Design and Monitoring of Water Level Model using Sensor Technology

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Abstract

For the cultivation of agricultural crops during the span of inadequate rainfall, irrigation process can be used. An automatic irrigation system does the work quite efficiently and with a positive impact on the place where it is installed. It doesn’t require any human intervention to perform operations if it is installed and also the water distribution to the crops and nurseries becomes easier. Internet of Things (IOT) extends internet connectivity. It connects the external environment that utilizes embedded technology and the various traditional devices via internet. The proposed model uses Internet of Things to communicate with the external environment. The working model helps in development of an automated system that could be efficiently used in agriculture. The primary goal of this model is to maintain the growth of the plant. To avoid over-watering, detection of soil condition, moisture level prediction is very essential. The sensors help to detect the moisture and water level and thereby direct the pump to pour the required amount of water to crops. The proposed model works well both in landscapes and slope areas and it also helps to control the uneven moisture with the help of soil moisture sensor. Water is fed to the crops and sequence of operations is intimated to the user.

Keywords: Internet of Things (IOT), Soil Moisture Sensor, Automatic Irrigation

I. INTRODUCTION

Agriculture has, arguably, been very successful at capturing the major share of the world’s exploitable water resources. Almost 70% of earth’s surface is covered with water and from that almost about 2% of the planet’s water is fresh. So, conserving this available water resource is a provoking issue to be considered. Therefore, efficient use and water monitoring are potential constraint for home or office water management system. Last few decades several monitoring system integrated with water level detection have become accepted. The proposed system is aimed at developing an automatic water level detection system that could be effectively used in agriculture. The proposed model comprises of an arduino kit that contains an embedded microcontroller and an IDE. Two sensors namely the water level and soil moisture sensors are used for the automatic detection. Based on the moisture level detected, the arduino directs the pumping motor to switch ON/OFF with the help of relays, thereby pouring the sufficient amount of water to the crops. The process will be monitored by the user and the sequence of alert messages will be sent to the user.

II. DESIGN AN IMPLEMENTATION

![Fig. 1: Design and Implementation](image_url)
**A. Arduino Board**

Arduino is an open source hardware used for building electronic projects. It consists of both a physical programmable circuit board (often referred to as microcontroller) and a piece of software, or Integrated Development Environment (IDE) that runs on the computer, used to write and upload computer code to the physical board.

![Arduino](image)

This arduino board which has an integrated microcontroller helps in controlling the entire field. Water level sensor, soil moisture sensor, power supply are connected to the board. The sensed information from both the sensors are given to the board which directs the pump motor to pour the required level of water to the crops. The entire field is under the control of the microcontroller present in the arduino.

1) **Sensor Unit**

The working model consists of two sensors namely water level sensor and the soil moisture sensor. Water level sensor is to be connected to the tank or well to sense the level of water. Soil moisture sensor is used to detect the water content in the soil. Once the condition of the soil in the field is detected, it not only helps in using less water to grow a crop, but also increase yields and the quality of the crop by improved management of soil moisture. After sensing the water level and the soil content using sensors, the sensed information is fed to the arduino board and the process continues accordingly.

2) **Control Unit**

The basic operation of the control unit is controlling water pump by arduino which is programmed by particular program. Water pump are connected with an output pin of an arduino via a relay circuit which is connected with a transistor. The two important operations performed by the control unit is

- **ON Operation**: If the crop’s moisture level is depicted as low, then the pumping motor will be turned on. In this case the microcontroller will send a positive signal where its emitter and collector will be short. The Relay circuit and the motor pump will get ground signal and for this reason the motor pump will be ON.

- **OFF Operation**: If the crop’s moisture level is depicted as adequate level, then the pumping motor will be turned off. In this case the microcontroller sends 0 volt to the base of the transistor so it becomes off which when its emitter and collector becomes open. Then no ground signal (0v) is collected in the relay circuit. So, the negative side in the cable of motor pumps getting positive signal (+5v). Therefore, the motor pump will be OFF due to getting positive signal (+5v) at one side and 220v ac at the other end.

**B. Monitoring**

The user could view the sequence of operations from any location. The user will be given the required alert messages depending on the different levels of water attained by the crops.

**III. Future works**

The future work is trying to improve a system which may neglect the problem related to the physical devices such as motor repair or power down conditions.

**IV. Conclusion**

Water is the most important substances on earth. But it is a fact, that much of the precious water is wasted due to the lack of well monitoring systems. Our sole reason for developing this working model is to save water for future use especially in agricultural sector. We have developed an automated system which is user friendly and time efficient. Our intension of this research work was to establish a flexible, economical and easy configurable system which can solve our water losing problem.
REFERENCES

