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Smart irrigation system using Arduino Uno

Kavya Monisha K.
kavyavickyshriya@gmail.com
SRM Institute of Science and Technology, Chennai, Tamil Nadu

Aishwarya D.
aishwaryasujji@gmail.com
SRM Institute of Science and Technology, Chennai, Tamil Nadu

Krupaleni K.
krupusonu@gmail.com
SRM Institute of Science and Technology, Chennai, Tamil Nadu

ABSTRACT

The smart irrigation system is an automatic irrigation system which is being widely used in the field of agriculture. Irrigation is practiced in farms where there is a scarcity of water. This smart irrigation system is a farmer-friendly irrigation system, which is completely automated. This system runs without intervention of humans. This smart irrigation system, using Arduino-Uno, checks the moisture level in the soil. If the moisture level in the soil is low, it automatically sends an alert message and turns on the water motor to flow water to the soil. If the moisture level in the soil is sufficient, it switches off the motor. This system helps in agricultural crop growth and soil maintenance. The smart irrigation system reduces the effect caused by insufficient rainfall. This irrigation system prevents excess of water flowing into the soil which causes a wastage of water, electricity and damage to the soil, effectively.

Keywords— *Arduino Uno, Non-intervention of humans, Automatic, Soil moisture sensor, Water motor*

1. INTRODUCTION

In most of the countries, agriculture plays a vital role in the economy of the nation. Agriculture is the main bone of the country for its development in, particularly livelihood of the people and production of food materials and such as other raw materials. Agriculture growth is the backbone of the country's economy. Smart irrigation system offers convenience while protecting your landscape investment. This system keeps your lawn and landscape beautiful and healthy.IT also helps in reducing the amount of water getting waste. Thus smart irrigation system is used for automatic irrigation, best time complexity, and non-intervention of humans.

2. PROPOSED SYSTEM

Our proposed system embodies three modules, that checks the moisture level in the soil using the sensor and automatically switches on the motor if the moisture level in the soil is low. It also sends a message to the farmer saying that the moisture level is low. To accomplish the above stated. The first module mainly checks the moisture level in the soil. The module uses a soil moisture sensor to measure the volumetric water content in the soil. Soil moisture sensor measures the volumetric water content indirectly by using some other property in the soil, such as electrical resistance, dielectric constant, or interactions with neutrons, as an alternative for the moisture content.

The one end of the probe in the sensor is connected directly to the Vcc and the other end of the probe is connected to the BC547 transistor. The base of this transistor is connected to a potentiometer to control the sensitivity of the sensor. The second module gets the output of the soil moisture sensor which is connected to digital pin D7 of Arduino.

The second module consists of a LED in the sensor circuit. If the moisture level is present the LED is in on state and off when the moisture level in the soil is low. The TTL SIM800 GSM module is a complete Quad-band GSM.The lm317 voltage regulator is used to power the SIM800 GSM module.

The third module A Relay of 12v is used to control the small water pump of 220vac. The relay is run by a BC547 Transistor which is further connected to the digital pin 11 of Arduino Uno board.

3. WORKING OF SMART IRRIGATION SYSTEM

The soil moisture sensor checks the moisture level in the soil. If the moisture level is present in soil then conduction occurs between the two probes of Soil Moisture Sensor. Due to this conduction, the transistor Q2 remains in triggered state and so Arduino Pin D7 remains Low. When Arduino pin reads LOW signal at D7. The GSM module sends SMS to the user that Soil Moisture is Normal and the motor is turned OFF.So water pump remains in Off state.

In case of low moisture in the soil the Transistor Q2 turns off and then the Pin D7 becomes High. Then the Arduino Uno reads the Pin D7 and triggers the water motor. Using the gsm module message is sent to the user about "Low Soil Moisture level detected and the Motor is turned ON".The water Motor will automatically turn off when there is sufficient moisture in the soil.

4. SENSOR USED

Soil moisture sensors measure checks the water level in the soil. Since the soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the level of water content indirectly by using some other property of the

soil. Soil moisture sensors are used in various research applications such as agriculture, horticulture, climate research, environmental science.

In this project, the process of Soil Moisture Sensor is to check the moisture level in the soil and in case moisture level is low then the Arduino which is connected to the sensor switches on a water pump to provide water to the plant.

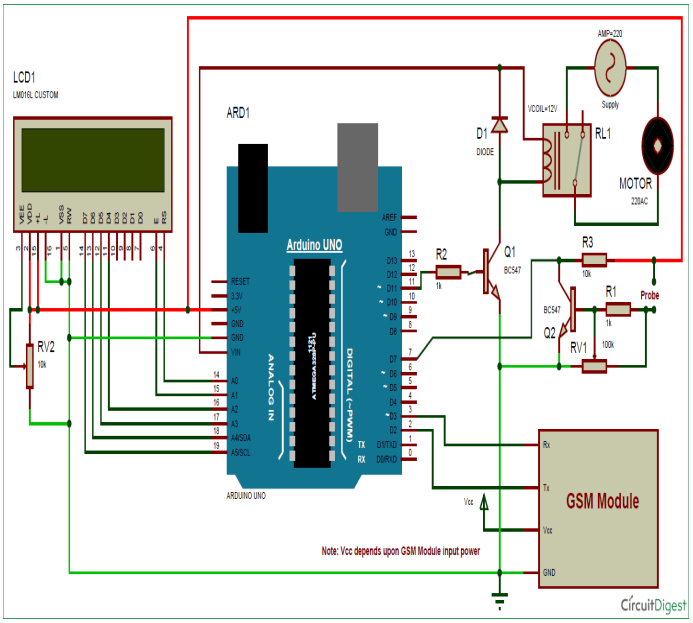

Fig. 1: Smart irrigation system

5. CONCLUSION

This project is feasible and cost-effective for optimizing water resources for agricultural production. This project allows cultivation in places with water scarcity thereby improving sustainability. It proves that the wastage of water can be reduced. I conclude that this system is very easy to implement. Here user should visualize his soil's moisture content from time to time and check whether the water level is sufficient or not. Smart irrigation system displays the values of the water level in mobile of the user so that user can operate them anytime.

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