Low Voltage Sub-System (LVSS)

1. Vicor
   a. Vicor DCM4623 is a DC-DC converter, operating from an unregulated, wide range input, 120 – 420 Vdc, to generate an isolated 28.0 Vdc output.
   b. We are using it to turn 400 V and split it into several 12 V signals.
   c. LVSS
2. Vicor Finite State Machine (In progress)
   a. Component Priorities
      i. High: HIB, GUB
      ii. Medium: TMS, Accessory Power
      iii. Low: HUDL
   b. When does DC-DC converter need to be enabled (We tell it when to turn on)?
   c. What triggers FT and what do we need to do in response?
3. Current Sensing
   a. Using an ACS71240 IC and an ADC I programmed an STM32F302R8 to take in a certain voltage and amperage and display them over UART.
   b. Found the ICs sensitivity measurement which was 1A = 44mV.
   c. Found that at 0A there was a voltage of about 1.653V and at 1A there was a voltage of 1.697V which proved the sensitivity of 44mV (1.697 - 1.653 = 0.044V).
   d. Found the ADC counts which were 3.3v/ 4096. This helped me find the equation for the voltage which was V = A * (1.653V / 44mV).
   e. After doing some Algebra I was able to find that the equation for current was I = ((ADC counts * 3.3) / (4096 * 0.044)) * 1000.

- EN_TMS_12V
  - Bidirectional; PA0
  - GPIO to power switches to enable functionality. Enables TMS line
- EN_HB_12V
  - Bidirectional; PA1
  - GPIO to power switches to enable functionality. Enables Handlebar line
- EN_HIB_12V
  - Bidirectional; PC14
- EN_HIB_12V
- USART2_TX
  - OUT; PA2
- USART2_RX
  - IN; PA3
- VICOR_SENSE_IN / CURRENTSNS
  - IN; PA4
  - current going through LVSS that needs to be stepped down.
- VICOR_FAULT
  - IN; PB4
- CAN_RX
  - IN; PA11
- CAN_TX
  - OUT; PA12
- SWDIO
  - IN; PA13
- SWCLK
  - IN; PA14
- SWITCH_1_SNS_MCU
  - IN; PC0
- SWITCH_3_SNS_MCU
  - IN; PC1
- SWITCH_2_SNS_MCU
  - IN; PC2

What to do if the Vicor has a fault?

1. Will be reporting what the current through the LVSS is (Which is VICOR_SENSE_IN).
2. Will have a startup sequence for all the switches.

CAN Messages

1. Enable/disable boards (input)
2. VICOR_SENSE_IN (output)
3. Power switch errors (output)
4. Currents of all power switches (output)

CAN Message Decryption

1. Determine Data
   a. How many bytes. How to split it up.

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- Test sending CAN messages.
  - Send messages and see them over Salea or Analog Discovery
- Test receiving CAN messages.
- Get board enable struct implemented.
  - Research bit width structs.

setBoardEnable:

- Gets a 16-bit hex value from VCU.
  - Find VCU pin.
  - Take input.
  - Send input to set board
- Uses a union to set uint16 var

getBoardEnable: