Project Report
On
water tank monitoring system
(IOT)

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Abstract

- Water is an important resource for life and its existence. Nowadays, due to increase in migration from a rural area to urban areas, the population in cities is increasing rapidly. To satisfy the water requirement, we are proposing an approach which is based on IoT (Internet of Things). In this IoT based model for water level monitoring. There are many other situations where water level monitoring is an important task. It may be used to preserve water or to study the water usage of a water source. This paper proposes a prototype system design, implementation and description of required tools and technologies to develop Internet of Things (IoT) based water level monitoring system which can be implemented in future smart villages in India

MOTIVATION

- The most important aspect for all living organisms is water and it is necessary to preserve water. So water level monitoring is fundamental step for protection of water resources. Designing this system will help to monitor the level of water based on information sensed by the sensors in water tank in order to know the parameter of water. Water engineers and so many other disciplines that study water, rainfall and so many other things related to water resources especially rivers, seas, lakes are faced with the challenge of acquiring quality and accurate data which is one of the motivations of this research.

Introduction

- The Internet of Things (IoTs) can be used for connecting objects like smartphones, Internet TVs, laptops, computers, sensors and actuators to the Internet where the devices are linked together to enable new forms of communication between things and people, and between things themselves. Building IoTs has improved significantly in the past few years. The number of devices connected to the internet are increasing day by day. IoT can be used in s mart village to develop Smart Agriculture, Smart Dairy, Smart Schools, Smart Healthcare and Smart Grid solutions. IoT in agriculture can be used for better management of resources used in crop production. Water is one of the important substances used in crop production. It must be saved to avoid water shortage in future. One such method for saving water is to screen and concentrate on its use and in like manner its usage ought to be made due. Checking water level of a water source, for example, water tank or borewell and so forth, assumes a key part in water the board. Monitoring water level in a water source can be utilized to save water and to concentrate on the water use. Subsequently checking water level is a significant undertaking in farming.

Description:

- This task assists us with realizing the water level in the tank whether it is in the base level or the greatest level dependent on detecting the degree of water to foresee the compartment/tank is filled or not and show its outcome with the assistance of screen and LED lights demonstrating the level of water level. The undertaking intends to fill the water tank consequently with next to no human cooperation with the assistance of a siphon to save the wastage of water and the time being the flood of the water, with the assistance of IoT application the task is executed with applied sensors

- This task focused on minimal expense programmed water level monitoring framework

