Measuring Electric Current in a Motor for the Purpose of Determining Energy Consumption

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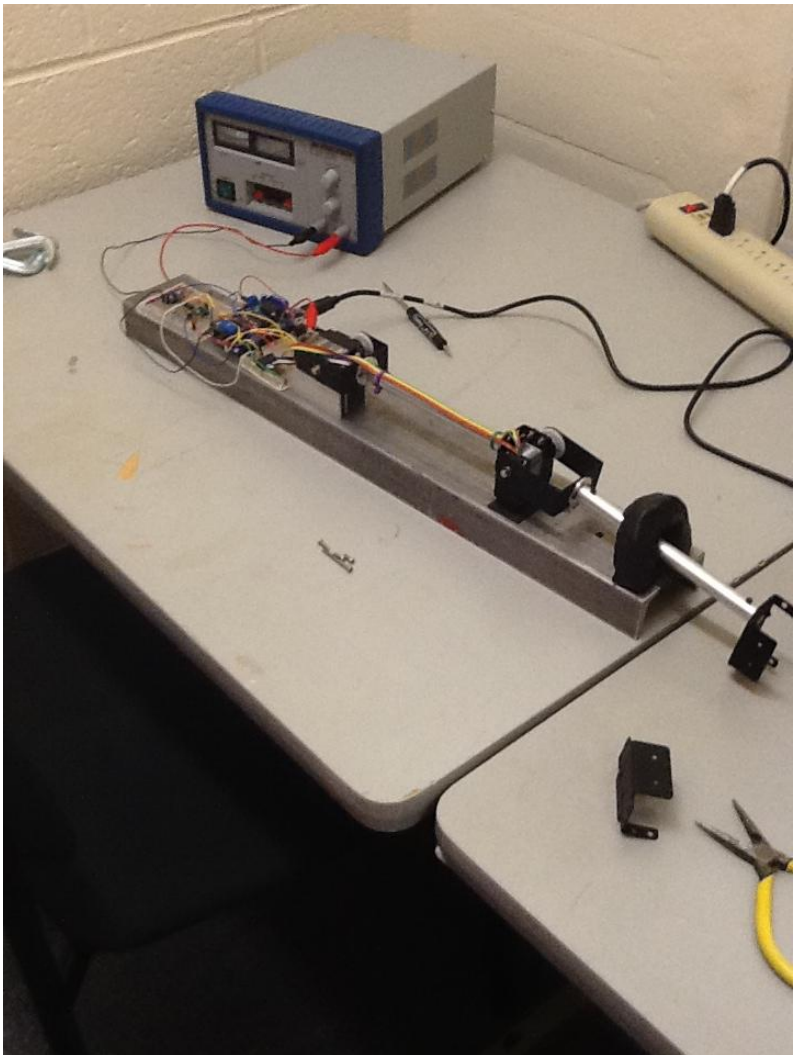
Research

Title: Measuring Electric Current in a Motor for the Purpose of Determining Energy Consumption

This research addresses the technical challenges of measuring the electrical energy consumed by a DC motor. In particular, the challenge is to accurately measure the electrical current through a DC motor. This challenge arises from the fact that we wish to determine the current consumed by a DC motor that is part of a servo-motor and the current is bi-directional. Two different pre-made sensors and two different op-amp circuits were evaluated to measure the current through the DC motor. The methodology and results of current measurement are documented in the full report and future directions of this research are also discussed.



Test rig for DC motor current measurement

Lesson Plan

Title: Analyzing Motion with an Updated Version of Galileo's Ramp Experiment

One of Galileo's many famous experiments consists of rolling a ball down a ramp to understand its motion. Galileo used a pendulum as a timing device and bells to mark the ball position at each second.

Using a ramp with sensors attached to a microcontroller and hand-held stopwatches, students will collect information about the motion of a ball rolling down a ramp. They will compare the data recorded using stopwatches vis-à-vis the data collected using the microcontroller. Due to experimental errors, the two sets of data will differ slightly. Comparing the two sets of data collected by different methods will be a basis for a discussion about accuracy and precision. Students will look at how the number of decimal places changes the precision of the measurement. Moreover, they will understand that the reaction time of students affects the accuracy of the measurements.

Galileo's ramp experiment