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IN-SITU DETECTION OF PLANETARY ROVER CATASTROPHIC FAILURES USING MACHINE LEARNING

Abstract

Current in-situ detection methods for planetary rovers do not fully capture terramechanics that could significantly enhance a rover's mobility. Unexpected wheel-soil interactions without in situ detection are potentially catastrophic, leading to a stuck wheel or the rover tipping over on a steep slope. Additional contributing factors hinder effective in situ detection by relying on visual data to measure wheel slip. Optical methods are effective for slow movements but are computationally too intense for in-situ detection of hazardous wheel-soil interactions. This research will test a hypothesis that machine learning can detect these anomalous events without using visual data. The test will be conducted by simulating a rocker-bogie rover within a virtual environment. Implementing a rover model within the virtual environment will obtain simulated sensor data and terrain telemetry to provide training data for machine learning.