

**LASBELA UNIVERSITY OF AGRICULTURE, WATER & MARINE
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PROJECT THESIS

**Automatic Fire Alarm and Water
Extinguishing System & Water Tank
Automation System**

HEAD OF PROJECT

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Introduction

This project is a combination of two important automatic systems:

1. **Automatic Water Tank Level Indicator / Controller**
2. **Automatic Fire Alarm & Water Extinguishing System**

Both systems are designed to improve **safety, efficiency, and automation** in daily life. The water level system helps in proper water management, while the fire alarm system helps in protecting life and property from fire hazards.

Automatic Water Tank Level Indicator System & Automatic Fire Alarm & Water Extinguishing System

Main Idea

The automatic water tank level indicator is used to **monitor and control the water level** in a tank without human effort. It automatically starts and stops the water pump based on the water level. This system is designed to **detect fire automatically and control it immediately**. It reduces damage by giving a quick response.

Working Principle

The system works on the basic concept that **water conducts electricity**.

- Sensors (metal probes) are placed at different levels inside the tank.
- When water touches these sensors, it completes an electrical circuit.
- This signal is sent to the control circuit.

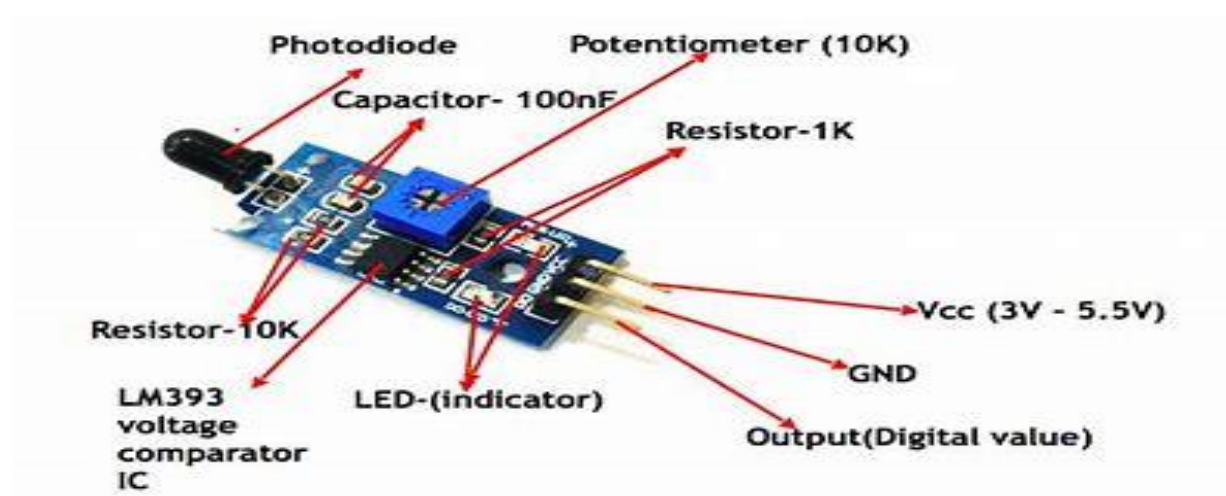
The system uses a **flame sensor** that detects infrared light emitted by fire.

- When fire is detected:
 - A signal is sent to the circuit
 - The transistor acts as a switch

Alarm and water pump are activated

🔍 **IR Flame Sensor Module:** This is a small electronic device that detects flames or bright light sources by sensing infrared light. It's often used in fire alarms.

- **Example:** When a candle flame is detected, the sensor sends a signal to a microcontroller to trigger an alarm.



