



A.S.E.R (Agricultural Space Exploration Rover)

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Opportunity: California Space Grant Consortium



With space exploration rapidly advancing, humanity is not yet fully prepared to send people to explore distant planets. However, we can deploy robotic rovers equipped with specialized instruments to investigate and assess possible planetary environments. These missions provide valuable data to determine whether a planet could support future human exploration and habitation. My research focuses on designing and developing a rover capable of collecting comprehensive environmental data to evaluate planetary conditions for potential human settlement. The rover is controlled via a bluetooth joystick and integrates multiple sensors, including air quality, temperature, humidity, gas, pressure, ultrasonic distance, soil moisture, and NPK (nitrogen, phosphorus, potassium) sensors, to assess both atmospheric and soil characteristics. It also features a custom 3D-printed robotic arm designed

to to assist with soil composition analysis. It is powered by a combination of solar panels and batteries for sustained operation. Data is collected through Arduino and ESP32 microcontrollers and transmitted to a web server via Wi-Fi for remote monitoring and analysis. The rover successfully collected and transmitted environmental and soil composition data in real time to a remote web server. This research demonstrates the feasibility of using a compact, sensor-equipped rover for autonomous planetary environment assessment. Such rovers could serve as cost-effective, remotely operated platforms to evaluate the habitability of extraterrestrial environments before undertaking human exploration.

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