

PUMP AUTOMATION USING ARDUINO

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Abstract—This paper presents a low cost and flexible pump automation using arduino system. It employs embedded micro web server in Arduino atMega 328p microcontroller, with connectivity for accessing and controlling devices and appliances automatically. To demonstrate the feasibility and effectiveness of this system, devices such as pump, arduino, float sensor, solenoid valve, tank, wires, motor, have been integrated with the proposed pump control system. In states including Maharashtra, Gujarat, Delhi, Karnataka, a city water authority supplies the clean water and pumps it into large ground-level storage tanks. A resident's water pump then pumps the water to a water tank on top of his/her house. When the water level in the ground-level storage tank becomes too low, the pump siphons air and shuts down, requiring a resident to manually prime the water pump to get it running again. Residents struggle to monitor the water level of the tanks effectively and keep the pump running properly. To remedy the issue, the Pump automation using arduino system monitors the water levels and controls the pump as necessary to prevent breakdown and maximize water storage without overfilling the rooftop tank and wasting water. The proposed water level controller circuit using a float switch is basically an automatic system where the pump is started automatically by arduino, once the water level reaches the brim of the tank; the operation is switched of automatically by means of a float switch. The filling of water tanks have been done through electrical pumps in the recent. However, untimely turning off the motor pumps lead to less filled tanks or over flown water from the tanks causing wastage. In order to avoid such situations we can have an electronic water level controller which can monitor the water level and switch the motor pump accordingly.

Keywords- Arduino, water tank, relay, Motor, Solenoid valve.

1. INTRODUCTION

The main aim of this project was to provide water to the plants or gardening automatically using microcontroller (Arduino Uno). We can automatically watering the plants when we are going on vacation or don't we have to bother my neighbors, Sometimes the neighbors do too much of watering and the plants end up dying anyway. There are timer based devices available in India which waters the soil on set interval. They do not sense the soil moisture and the ambient temperature to know if the soil actually needs watering or not. The proposed water level controller circuit using a float switch is basically an automatic system where the pump is started automatically by arduino, once the water level reaches the brim of the tank; the operation is switched of automatically by means of a float switch. The filling of water tanks have been done through electrical pumps in the recent. However, untimely turning off the motor pumps lead to less filled tanks or over flown water from the tanks causing wastage. In order to avoid such situations we can have an electronic water level controller which can monitor the water level and switch the motor pump accordingly. This device has two level sensors which work in harmony of a power switching relay. This relay is the one which connects the water pump to the mains power supply. If the system indicates that water level in the tank is Low, then the system turns on the power supply for the water pump. The pump remains till the system indicates the water level is low. Once the system indicates the water level as high and not low, the power to the water pump is switched off. It remains switched off till the water level is not again to the low level in the tank. Conductivity of water is what makes the level sensing work. With a reference level at the bottom sensor. At the time when water isn't the high level the circuit triggers the low level sensor and also the relay to turn ON the water pump. Once the water level catches up the high level, the high level sensor is turned ON and the relay is switched to turn OFF the water pump till the next low level trigger.

2. LITERATURE SURVEY

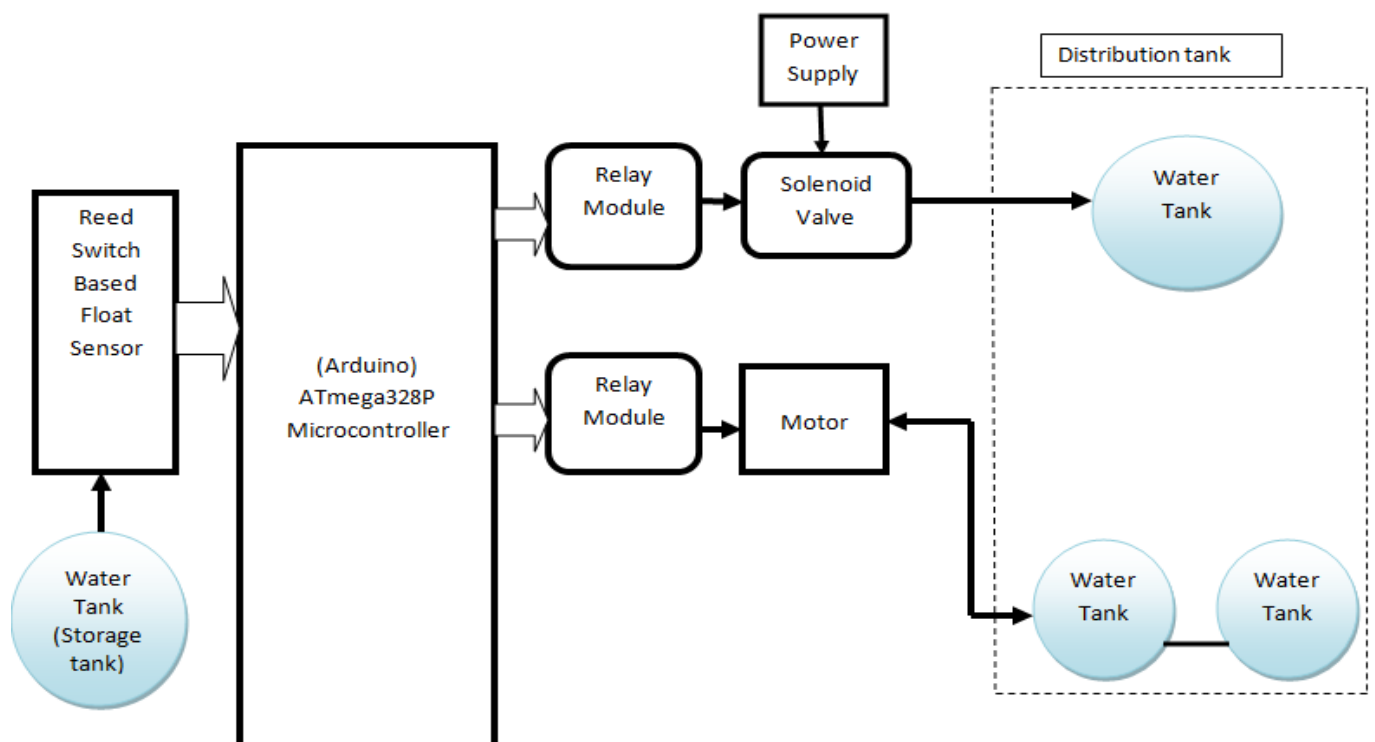
The literature review contains the brief discussion of some recent works of water automation for water pump controller system through android application. A model is presented in [1] which can collect water expense from a customer and detect the leakage in the water distribution system. The advantage of this model is that it can reduce the periodic tours of providers to each physical location to read each meter. Another advantage is that the bill of water usage can give based on the near real-time expense from the previous expense. Detecting leak supports to save water resources and energy and also reduce the cost.

The paper [2] proposes a water monitoring system by using an automatic overflow control circuit unit. The proposal is designed from the perspective of monitoring the flow of water into the tanks automatically and from the perspective of setting as per the user demands using a Mobile Application. The advantages of the system are the conservation of water resource, reduction of the manual attempt, and time to time changes over the situation of water storage with the help of sensors.

A basic model of the android application is proposed in [3] which states that water pumps can be switched ON and OFF with the assistance of radio transmitters and Wi-Fi router. The wastage of water and the wastage of electricity can be avoided by this system. Users can check the water level of the tank and turn the pump ON and OFF from remotely using the android application.

Observing the water level with the help of the ultrasonic sensor is given in [4]. This system helps to conserve water and keep track of water usage and inform the users in situations of abuse of water. It assists the users to check the water level in the water tank. Moreover, users are capable to observe their water usage using the android application. Also, using the android application can avoid the wastage of water by cutting off the water supply.