Materials

- Arduino Pro mir

- HC-SR04 ultrasonic sensor

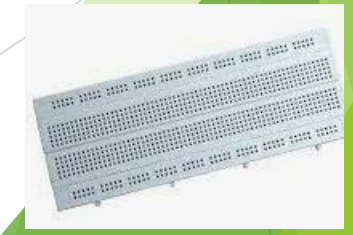
- Led

- Buzzer

- Jumper wires

- Water pump

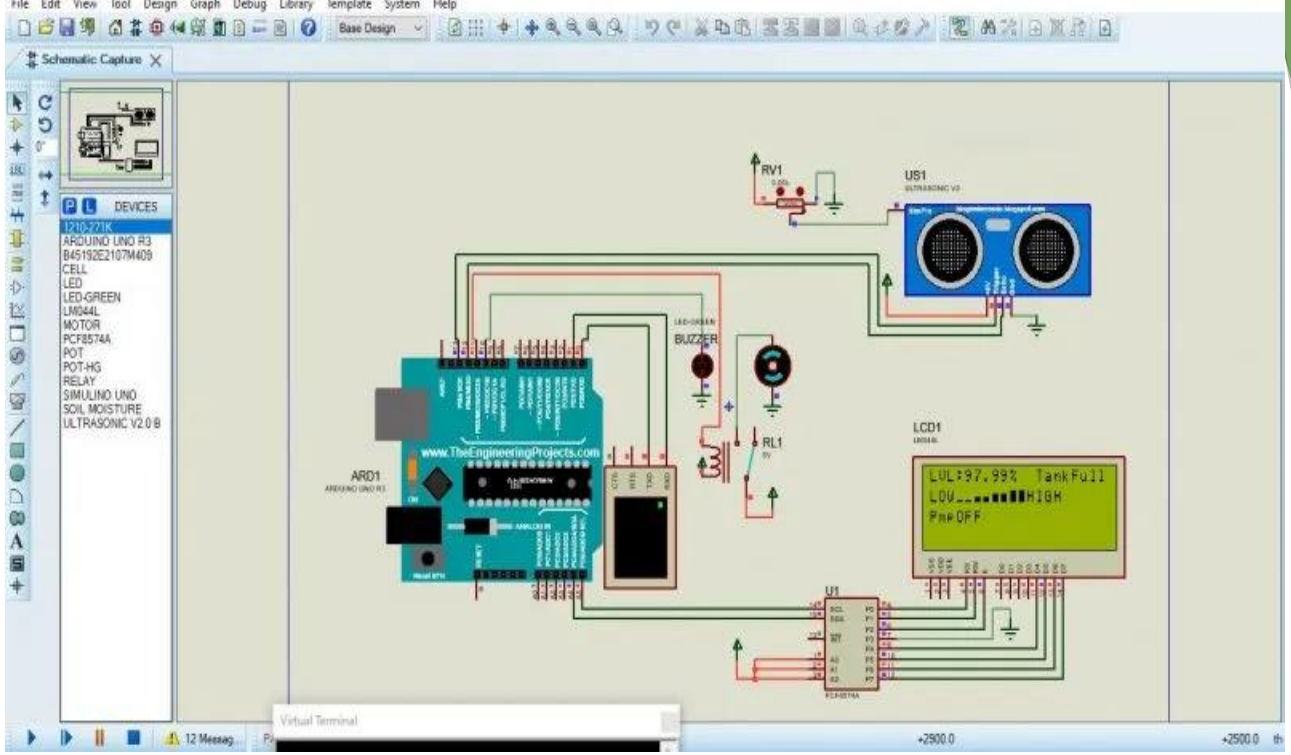
- breadboard



Methodology

A tank monitoring system can sort out the issues associated with a water tank. Thus, it is also possible to check the level of the water using a sensor so that whenever the water goes low, the pump turns on automatically. Also, to avoid the overflow of water, it detects when the water level goes above the set limit, which turns off the pump automatically.

- The water level in the tank is continuously monitored by the ultrasonic sensor mounted on top. As the water level in the tank drops below 20 percent, the pump is turned on using the relay mechanism and is kept on until the tank is full. The pump is then turned off and the loop iterated again.
- This tutorial focuses on implementing an Arduino-based system to monitor the water level in a tank using an ultrasonic sensor, which also controls a relay-connected pump based on the input from the sensor.
- After gathering the required components, it’s time to implement a circuit following the circuit diagram.



Two water levels are set based on the total tank height. The lower level is at 20 percent of the total height, and the upper level is set at 90 percent of the total tank height.

The ultrasonic sensor is mounted on the top of the tank. When the tank is 20 percent full, the distance between the U.S. and the water surface will be:

$h_{20\%}$= Total height – height of 20% filled water

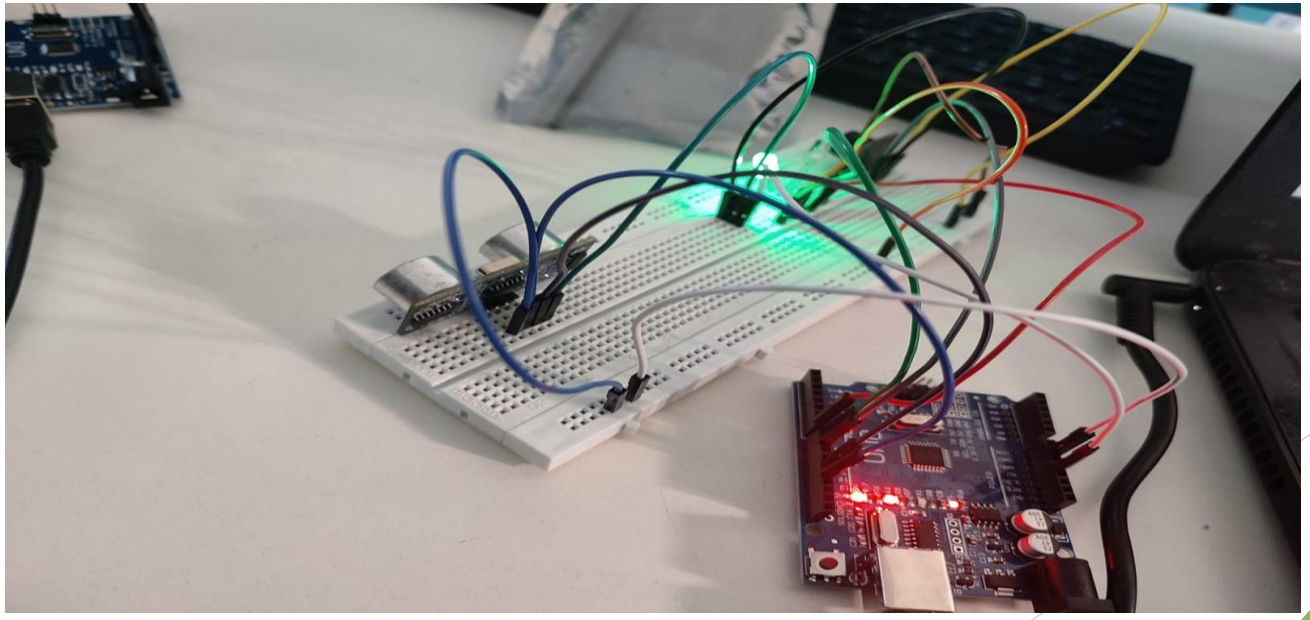
Similarly, when the tank is 90 percent full, the distance between the U.S. and the water surface will be:

$h_{90\%}$= Total height – height of 90% filled water

when the distance of the water surface from the ultrasonic sensor is greater than $h_{20\%}$, the pump is on. The pump is kept on until the set upper water level is achieved, then it automatically turns off. This happens when the distance of the water surface from the ultrasonic sensor is less than $h_{90\%}$.

Arduino IDE Setup

Install the Arduino integrated development environment (IDE) software on your PC, then connect the Arduino board to the PC using the USB cable. Set the board as “Arduino UNO” and port to whichever board is connected in the “Tools” menu of the IDE. You can find the port number by going to the “Device Manager” window on your Windows PC.



```
#define pump 6

const int trigPin =12;
const int echoPin =13;
const int buzzer = 9;
int ledA=7;
int ledB=8;

long duration;
int distance;

void setup() {
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(ledA,OUTPUT);
pinMode(ledB,OUTPUT);

pinMode(buzzer, OUTPUT);
pinMode(pump,OUTPUT);
Serial.begin(9600);
}


void loop() {

digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
```

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```
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
digitalWrite(pump, LOW);
duration = pulseIn(echoPin, HIGH);
distance= (duration/2)/29.1;

if (distance <= 15)
{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledA, HIGH);
  digitalWrite(ledB, HIGH);
  digitalWrite(pump, LOW);
  Serial.print("Capacity of tank has been reached!!");
}
else if(distance<=45){
  digitalWrite(buzzer, LOW);
  digitalWrite(ledA, LOW);
  digitalWrite(ledB, HIGH);
}
else {
  digitalWrite(buzzer, HIGH);
  digitalWrite(ledA, LOW);
  digitalWrite(ledB, LOW);
  digitalWrite(pump, HIGH);
}
// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);
}
```

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53

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Code for Water Tank Monitoring System

OUTPUT

```
Distance -> 97
Distance -> 98
Distance -> 94
Distance -> 94
Distance -> 96
Distance -> 99
Distance -> 99
Distance -> 97
tank is full....!!Distance -> 10
tank is full....!!Distance -> 10
tank is full....!!Distance -> 10
tank is full....!!Distance -> 8
tank is full....!!Distance -> 7
tank is full....!!Distance -> 8
Distance -> 185
Distance -> 728
tank is full....!!Distance -> 7
tank is full....!!Distance -> 7
tank is full....!!Distance -> 7
tank is full....!!Distance -> 8
tank is full....!!Distance -> 8
tank is full....!!Distance -> 8
tank is full....!!Distance -> 7
tank is full....!!Distance -> 7
tank is full....!!Distance -> 6
tank is full....!!Distance -> 6
tank is full....!!Distance -> 6
tank is full....!!Distance -> 7
Distance -> 14
```

Application And Use

- Can be used in water tanks to control water levels
- Automatically turn ON/OFF pumps
- Can be used in factories, commercial complexes, apartments, home,
- Fuel tank level gauging
- Oil tank level control
- High & low-level alarms
- Pool water level control

CONCLUSION

- An automated water level monitoring system was brought to use, supplemented by the significance that it is not only automatic but also the values can be transmitted within a predefined distance. The model used for testing had some added features to fit for all the possible factors that can influence the readings.

- It also signifies when the water level is below and above then the requirement. System design and architecture is as discussed, thus being a cost effective and simple strategy to monitor the water level system. Future Work can involve