E – AGRICULTURE BASED MONITORING SYSTEM USING ANDROID APP & SMS ALERT

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Abstract : The irrigation based modern agriculture industries are the recent requirement in every part of agriculture in India. In this method, the soil moisture, water level, humidity and temperature of plants is precisely handled and kept track of. Due to the variable atmospheric circumstances, these conditions sometimes may change from certain spots in large farms, which makes it very tough to maintain the consistency manually. It is observed that an android phone, can maintain the irrigation system, which could give the facilities of maintaining consistent environmental conditions. Mobile phones have almost become an integral part of human life serving multiple needs of humans. This application makes use of the GSM in a mobile phone as a solution for irrigation control system. GSM (Global System for Mobile Communication) is used to inform the user about the exact field condition. This information is passed onto the user request in the form of SMS.

IndexTerms - ***Monitoring system, GSM Module, Arduino (Microcontroller), Temperature Sensor, Humidity Sensor, Soil Moisture Sensor, Water Level Sensor, Android App, Smartphone***

I. INTRODUCTION

The major factors that impact production of yield of farmers are climate change, humidity and irrigation problem. The raw materials to major industries and food processing industries include cotton, sugar, pulses, vegetables, fruits, edible and non - edible are source of agriculture. About 70% of rural population relies mainly on agriculture for income. 82% of farmers are small and marginalized. To scree the condition when it comes to agriculture, the standard method is to be physically present at the respective site. The updated system is suitable for services based on GSM, SMS and communication protocols. The system not only monitors various factors of the crops, but also increases the productivity by sending accurate data. This can be achieved by installing sensors at the site to monitor various factors (such as soil temperature, humidity, soil moisture content, and water level). The GSM controller is used with the sensor to transmit the detected data to the application through network service. An application that already contains a GSM standard will weigh up the obtained data and display it to users who use the application via SMS. The main purpose of the project is to allow users to monitor the planting of crops to obtain sufficient resources, such as water and light, without using those resources on the farm.

II. LITERATURE REVIEW

Prof. Pranit P. Kathale, Jyoti Mankari et al. present a journal paper about a system in the greenhouse environment. This automation is found to be a sophisticated and reliable system which is well designed to react to the climate changes taking place in the environment. Feedback control system is used, which helps it to respond to the external changes efficiently. This paper presented one of the new systems for monitoring the greenhouse to make it automated and to enhance the current situation. More production as well as low - labor costs comparing with the present condition can be achieved with the implementation of this system [1].

Er. Anshoo Sarswat, Hitendra Pratap Singh, et al. presents a work which attempts to save the natural resources available for human kind. Continuously monitoring the status of the soil, the flow of water can be controlled and thereby reduce the wastage of water. The GSM is used to know the status of moisture and temperature through with the use of moisture and temperature sensors connected. Just by sending a message from our mobile, the water flow can be controlled. Since the systems are automatic and they do not require continuous monitoring by labor the conservation of water and labor can be achieved. Thus, this system avoids over irrigation, under irrigation, top soil erosion and reduce the wastage of water. The main advantage is that according to the situation like crops, weather conditions, etc., the system's action can be changed. The agricultural, horticultural lands, parks, gardens, golf courses can be irrigated by implementing this system. Thus, this system is an efficient system compared to other type of automation system [2].

Pavithra D. S, M. S. Srinath et al. gives a system that has an incorporated Bluetooth for remote monitoring which reduces the matter of range with GSM network and saves SMS cost for the farmer. The smoke detectors are used to transmit SOS information to the user in case of a fire in field or burning of a motor. The design is low power, low cost, small size, robust and versatile. Thus, the system avoids under irrigation, top erosion, over-irrigation, and reduces the wastage of water. The most important advantage is

that with respect to the condition of the field, the system's action can be modified. With this technique, agricultural, horticultural lands, parks, gardens, golf courses are often irrigated. Thus, the system is cheaper and efficient as compared to other sorts of automation systems. For large-scale applications, high sensitivity sensors can be implemented for large areas of agricultural lands [3].

