Lean-Green Switch It Off

Overview
Modern industry requires electricity to perform all of its functions. Electricity however is becoming more and more expensive as global climate change and greenhouse gases become more and more important. In light of this, energy managing tools must be developed to conserve electricity. One such device is the Intelligent Circuit Switch (ICS) as developed by Lean-Green LLC. This device when connected to a motor will turn off a motor when the motor is on, but is sitting at idle. To see if the device works, then it will be put through a series of tests both in a laboratory and on a real motor. The device has performed as designed.

Objectives
The goal of our project is to help Lean-Green LLC market their Switch It Off device. We have received four of their devices, which will be used to design circuits for testing. These tests will be used in order to determine the conditions under which the ICS conserves the most energy. With marketing in mind, the results will be analyzed and displayed in an easy-to-understand figure, and also in a short video.

Approach
- We set up a design plan and clarified the customers’ needs with the help of visiting the EMS for twice.
  - Laboratory Environment Requirements:
    - Easy to change current
    - Produce high current through current sensor
  - Factory Environment Requirements:
    - Create load to consume high power
- With the help of Professor. Mayer, we came up with the solutions as followings.
  - Lavatory Environment Solution:
    - Use Function Generator to manipulate the current
    - Increase wire turns base on Hall Effect, and use Power amplifier to increase power level
  - Factory Environment Solution:
    - Connect Generator to Motor to consume large power

Outcomes
- Payback time of the switch with 5Hp motor is 147 days.
  And the one for 10Hp motor is 302 days.
- Device was too sensitive to pick up starting current of motor
- Potentiometer was not marked probably
- Determined that Idle Period is set around 90 seconds
- Verify the relationship between circuit current and output voltage
- Device is able to perform as expected under most circumstances