Weekly Progress Report

Project Name: AWS PROJECT
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Date: December 29, 2025

1. Executive Summary

This week focused on power system prototyping, firmware development, and full system integration testing. Major efforts were directed toward designing and validating the Power Board, implementing power monitoring firmware on the STM32F401, and resolving communication and boot-related challenges on the ESP32 Gateway Board. Additionally, version control practices were established through a shared GitHub repository, and PCB designs were revisited to reflect all validated prototype changes. Overall, the week marked a transition from isolated prototyping to a more cohesive and integrated system design.

2. Key Accomplishments

- **Power Board Prototyping & Testing:** Designed and prototyped the Power Board on a perforated board. A buck converter was used in place of an MPPT controller to function as a solar charger for the battery cells. The converter was configured at a higher output voltage to ensure effective charging, and the setup was successfully tested using a solar panel.
- **Design Validation & PCB Creation:** Validated the Power Board design through testing and proceeded to create the corresponding PCB layout based on the confirmed prototype behavior.
- **Firmware Development (STM32F401):** Wrote firmware for the STM32F401 microcontroller to perform power monitoring. The firmware enables voltage level sensing and transmits the measured data to the ESP32 via I^2C communication.
- **System Integration Testing:** Tested the complete system with the Power Board supplying power to the Gateway Board, validating stable operation across both boards under real conditions.
- **ESP32 UART Configuration:** Implemented a custom UART configuration for the LoRa module on the ESP32. This was done to address challenges encountered while multiplexing LoRa and GSM modules, both of which have long setup and initialization times.
- **ESP32 Boot Issue Resolution:** Identified boot failures caused by the use of strapping pins for peripheral connections. This issue was resolved by selecting logic-high strapping pins to avoid logic-level conflicts during ESP32 boot and reset cycles.

- **Version Control Setup:** Created a GitHub repository for the project and added all relevant personnel. This significantly improved version control, collaboration, and traceability of firmware and hardware design changes.
- **PCB Design Review:** Revisited all PCB designs to ensure they accurately reflected the modifications and improvements identified during the prototyping and testing phase.

3. Challenges & Technical Constraints

- **Unvalidated Sensors:** Some required sensors have not yet been tested. As a result, the current design cannot be fully verified for compatibility with these components until physical testing is completed. This introduces a risk that minor design changes may still be required before final PCB printing.
- **Limited ESP32 Pin Availability:** The use of remaining strapping pins introduced boot instability, which required careful pin selection and logic-level considerations to resolve

4. Plan for the Upcoming Week

- **Sensor Testing:** Test and validate the remaining sensors to confirm compatibility with the current hardware design.
- **Enclosure Design:** Begin designing the mechanical casing for both the Power Board and the Gateway Board to support deployment and protection of the system.