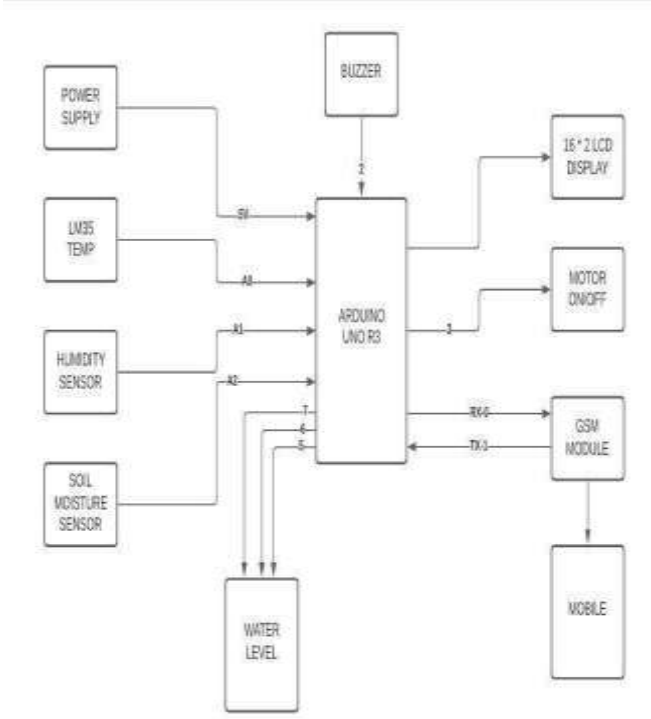
Abhishek Barve, Pragnesh Shah et al. proposed a system which describes an intelligent Monitoring System supported android platform gives facility to access monitored parameters on mobile handsets quickly anywhere from the planet. As the mobile phones and therefore the application supportability given by the android system provide mobility over 2G and 3G network there are infinite possibilities to expand monitoring system. In this paper, a smart remote monitoring system is explained which does data acquisition from various channels in analog form digitizes it in high 10- bit resolution, then stores into database server.

This paper uses an innovative idea of creating GUI in android application which may access the info stored in dedicated web server just by touch of ones anywhere from the planet. A build application is user friendly and more importantly an entire monitoring system is portable that one can carry in mobile [4].

D Dursun M, Ozden S, et al. developed a drip irrigation automated system using wireless technology whose objectives were to develop a low cost wireless controlled irrigation system, real - time monitoring of water content of soil, to fulfill the need of workmanship for flooding irrigation. The designed system has three unit namely base station unit (BSU), valve unit (VU) and sensing unit (SU) which were applied system was applied to an area of 8 acres in a venue located in central Anatolia for controlling drip irrigation of dwarf cherry trees. From the trees, sensors were placed 20cm deep and 50cm away. The analysis of the system produced the circa linear graph between volumetric water content (VWC) and time values for which system was analyzed. System was low - cost and reliable having advantages such as preventing moisture stress of trees, diminishing excessive water usage, ensuring rapid growing weeds and derogating salification [5].

III. PROPOSED SYSTEM MODEL

Arduino Uno R3 is an ATmega328P based microcontroller board. It has 14-digit I/O pins. Each pin has its distinctive function. The ON and OFF of the motor are handled by the Arduino Uno R3 and it is coupled with the pump for pumping water to the field. The system receives the temperature value via GSM each minute. We have used an LM35 temperature sensor in this model. Its output voltage varies based on the external surrounding temperature. It can easily be interfaced with a microcontroller like Arduino Uno R3. It can also convert the total temperature into Fahrenheit or Celsius, depending on its configuration. The soil moisture sensor detects the moisture of the soil. It measures the volumetric content of water inside the soil and provides us the moisture level as the output. A basic cheap soil moisture sensor consists of two probes (the metal rods) held apart at a hard and fast distance by some insulant.



The other factor is that a part of the probe is insulated in order that you'll control at what depth you'd wish to take the reading. So, our sensor starts with a 50mm thick (tall) insulating block. This does keep the rods apart, and is additionally just a booster - an enormous, foam block sitting on the soil so you don't accidentally obtain your sensor.

Next down is that the insulated section of the probe (also 50mm). From here down, the probes are going to be under the soil. If you would like to vary the depth of the reading, you'll just change the length of this insulated section. you'll not need to make changes to the local circuit. Finally, we have exposed a part of the probe (again 50mm).

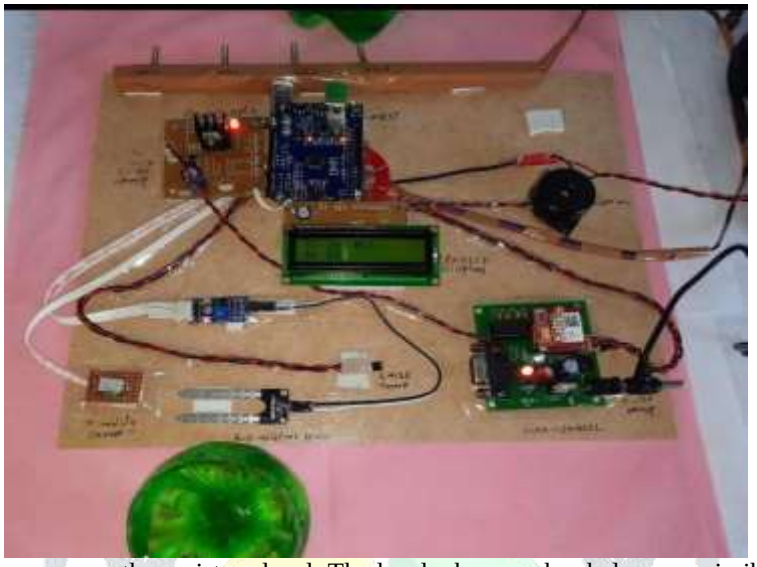
Humidity sensors are obtaining more recognition in diverse areas of measurement and control technology. Manufacturers aren't only improving the accuracy and long – term drift of their sensors, but they are also improving their durability for use in different environments, and simultaneously reducing the component size and the costs. We have also used a water level indicator which is

