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IoT Based Smart Plant Irrigation System

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Abstract

This study is an attempt for an automated irrigation system which enable the users to regularly supervise relative humidity of the soil at different sites through the entire agricultural field for more accurate setting up of irrigation cycles. The sensing unit is modeled on a feedback mechanism with centralized control system which measures relative humidity (RH) of the soil and controls supply of water to the field in a realtime process. A wireless communication is established between the sensor as well as controlling unit and the sprinkler. In practice, the pump on which control action is to be taken is at a distance from the land. A data acquisition system with a PC interface using UART-USB is also built up to record instantaneous values of soil temperature

Keywords: *smart irrigation, Arduino Mega 2560, soil sensor, dht 11 sensor, water pump.*

I. INTRODUCTION

The increasing world population has led to exponential growth in food demand. This event has necessitated the need for more land to be cultivated. Due to change of weather patterns brought about by global warming and other environmental degradations, irrigation remains as the only reliable method of crop production. With the increasing demand of land irrigation there is a need for optimal usage of water and it has really become a challenging task for the farmers. In the forefront, revolution of electronics began with the design and manufacturing of electronic sensors and with the inception of microcontrollers. In order to provide long term automated yet sustainable solution for agriculture, a portable measurement technology including soil moisture sensor, air humidity sensor and air temperature sensor can be developed. Microcontroller may be used for monitoring and controlling their levels. Thus automatic systems have been introduced to agriculture also, which has given rise to the smart farm business. Moreover, wireless sensor network (WSN) can be set up for collection of environmental data and transmitting control command to turn on/off the irrigation system via a smart phone The earliest work in the field of RH content of soil was done by using a cheap RH sensor so that it can read the temperature, amount of relative humidity in the soil while software monitors data from the sensors in a feedback loop. Precision agriculture is used for both the size of crop area as well delivery amount of water and fertilizer These automated solutions have also reduced the labor requirement Use of the ZigBee and configuration technology can be implemented to design a remote, reliable and failsafe irrigation control platformLike India, Pakistan and Bangladesh also have strong agriculture based conomy.These countries have to face severe

mismanagement of water and hence shortage of it.In order to ensure even distribution of water, a Wireless Sensor and Actuator Network (WSAN) is capable for smart control of irrigation which is cost effective and it ensures proper monitoring of the field, instant and accurate decision making along with less human involvement Anincorporated sensor network including all the ground sensors monitoring soil moisture levels, temperature, plant growth, ground water level, disease identification together with field monitoring system to absorb the variations in the agricultural field can be designed. It enables and determines the risk levels thus providing us with valuable information about agricultural development Central Processing Unit (CPU) may be used for monitoring the data in software GUI platform as well as applying the PIC microcontroller to develop wireless communication between two remote locations. An automated control and remote management may be designed for irrigation system by the use of Arduino and Android operating system Considering the characteristic of irrigation in the rural area of China, new devices based on GSM (Global System Mobile) network and radio communication has been innovated The data acquisition system adds great advantage with the idea of controlling temperature and humidity The current work aims to develop a wireless microcontroller based low cost RH monitoring system that can track the humidity content at different locations of the field in real time.It allows water to be sprinkled on to the field if soil moisture falls below a prescribed limit depending on the nature of crop grown in the soil. Moreover, there is a temperature measuring unit which is developed using LM35DZ IC to constantly monitor the soil temperature of the agricultural field

II.METHODOLOGY

Block Diagram of Smart Irrigation System

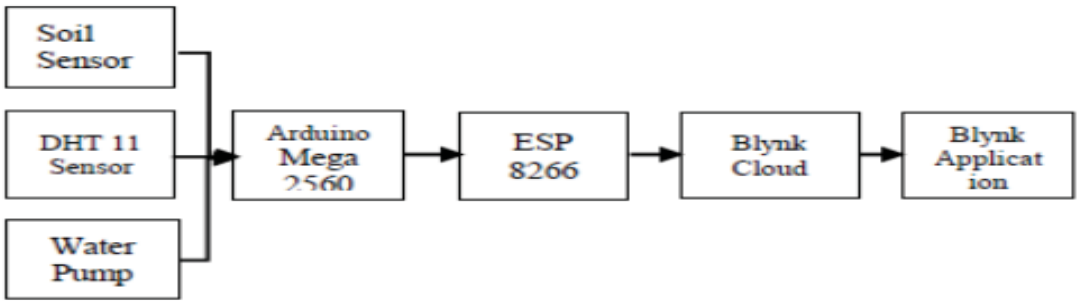

Figure 1: Block Diagram Of Smart Irrigation System

Figure 1: shows the block diagram of the smart irrigation system. This system consists of three hardware that is linked to the Arduino Mega 2560 which are the soil sensor, dht 11 sensor and the water pump. The next flow is the esp 8266, blynk cloud and the blynk application.

