SMART IRRIGATION SYSTEM

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ABSTRACT: ***The agriculture is one of the most fundamental resources of food production and also plays a vital role in keeping the economy running of every nation by contributing to the gross domestic production. This paper aims at developing the smart irrigation system using Wireless Sensor Network. Technology with an objective of automating the total irrigation system which provide adequate water required by crop and monitoring the moisture of soil, temperature and humidity condition in order to increase the productivity of crop. It will also have many advantages for farmers. Soil parameters like soil moisture, pH and humidity are measured. The GSM module is used for establishing a link to communicate between the farmer and the field. The status of the given field will be notified to the farmer through SMS.***

Keywords- Wireless Sensor Network (WSN), GSM, Sensors, Arduino UNO.

I INTRODUCTION

Agriculture is the back bone of all developed countries. 85% of fresh water resources is used worldwide and this percentage continues to be dominant in water consumption due to population growth and increase in food demand. Due to this, efficient water management is the major concern in many cropping systems in arid and semi-arid areas. The Smart Irrigation System is used to overcome over irrigation and under irrigation. In future agriculture fields, data collected from sensors would become the fertilizer to grow crops. Wireless Sensor Network temperature, humidity, pH, soil moisture, etc., can be used in Wireless Sensor Networks to calculate data from different sensors. The wireless system improves crop productivity and convenience. WSNs collect information from different sensors in large and small area so end user can get and process the data. In our proposed system, we collect different data through sensor notes. In addition, it contains current information such as weather condition because analyzes of the system that takes external factor into its own is more reliable. This neutralizes the need for costly and ungainly wiring between nodes, instead relying on the flexibility of mesh networking algorithms to make simple. A sensor is a device that detects and response to some of the inputs detected from the field. The input is generally a signal and that is converted to output in the form of human readable display at the sensor location or further processing.

II RELATED WORK

In [1] has proposed a smart sensor network so the authors design architecture to data collection from nodes in an agriculture environment. The analyzed data is collected and displayed to the farmers. In [2] has introduced a smart system based on Wireless Sensor Network in a red bayberry green house using soil moisture and temperature sensors. This system can collect the temperature humidity of the green house. In [3] has proposed a system to develop WSN based soil moisture controllers that determine the water requirement by comparing soil moisture with pre-defined threshold value. An Intelligent remote system consists of Wireless sensor nodes and computer system in which data is transmitted to a system from where the data accessed by individuals for decision making for automated control of irrigation for the yield productivity. In [4] has proposed the design of an automated irrigation system using WSN including soil moisture sensor, temperature sensor and humidity sensor in order to collect the environmental data and controlling the irrigation system. By using smart phone, the irrigation system users' values to turn on/off the solenoid valve. The irrigation system control water by sending and receiving control commands from smart phone application through internet. Result shows that proposed AIS is useful, cost effective and provides better performance than conventional system. In [5] has proposed a novel platform to establish energy efficient Wireless Sensor Network in a sugar farm. It provides the energy efficiency by the solar system.

III PROPOSED SYSTEM

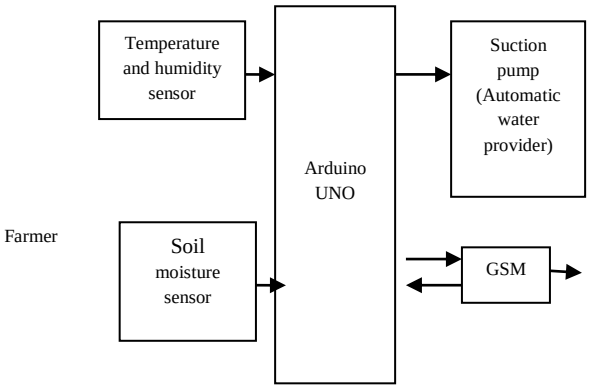

Fig.1. Block diagram

The temperature sensor monitors the soil temperature of the given agricultural field to detect the dryness of the field. The minimum soil temperature for vegetables like carrot, cabbage, beetroot, cauliflower, radish, pea is 40oF. The moisture and humidity sensor monitors the moisture of the given agricultural field. The soil moisture is measured using the gravimetric method, scoop up a small sample of the given field soil and uses a small metric scale to weigh it. Most of the vegetables require soil moisture of about 41% - 80%. There are three types of soils, loam soil which is very porous and retains moisture well, this is the optimal soil type and can be watered normally. Sandy soil which is extremely porous and drains quickly, water slowly to saturate soil root zones. Clay soil which holds more water, but it is slow to absorb and do not water faster than the soil can absorb. GSM is used for transfer the detected data by the sensors to the user through mobile SMS.

