Week 6 Lab

CC2511

This week you'll start on your design project schematic.

Part 1—Breadboard the stepper motor driver circuit

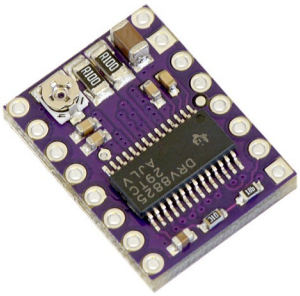

Figure 1: Stepper motor breakout board.

We have provided breakout boards for the DRV8825 stepper motor controller.

1. **Read the DRV8825 datasheet to familiarise yourself with the controller:** `http://www.ti.com/lit/ds/symlink/drv8825.pdf`
2. **Read the product page for the breakout board:** `https://www.pololu.com/product/2133`
3. Build the control circuit on a breadboard but do not connect a stepper motor yet.
4. The controller will use a current limit calculated as:

$$I_{limit} = \frac{V_{ref}}{5R_{sense}} = \frac{V_{ref}}{5 \times 0.1} = 2V_{ref}.$$

   The stepper motors are rated for 1.33 A maximum. **Therefore you must ensure that V_{ref} is approximately 0.5 V or less.**

5. Adjust the trimpot to calibrate V_{ref}. Measure V_{ref} by placing a multimeter between the trimpot dial and ground.
6. Turn off the power then connect a stepper motor. Turn the power on and the controller should hold the stepper motor fixed. You won't be able to turn the motor with your finger.

   Never connect or disconnect a motor when the driver is powered.

7. Develop software to generate the STEP and DIR signals and connect your microcontroller to your breadboard. Ensure that you can drive the stepper motor in forward and reverse directions.
8. Experiment with the different microstep modes by varying the MODE pins.

Part 2—Schematic

Start designing your schematic for Assignment 2.

Some hints:

- The current sense resistor on the breakout boards is quite small, to suit a high current motor. For this application, you might consider choosing a larger R_{sense} so that V_{ref} can be larger without exceeding the motor rating.
- V_{ref} would normally be formed using a voltage divider circuit. However, you can maximise your flexibility by including a header that exposes the V_{ref} pin. If you leave the voltage divider unsoldered, you can find a suitable V_{ref} experimentally and then solder the voltage divider once you're happy with your choice.

Assessment

There is no assessment this week. You're expected to make substantial progress towards your design project schematic.