essentially a system that tells us whether a body of water features a high or low tide level. It helps the farmer to live the water level in his field in centimeters. It indicates an abnormality when the water level reaches rock bottom of the metal rod. The motor turns OFF automatically. These updates are often continuously updated to the system using GSM. GSM is that the system's administration of the particular gadgets, vehicles, structures and various things implanted with hardware, programming, sensors, actuators and organization availability that empowers these things to collect and trade information. It is a tremendous, inexpensive Wi-Fi module suitable for adding Wi – Fi characteristics to a micro - controller through UART via serial connection. The GSM module is configured by using a SIM card of any service provider.

3.1 Implentation

The goal of this proposed model is to screen various parameters identified with the yields under perception through a remote, wireless network on an electronic gadget. These parameters incorporate air dampness, climatic temperature, soil dampness. The model is likewise needed to make vital moves like killing or turning the water pump on when required or when wanted through a guidance given by the client over the electronic gadget. It is imperative to upgrade the farming production by utilizing technology to eradicate the damages being done. The proposed framework automates the water system and fertilization using WSN to give a higher yield than the old methods.

3.2 Working



The soil moisture sensor senses the moisture level. The level when reaches below permissible level, a notification is sent to user mobile. The user then can, using the smart phone app, turn ON the motor. The relay helps turn on the motor and the water starts flowing out of the tubes. The moisture sensor keeps a track of the moisture values every 1 minute. Each time an algorithm compares the level with the required value. Once it reaches the required level, motor automatically turns OFF, and a notification of the same is passed on to the user.

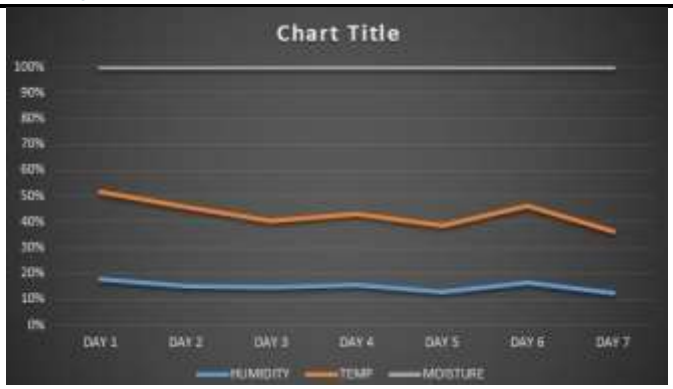
IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: Descriptive Statics

DAY	HUMIDITY	TEMP	MOISTURE
DAY 1	32	60	86
DAY 2	30	62	109
DAY 3	34	61	140
DAY 4	36	64	133
DAY 5	31	63	200
DAY 6	37	68	122
DAY 7	35	65	177

The progress in electronics and telecommunication engineering, paved way for new inventions and technologies. As we are moving towards miniaturization, handy components are needed which have a better accuracy and reliability. The sensors present in the system measure various parameters. The sensed data is transmitted to the receiver station via SMS by GSM module.



4.2 Conclusion and Scope

Wireless sensor networks can help bring about a revolution in automating agriculture. This project would simplify plant monitoring process and reduce human effort drastically. User can create customized environment for the plants, thus providing them with optimal growth conditions. The scope for the project can be further widened by the use of more sensors and then storing the sensor data in the cloud enabling access from anywhere in the world.
In this paper, we have presented a different approach of various different types of irrigation systems based on GSM. These systems were all remotely controlled systems which proposed a low – cost information exchange via SMS and GSM. The result of the survey conducted has led to a very positive approach on the impact of GSM technology in farm irrigation methods and techniques. Everyday new techniques have been implemented for minimizing the irrigation process like mobile phones and other software application for conduction of irrigation process. This leads to a better and more efficient agricultural development for the future generations to come.

Additionally, interfacing the software with Android technology would increase its scope. The sensor values can also be converted into analog outputs. This would help getting a clear idea of the environmental condition through past records. The data can also be stored in the cloud enabling access anywhere anytime.
With an increase in COVID – 19 cases and considering the current situation with the global pandemic, we can control farming and the yield easily with this remote system.

V. ACKNOWLEDGMENT

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