IVHARDWARE DESIGN

A. SOIL MOISTURE SENSOR

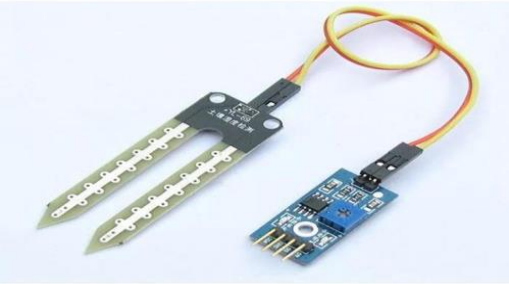

Fig.2. Soil moisture sensor

Soil moisture sensor is used to calculate the volumetric water content of the given agricultural field. Since the direct gravimetric calculation of free soil moisture needs separating, drying and weighting of a soil, calculate the volumetric water content indirectly by using some other properties of the soil. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature or electric conductivity.

B. TEMPERATURE AND HUMIDITY SENSOR

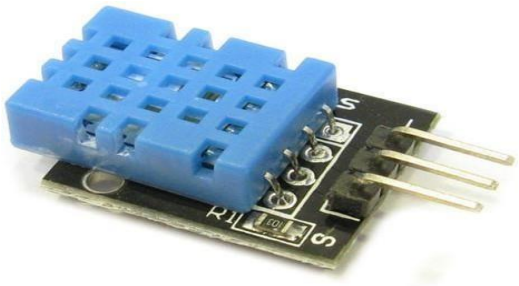

Fig.3. Temperature and humidity sensor

Temperature sensor which senses the temperature of the surrounding and gives a calibrated digital signal output. The sensor includes a resistive type temperature measurement component along with an NTC temperature measurement component. This value helps in conservation of water used in irrigation. Even though the soil moisture is less, if the temperature is not too high then the irrigation to the crop can be limited. This is because many plants can withstand in low moisture condition. Humidity is an integrated circuit sensor that can be used in the measure of water level in field.

C. GSM MODULE

Fig.4. GSM Module

GSM module is a standard developed by the European Telecommunication Standard Institute to describe protocols for second-generations (2G) digital cellular networks utilized by mobile phones. GSM narrates a digital, circuit- switched network modified for full duplex voice telephony. It expands to involve data communications. The longest distance the GSM description helps in practical is 35km. Using GSM technique, an automated remote monitor irrigation system is provided. The system sets the time period depending on the temperature and humidity of the soil for irrigation. The humidity and temperature level of the soil and the crop where is for various types of fields.

D. ARDUINO UNO

Fig.5. Arduino UNO

The Arduino UNO is an open source microcontroller board based on the micro chip ATmega 328P microcontroller and developed by Arduino.cc. The board is provided with a set of digital and analog input output pins that may interfaced with various expansion boards and circuits. The board has 14 digital pins, 6 analog pins, and programmable with the Arduino IDE through a type B USB cable. The ATmega 328 on the Arduino UNO comes preprogrammed with the boot loader that allows uploading new code to it without the help of an exterior hardware programmer. It interfaces using the original STK500 protocol. The UNO also differs from all beginning boards in that it does not utilize the FTDI USB-to-serial driver chip.

E. SUCTION PUMP

Fig.6.Suction pump

Electric submersible pumps are multi stage centrifugal pumps operating in a vertical position. A liquid are accelerated using impeller and loses their kinetic energy by the diffuser where a conversion of kinetic to pressure energy is taken. This is the main operational mechanism of radial and mixed flow pump. The pump shaft is attached with the gas separator or the protector by a mechanical coupling at the end of the pump. Fluids enter into the pump with the help of an intake screen and are lifted with the pump stages. An optional thrust takes up part of the axial forces arising in the pump but most of those forces are absorbed by the protectors thrust bearing.

