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SMART IRRIGATION SYSTEM using IoE

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ABSTRACT: Presence of farmers is very essential for proper care of farming or irrigation. But the farmers cannot Be Present in each and every time to take proper measure. Smart Irrigation System play very important role in farmers life. The aim is to make smart irrigation system into Smart and more effective. Smart irrigation system is implemented to make the pumping of motor ON and OFF after the detection of moisture content by using the soil moisture sensor without the interaction of farmers or humans. The main aim of implementing this techniques is to reduce human interaction and it is quite easy, feasible and affordable. We are implementing Smart irrigation system by using Arduino board, soil moisture sensor which used to measure the soil moisture content, ultrasonic sensor (used to measure the level of water inside the tank) Messaging module (used to send text messages to the farmer whenever the pump changes its status), LCD (used to display the level of water and moisture content together with the pump status) and two pumps (one for watering the plants and the second one for supplying water to the tank).

KEYWORDS: IoE, Arduino UNO, Soil Moisture Sensor, Ultrasonic Sensor, Messaging module, LCD , Two Pumps.

I. INTRODUCTION

As the IOT is maturing, systems are converging, deployments are growing, and IOT technology is used with more and more demanding applications such as industrial, automotive, for farmers or healthcare. This leads to new challenges for the IOT.

In Asia, for some human beings Agriculture is one of the main source of living. Agriculture may also have major impact on economy based on their country. The utilization of water is increasing day by day which may lead to come with the problem of water scarcity. AS we are Indians our farmers are struggling more hard in agriculture field but one of the major important task is irrigations of fields which is becoming more quitter and harder due to lack of regularity in their work. Our Indians farmer are so busy that sometimes they forget to switch off the motor which may cause to wastage of lacks of water on the daily basic. Inversely sometimes they forget to switch ON the irrigation system which may leads to damage of crops. To overcome these issue we have implemented “Smart Irrigation System “by using Arduino board, soil moisture sensor which used to measure the soil moisture content, ultrasonic sensor, Messaging Module (used to send text messages to the farmer whenever the pump changes its status), LCD, Two Pumps (one for watering the plants and the second one for supplying water to the tank).

A. Arduino Uno Board

It is an IOT tool which is very much useful when interfacing with the electronic components and coding which would too hard it we would have to code the components individually by using the machine level code. Arduino provide the software tool which helps us to code the components using embedded c. The tool is the Arduino IDE and it is an open source software provided by the Arduino. It uses the ATmega328P microcontroller. It consists of the set of Digital and Analog pins. It can be operated in two voltages i.e the 3.3v and 5v as some of the components doesn't require high voltage as it can damage the components. So the components required to build the Fingerprint scanner lock have been studied and now we proceed toward combining the system.



fig.1 Arduino Uno Board

B. LCD Screen

The Hitachi-compatible LCDs can be controlled in two modes: 4-bit or 8-bit. The 4-bit mode requires seven I/O pins from the Arduino, while the 8-bit mode requires 11 pins. For displaying text on the screen, you can do most everything in 4-bit mode, so example shows how to control a 16x2 LCD in 4-bit mode.



fig.2 LCD Screen

C. SOIL MOISTURE SENSOR

Soil moisture sensors measure the volumetric watercontent in 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. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

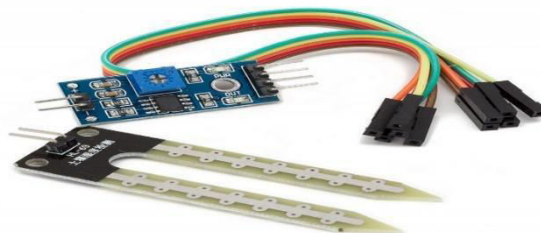


fig.3 Soil Moisture Sensor

D. ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound. Ultrasonic sensors have two main components: the transmitter and the receiver.



fig.4 Ultrasonic Sensor

E. SIM900D GSM MODULE

The SIM900 is a complete Quad-band GSM/GPRS solution in an SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for a slim and compact demand of design.



fig.5 SIM900D GSM MODULE

F. Breadboard

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

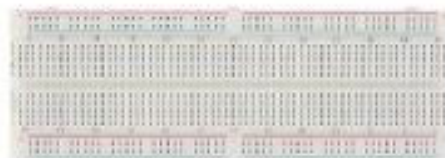


fig.6 Breadboard

G. Water Pump

A water pump is an essential tool to pump out water from the garden, pool, or under the ground. It controls the speed of the water and is incredibly useful in conserving water. The pumps come with various designs and capacities to cater to different needs of water pumping.

H. Wires

These are Jumper wire male to female, used in connecting female header pin of any development board (like Arduino) to other development board having male connector. We have also used some male to male connectors.



fig.8 Wires

I. Proteus Simulator

It is a **software** suite containing schematic, **simulation** as well as PCB designing. ISIS is the **software** used to draw schematics and **simulate** the circuits in real time. The **simulation** allows human access during run time, thus providing real time **simulation**.

II. PROPOSED SYSTEM

The working of Automatic Irrigation System is displayed through simulation only. In the simulation the two pumps namely tank pump and water pump are connected to ultrasonic and soil moisture sensor respectively. The sensors are coded with certain conditions when they reach their threshold value they make the motors of both the pumps act accordingly (i.e. they either start or stop). This process information is given to farmer to check the condition of his irrigation system via GSM module. This sensor data from both the sensors data along with status of pumps is send via text messages.

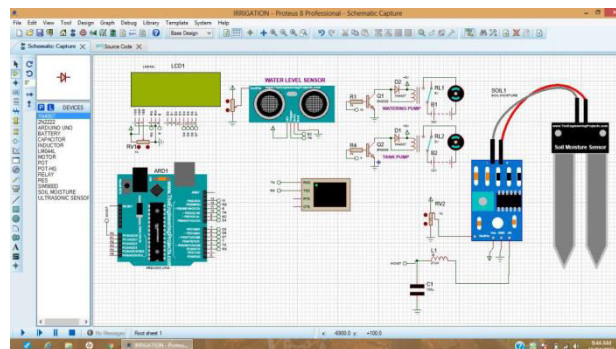


fig.10 Circuit Diagram

The circuit diagram involves a Soil Moisture sensor, which is used to calculate the moisture content of the soil. Our project is to find the moisture level of the soil, and if the moisture level is below the require threshold the two pumps should automatically start. There are two water pumps and a Ultrasonic sensor, First pump is to pump the water from the well or water reservoir to the water tank. The second pump is responsible for sprinkling the water to the soil. The ultrasonic sensor is used to check the water level of the water tank. If the water level in the tank is not enough to spread to the soil the second pump will start. We also have an LCD to display three readings moisture content of the soil, water pump ON/OFF, tank pump ON/OFF. GSM Module is used to give continues update to the owner about the pumps via messages.

III. RESULT & SIMULATION

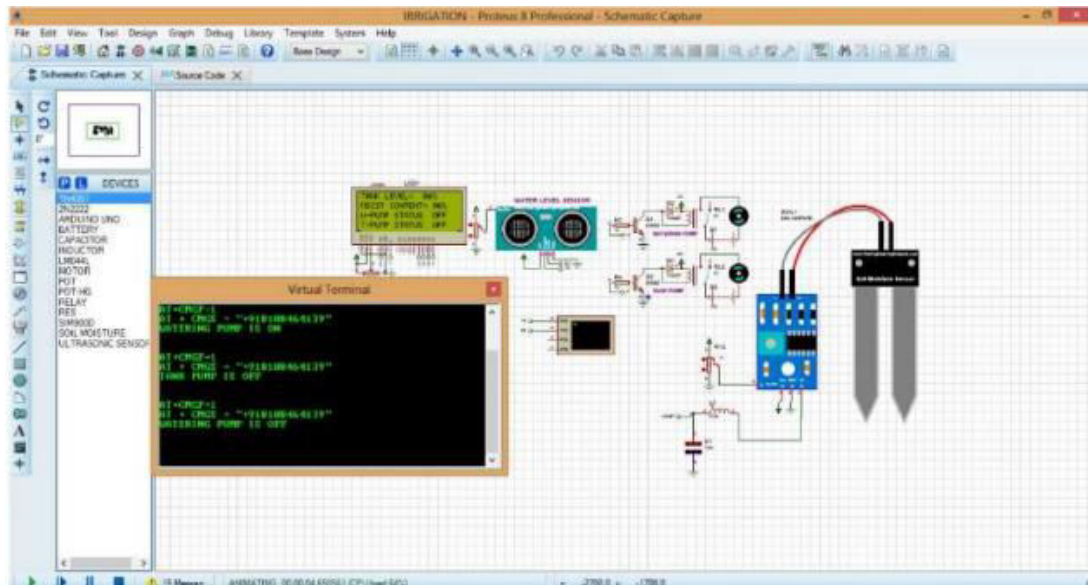


fig.11 Output Values On Virtual Terminal

As shown in the fig when moisture $\leq 85\%$ then water pump will be activated an it will start sprinkling water.

IV. FUTURE SCOPE

More sensors and technologies such as image and video processing can be used for more efficiency. Further updates can be done to improve its performance and efficiency of the system. We can convert this system into a smart detective robot with the help of some modifications and additions.

V. CONCLUSION

So from implementation of this project we were able to check the water level of the water tank. Also we can see which water pump is working at the moment by messages received through GSM module. As the soil moisture decreases pump starts pumping water from the tank and sprinkled on the soil.

VI. ACKNOWLEDGEMENT

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