

# Advance Communication Bus Breakout Board



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# Introduction/Background

- Project Name: Advanced BreakOut Board
- What is it
- Why we need to produce it
  1. How Chrysler deal with it in the past
  2. How do we solve this problem
- Speed up prototype process

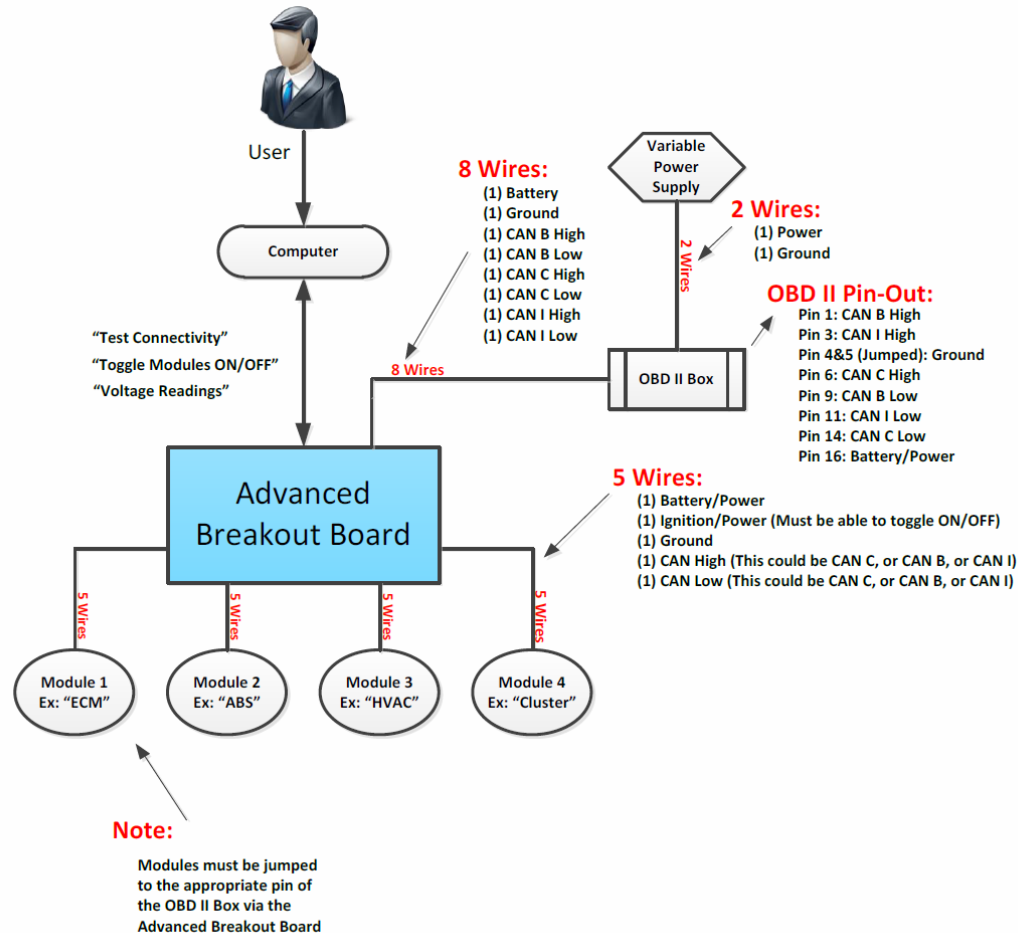


# Objectives/Design Spec

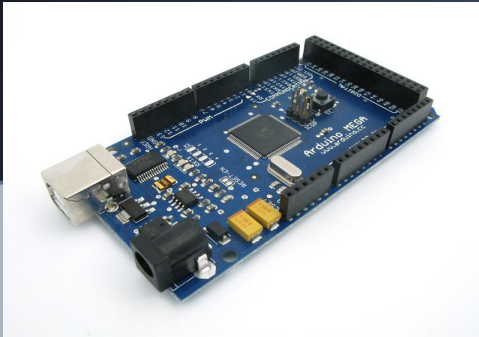
## **To meet Chryslers needs we must:**

- Support up to 10 modules simultaneously
- Toggle power on/off for indiv. modules
- Handle up to 15 amps per module
- Display real time voltage/current readings
- Change CAN bus communication
- Provide easy to use GUI

