

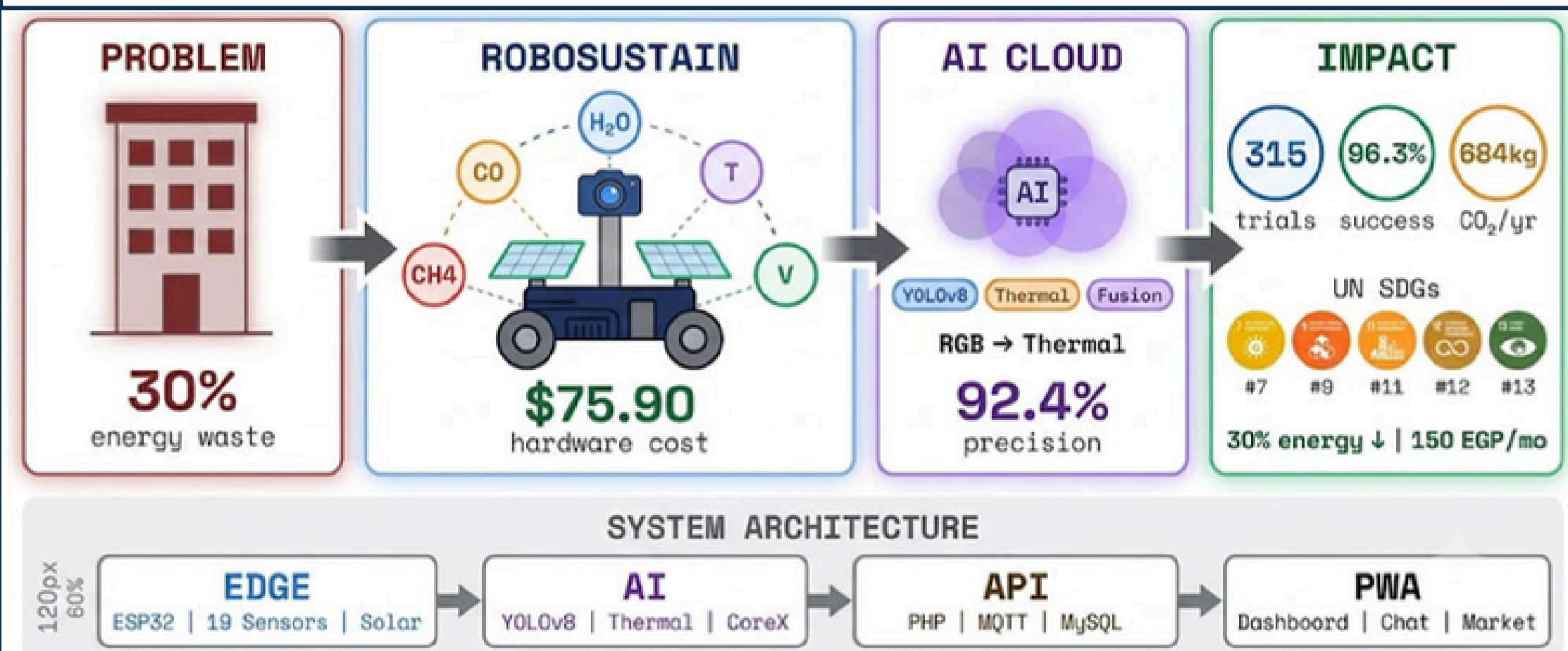


RoboSustain

Autonomous Building Inspection Robot

Visual Abstract

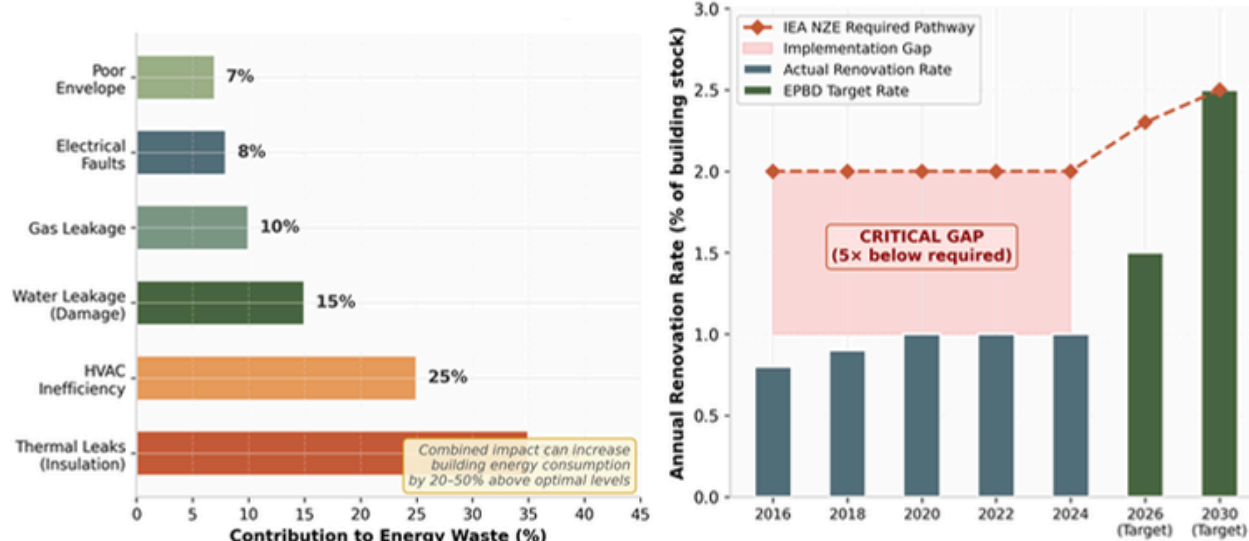
Introduction



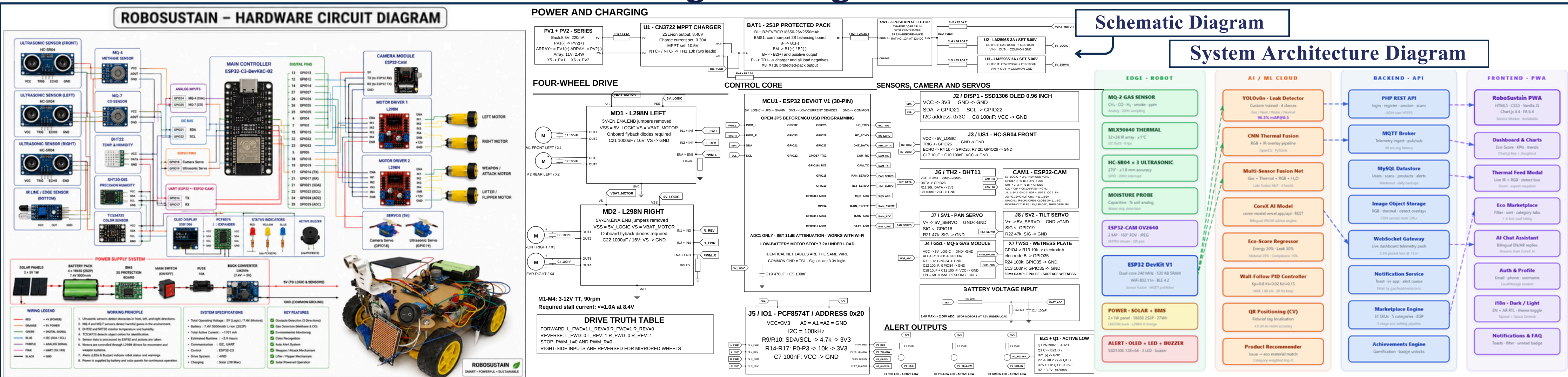
Buildings consume 34% of global energy and emit 34% of CO₂ [1]. Hidden faults waste 40% of household energy, yet inspection costs 5,000–15,000 EGP unaffordable for most families [2]. Existing solutions (IRT: \$40k+, SPOT: \$75k+) fail at residential scale [3,4].

