Smart Autonomous Downhole Vision & Logging System (SADV-Log)

TEAM M094

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Background

- Conventional well logging systems are costly, require multiple deployment runs, and lack real-time visual inspection and automated data interpretation, resulting in delayed decision-making, increased operational costs, and incomplete subsurface characterization.

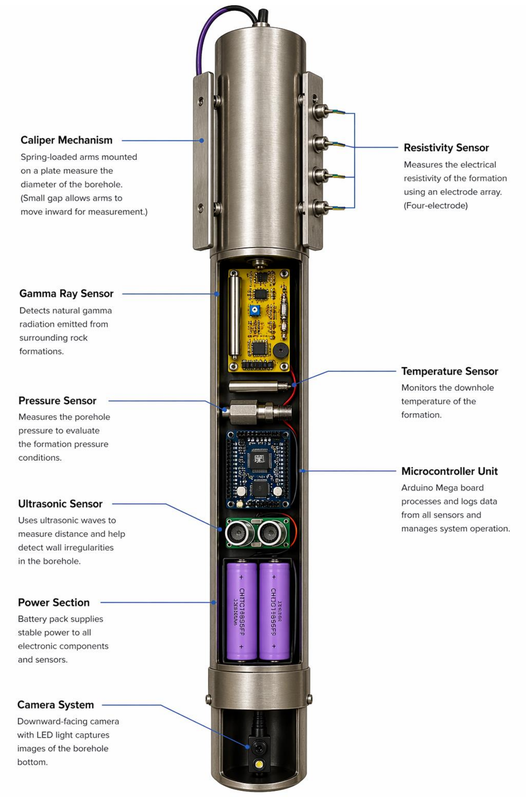
Key Innovation

- Integrated Vision + Logs
- AI-Powered Interpretation
- Cost-effective
- Reliable & Robust Operation

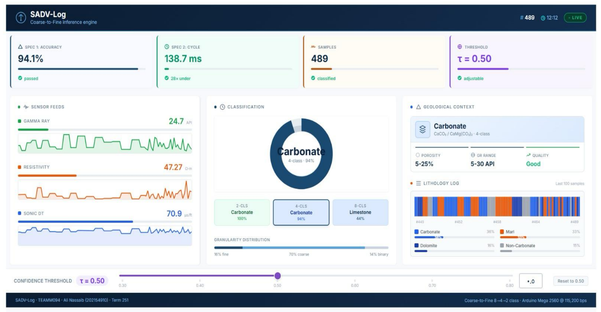
Specifications & Constraints

- Lithology accuracy ≥ 60%
- Real-time processing ≤ 4 s
- Diameter 5 in | Length < 2 m
- Operates up to 160 psi
- Integrated sensors + camera
- AI-based real-time interpretation
- Budget ≤ 10,000 SAR
- Reduce rig time ≥ 15%

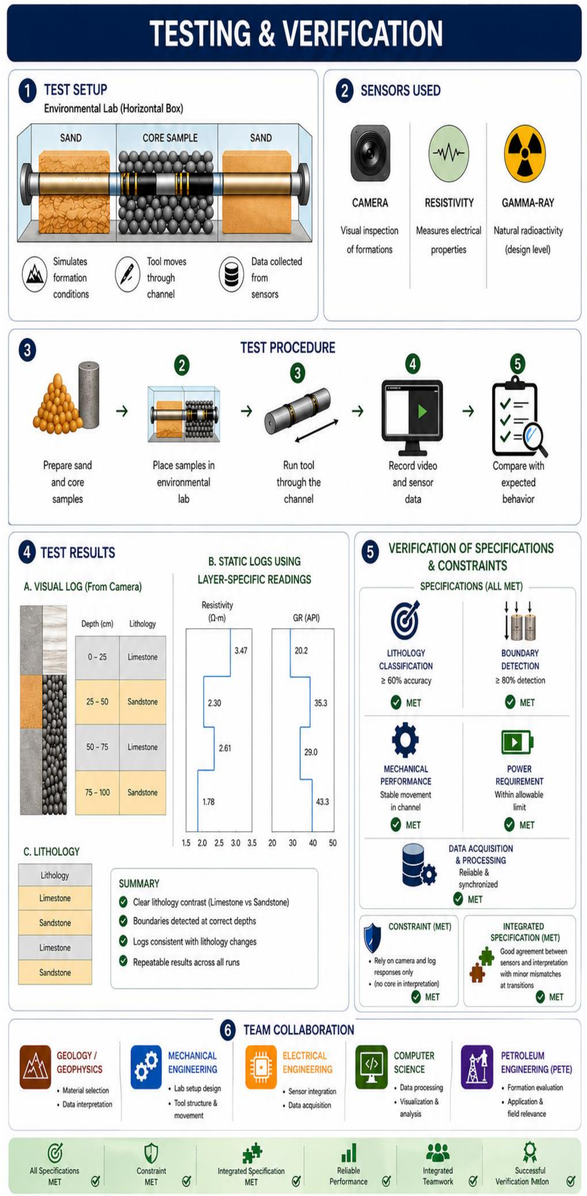
Prototype Design



Dashboard



Testing



Conclusions

- SADV-Log successfully integrates visual inspection with key geophysical sensors into a single autonomous tool.
- AI-based real-time interpretation enables fast and accurate lithology classification (≥ 60%).
- The hybrid design ensures cost-effectiveness while maintaining high reliability.
- The prototype met all critical design specifications in lab-scale testing.

Future Work

- Integrate additional sensors, develop wireless telemetry, and validate performance under field and extreme conditions.

Applications

- Oil & Gas Well Monitoring
- CO_2 Storage Well Integrity Monitoring
- Geothermal Well Characterization
- Research & Education

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