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 Chrysler's needs we must:

- Support up to 10 modules simultaneously
- Toggle power on/off for individual 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

User

Computer

8 Wires:
1. Battery
2. Ground
3. CAN B High
4. CAN B Low
5. CAN C High
6. CAN C Low
7. CAN I High
8. CAN I Low

Variable Power Supply

2 Wires:
1. Power
2. Ground

OBD II Pin-Out:
1. CAN B High
2. CAN I High
3. CAN C High
4. CAN B Low
5. CAN I Low
6. CAN C Low
7. CAN I Low
8. Battery/Power

Advanced Breakout Board

Module 1
Ex: “ECM”

Module 2
Ex: “ABS”

Module 3
Ex: “HVAC”

Module 4
Ex: “Cluster”

5 Wires:
1. Battery/Power
2. Ignition/Power (Must be able to toggle ON/OFF)
3. Ground
4. CAN High (This could be CAN C, or CAN B, or CAN I)
5. CAN Low (This could be CAN C, or CAN B, or CAN I)

Note:
Modules must be jumped to the appropriate pin of the OBD II Box via the Advanced Breakout Board
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
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?