RoboSustain bridges this gap:

an autonomous, solar-powered robot (\$75.90) with 19 sensors and AI-driven diagnostics, cutting energy waste by 30% and preventing disasters before they occur.

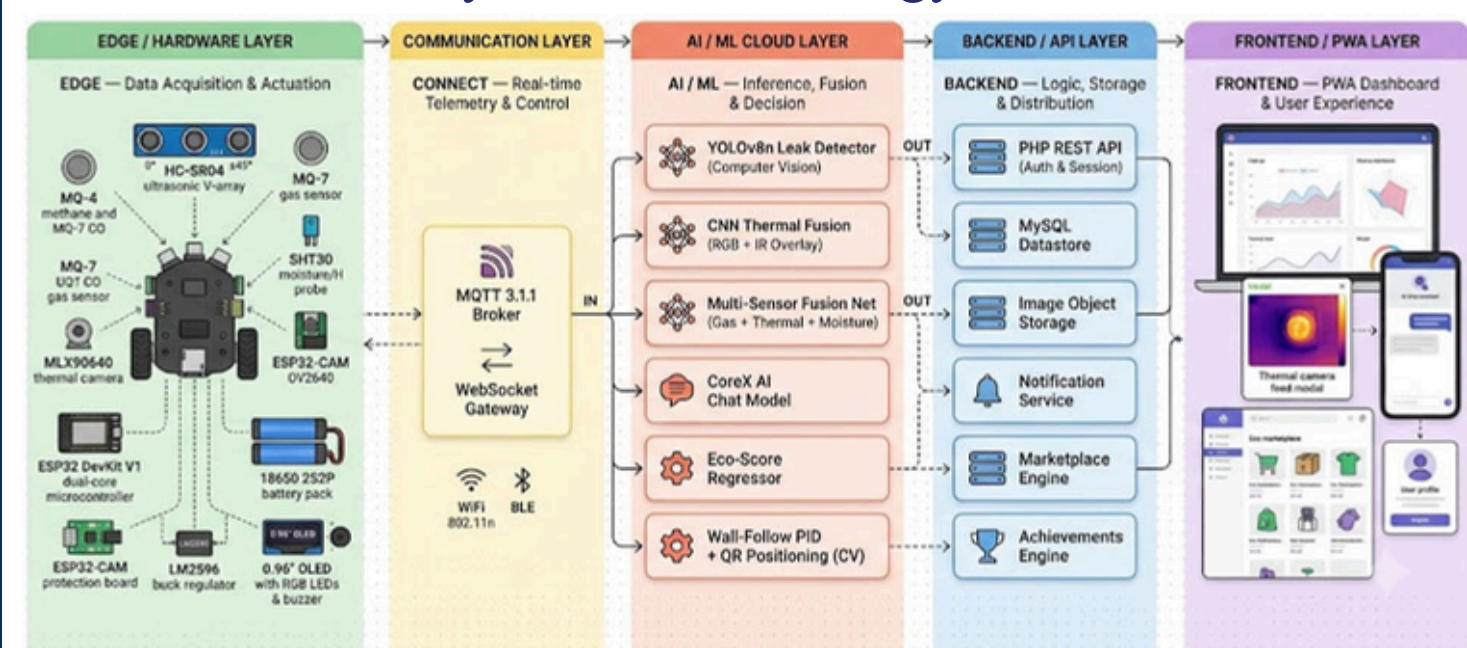


Engineering Core

