we are using Arduino ATmega-328, Temperature sensor, dry/wet sensor to detect the soil moisture condition automatically and 16X2 LCD is used to display their values with the help of in built Analog to digital converter and the people can access the information of sensors with the help of simple SMSs by using GSM technology. The project is mainly used to control the on-off action of a motor in the field based on the dry and wet conditions of the field using GSM Technology. In this system all devices work on their own with the help of inputs received from the sensors which are monitoring the agricultural land round the clock and farmer can monitor whether everything is going normal or some action is needed to be taken. The entire process is controlled and monitored by programmable controller.

II. EXISTING SYSTEM

Today energy resources are becoming limited and valuable, because of population growth; food production has become more critical. Climatic effects upon agricultural cultivation, along with other environmental parameters over time make the farmer's decision-making process more complicated. WSN is proposed to provide a helping hand to farmers in real-time monitoring, achieving precision agriculture and thus increasing crop production. Attempts have been made in the recent past to introduce remote monitoring in ISs using various strategies ranging from the use of satellite to Wi-Fi connectivity. However, these strategies are expensive and hence not suitable for the developing world.

Disadvantages of existing system

- Large amount of water is used in above irrigation techniques.
- Substantial amount of ground water goes waste.
- Problem of water logging in fields and required large number of labors.
- Problems related to soil erosion are major problem.
- Efficient and welfare use of fertilizers is not possible.
- Requires large man work and Net yield or Productivity is also not high.

III. PROPOSED SYSTEM

New GSM system it provides easy wireless installation of sensors at a lower cost and also increases reliability using mesh networks. It provides more secured system with less power consumption. In this system GSM modules are interfaced with AVR controller chip. GSM is used and controlling the devices via mobile phone by sending and receiving SMS via GSM network. It will have two units one at the farmer's place and other at the sensor's side. Sensor like soil moisture, temperature, water level, humidity sensors will sense the farmer's parameters which will be given to microcontroller for evaluation. Then GSM module will send these parameters to farmer. According to data, farmer will act and in unusual condition message will be sent to farmer's mobile via GSM module. The farmer will be irrigated and

crops will be cultivated smoothly. This is an important merit of the proposed system. The motor pumps are controlled automatically using sensor

Benefits of Proposed system:

1) It monitors crop yield area by using moisture sensor in the land to detect the places where the water level is low.

2) Farmers can get the idea about the climate by using temperature sensor.

3) Low cost and low power consumption.

IV. SYSTEM ARCHITECURE

The working of the system is as follows: ATmega328 microcontroller is interfaced with soil moisture sensor, water level sensor, GSM, LCD, Temperature sensor and water pump. First initialize GSM and wait until it obtains the network. The green light indicates GSM is ON and red light indicates the network strength. Once it obtains complete network there will be delay in blinking of red light. Then initialize LCD, it will display all the statements given in code such as title, and the status of field regarding pump and tank storage. Using the inputs from soil moisture sensor and water level sensor we turn ON the water pump manually as well as automatically.

When the soil is moisturized and soil moisture sensor senses moisture presence it keeps the pump off and when it senses absence of moisture it switches on the pump and supply water to field. Then we need to continuously monitors the sensors and based on that we take some actions. It supplies water until it again sense the presence of moisture, once it senses moisture is present is switches of the pump. Water level sensor gives the presence of water in tank whether it is high or low.

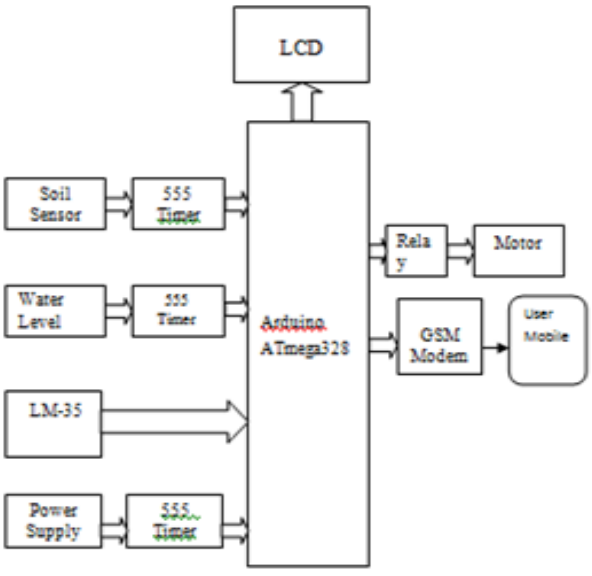

Figure 1: System Architecture

Temperature sensor gives room temperature. This whole process is automatic process of irrigation system using wireless sensor networks and GSM module. A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as soil moisture, temperature, humidity, water level, power supply at different locations. To take full advantage of these technologies, we should not just consider the implication of developing a new single technology but should look at the wider issues for complete development of a system. In this project we are using Arduino AT mega328 Temperature sensor, Humidity sensor, dry/wet sensor to detect the soil moisture condition automatically.

V. IMPLEMENTATION

There are 3 modules in this system:

1) Soil Moisture Sensor

The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agricultural science, environmental science, horticulture, botany, and biology.