# Objectives/Design Spec



# Microcontroller



Arduino Uno:

Max speed: 16MHz

14 GPIO ports

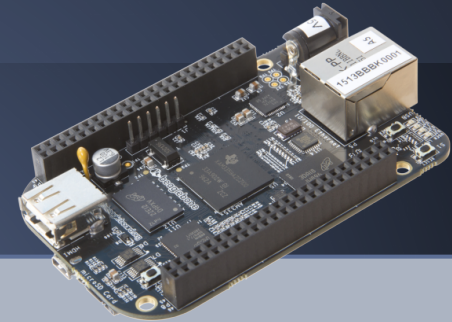
32 KB flash memory



Raspberry Pi:

Max speed: 700MHz

8 GPIO ports



BeagleBone black:

Max speed: 1GHz

A/D Converter

Easier to set up

65 GPIO ports

2 GB on-board storage

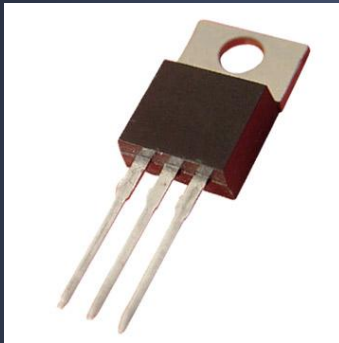
# Voltage/Current Measurement

- Extra A/D Converter chip
  - 7 On-board A/D converter
  - 8 Channel Chip x 2
- Resistor for current
- Voltage Divider

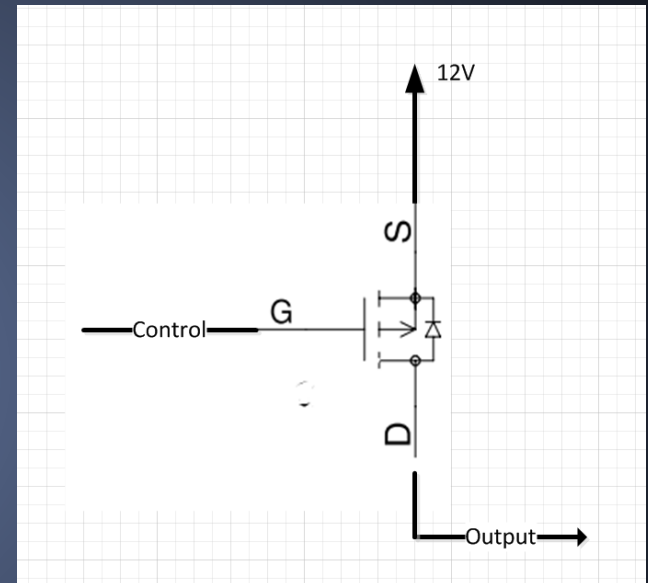


# Toggle Devices

- Transistor(low current)

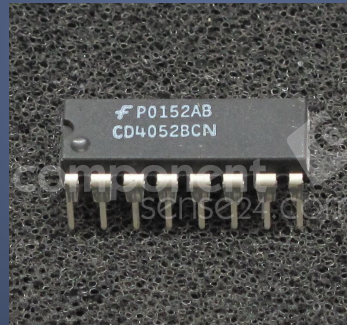


- Relay (high current)