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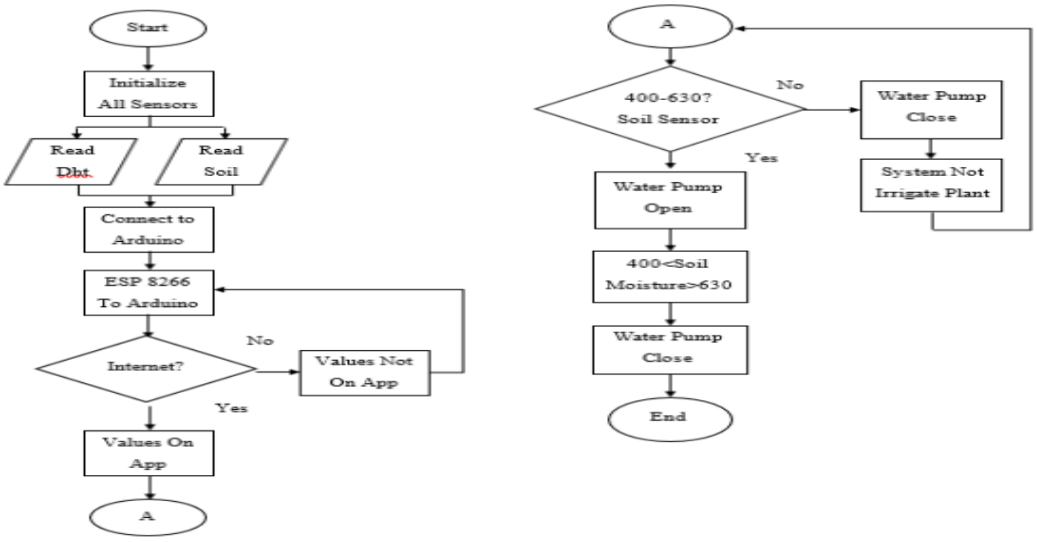

Figure 2: Flowchart for configuration of smart irrigation system

Figure 2: shows the working principle of smart irrigation system to measure the soil moisture. The samples data was taken for 7 days due to the purpose of proving that the running system is capable to provide the data of soil moisture, humidity and temperature.

III. PROPOSED SYSTEM

All the sensors i.e. moisture sensor, humidity sensor, temperature sensor, is connected to the microcontroller.5volts of power is supplied to the micro controller. From that microcontroller a relay gets the information about the percent of the moisture in the soil. If the moisture percent is low then the motor gets automatically ON and the notification is sent to the user device. Block diagram of arduino based smart irrigation system which consist of three sensors which are connected to controller and sensed values from these sensors are send to the mobile application.

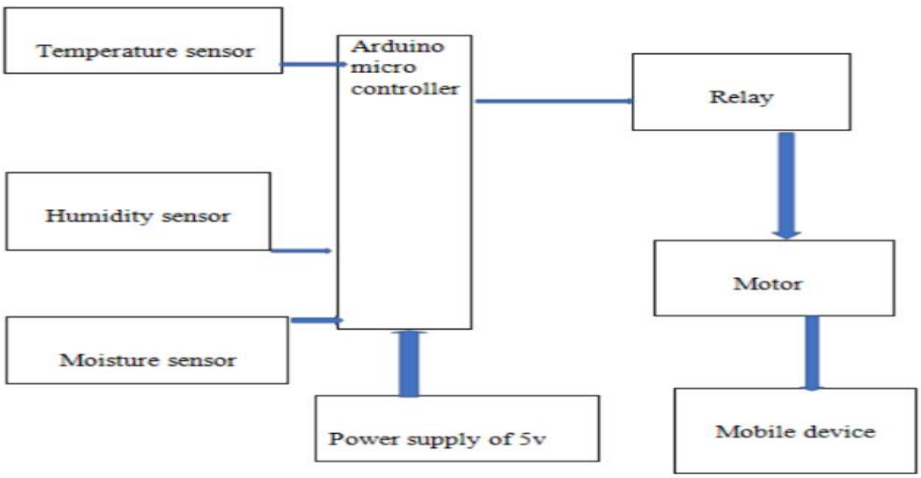

Figure 3: Automation Of Irrigation System

IV. RESULT

The attached sensors will find the various situations of the soil and based on soil moisture percent, land gets automatically irrigated. It means when field needs water then automatically motor will get ON and it will get OFF when it's get enough. These sensed parameters and motor status will be displayed on user devices. These have been running successfully. It will reduce the farmer pore as well. By this type of Smart Irrigation System we can save water and we can maintain soil moisture percent, and it reduces power loss of humans**.**

V. CONCLUSION AND FUTURE WORK

This smart irrigation system using Internet of Things project had achieved the first objective which is to investigate the whole concept of smart irrigation system using internet of things. The study is about the function of irrigation which is to water the plant with the right amount of water only when it needed water which is based on the condition of the soil. The system must have both software and hardware components which can be presented later on. The software that being studied is the Blynk application which can be used in all smartphone and it is very practical for the users to use. The hardware is the temperature sensor, humidity sensor, Arduino Mega and most importantly, the soil sensor as it detects the dryness of the plant and the water pump is going to open as the water comes out right when it detects the dryness between 400 to 630. This system creates a very good experience for the farmers to irrigate the plant. The farmers can even monitor the condition of the plant directly from the phone. With the right amount of water needed, they can save their bills on water too. Hence, this is such a great project. The second objective which is developing a system using an Arduino Mega that process the data from the soil sensor control the whole irrigation system by automatically water the plant was achieved too. There was some challenging while doing the hardware as some trying out the new sensors and finding the right sensors for the soil. The data do not only can process but the data can be stored for up to 1 year in Blynk Server. The final Smart irrigation is a rapidly growing technology that has the potential to revolutionize agriculture and improve the environment. With new technologies emerging, such as AI, drones, IoT, and machine learning, the future of smart irrigation looks bright.

As water scarcity becomes an increasingly critical issue, smart irrigation systems will become more important than ever, helping to conserve water, improve crop yields, and reduce environmental impact.

For future work, The future of smart irrigation looks bright, with several new technologies emerging that could improve the efficiency and effectiveness of these systems. The suggestion on improving it is using a solar panel for the power consumption of the system. Hence, the system is going to be eco-frien.

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