**Equipment and Components Recap**

1. **4 Arduino Boards** (1 Central, 3 Zone boards)
2. **Current and Voltage Sensors** (e.g., ACS712 for current, ZMPT101B for voltage)
3. **LCD/OLED Display** for central monitoring
4. **Push Buttons** for each zone (reset, input functions)
5. **LED Indicators** for threshold alerts
6. **EEPROM** (internal on Arduino for data storage)
7. **Wires, Resistors, and Breadboards**

**Physical Setup and Connections**

**1. Arduino Board Roles and Setup**

* **Central Arduino**: This board aggregates data from the zone Arduinos and displays it on an LCD.
* **Zone Arduinos (Zone 1, Zone 2, Zone 3)**: Each handles a specific area (zone), reads power data from sensors, stores it periodically in EEPROM, and communicates with the central Arduino.

**2. Voltage and Current Sensor Connections**

* **Voltage Sensor (ZMPT101B)**:
  + Connect the sensor’s Vcc to the 5V pin on the Arduino.
  + Connect GND to Arduino GND.
  + Connect the **signal output pin** of the voltage sensor to an analog pin on the Arduino (e.g., A0).
* **Current Sensor (ACS712)**:
  + Connect Vcc to the Arduino 5V pin.
  + Connect GND to Arduino GND.
  + Connect the **output pin** of the current sensor to an analog pin on the Arduino (e.g., A1).

**3. LCD/OLED Display (Central Arduino)**

* Use an **I2C LCD Module** (if available) for easier connections.
  + Connect SDA (data) to A4 and SCL (clock) to A5 on the central Arduino.
* If using a standard LCD:
  + Connect Vcc to 5V and GND to GND.
  + Connect RS, E, D4, D5, D6, and D7 pins to specific digital pins on the Arduino (e.g., D2 to D7).
  + Use a 10K potentiometer for contrast control between the LCD V0 and GND.

**4. Push Button (Each Zone Arduino)**

* **Reset Button**:
  + Connect one side of the button to a digital input pin on the zone Arduino (e.g., D2).
  + Connect the other side to GND.
  + Optionally, use a 10K pull-up resistor between the button pin and Vcc to stabilize the input.

**5. LED Indicator (Each Zone Arduino)**

* Connect the **anode** of an LED to a digital output pin on the zone Arduino (e.g., D3).
* Connect a 220Ω resistor from the **cathode** to GND to limit current.

**6. Serial Communication (Connecting Zone Arduinos to Central)**

* Connect the **TX** (transmit) pin of each zone Arduino to a digital input pin on the central Arduino (e.g., D10, D11, D12).
* Connect **RX** on each zone to the corresponding TX on the central board.
* Remember to connect all Arduinos’ GND pins together for a common reference.