# Connection with CAN Bus

## Analog Multiplexer



CAN A



CAN B



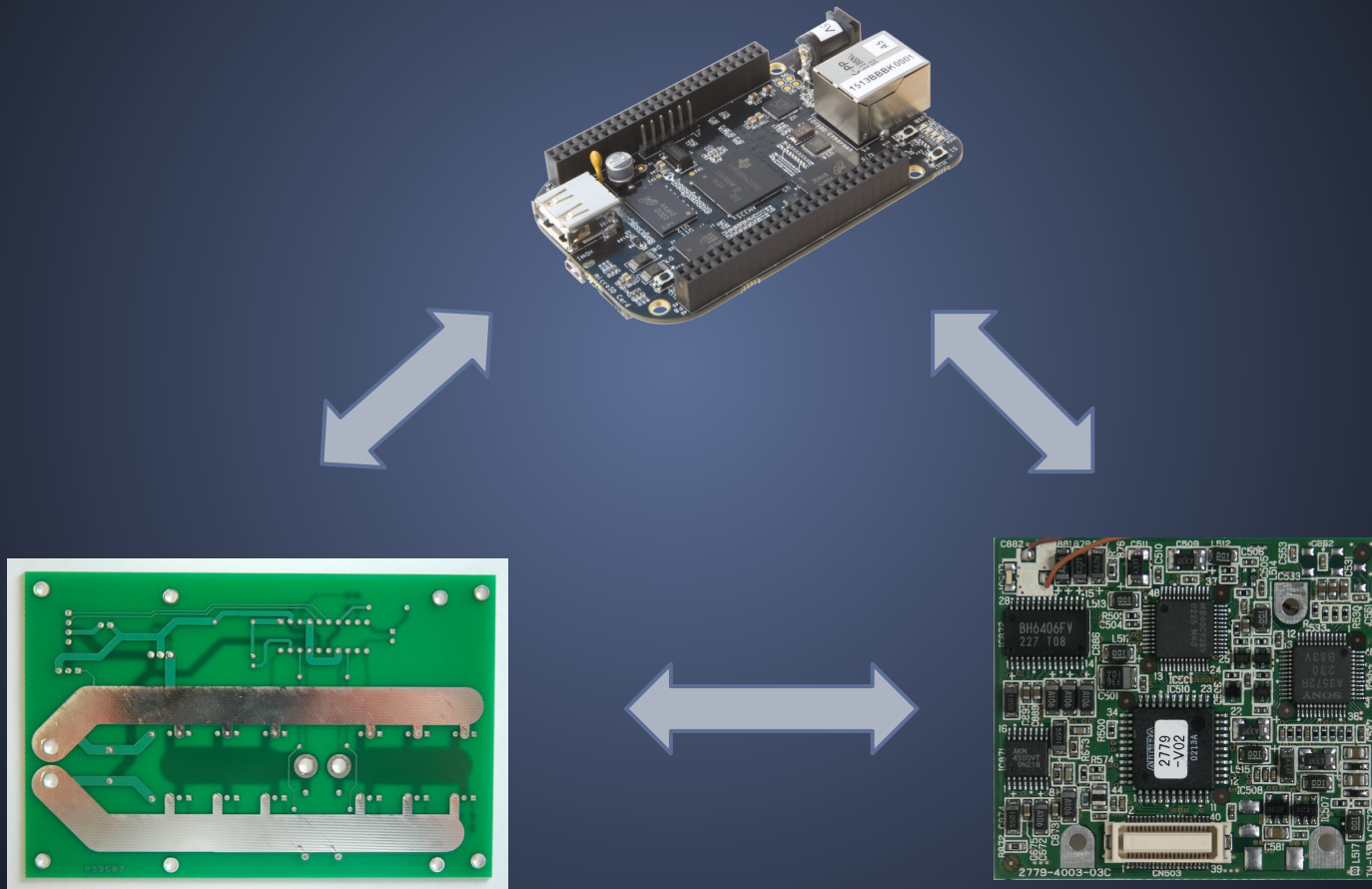
CAN I

# Graphical User Interface

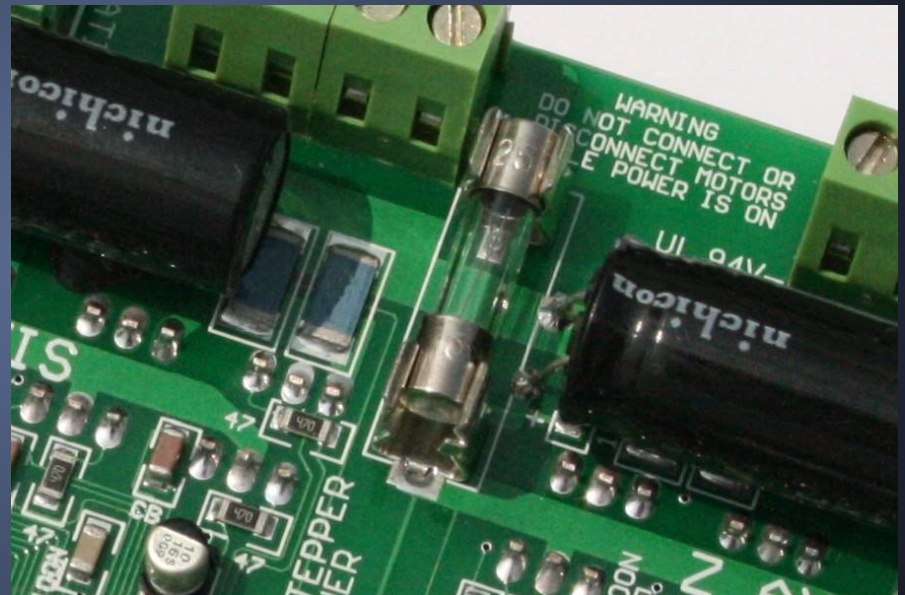
- GTK+ and Qt are open-source cross-platform toolkits and development frameworks. Popular frameworks for Linux because they are open-source and give developers a powerful toolkit to design GUI.
- Qt has C++ based libraries. Qt supports Java, Perl, Python, PHP and Ruby based development.
- GTK+ has C based libraries. It supports several languages, including C++, Java, Perl, PHP, Ruby and JavaScript.
- Qt can run directly on the hardware, without the need of X11 or a window manager.
- Qt works faster with certain widgets.
- Python binding- PyQt