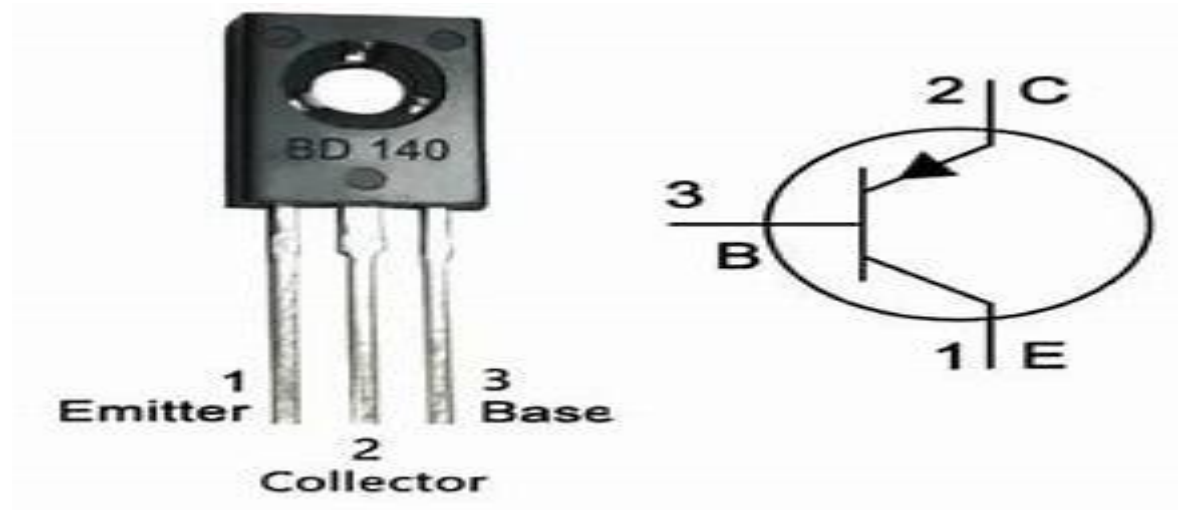
🔍 **Active Buzzer:** A buzzer that produces sound when powered with a direct current (DC) voltage. It has a built-in oscillator, so it doesn't need an external signal to make noise.

- **Example:** A doorbell that rings continuously when pressed.



🔍 **BD140 PNP Transistor:** A type of transistor that allows current to flow from its emitter to collector when a small current is applied to its base. It's used in various electronic circuits³.

- **Example:** Used in an audio amplifier circuit to control the flow of current.



🔍 **5V Water Pump:** A small pump that moves water and operates on a 5-volt power supply.

- **Example:** Used in a small aquarium to circulate water.



🔌 **2-Pin Push Button Switch:** A simple switch with two pins that closes the circuit when pressed, allowing current to flow.

- **Example:** A button on a toy that makes a sound when pressed.



🔌 **3.7V Battery:** A rechargeable battery that provides 3.7 volts of power, commonly used in portable devices.

- **Example:** The battery in a smartphone.



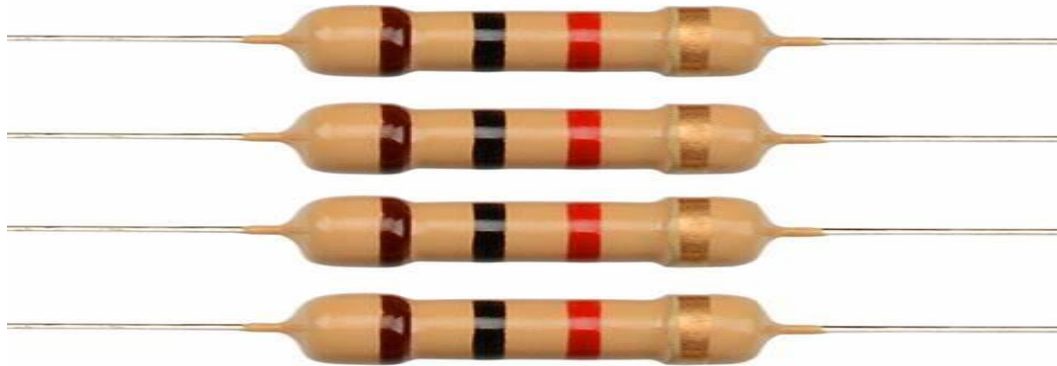
Battery Cell Holder: A holder that keeps the battery in place and connects it to the circuit.

- **Example:** A holder for a 9V battery in a remote control.



🔌 **1K Ohm Resistor:** A resistor that limits the flow of electric current in a circuit, with a resistance value of 1,000 ohms.

- **Example:** Used to control the brightness of an LED in a circuit.



