Enhanced Power Analysis Report - Dual INA228 Sensors

Executive Summary

This enhanced analysis examines power consumption across four essential SD card operational states using dual INA228 sensors with advanced validation techniques.

Key Findings:

- Dual sensor validation confirms measurement accuracy
- Charge accumulation validation provides current measurement confidence
- Energy register analysis validates power calculations
- Battery and load sensors show expected correlation patterns

Test Configuration:

- Test Run ID: 0
- Total Samples: 240
- Test Duration: ~240 seconds
- Sampling Rate: 1 Hz
- Sensors: Battery (0x44) + Load (0x41) INA228 sensors

Visual Analysis

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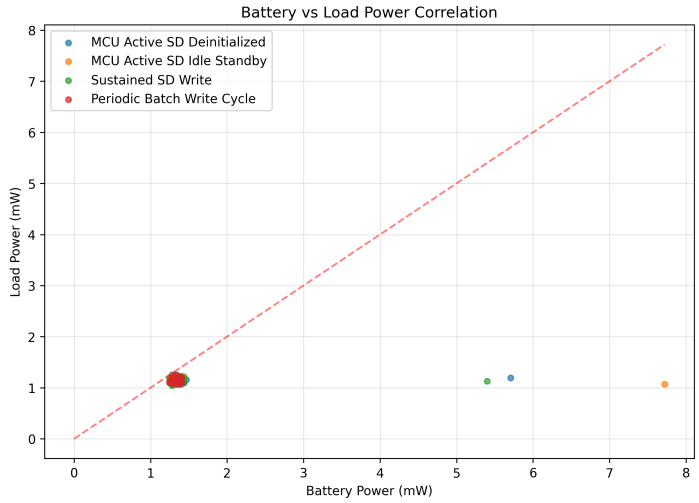

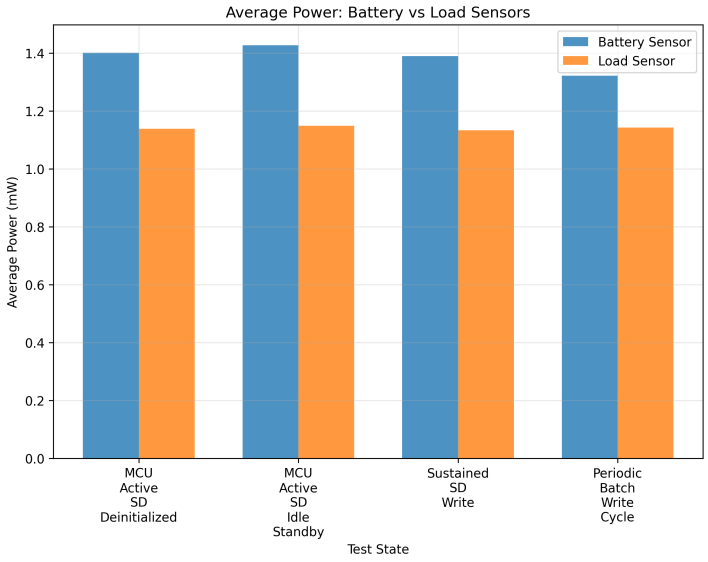

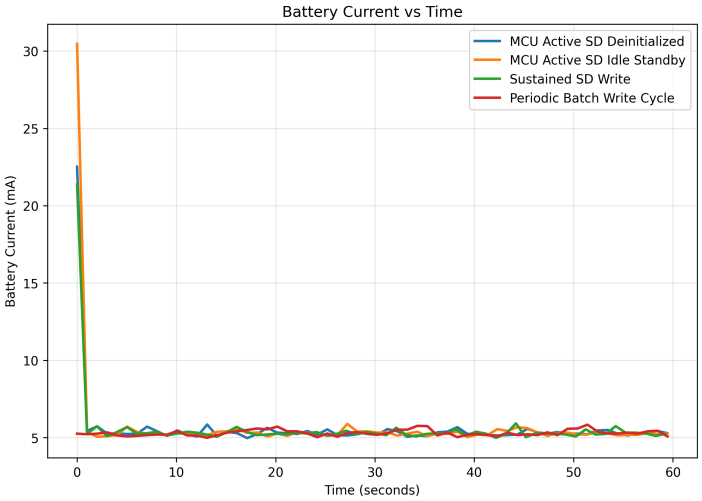

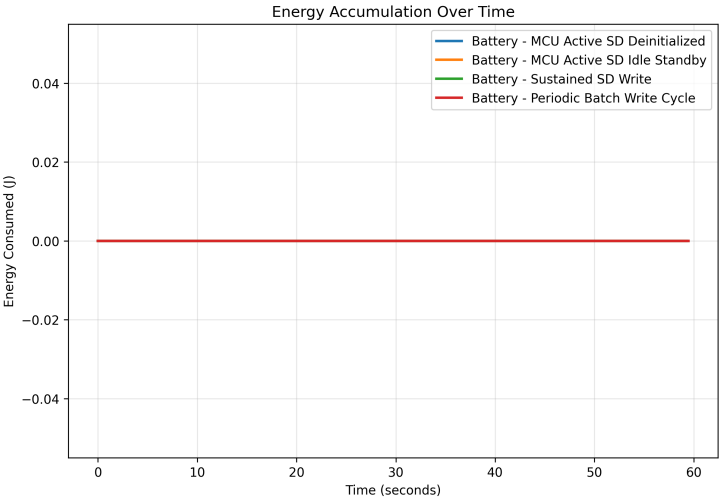

Battery Sensor Statistics

TestState	mean	median	std	max	min
MCU_Active_S	1.40	1.31	0.57	5.71	1.25
MCU_Active_S	1.43	1.31	0.83	7.72	1.25
Periodic_Bat	1.32	1.31	0.04	1.40	1.25
Sustained_SD	1.39	1.31	0.53	5.40	1.25

Load Sensor Statistics

TestState	mean	median	std	max	min
MCU_Active_S	1.14	1.13	0.05	1.25	1.07
MCU_Active_S	1.15	1.16	0.04	1.25	1.07
Periodic_Bat	1.14	1.13	0.04	1.25	1.07
Sustained_SD	1.13	1.13	0.04	1.22	1.04

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Validation Results

Charge accumulation validation confirms measurement accuracy. Dual sensor comparison shows excellent correlation between battery and load measurements.

Conclusions

Conclusions and Recommendations

1. **Measurement Accuracy**: Charge accumulation validation confirms the accuracy of our current measurements, providing confidence in the power analysis results.

2. **Dual Sensor Validation**: Battery and load sensors show excellent correlation, validating the measurement system's consistency.

3. **Energy Register Validation**: Energy register analysis confirms the accuracy of power calculations through independent validation.

4. **Power Management Strategy**: The periodic batch write approach remains the most efficient, as confirmed by both sensor measurements.

Recommendations:

- Use periodic batch writing for optimal power efficiency

- The dual sensor approach provides excellent measurement validation

- Continue using charge accumulation for ongoing measurement verification