# Separate PCB Design

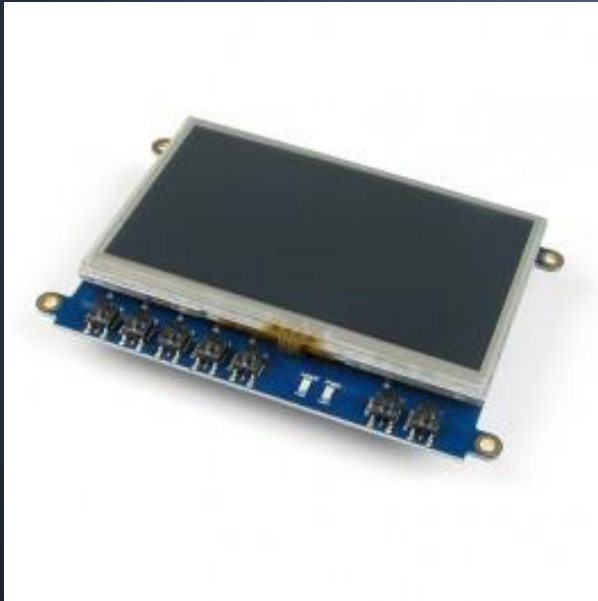


# Fuse Protection



# Advanced Design

## Stand-alone Control



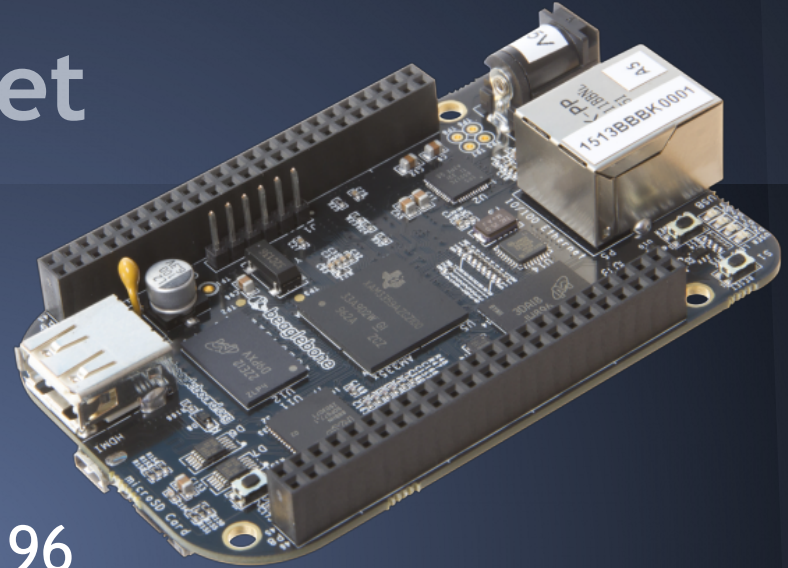
# Project Management

Divide design solution into smaller pieces:

1. GUI
2. Multiplexing
3. Concurrent A/D Conversions
4. CAN Bus Integrity



# Budget



## Purchased Items:

Beagle Bone Black- \$45.00

A/D Converter- 2 @ \$3.48 -> \$6.96

Dual 4x1 Multiplexer- 10 @ \$0.46 -> \$4.60

Running total: \$56.56

## Future Charges:

Main and backup PCBs

Final product enclosure if time permits

# Questions?