Figure 2: Soil Moisture Sensor

Use the Soil Moisture Sensor to

- Measure the loss of moisture over time due to evaporation and plant uptake.
- Evaluate optimum soil moisture contents for various species of plants.
- Monitor soil moisture content to control irrigation in greenhouses.
- Enhance your Bottle Biology experiments.

2) Temperature Sensor

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermostat. It also possess low self heating and does not cause more than

0.1 ºC temperature rise in still air. An important feature of this circuit is induction of Precision Centigrade Temperature Sensors. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). With an LM35, temperature can be measured more accurately than using a thermostat. The sensor circuitry is sealed and not subject to oxidation.

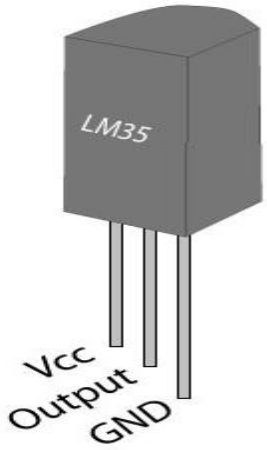

Figure 3: Temperature sensor

3) Water Level Sensor

This sensor is implemented with the help of electromagnetic reed switch and a floating magnet. The reed switch is based on the principle that when it will come in contact of any magnetic field it provides conductivity. It is one of the significant operations. It might happen that the water level reaches to critical level and the motor is still running. In order to avoid such situation arrangement should be there to monitor the water level. If the subscriber wants to enquire about the water level status at a particular time, he can send a message to the centralized unit.

Centralized unit checks the water level and reply the subscriber with the current status. The receiver uses a standard form of message decoding called NMEA protocol. In our project, we do not display the message on LCD although we have the facility.

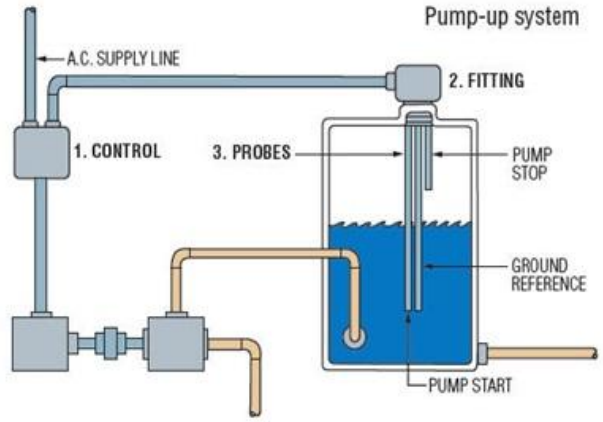

Figure 4: Water Level Sensor

VI. RESULTS

Result can be analyzed by considering the success and failure of following constraints:

6.1 Detection Test

The sample is tested for a period of 4 days depending on success and failure rate of detecting the status of field and message delivery, graph is drawn as shown in figure:

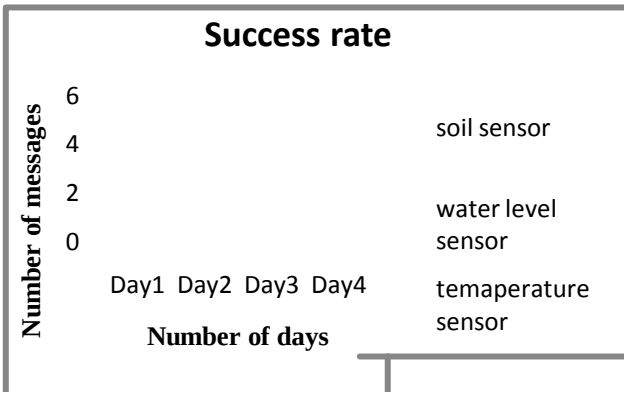

Figure 5: Message Success rate (5 Samples)

CONCLUSION

The study has incorporated major WSN based automated agriculture monitoring system. The GSM module used has the range of about 150 meters. The readings of temperature, moisture and level of water were recorded and timely sent to former's mobile enabling him to take the proper action. The proposed system is a low cost system where information is exchange via SMS on GSM network. The system is highly beneficial for crop fields and thus responsible for efficient utilization of water resource and men power. Irrigation Control System for Precision Agriculture using WSN in Indian Agricultural Sectors has been proposed to bring Indian agricultural system to the world class standards. Irrigation in agricultural areas has a crucial importance. With the

increasing demand for water resources, optimal usage of water resources has been provided with greater extent by automation technology. The proposed system is a real time feedback control system which monitors and controls the irrigation system activities efficiently.

ADVANTAGES

- It monitors crop yield area by using moisture sensor in the land to detect the places where the water level is low.
- Farmers can get the idea about the climate by using temperature sensor.
- Low cost and low power consumption.

APPLICATIONS

- Mainly in agriculture
- Control of water
- WSN has great potential to make a crop monitoring easy and leads to less expensive.
- Proposed system handles manually and automatically.

ACKNOWLEDGEMENT

We are thankful to **Prof. Manjunath Suryavanshi** Asst. Professor, Dept. of Computer Science & Engineering who gave unending support right from the stage. We also thank **Prof. Chetan Bulla** Asst. Professor, Dept. of Computer Science & Engineering who has played an important role in carrying this work.

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