Automatic Fire Extinguisher



Automatic Water Tank Level Indicator / Controller

Introduction

Water is one of the most important resources in daily life. In homes, offices, and industries, water tanks are used to store water. Sometimes tanks overflow or become empty because people forget to monitor them. To solve this problem, an Automatic Water Tank Level Indicator / Controller system is developed using Arduino UNO, Water Level Sensor, 16×2 LCD Display, and I2C Serial Interface Adapter Module.

This system automatically checks the water level inside the tank and displays the level on the LCD screen. Different LED indicators show LOW, MEDIUM, HIGH, and VERY HIGH water levels. This project helps save water, electricity, and human effort.

Components Used

1. Arduino UNO DIP Model
2. Water Level Sensor
3. 16×2 LCD Display
4. I2C Serial Interface Adapter Module
5. LED Indicators
6. Resistors
7. Breadboard
8. Jumper Wires
9. USB Cable / 5V Power Supply

Component Description

Arduino UNO DIP Model

Arduino UNO is a microcontroller board based on the ATmega328P. It controls the entire system and processes sensor data.

Example:

It reads water level values from the sensor and controls LEDs and LCD display.



Water Level Sensor

A water level sensor detects the amount of water present in the tank.

Example:

When the water level increases, the sensor sends higher analog values to Arduino.



16x2 LCD Display

The LCD display is used to show water level messages.

Example:

It displays messages such as:

- Level: LOW
- Level: MEDIUM
- Level: HIGH



I2C Serial Interface Adapter Module

The I2C module reduces wiring connections between Arduino and LCD.

Example:

Instead of many wires, only SDA and SCL pins are used for communication.

LED Indicators

LEDs indicate different water levels visually.



Example:

- White LED = LOW
- Yellow LED = MEDIUM
- Green LED = HIGH
- Blue LED = VERY HIGH

Working Principle

The water level sensor continuously detects the amount of water in the tank. Arduino UNO reads the analog values from the sensor through pin A3. According to the sensor value, Arduino turns ON specific LEDs and displays the water level on the LCD screen using the I2C module.

When the tank is empty, all LEDs remain OFF and the LCD shows “EMPTY”. As the water level increases, different LEDs glow and corresponding messages appear on the LCD display.

Step-by-Step Process

1. The water level sensor detects water inside the tank.
2. Sensor sends analog values to Arduino UNO.
3. Arduino processes the received values.
4. LCD display shows the current water level.
5. LEDs indicate LOW, MEDIUM, HIGH, or VERY HIGH levels.
6. The system continuously monitors water level automatically.

Pin Configuration

Component	Arduino Pin
White LED	Pin 7
Yellow LED	Pin 8
Green LED	Pin 11
Blue LED	Pin 12
Water Sensor	A3
LCD SDA	A4
LCD SCL	A5

Advantages

- Saves water
- Prevents water overflow
- Easy to use
- Low cost project
- Automatic monitoring system
- Suitable for homes and industries

Applications

- Home water tanks
- Industrial tanks
- School laboratories
- Agricultural water systems
- Office buildings

Conclusion

The Automatic Water Tank Level Indicator / Controller is a simple and efficient project developed using Arduino UNO DIP Model, Water Level Sensor, 16×2 LCD Display, and I2C Serial Interface Adapter Module. The system automatically monitors water levels and displays information on the LCD screen. It helps prevent overflow and water shortage, making it useful for homes, offices, and industries.

Coding in Arduino

```
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);
```

```
void setup() {
  Serial.begin(9600);
  lcd.init();
  lcd.backlight();
}
```

```
void loop() {
  int value = analogRead(A0);
  lcd.setCursor(0, 0);
  lcd.print("Value :");
  lcd.print(value);
  lcd.print(" ");
  Serial.println(value);

  lcd.setCursor(0, 1);
```

```
lcd.print("W Level :");
```

```
if (value == 0) {
```

```
    lcd.print("Empty ");
```

```
} else if (value > 1 && value < 350) {
```

```
    lcd.print("LOW  ");
```

```
} else if (value > 350 && value < 450) {
```

```
    lcd.print("Medium");
```

```
} else if (value > 510){
```

```
    lcd.print("HIGH  ");
```

```
}
```

```
}
```

Thesis Title: Automatic Fire Alarm and Water Extinguishing System & Water Tank Automation System

Introduction

Fire accidents can cause severe damage to life and property. An automatic fire alarm and water extinguishing system can help in early detection and extinguishment of fires, minimizing damage. This system uses an IR flame sensor to detect fire and a water pump to extinguish it automatically.