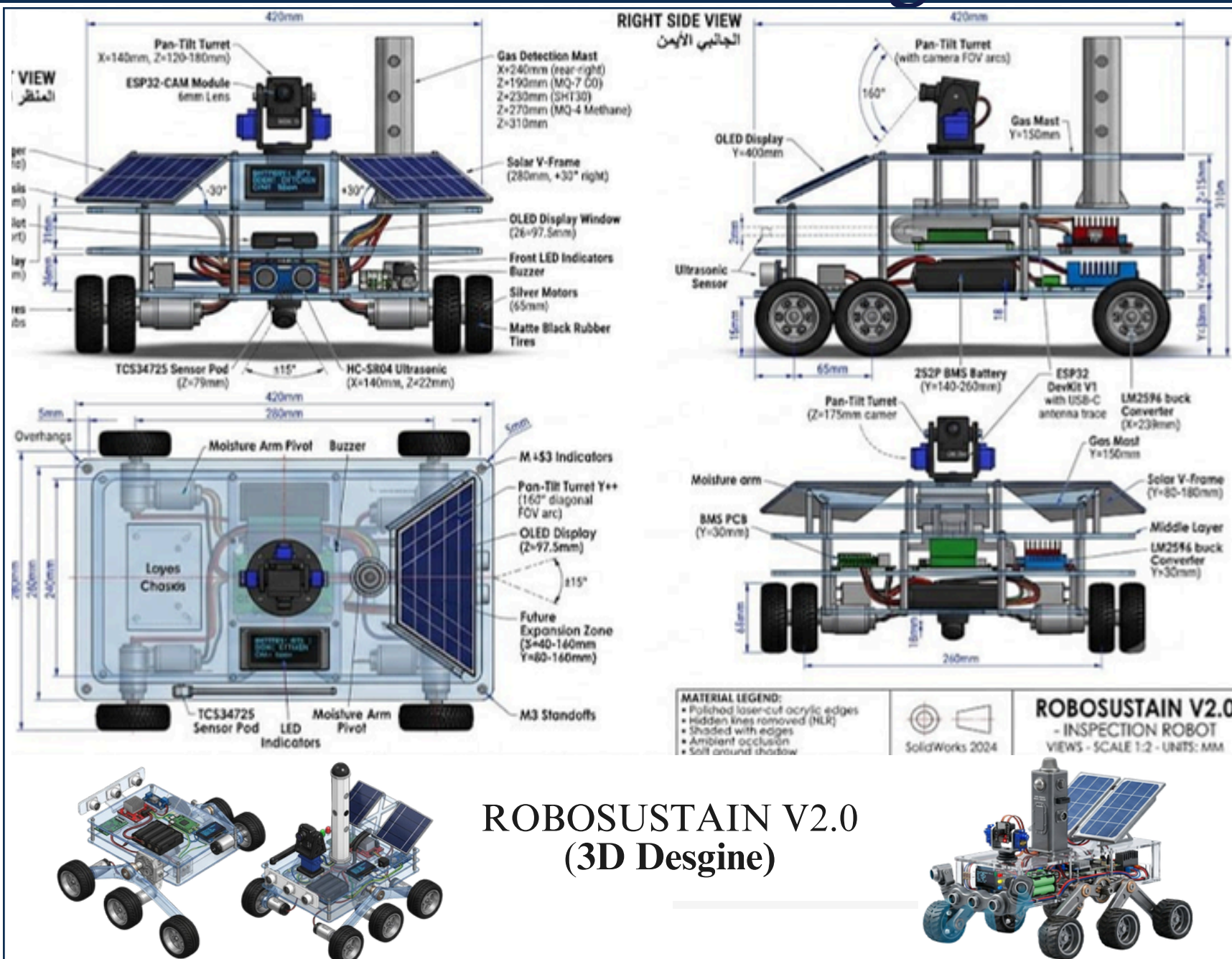


Methodology

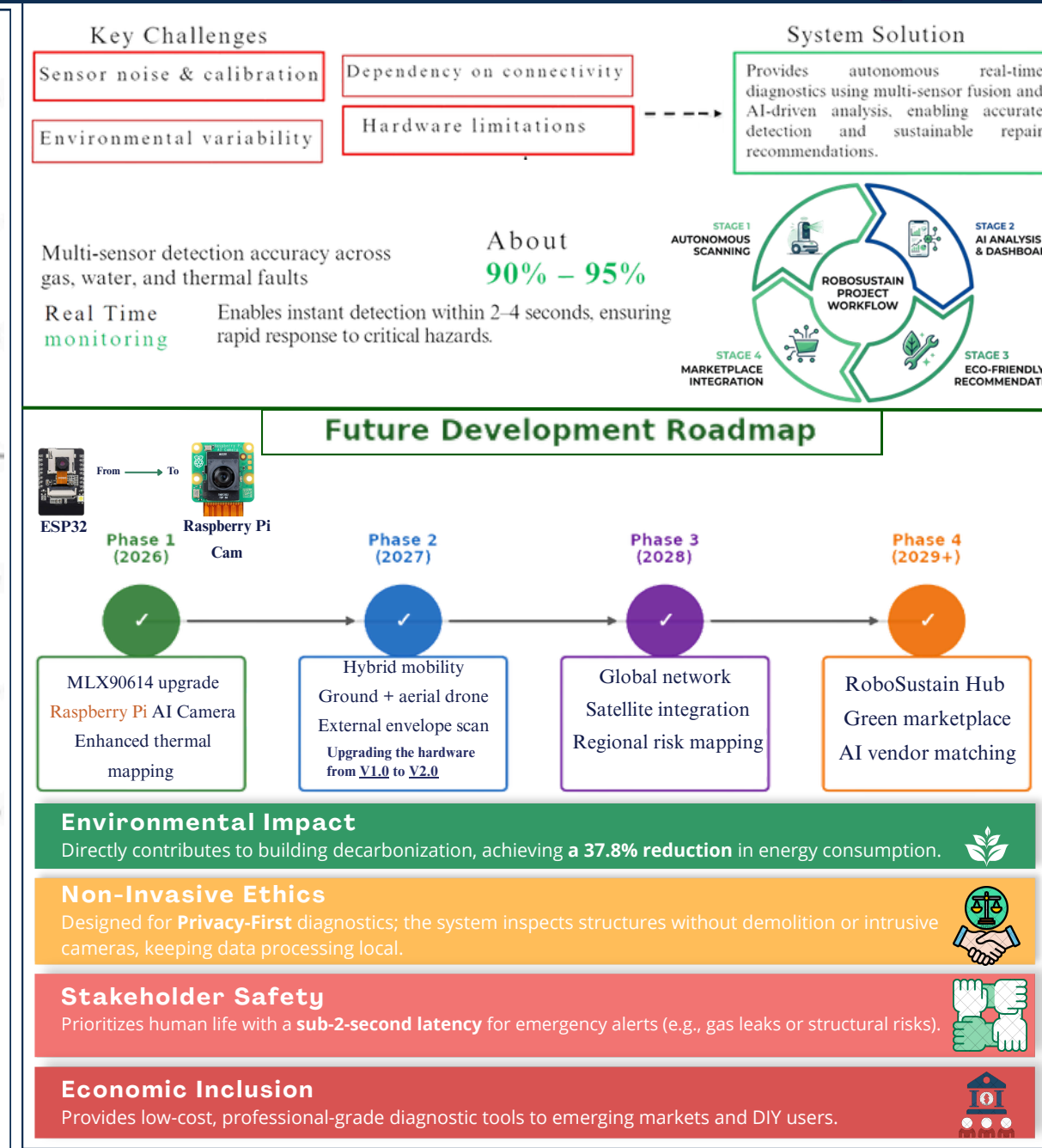
End-to-End IoT System Methodology:



