

Smart Agriculture Monitoring and Protection System Using IOT

Sudarshan K G, Rakshith Ramesh Hegde, Sudarshan K, Siddesh J, Shilpa Patil

Electrical and electronics engineering, Sai Vidya Institute of Technology, Bangalore

Abstract - Agriculture plays a vital role in framing up the economy. Though, India is one biggest producer of agricultural products, the growth in agricultural products has been stagnant for past from olden days; thereby, requiring technologies to improve the efficiency of the agricultural productivity in smart way. Hence, the key objective of the proposed project is to making agriculture smart using IoT technologies addition with solar energy. The important feature of this project includes the prevention of crops from spoilage during rain and efficiently recycling the rain water for irrigation. Secondly, it gives alarm/buzzer when detect any human/animal intruder into the farm. Finally, the operation will be performed by interfacing Wi-Fi module, GSM module and sensors with Arduino. With the help of proposed work, current problems related to agriculture are solved by reducing human efforts, wastage of water and giving information to the farmer about the live condition of the field on the mobile device.

Keywords- Arduino; GSM (Global System for Mobile); IOT(Internet of Things); Sensors

I. INTRODUCTION

Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. It also provides large ample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. Everywhere throughout the world where farming assumes a crucial part in confining up the economy and the climatic conditions or isotropic, in any case we are not prepare to make full usage of developing resources. One of the basic reason is the lack of precipitation and deficiency of land supply water. Extraction of water at standard between times from soil is reducing the water level along this lines; the zones of un-overflowed land or persistently extending. In like way, the unconstrained usage of water adventitiously achieves wastage of water. In an automatic irrigation system, the most basic favored angle is that water is given exactly when moistness in ground goes

underneath a destined edge regard. This will help us to save a huge amount of water. Recently, the farmers have been using water framework strategy through the manual control in which the agriculturists surge the land at standard between times by turning the water pumps ON/OFF when required. This framework from time to time utilizes more water and as a rule the water supply to the land is moved due to which the yields dry out.

Customary water deficiency goes into disrepair lands improvement before detectable shrinking happens. Despite this obstructed advancement rate, lighter weight regular item takes after water deficiency. This issue can be perfectly readdressed on the off chance that we utilizes automated irrigation framework in which the water system will happen just when there is the serious pre requisite of water, as proposed by the dampness in the dirt.

II. SYSTEM OVERVIEW

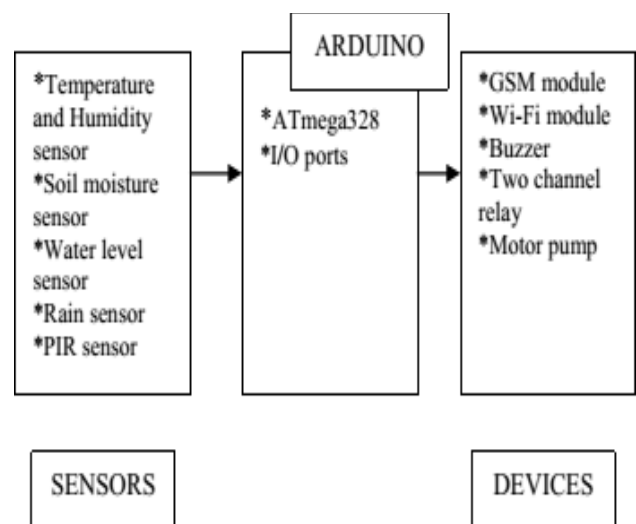


Fig 1. Overview of the system

The sensors and the devices are connected to the Arduino as shown in the fig.1 consist of ATmega328 microcontroller. Thus voltage output from the sensors sent as inputs into the Arduino. Based on the input values, Arduino output specifies voltage to turn ON/OFF the devices.

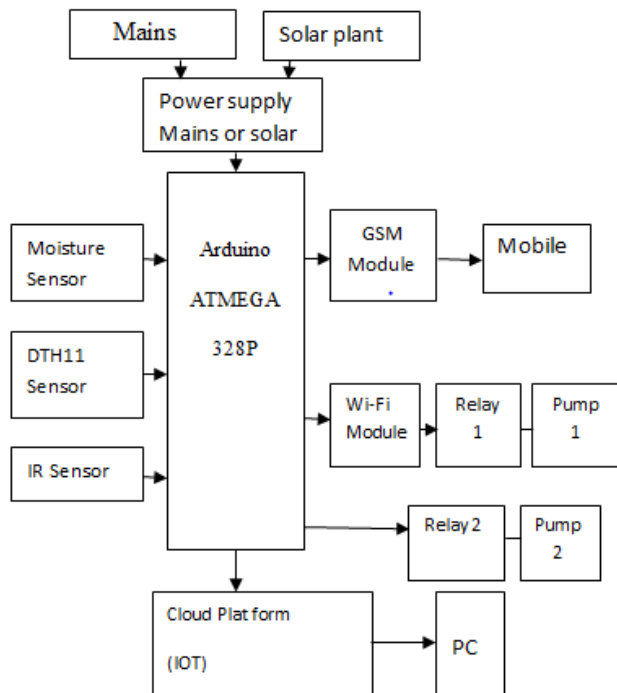


Fig 2. Block diagram of the system

The proposed system as shown in the fig is serves two purposes: one, for gardening purpose and another, for agriculture purpose. The heart of the project is Arduino Uno board and shown in the block diagram. Whenever there is sufficient amount of water in the field, water will not pump into the field. Whenever, the water moisture level of the soil goes low, water will be pumped into the field until the required amount of moisture is required. DHT11 sensor measures the temperature and humidity value of the field. PIR motion sensor detects the motion of the intruder (human/animal) into the field. Thus the sensor values are continuously monitored and the readings are displayed to the farmer's mobile via GSM sim900A module where a sim with 3G data pack is inserted into this modem which provides IOT features to the system.

