A.R.E.S.
(AI Rover Exploration Scout)

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Opportunity: California Space Grant Consortium

Vehicles used for space exploration can often be expensive and limited to specific applications. This NASA-sponsored internship project develops a small-scale, AI-powered rover designed to simulate planetary exploration. The rover is a six-wheel, all-terrain buggy equipped with Raspberry Pi and Arduino microcontrollers to control navigation, sensing, and communications. It operates autonomously, using computer vision and machine learning to map terrain through image and video capture while detecting and classifying materials such as iron. Integrated ultrasonic sensors and AI-driven obstacle avoidance allow it to traverse diverse surfaces without manual intervention. Material identification results are transmitted to the user for further analysis, demonstrating potential applications in the detection of extraterrestrial resources. The project showcases how low-cost, modular platforms can be adapted for advanced autonomous navigation, environmental mapping, and material recognition in simulated space environments. By combining AI, robotics, and sensor integration, this work provides a scalable framework for future planetary exploration rovers.

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