Requirements

Constraints

The LCD display must be readable in all weather conditions. A trans-reflective display that is 500-900 nits bright will allow the display to be readable in sunlight. A waterproof enclosure will allow the device to operate in rainy conditions and allow it to be readable in rain. The digital dash unit must be large enough to be readable but small enough to be mountable on the dash of the electric car. A 3.5” LCD screen will allow for both size constraints.

Objective

The digital dash will give the operator of the electric car critical system warnings of various systems. The warnings will come from a CAN bus connected from the electric car VCU that will be connected to a microcontroller contained in the digital dash unit. The microcontroller will parse the CAN data and display it on the LCD contained in the digital dash unit. The microcontroller, LCD and a power supply will be contained in a waterproof enclosure that is easily installable on to the current setup of the Formula SAE electric car.

# Engineering Requirements

Operation

* The unit must have a trans-reflective screen capable of 500-900 nits, for visibility in direct sunlight.
* The digital dash should gather data from the EVCU, BMS and Motor controller and be able to interpret data and display in a graphical interface.
* The display’s interface must be simple and clear so driver can easily read at a quick glance; it should include big fonts and symbols with bright colors to differentiate indicators.
* Displayed data does not need to be real-time, but update and refresh at a rate that will be useful.
* The electric car must be independent of display system and run with or without it, in case of failure the electric car must still be operable.
* Display must boot up in less than 30 seconds, so it is not a nuisance to turn on and use.

### Price

* Total parts and manufacturing should not exceed $500 as to accommodate the Viking Motorsport budget. The digital dash must also be relatively cheap to be a viable open source alternative to similar existing solutions.

### Power

* Display must be able to be powered by a 12V DC supply, the unit will be powered from the main battery on the electric car.
* A power supply must be designed for the digital dash to be robust against electrical noise. And be able to regulate battery voltage (9-13V) down to the display and controller voltage of 5V.

### Health & Safety

* Display must be securely bolted to car frame and not stick out of car body to prevent module from flying of and injuring driver.

### Environmental

* Must be made with non-toxic/hazardous chemicals that would require proper disposal.

### Maintainability

* Must have minimal to no user maintenance over entire life cycle.

### Manufacturability

The electric car dash does not have a lot of space available and will need to be moved around easily.

### Reliability & Availability

Must be reliable for complete life cycle. The digital dash should be reasonably simple to reconfigure and add/remove variable/messages to display the digital dash must be easy for another user to add information to it with a user manual. The digital dash will be used in rain and must be usable in such conditions, the unit must be weather proof.

Usability