

REAL TIME AUTOMATIC IRRIGATION SYSTEM WITH MOBILE ALERT

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Abstract - Water is an important element which is responsible for life on earth. Although two third of the world is covered with water it is not in the usable form. Rivers, lakes and rain are the only fresh water sources on earth. This has to be utilized by various forms of life, in agriculture, in industries and so on. In agriculture for the process of irrigation majority of the fresh water is being used but due to lack of automatic irrigation techniques the crops are being destroyed either due to over irrigation, under irrigation and sudden change in climatic conditions. This paper is about a project on a automatic real time system which detects the moisture level in a particular sector and if it is less than desired value then watering that particular sector. This system uses solenoid valves for each sector and main water pump which are used for particular sector only. This system also provides messages to the farmer about which sector is DRY and which sector is WET using a gsm module.

Key Words: Arduino UNO, GSM, Relay, moisture sensor, solenoid valve, sector.

1. INTRODUCTION

Agriculture is a major source of income for the economy of a nation. It contributes 16-17% of GDP. About 70% of population in India depend on agriculture. Artificial application of water to the soil for assisting in growing crops is known as irrigation. There are various types in irrigation like drip irrigation, surface irrigation, hill top irrigation, sprinklers. Most of these irrigation practices are done manually by farmers. The farmers cannot judge about the exact amount of water required by the plants and weather. The fresh water are very less on earth these have to be efficiently utilized to make them available for future generations. Already all the metropolitan cities are facing water problem and lack of ground water resources. Moreover a lot of amount of water we supply as irrigation is getting evaporated without being suck by the roots. Many plants are being damaged because of under irrigation or over irrigation. The main proposal of this project is to develop a real time autonomous system which calculates the moisture value present at the roots of the plant and supplies the adequate amount of water to the crop. The complete field is divided into sectors. Each sector is associated with a moisture sensor and solenoid valve. Soil moisture and irrigation to a particular sector are taken as major emphasis. The proposed project can be used for any type of irrigation

by dividing the entire farm into sectors and changing the outlet design.

2. OBJECTIVES:

- Reduce human effort in irrigation.
- Effective utilization of water resources.
- Supplying the required amount of water to plant (Not high or low).
- Converting irrigation from manual to autonomous work.
- Effective utilization of electricity.
- Performing irrigation based on sudden changes in environment & natural calamities.

3. LITERATURE SURVEY:

In [1] the humidity and soil moisture sensors are placed in the root zone of the plant. The system is completely autonomous. Based on the sensed values the microcontroller performs the action of switching the motor on/off. The motor pump pumps the water to the plant when the moisture level reaches the desired value then the motor gets turned off automatically. But this system don't intimate the farmer about the field status. In [2] moisture and temperature at desired location calculated and sent to the farmer. Though this system indicates farmer about the field status controlling of motor has to be done manually by farmer. The autonomous system is removed and manual mode of operation of the system comes into picture. If farmer neglects any message or if any information is not delivered to the farmer then he/she may not switch on the motor resulting to loss of plants. In [3] the motor is ON/OFF automatically but it consists of only single sensor. The main aim of every project is to make it applicable in real time placing of a single sensor and a single motor will not do any work in real time.

4. SYSTEM OVERVIEW:

This paper is based on real time automatic irrigation system with mobile alert to farmer. This system supplies water to the required sector of field based on the moisture sensor valve at that particular sector. The sensors senses the moisture level at their sectors and transmit the data to the Arduino. The Arduino analyses the data if the moisture level at a particular region is less than desired value then it excites the solenoid valve belonging to that particular sector and switch on the motor. A message will be send to the farmer

whether the sector is dry. The GSM module will send a message only when there is a state change in sector i.e., from DRY to WET or from WET to DRY. Again when the desired moisture level is achieved the motor pump and solenoid valve are made to OFF. A message to the farmer that sector is wet is sent.

HARDWARE DETAILS – The project includes Arduino UNO which works a microcontroller. It consists of FC – 28 moisture sensors which senses the moisture contents. A relay board used for switching the solenoid valves and motor ON and OFF. Solenoid valves are used for each sector these are inductive coils and allow water to flow through them when supply is given. A 0.5hp motor pump is used to supply the water.

SOFTWARE DETAILS – The Arduino IDE is the software used for coding. It is simple and easy to code. It uses embedded C coding language. It has number of inbuilt libraries which makes it easy to operate.

5. SYSTEM ARCHITECTURE:

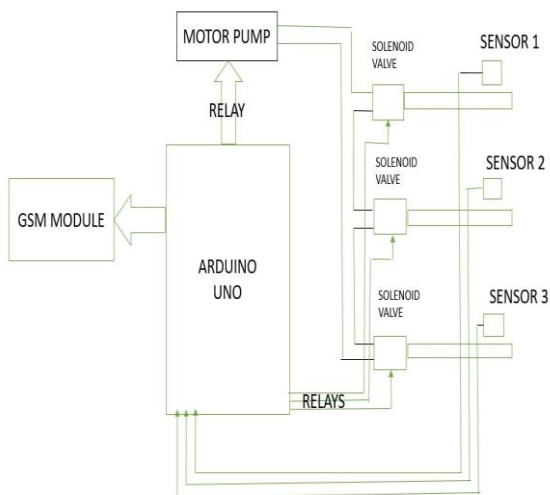


Fig -1: System Architecture

6. SOLENOID VALVE:

Solenoid valve is an important component which makes automatic irrigation system to be applicable to the real world. It consists of inlet, outlet and an inductive coil which when excited lifts the plunger up. This allows the water to flow from inlet to outlet. When the inductive coil is de-energized then plunger moves down and the path between inlet and outlet is closed.



Fig - 2: Solenoid valve

7. ALGORITHM:

Step 1: Switch ON the power supply to GSM module, Arduino and relays.

Step 2: Sensor measures the moisture level at i^{th} sector and sends it Arduino.

Step 3: If the moisture level is less than the threshold valve then solenoid valve of i^{th} sector is excited and motor is made to ON. Motor is made to ON if moisture at any sector is less than desired value.

Step 4: If step 3 is executed then a message will be send to the farmer regarding about whether the sector is DRY.

Step 5: When the moisture level reaches the desired value then check

- If all the sectors have desired moisture level then OFF the pump then de-excite the solenoid valve belonging to i^{th} sector.
- If not all the sector have desired moisture level then don't switch OFF the motor pump but de-excite the solenoid valve belonging to i^{th} sector.

Step 6: If step 5 is executed then a message will be send to the farmer regarding about whether the sector is WET.

Step 7: Repeat the steps from step 2 for all the sectors.

FLOW CHART:

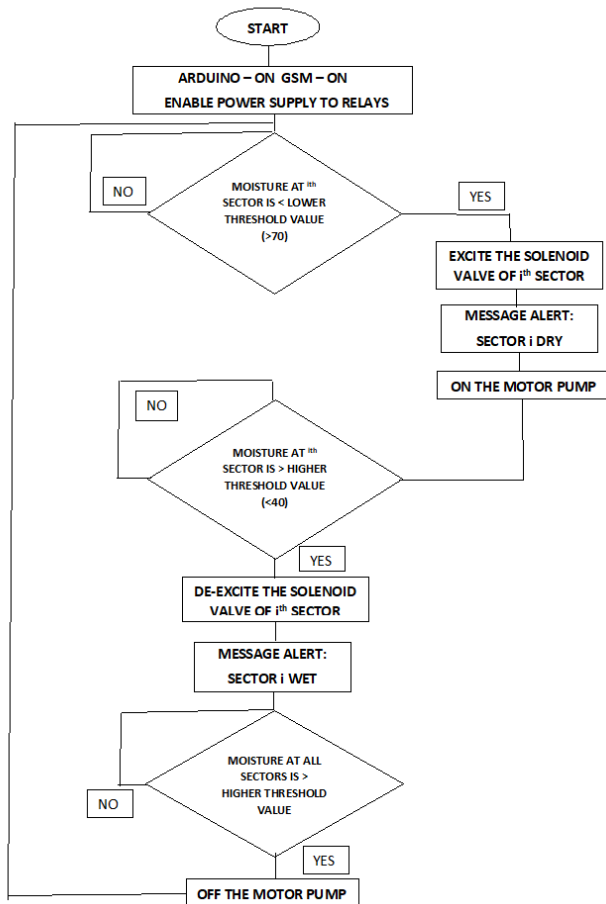


Fig - 3: Flow Chart



Fig-4: snapshot of project



Fig - 5: snapshot of messages to phone

8. RESULT:

The project is tested by considering a dry soil sample and a wet soil sample. Here we considered three sectors each one associated with two messages dry and wet samples. When the sector is dry then farmers get a message that the sector is in dry state. If it is in wet then farmers get a message that the sector is wet. All these messages are sent via GSM module which is used in the project to a number that is assigned in Arduino. In this project a three sector field is considered and each sector is associated with a message dry and wet with the sector name. The farmer will receive the message only when there is state change. Figure 4 shows the sectors one and two are dry and the water is allowed through these outlet pipes. Figure 5 shows a screenshot of messages that received during testing.

9. CONCLUSION:

At the end we would bring to the conclusion that the project helps the farmers to irrigate their without any effort. They could use this time effectively on some other work besides having knowledge about their field status. This project is fully operational and can be implemented on a large scale dividing the complete farm into sectors. This project reduces the human effort and reduces the wastage of water. Depending on the weather conditions the project can automatically adjust the water that should be supplied for each sector. This project can be suitably used for any type of irrigation. Fertilizers required for plants can also supplied by dissolving them in the tank. The main aim of this project is farmer should go to the farm one is for planting seeds and other is for harvesting.

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