3. BLOCK DIAGRAM



Explanation-

There are two functional components in this project. They are the moisture sensors module and the motor driver for motor pump. Thus the Arduino Board is programmed using the Arduino IDE software. The function of the moisture sensor is to sense the temperature content present in the soil, and also it measure moisture level in the soil. The motor driver interrupts the signal to, water pump supplies water to the plants. This project uses microcontroller Arduino Uno board to controls the motor and monitor soil moisture. Follow the schematic to connect the Arduino to the motor driver, and the driver to the water pump. The motor can be driven by a 5 volt battery, we can also supplies power from external source or from Arduino board. The Arduino Board is programmed using the Arduino IDE software.

4. EXPERIMENTAL RESULTS

Result Table

- **Motor on, solenoid valve on.**

condition	Sensor1	Sensor2	Sensor3	Sensor4	Sensor5	Motor
1	Low	Low	High	High	Low	On
2	Low	Low	High	Low	Low	On
3	low	low	low	low	low	On

- **Motor on solenoid valve off.**

4	Low	High	Low	Low	Low	On
5	High	High	Low	Low	Low	off
6	Low	low	high	high	high	Off

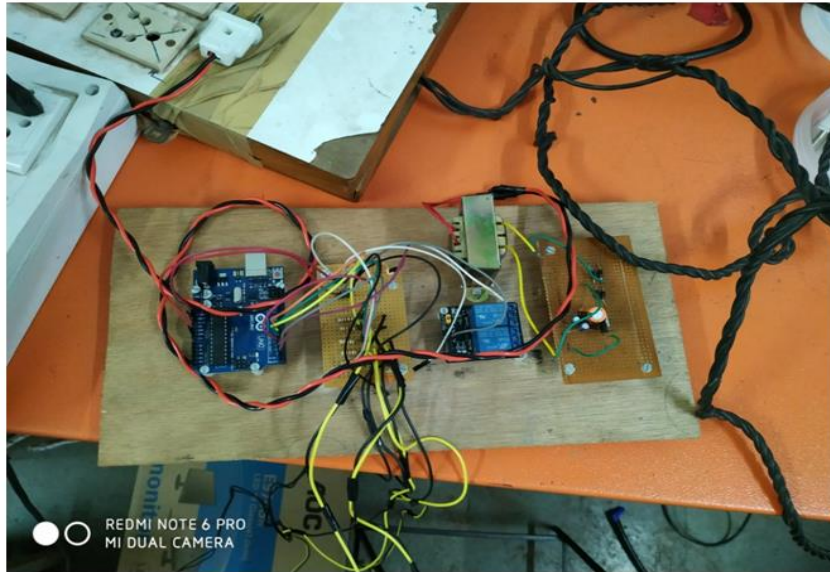
- **Motor off solenoid valve off.**

Hardware implementation



Explanation:

There are 3 tanks. Of which two distribution tanks. one at top and other at bottom. And third is storage tank. Bottom distribution tank consist of two NC float sensors, Top distribution tank consist of two NO float sensors. Storage tank has only one NO float sensor is used. A solenoid valve is used between two distribution tanks for ON and OFF switching. A motor is used in storage tank. By observing the conditions of sensors, motor will be performing ON/OFF operation. By this distribution of water in tanks takes place.



In this project we are using a Arduino UNO, 3 relay(1st for motor, 2nd for solenoid valve and 3rd for future use), One solenoid valve, one motor, five float sensors and a power supply of 12v DC for solenoid valve.

CONCLUSIONS

In this digital world Technology is very advanced and we prefer things to be done automatically without any human efforts. This project also helps to reduce human efforts. Also it is very useful to conserve resources. It is very useful in Schools, hospitals, malls, offices, auditoriums etc. In any big hall if we want to count number of individuals it is very difficult as it results in congestion and disturbance to the whole Class. This project becomes helping hand in such situation because it gives the count on LCD display. Also it controls the lighting system automatically according to how many individuals are there in a room.

- Turning OFF of motor will increase with increasing the individual in tank water level
- Turning ON of motor will decrease with decreasing the individual in tank water level

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