This project is a combination of two important automatic systems:

1. **Automatic Water Tank Level Indicator / Controller**
2. **Automatic Fire Alarm & Water Extinguishing System**

Both systems are designed to improve **safety, efficiency, and automation** in daily life. The water level system helps in proper water management, while the fire alarm system helps in protecting life and property from fire hazards.

Main Idea

The automatic water tank level indicator is used to **monitor and control the water level** in a tank without human effort. It automatically starts and stops the water pump based on the water level. This system is designed to **detect fire automatically and control it immediately**. It reduces damage by giving a quick response.

Components Used:

1. **IR Flame Sensor Module**
2. **Active Buzzer**
3. **BD140 PNP Transistor**
4. **5V Water Pump**
5. **2-Pin Push Button Switch**

6. **3.7V Battery**
7. **Battery Cell Holder**
8. **1K Ohm Resistor**
9. LEDs or buzzer
10. Water level sensors (probes)
11. Arduino UNO DIP

Working Principle: The IR flame sensor module detects the presence of a flame by sensing infrared light emitted by the fire. When a flame is detected, the sensor sends a signal to the BD140 PNP transistor. The transistor acts as a switch to control the water pump and the active buzzer. The active buzzer sounds an alarm to alert people nearby, while the water pump activates to spray water and extinguish the fire.

Step-by-Step Process:

1. **Detection:** The IR flame sensor module continuously monitors for the presence of a flame.
2. **Signal Transmission:** Once a flame is detected, the sensor sends a signal to the BD140 PNP transistor.
3. **Activation:** The transistor switches on the 5V water pump and the active buzzer.
4. **Alarm:** The active buzzer produces a sound to alert people about the fire.
5. **Extinguishment:** The water pump sprays water to extinguish the fire.
6. **Reset:** The system can be reset using the 2-pin push button switch after the fire is extinguished.
7. **Tank Empty Condition:**
 1. No sensor is in contact with water
 2. Circuit detects low level

3. Water pump turns ON automatically

8. Water Filling Stage:

1. Water rises and touches lower sensors Signals are generated step-by-step

9. Middle Level:

1. More sensors get activated
2. LEDs may show medium level

10. Full Tank Condition:

1. Water reaches top sensor
2. Circuit detects full level
3. Pump turns OFF automatically

11. Indication System:

1. LED or buzzer indicates tank is full

12. Monitoring Stage:

1. Flame sensor continuously checks surroundings

Power Supply: The entire system is powered by a 3.7V battery, held in place by a battery cell holder. A 1K ohm resistor is used to limit the current and protect the components.

Applications

- Houses
- Hostels
- Schools
- Industries
- Homes
- Offices
- Small industries
- Laboratories

Combined System Importance

When both systems are combined:

- Water is managed efficiently
- Fire can be controlled quickly
- Human effort is reduced
- Safety level increases

Conclusion: This simple fire alarm and water extinguishing system can be used in homes, offices, and small industrial setups to ensure early detection and automatic extinguishment of fires, thereby reducing damage and enhancing safety.

Conclusion

The Automatic Water Tank Level Indicator / Controller and Automatic Fire Alarm and Water Extinguishing System are important safety and automation projects for homes, offices, and small industrial setups. The water level monitoring system helps prevent water overflow and water shortage by continuously checking the tank level using Arduino UNO, Water Level Sensor, 16×2 LCD Display, and I2C Serial Interface Adapter Module. At the same time, the fire alarm and water extinguishing system helps in early fire detection and automatically activates an alarm and water pump to reduce fire damage and improve safety.

Both systems work together to provide better protection and efficient water management. In emergency fire situations, sufficient water availability in the tank is very important for extinguishing fire quickly. Therefore, combining water level monitoring with fire safety systems increases reliability, saves water, protects property, and enhances human safety in daily life applications.

This project is a **smart automation system** that combines:

- Water level monitoring
- Automatic pump control

- Fire detection
- Automatic fire extinguishing

It helps in:

- ✓ Saving water
- ✓ Saving electricity
- ✓ Improving safety
- ✓ Reducing human effort

Automatic Fire Extinguisher Using IR Module