III. METHODOLOGY

The smart irrigation system is firmware based where the hardware output is linked to the software which intimates the farmer about the condition of the farm. The hardware and software comprises of sensors, Arduino, GSM and Wi-Fi module

A. Temperature and humidity sensor:

The temperature and humidity sensor used here is DHT11 which is used to measure the surrounding air, and a capacitive humidity sensor and thermistor in DHT11 spits out a digital signal on the data pin. It also has a resistive elements and a temperature measuring devices. Its technology is highly reliable and more stable.

B. Soil moisture sensor:

The volumetric water content in the soil is measured using soil moisture sensor. It consists of two probes like structure, which act as a variable resistor. Thus it is used to monitor the soil moisture content to control irrigation.

C. PIR Sensor

The PIR-based movement locator is utilized to detect development of individuals, creatures or different items. They are small, cheap, low-control, straightforwardness to utilize and don't destroy. It is essentially comprised of pyroelectric sensor which can identify levels of infrared radiation.

D. Arduino:

The Arduino uno is an open-source electronic prototyping platform/environment and it is a microcontroller board based on ATmega328. It can be programmed with the Arduino software IDE where it comes pre-burned with the bootloader. It supports huge documentation, large library collection, low-power consumption and highly portable.

E. GSM sim900A:

The Global system for Mobile communication is a mobile communication modem where it is used for transmitting mobile voice and data services.

IV. RESULTS AND DISCUSSIONS

Water being a precious resource must be utilized efficiently. Agriculture is one of those areas which consumes lot of water. Irrigation to the farm is a time consuming process and must be done on timely basis. As aimed, through this work an auto irrigation system measuring the moisture content, and the water level. Later harvesting the excess water from the cultivation field and recycled back to the tank. The developed system also alerts the farmer with buzzer when there is intruder (human/animal) into the farm

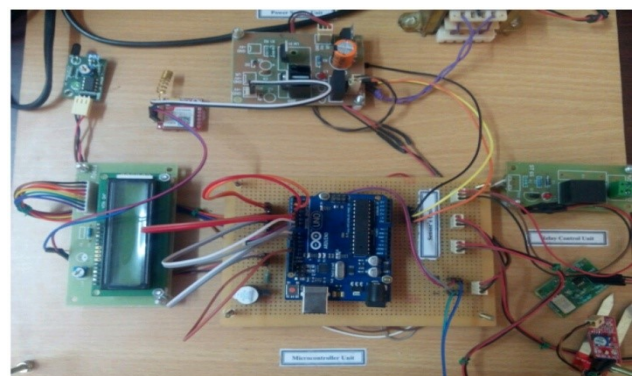


Fig 3. Experimental setup of the smart irrigation system

The fig.3 shows the experimental setup of the smart agro system using wireless sensor network. The temperature, humidity, soil moisture content, water level are monitored through handheld device like mobile and

also intimate the intervention of human/animals into the farm which is shown in fig.4 given below.

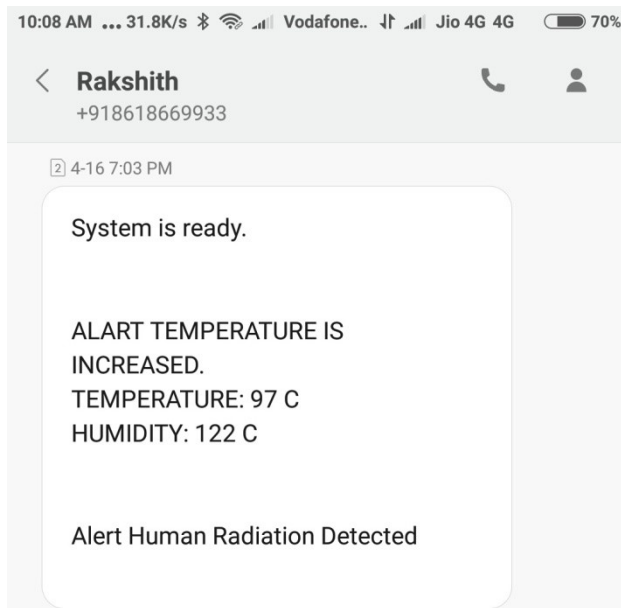


Fig 4. SMS Notification

V. CONCLUSION

Thus the proposed system deals about the irrigation system in smart way using Internet of Things (IoT) which solved the current problems related to farming such as by reducing human efforts, wastage of water and updating the farmer about the live condition of the field on the mobile device. The work can be extended in such a way it detects plant disease, crop theft etc.

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