A Novel Self-Extricating Mechanism for Martian Planetary Exploration Rovers

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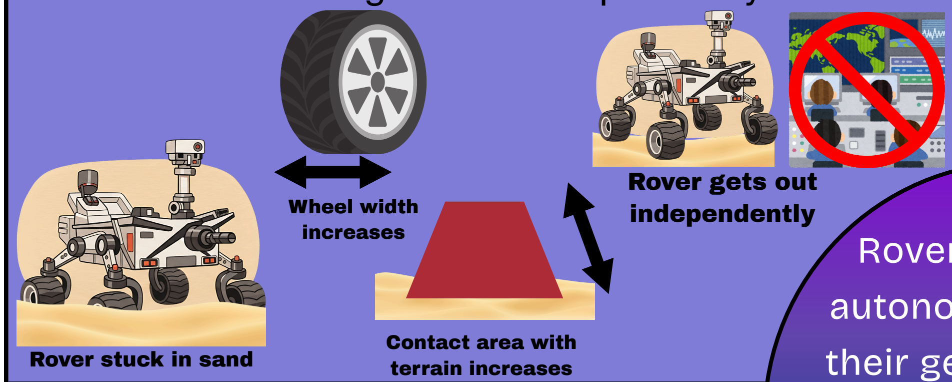
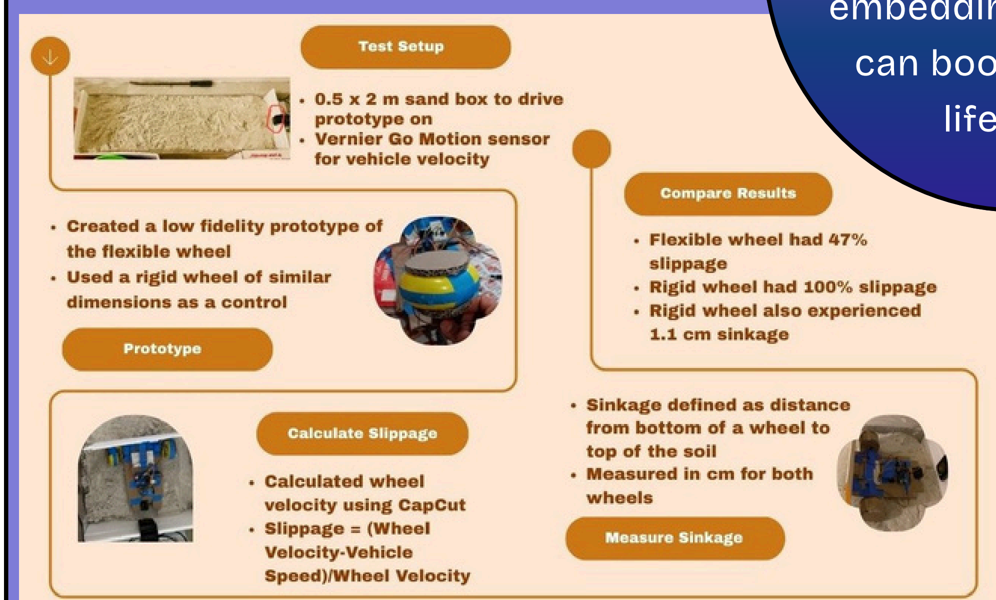
Engineering Problem & Objective

When planetary rovers on the Martian surface get stuck in the terrain, they rely on ground control to recover. The objective of this project is to make an autonomous self-extricating method for planetary rovers.



Rover wheels that autonomously adjust their geometry based on a rover's embedding condition can boost mission lifetime.

Methodology Infographic



Data Analysis and Results

The inflatable wheel had an average vehicle velocity of **0.275m/s** and the wheel's rotational velocity of **0.528 m/s**. It had a slippage of **48%**, but there were no incidents of sinkage in any of the 3 tests.

The rigid wheel itself had a rotational velocity of **0.31 m/s**; however, it didn't move forward when placed on the test bed, which means it has a **100%** slippage. Furthermore, the wheel also sunk **11mm** into the sand during one of the tests.

Interpretation and Conclusions

These tests show that the inflatable wheel had a slippage of 48% while the rigid wheel had a slippage of 100%.

This shows that a flexible wheel experiences less sinkage and slippage than a rigid wheel.