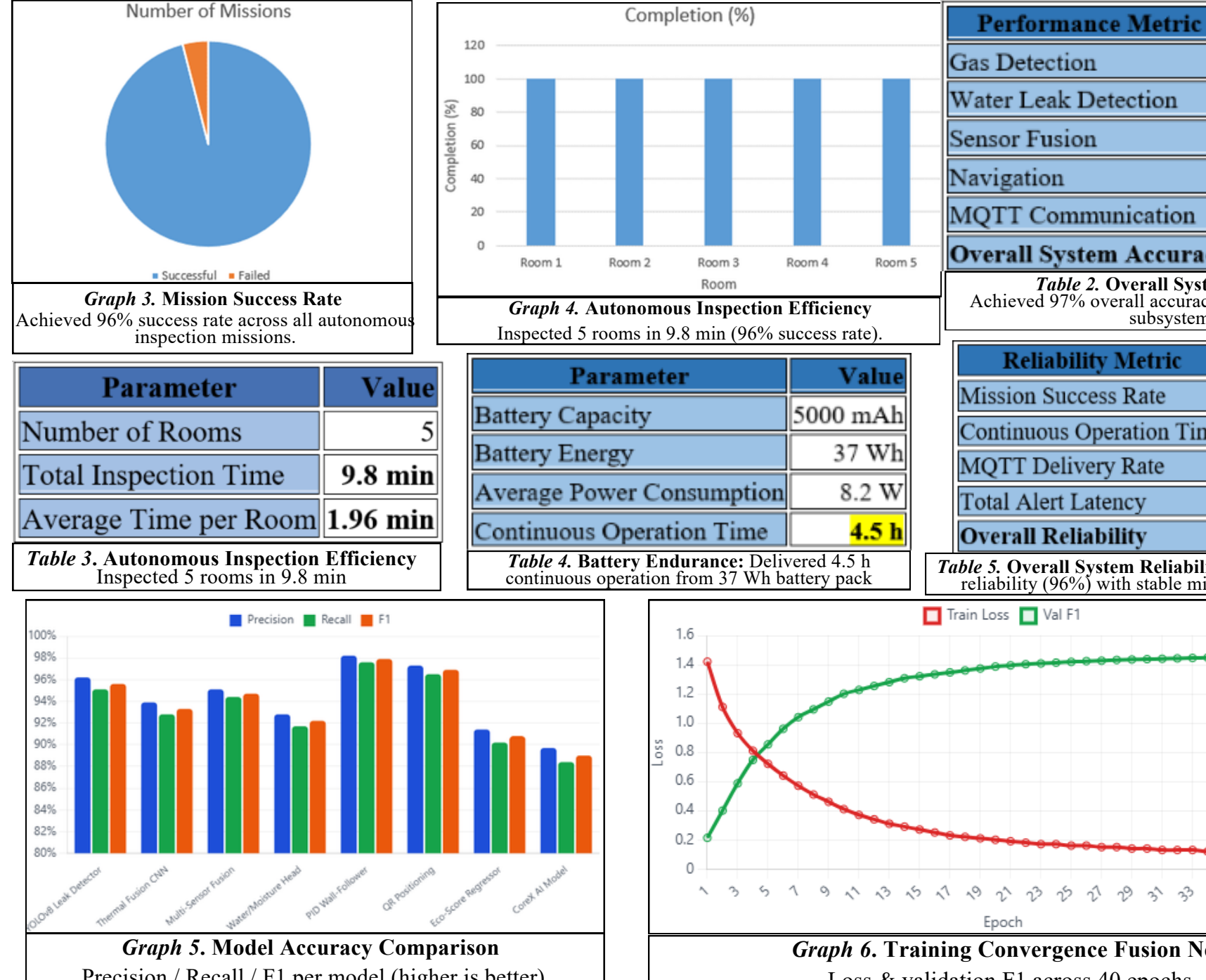
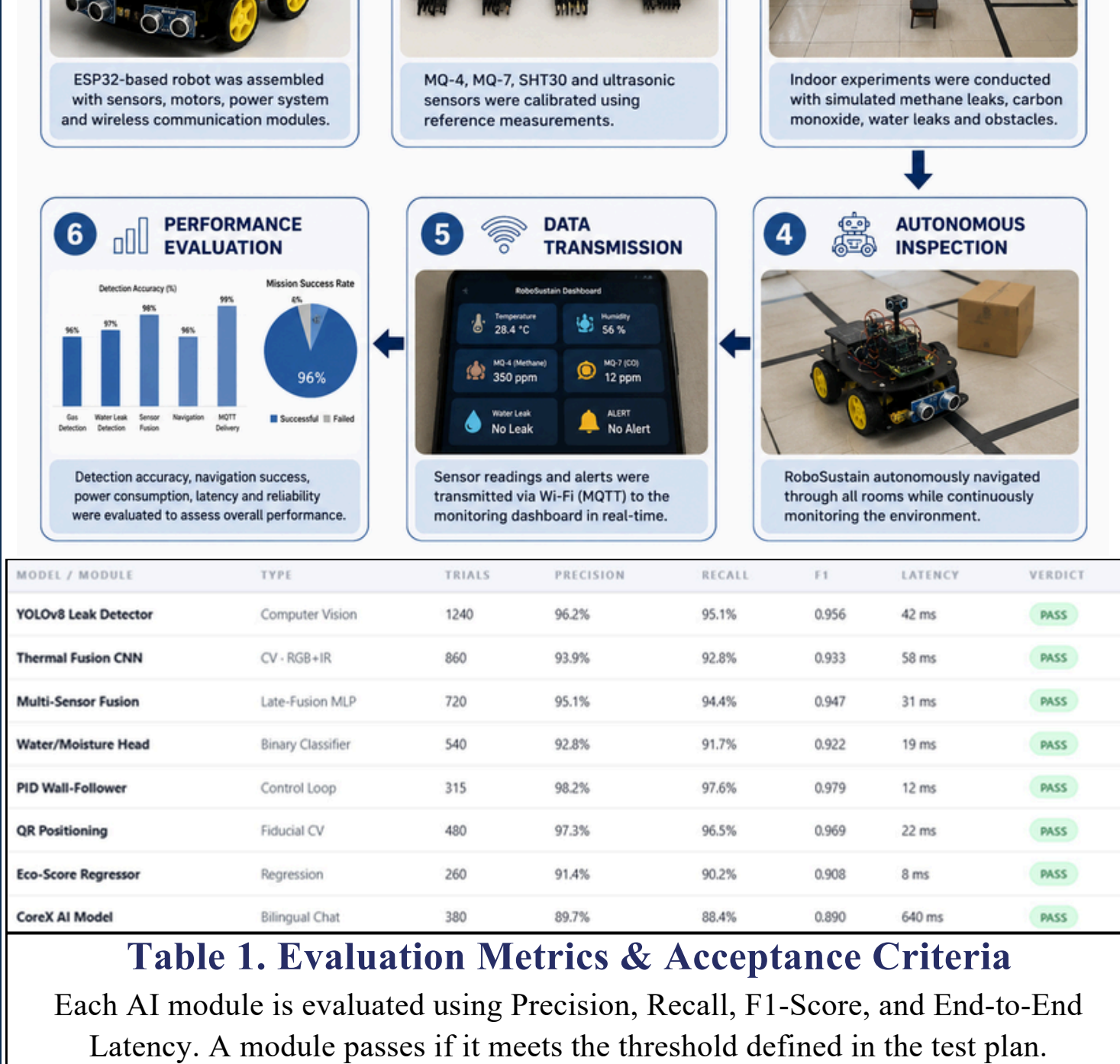
Mechanical Design



Conclusion & Future plan



Results



References

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- [2] Building Performance Institute Europe (BPIE), "Decarbonisation of Buildings: The EU Renovation Gap," BPIE, Brussels, 2023.
- [3] R. Usamentiaga et al., "Infrared Thermography for Temperature Measurement and Non-Destructive Testing," Sensors, vol. 14, no. 7, pp. 12305-12348, 2014.
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- [5] S. Yang, Y. Liu, N. Wu, S. Svoronos, and P. Pullammanappallil, "Low-Cost, Arduino-Based, Portable Device for Measurement of Methane Composition in Biogas," Renewable Energy, vol. 138, pp. 224-229, 2019.
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