EE499 : Senior Design Project

Team: 08

Cost-effective Monitoring System for Biomedical and Cleanroom facilities

Operating Instructions

Prototype Operation Instructions: Full Demonstration

1. **Power On:**
   - Connect the prototype to the main power supply.
   - Confirm that all necessary connections are secure.
2. **Backup Power Supply:**
   - Ensure the backup power supply is connected.
   - The ESP32Sim800L will autonomously manage the power source and switch between main and backup supplies as needed.
3. **Connectivity Setup:**
   - Confirm the ESP32Sim800L successfully connects to the cellular network.
   - Verify Wi-Fi connection for data transmission to the ThingSpeak website.
4. **Sensor Initialization:**
   - Power up the PMS9003m, SHT20, BMP280, motion sensor, and gas sensors.
   - Confirm all sensors are correctly connected to the corresponding I2C or analog mux.
5. **I2C Mux Configuration:**
   - Use the I2C mux for SHT20 and BMP280 sensors independently.
   - Select the desired sensor group by configuring the I2C mux accordingly.
6. **Analog Mux Configuration:**
   - Use the analog mux for motion sensors and gas sensors independently.
   - Choose the desired sensor group by configuring the analog mux accordingly.
7. **Data Acquisition:**
   - Verify accurate data acquisition from each sensor.
   - Monitor PMS9003m for particulate matter, SHT20 for temperature and humidity, BMP280 for atmospheric pressure, motion sensors for movement, and gas sensors for relevant gases.

8. **Data Transmission:**
    - Ensure correct formatting of collected data.
    - Transmit data to the ThingSpeak website using the ESP32Sim800L module.
9. **Visualization:**
    - Access the ThingSpeak website and verify real-time visualization of the acquired data.
    - Cross-reference displayed data with actual sensor readings to confirm accuracy.
10. **Power Source Switching:**
    - Observe ESP32Sim800L for seamless switching between the main and backup power supplies.
    - Confirm uninterrupted functionality during power source transitions.
11. **Troubleshooting:**
    - If connectivity or sensor data issues arise, check ESP32Sim800L connections and configurations.
    - Ensure proper functionality of the power source switching mechanism.
12. **Power Off:**
    - Safely power off the prototype after the demonstration.
    - Disconnect the main power supply and backup power supply.
13. **Documentation:**
    - Document any issues faced during the demonstration.
    - Record sensor readings, configurations, and details of power source switching for future reference.
14. **Feedback:**
    - Provide feedback on the prototype's performance, especially regarding power source switching, and suggest improvements if needed.