V IMPLEMENTATION & WORKING

Working of this smart irrigation system is quite simple. It is completely an automated system and there is no need of man power to control the system. Arduino is used for controlling the whole process and GSM module is used for sending alert messages to their mobile phone. If moisture is present in the soil then there is conduction between the two probes of the soil moisture sensor and due to this conduction, transistor remains in triggered state and Arduino pin D7 remains low. In this system, various sensors such as soil moisture sensor and the temperature sensor are connected to the input pins of Arduino microcontroller. Measuring soil moisture is important for agriculture applications to help farmers manage their irrigation system more efficiently. Knowing the exact soil moisture condition on their field is used to increase the yield and quantity of crop. The voltage value of typical output with respect to its relevant percentage of the relative humidity. The temperature sensor is used in this smart irrigation system for detecting the soil temperature. IC-741 Op-Amp is act as a differential amplifier, the combination of inverting and non-inverting amplifier.

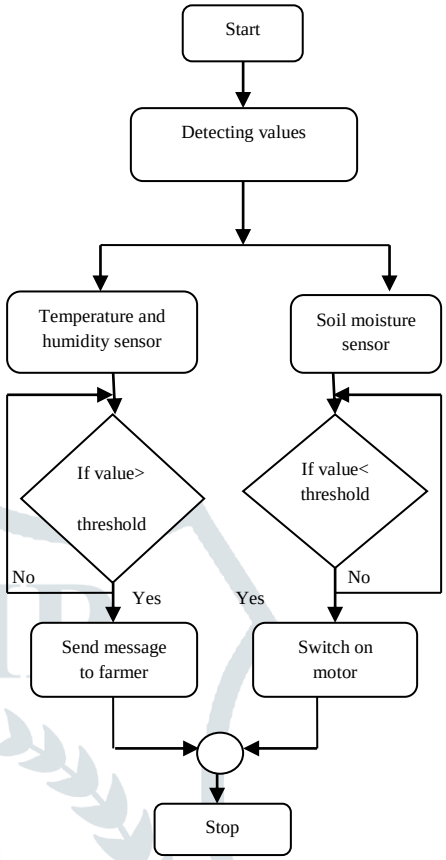

Fig. 7. Flow chart

RESULT

The smart irrigation system, architecture has been proposed so it helps farmer to increase the agriculture productivity. The farmer will provide saving in their time and water consumption. It is reliable because it provides information about the changes in the temperature and humidity. The wastage of water consumption is reduced by the Smart Irrigation System. If the sent value goes behind the threshold values set in the program, the pump will be automatically switched ON/OFF by the relay circuit ant it is connected with driver circuit which assists to switch the voltage. The farmer will be notified about the current field condition through GSM module. By using the system, the farmer can access the details about the condition of the field anywhere at any time.

Fig. 8. Output

V CONCLUSION AND FUTURE WORK

Water issue and irrigation methods play an important role in efficient water using and increase productivity. The water consumption reduction that helps farmers economic at the small farms. Depending upon the threshold value motor is controlled automatically. Hence the farmer can easily access and control the agricultural production, whereas saving the input materials, improving efficiency, productivity and profitability using Smart Irrigation System. In future, the system can be improved by using machine learning to yield more types of crops. This will be more efficient and user friendly to the farmers to increase their productivity.

VI REFERENCE

[1] G.Mendez, M.A.Yunus and S.C. Mukhopadhyay, "A Wi-Fi based smart wireless sensor network for monitoring an agricultural environment". IEEE conference in Instrumentation and measurement technology conference (I2MTC), pp.2640-2645, 2012.

[2] X.Jianfa, "An environment monitoring system for precise agriculture based on Wireless Sensor Networks". IEEE International Conference Mobile Ad-hoc and Sensor Networks (MSN), pp.28-35, 2011.

[3] B.Balaji Banu, M.A.Hussain and P.Ande, "Monitoring of soil parameters for effective irrigation using wireless sensor networks", 2014 Sixth International Conference on Advanced Computing (ICoAC), Chennai, 2014, pp.211-215.

[4] N.Keewmard and S.Saiyod, "Sensor data collection and Irrigation control on vegetable crop using smart phone and Wireless Sensor Network for smart farm", Wireless Sensors (ICWiSC), 2014 IEEE Conference on subang, 2014, pp.106-112.

[5] S. Lachure, A.Bhagat and J.Lachure, "Review on precision agriculture using Wireless Sensor Network". International Journal of Applied Engineering Research, 10(20), pp. 16560-16565, 2015.