

Fastening Torque/ Motor Current Analysis for a Motor Powered Screw Driver Mechanism

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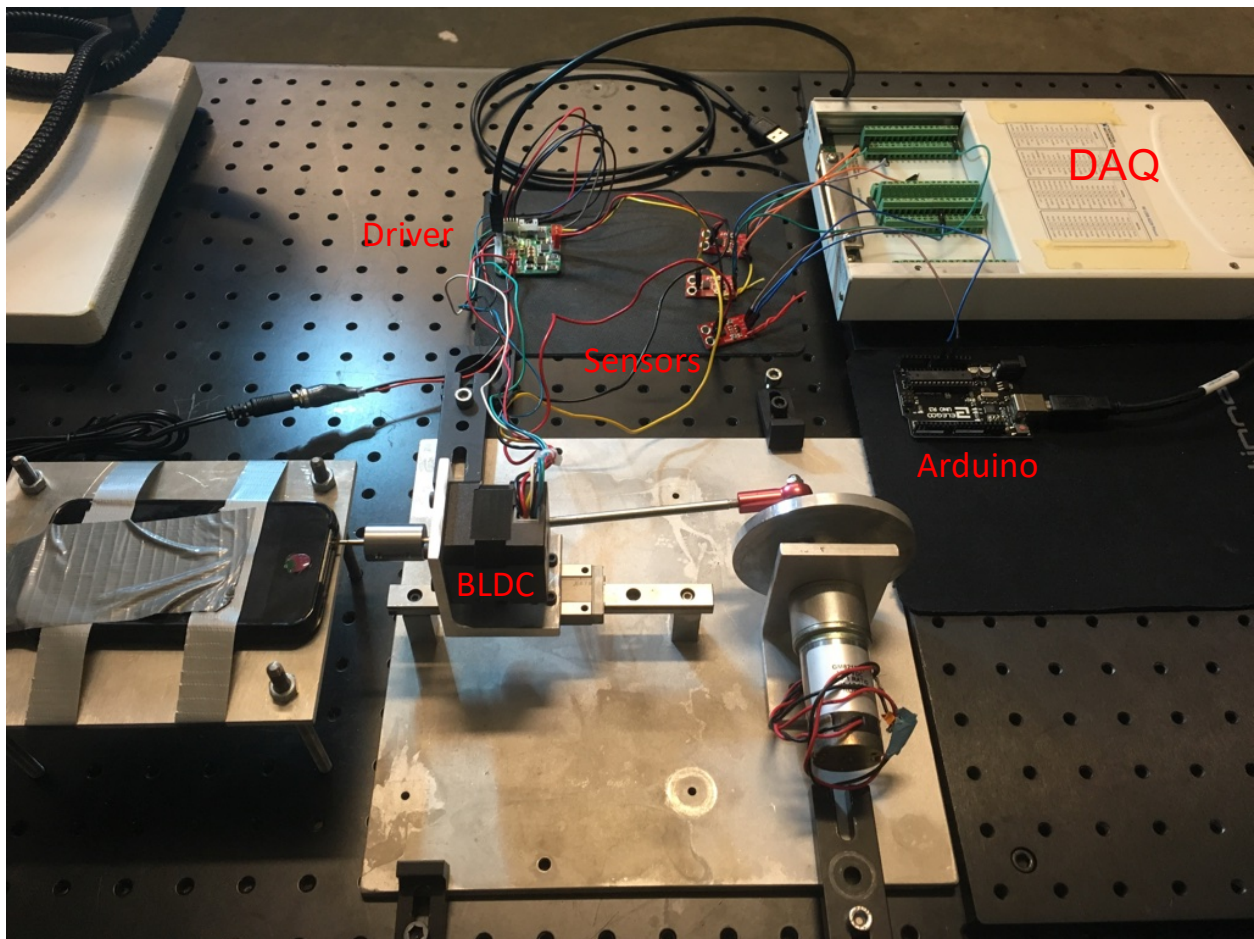


Figure 1: iPhone Pentalobe power screw driver.

The objective of this project was to investigate the relation between fastening torque and phase current in a motor-powered screwdriver mechanism. The aim was to establish a correlation between phase current changes during load imbalance occurring in the motor shaft. to identify the possible defects during assembly process in the production line we have studied the Apple iPhone Pentalobe screw insertion using a brushless DC motor, BLDC. In our preliminary results we have observed the fluctuation of the load-torque signature in three phases of the BLDC current. We have artificially simulated a one- dimension imbalance force on the motor shaft and were able to measure a significant phase current fluctuation as a result. Therefore, this result forecasts the importance of further investigating of phase current fluctuations (model based) to implement highly accurate fault diagnosing/forecasting mechanism for screw tightening-based assembly operations.

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