BFB Embedded Software Documentation

Intro:
This revision of the BFB utilizes a Teensy 3.6. It has 7 analog voltage inputs from the Energus modules temperature sensors. It communicates with the Orion BMS v2 using the Teensy's built CAN Bus controller. The controller sends a signal to a TI transceiver, which is the device that actually connects to the CAN Bus lines. There is also a fault out pin, which is optional to implement.

Architecture:
The program first setups the serial and CAN bus communication. Then the loop begins. It continuously checks input voltages. This value is 0 - 1023, corresponding to 0 - 5v. An array is used as a map, mapping these voltages to a temperature. This can be found in an Energus module datasheet. The code checks if the temperature is within bounds, otherwise this indicates a fault with hardware (either open circuit or set to 5v). The lithium cells have a stricter safe temperature zone, but this check will be done by the Orion BMS v2. The values are interpolated with this map, then rounded to the nearest integer.

After obtaining temperatures, a function calculates the average, high, and low temperature, making sure to omit any out of bound values. The * is a pointer. These values, along with individual temperatures, will be sent over CAN Bus. The Flex CAN library is used to allow control of the internal Teensy CAN controller. The proper message must be sent with the proper identifier at the correct frequency. The Metro library is used to do the timing for the frequency.

Tips:
Learn about CAN Bus protocol by googling CAN Bus pdf
V1.1 is written in Arduino IDE, start with that to learn basics
V1.2 is written in the platform IDE, which is a package for VSCode. This is intermediate level
Learn arduino by reading through tutorials and other people's code. Look at sample programs that relate to what you what to do (adafruit and arduino are good websites)
<< is bit shifting, took me a year to learn that, don't be like me
Google is your friend lmao
Read through Orion BMS v2 and thermistor expansion module documentation to understand and gain necessary knowledge
More complete Orion BMS can bus message format was found here: https://www.reddit.com/r/FSAE/comments/sbj2jo/emulating_thermistor_expansion_module_for_orion/