REPORT

Title: Automated slug detection system for water tanks

Problem Statement:

Develop a microcontroller based prototype which alert the user to clean the water tank as the sludge level is more

Scope Of The Solution:

This project presents a microcontroller-based system designed to automate sludge level monitoring in water storage tanks, with the primary goal of facilitating timely maintenance and cleaning. The system employs an ultrasonic sensor to continuously measure the distance between the sensor and the sludge layer. These readings are then compared against a predefined threshold to determine whether the sludge has reached a critical level.

When the sludge level exceeds the threshold, the system activates an LED indicator and optionally a buzzer to alert users. This automated approach significantly reduces the need for manual inspections, thereby saving time, effort, and operational resources.

The solution is flexible and scalable, making it suitable for a wide range of applications, including residential, industrial, and agricultural water tanks. It can be adapted to accommodate different tank sizes and environmental

conditions. Furthermore, the integration of IoT technologies such as Wi-Fi or GSM modules can enable remote monitoring and notifications, providing users with real-time updates on tank conditions.

By ensuring timely cleaning, the system contributes to improved water quality and hygiene. While there are some limitations, such as the reduced accuracy of ultrasonic sensors in harsh or highly turbulent environments and the need for occasional hardware maintenance, the system offers a cost-effective and efficient solution for sludge monitoring and tank management.
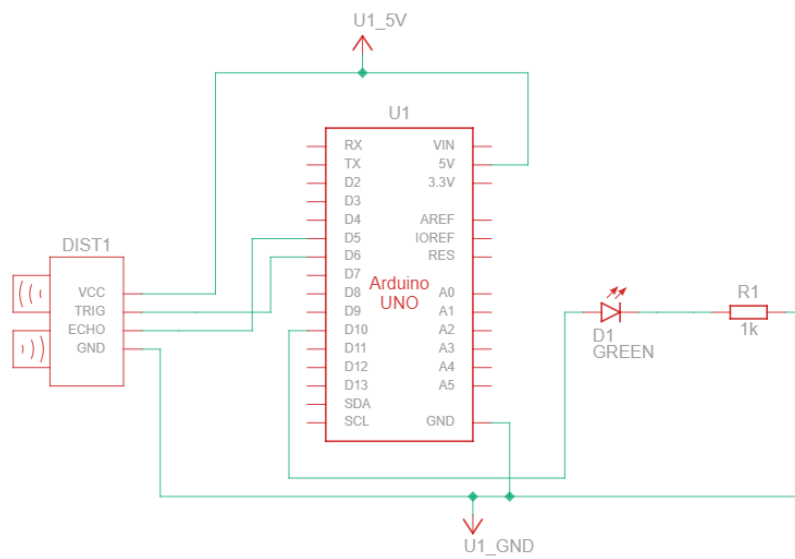
Material Required:

Ultra sonic sensor, Arduino uno board , Resistor , LED , Breadboard,wires

Software: Arduino IDE, Tinkercad

Simulated Circuit:
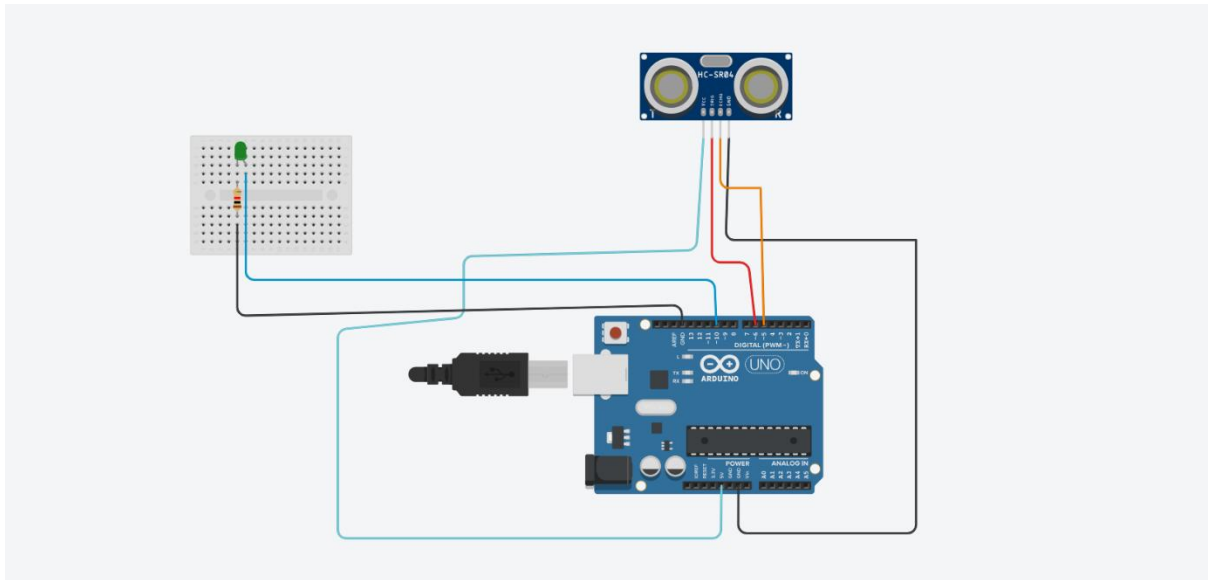
Simulted view:

Code For The Solution:

```
#define TRIG_PIN 6

#define ECHO_PIN 5

#define LED_PIN 10


void setup() {

  pinMode(TRIG_PIN, OUTPUT);

  pinMode(ECHO_PIN, INPUT);

  pinMode(LED_PIN, OUTPUT);

  Serial.begin(9600); // For debugging

}


void loop() {

  // Send a trigger pulse

  digitalWrite(TRIG_PIN, LOW);

  delayMicroseconds(2);

  digitalWrite(TRIG_PIN, HIGH);

  delayMicroseconds(10);

  digitalWrite(TRIG_PIN, LOW);


  // Measure the echo time

  long duration = pulseIn(ECHO_PIN, HIGH);
```

```
  // Calculate distance in cm
  float distance = (duration / 2.0) * 0.0343;

  // Print distance to Serial Monitor
  Serial.print("Distance: ");
  Serial.print(distance);
  Serial.println(" cm");

  // Check if distance is below the threshold
  if (distance < 10) { // Set threshold as 10 cm
    digitalWrite(LED_PIN, HIGH); // Turn on LED
  } else {
    digitalWrite(LED_PIN, LOW); // Turn off LED
  }

  delay(500); // Wait before next measurement
}
```

SIMULATED VIDEO FOR DEMO:

https://drive.google.com/file/d/1ahxhvxOAi8M2Uyz3Ln7obompFMYYj0eG/view?usp=drive_link