Mobile Inverted Pendulum Testing Platform

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Rockets, assembly lines, temperature controllers, and inverted pendulums use one thing in common: sophisticated control algorithms to maintain proper balance. The objective of this project was to create a mobile inverted pendulum testing platform (MIPP) to be used to find the most efficient and viable control algorithms that can be applied into these systems. Currently control algorithms are tested through simulated software and receive no feedback in the real world. My proposed solution was to use the MIPP to gather real world data, and then create an algorithm that takes live sensor data and calibrates the system for perfect balance. A MIPP with advanced control systems can be created using custom software to read digital gyroscope and accelerometer feedback data, and produce the required stability control response. After researching required parts needed to build a MIPP, a micro-controller and electronic components were acquired, and the control circuits were built and tested. A chassis was designed and build using machined aluminum, and all components were mounted onto the chassis. Software was written to read the sensor's data and refined to control the MIPP. The sensor's data was logged to find its accuracy in maintaining the stability of the pendulum. Multiple algorithms were tested, as well as varying data filters. A successful mobile inverted pendulum testing platform was created and has software capable of testing algorithms for use in control and feedback systems. The resulting information can now be applied in applications using similar stability controls such as rockets, assembly lines, temperature controllers and inverted pendulums; saving lives and money, reducing waste, making products cheaper, and conserving energy.

Awards Won:

Fourth Award of $500