**Smart agriculture monitoring system**

**System Features**

1. **Temperature Monitoring**: Continuously measure the temperature and display it on an LCD.
2. **Manual/Automatic Mode**: Use the slide switch to toggle between manual control and automatic alerts.
3. **LED Indicators**: Indicate system status (e.g., temperature normal or critical).
4. **Buzzer Alerts**: Sound an alarm if the temperature exceeds a predefined threshold.
5. **Push Button**: Reset the system or acknowledge alerts.
6. **LCD Feedback**: Display real-time temperature readings and system status.

**Components**

1. **ESP32**: Main controller for sensor reading and device control.
2. **Temperature Sensor**: E.g., DHT11 or DS18B20.
3. **16x2 LCD**: Displays temperature and system status.
4. **Push Button**: For reset or manual control.
5. **Buzzer**: Provides audible alerts.
6. **LEDs**: Indicate different status levels (e.g., green for normal, red for high temperature).
7. **Slide Switch**: Toggles between manual and automatic modes.
8. **Breadboard & Jumper Wires**: For connections.
9. **Power Supply**: 5V for ESP32 and components.

**System Design**

1. **Temperature Sensor**:
   * Connect data pin to a GPIO pin on the ESP32.
2. **LCD**:
   * Use I2C for simple connections (SDA, SCL to ESP32).
3. **Push Button**:
   * Connected to a GPIO pin with a pull-up or pull-down resistor.
4. **Buzzer**:
   * Connect the signal pin to a GPIO pin.
5. **LEDs**:
   * Use one GPIO for each LED (e.g., green and red).
6. **Slide Switch**:
   * Connect to a GPIO pin to detect manual or automatic mode.

**Software Development**

Use the **Arduino IDE** for programming.

**Libraries Required**

1. Wire.h for I2C communication (LCD).
2. DHT.h or OneWire.h depending on the temperature sensor used.
3. LiquidCrystal\_I2C.h for LCD control.

**Code Structure**

1. **Setup**:
   * Initialize peripherals: LCD, temperature sensor, push button, buzzer, LEDs.
   * Configure GPIO pins.
2. **Loop**:
   * Read temperature.
   * Check mode (manual/automatic).
   * Display temperature on LCD.
   * Activate LEDs and buzzer based on thresholds.

Project link:- https://wokwi.com/projects/417726963942630401