Group No. 03

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1. Smart Water Level & Quality Monitoring

Project Overview

This project monitor **water level** and **soil moisture** for smart agriculture and water conservation. The system collects data from sensors and can automate irrigation or send alerts based on real-time readings.

Components Required

a) **ESP32**
b) **Water Level Sensor**
c) **Soil Moisture Sensor**
d) **Buzzer or LED** (for alert notifications)
e) **Power Supply**

Functionality

- **Water Level Monitoring**
    - Detects water level using a sensor.
    - Displays readings on **LCD** and sends alerts when the level is too low or too high.
- **Buzzer Aler**
    - A buzzer sounds when water level is low or soil is too dry.
- **IoT Integration**
    - Using an ESP32 Wi-Fi module, data can be sent to a **mobile app or cloud** for remote monitoring.

Applications

- **Smart Agriculture**: Automated irrigation prevents over-watering or under-watering.
- **Water Conservation**: Reduces water wastage by controlling the pump based on actual need.
- **Flood Prevention**: Can be used in reservoirs to monitor and control water levels.

2. Smart Soil & Irrigation System

Project Overview

This IoT based **Smart Soil & Irrigation System** automates irrigation by monitoring **soil moisture, temperature, and humidity**. When the soil is dry, the system automatically turns on the **water pump** and turns it off when the moisture level is adequate. The system ensures **optimal water usage** for agriculture and gardening.

Components Required

a) **ESP32**
b) **Soil Moisture Sensor**
c) **Relay Module**
d) **Water Pump**
e) **LED**
f) **Power Supply**

Functionality

- **Soil Moisture Monitoring**
    - Measures the **moisture content** of the soil.
    - If the soil is dry (below a certain threshold), it turns on the **water pump**.
    - When moisture is sufficient, the pump turns off automatically.
- **Temperature & Humidity Monitoring**
    - The **DHT11/DHT22 sensor** continuously checks weather conditions.
    - Displays **temperature & humidity** on the **LCD screen**.
- **Automated Pump Control**
    - Uses a **relay module** to control the **pump**.
    - Prevents **overwatering** and saves water.
- **Buzzer/LED Alert**
    - When the soil is **too dry**, a buzzer sounds or an LED blink.
- **IoT Integration**
    - With an **ESP32 Wi-Fi module**, sensor data can be **sent to a mobile app or cloud**.

Applications

- **Smart Agriculture**: Automates watering based on real-time soil and weather conditions.
- **Gardening & Landscaping**: Ensures plants get optimal water without manual intervention.

3. Smart Street Light System with Motion Detection

Project Overview

This **Smart Street Light System** automatically turns on **LED streetlights** when motion is detected and adjusts their brightness based on ambient light. The system **saves energy** by dimming or turning off lights when there is no movement and increasing brightness only when needed.

Components Required

a) **ESP32**
b) **LDR (Light Dependent Resistor)**
c) **PIR Motion Sensor**
d) **LED**
e) **Relay Module**
f) **Power Supply**

Functionality

- **Motion-Based Light Activation**
    - Uses a **PIR motion sensor** to detect movement.
    - If motion is detected **at night**, the **lights turn ON**.
    - If no movement is detected, the lights **dim or turn OFF**.
- **Energy Efficiency**
    - Reduces power consumption by **dimming or switching OFF** when not needed.

Applications

- **Smart City Street Lighting**: Reduces electricity usage by activating only when needed.
- **Parking Lots & Highways**: Lights up only when vehicles or pedestrians are present.
- **Home & Garden Security**: Motion-based lighting prevents unnecessary energy usage.