Current Sensor Boards Fall 2017 Design

Overview:

Boards are set up for 3v3 supply voltage.

Sensors are bidirectional and normally output 2.5V <Vout < 4.5V on their respective ranges (20A or 30A). But since a 3v3 supply is used the range is 1.65 <Vout< 2.97 for the full 0-20A range or 0-30A range. For the 5A board, a 20A sensor is being used so the range is 1.65<Vout< 1.98. This voltage range is being mapped onto as close to [0,3.3] as possible to get maximum resolution.

Using a 20A hall-effect sensor to sense current both on 20A and 5A range. Using a 30A hall-effect sensor to sense current on a 30A range. These boards have been tested. Resistor values and current vs voltage from op-amp data is contained in the “20A and 30A board new resistors oct 31 3v3” document.

In progress:

As of November 11 2017:

ADCs have not been ordered. 100A board has not been tested.

The ADCs originally planned for do not have selectable I2C addresses. This is an issue because 6 boards are needed for motors, 1 board for the battery, and one board for the end-effector. To address this problem there are 5 courses of action that can be taken (2, 4 and 5 are most promising because we can buy $1.2 single address ADCs)

1. Purchase eight 5-7$ ADCs with 3 address pins, respin boards
2. Purchase ADA fruit i2c expander break-out (MUX) and run clock and data lines to the break-out then a single SDA and SCL to the arb board
   1. Need a good way of connecting the lines to the breakout
      1. pin headers and solder wires and use wire-wire connectors?
3. Purchase eight 4$ ADCs with 4 selectable addresses and use a transistor to multiplex
4. Buy a $0.60 8:1 multiplexer IC and incorporate it into the arm board. This would mean that connectors would be needed for at least 6 clock and 6 data lines on the actual arm board.
5. Make a separate board for a multiplexer IC and the necessary connectors. Has the benefit of not having too many connectors on the actual arm board and also not having to elaborately find a way to get connectors on the adafruit break-out.