Dacq tracker

Sunday, January 16, 2022 5:13 PM

Item	teensy	Sensor	PCB	Connectors	CAN chip	Ready to make	Done	3	pins
Accel(FT)	-F&R BP -stearing -IMU -Teensy LC	y	N	y	Y	N	N	N	N
Omni V2	-GPS	y	y	y	y	n	n		
Corner Node	- Shock Pot - Strain Gauge(v2) - Tire temp - Wheel speed - TPMS (v2)	y	n	y	y	n			
IMU (CG)	- LC	Y	n	y	y	y	y	n	4
Rear accel	- IMU		n						4
			n	n	n	n	n	n	n
			n						
			^						

Accel and brake in front
Unknow what accell
2 3 pin duitch for brake in?
Teensy LC
Sdm can
Desoder off blue chip
Stearing angle

Rear accel

Corner node pcb:
Check conectors for PCB
4.0 teensy

CG node
Teensy LC

Current Problems

Saturday, August 20, 2022 4:36 PM

- Controller overheating
- Error on can network
- No termination on boards
-

Omni seems to be missing can packets

- Coded Bulkhead node to send two messages every 100ms
    - Omni only gets 10 messages per sec while connected to bh node, should be 20
- Candapter picks up both messages
- consistently
- Data of message is consistent with the serial print
- Log sporadically picked up both
- Guess at the prob: need interrupt pin connected
    - OG omni used interrupts to call the packet receive routine

Cannot tell what the "error 101" is actually affecting but have not checked for data parity

- Error "101" is actually 0b101=5

Running the bus at 125kbps did not get rid of the error

Potential Sponsors

Tuesday, June 21, 2022 7:21 PM

- Prowire USA - https://www.prowireusa.com
- CRP USA - https://www.crp-usa.net
- Creality - https://creality3d.shop/pages/contact-us

Stuff to buy

Friday, June 24, 2022 2:42 PM

- CanBus Wire - 23-00072 - champlain cable
- Shock Pots - SLS095/075/R/N
- Deutsch AS Connectors - prowire usa
    - 5 Pin
        - ASL006-05PB-HE
        - ASL606-05SB-HE
    - 3 Pin
        - ASU603-03PN
        - ASU003-03SN-HE

https://www.csselectronics.com/products/can-bus-data-logger-wifi-canedge2 try to get sponsored discount
Vectornav sponsorship!?

- AJ Wishlist
    - Strain guages
        - Seems like a good thing to learn how to do.
            - future use cases could be validating suspension forces, validating chassis stress, steering force, real world aero validation, shock pot replacement? Etc.
        - https://micro-measurements.com/stress-analysis-strain-gages
        - https://docs.micro-measurements.com/?id=6744
    - NavX mxp (why doe) use the other one matthew was talking about
        - Worth messing with to see if it can be used for our use cases (if we can get one for free)
        - 9 axis heading
            - Magnetometer readings taken on calibration, when combined with the navX-MXP yaw measurements, enable a position and absolute heading to be maintained. This feature of the navX-MXP is referred to as a “9-axis” heading.
        - Built for FRC
            - Built to be simple to use
            - Has Arduino libraries
        - Interesting data analysis possibilities
            - Potential to Map telemetry onto a model of the track
        - Onboard filtering
        - I2C protocol
        - https://pdocs.kauailabs.com/navx-mxp/wp-content/uploads/2019/02/navx-mxp_robotics_navigation_sensor_user_guide.pdf

Methodology of wireing

Monday, August 22, 2022 5:25 PM

CAN line:

Solder joints

Pros:
Tiney
Cost is nill
Easy to include in a line

Cons:
Adds a failure points

Make a joining board

Pros :

Cons:
Adds min of 3 failure points
Making another board
Adding another object to the car
More connectors

Would love to see some drawings of what the two options look like here

Data Acq Priories list

Tuesday, February 8, 2022 5:46 PM

1. ~~Brake Tester~~
2. ~~Put old data acq system on car~~
3. ~~EV BMS Can (3rd)~~
4. Tire Temp
5. Strain gauges
6. Wing Tester
7. New data Acq system
8. Telemetry
9. ETB(Needs single button then Ready)
10. Pcb nodes
    a. TPMS
    b. Shock pot
    c. Tire temp
    d. Strain gauges
    e. GPS

1. Can System
    a. Get Teensys
    b. Finish PCB omni V2
    c. Sensor nodes(not in order)
        i. Tire temp
        ii. GPS
        iii. Shock pot
        iv. Speed Sensors
        v. Brake Pressures
        vi. Steering angle
        vii. TPMS
        viii. Strain Guages
    D. Omni Box
2. Xbee - telemetry

Omni 2.0 - order 4/12
Fw tester - 4/22
Mounting old with new - before car rolls
Fix gyro code - before car rolls
Undertray - TBD
Nodes -

When the ranked priority list does its job & Keeps people from killing time.

Hakko stuff

Tuesday, November 1, 2022 10:51 PM

Stuff we got:

1. https://hakkousa.com/fm203-dual-port-soldering-system.html
2. https://hakkousa.com/fm-2027-conversion-kit.html
3. https://hakkousa.com/fa-400-smoke-absorber.html
4. https://hakkousa.com/fm-2023-mini-hot-tweezer-kit.html

Stuff we want for free:

FM203-DP

From <https://hakkousa.com/products/soldering/soldering-stations/fm-203-dual-port-soldering-system-w-two-soldering-handpieces.html>

FM2023-05 hot tweezers

From <https://hakkousa.com/catalog/product/view/id/9652/category/376/>

Three tips: fine pitch, chonker for large stuff, general purp.
Fine:
T15-BLL

From <https://hakkousa.com/catalog/product/view/id/9491/category/376/>

Chonk:
T15-D4

From <https://hakkousa.com/catalog/product/view/id/9476/category/376/>

General
T15-B2

From <https://hakkousa.com/catalog/product/view/id/9453/category/376/>

Electric Screwdriver
AT-4500
https://hakkousa.com/products/at-4500-brush-electric-screwdriver.html

Tip Polisher
FT-700
https://hakkousa.com/ft-700-tip-polisher.html

Sucky Boi
FA-430 with Duct & Round Nozzle
https://hakkousa.com/products/fume-extraction/smoke-absorbers/fa-430-with-duct-round-nozzle.html

FM203-DP, FM2023-05, FA400-04, T15-BLL, T15-D4, T15-B2, CHP-170-D

Corner node quick schematic review

Sunday, June 26, 2022 12:24 AM

Coner node problems:

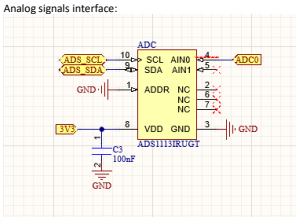
- No i2c pullup resistors=cannot use the ADC on board
  - Solution: use teensy ADC (requires mod)
- ADC is given 3.3v supply while shock pot gets +5v, so shock pot will be out of range
  - Solution: cut +5v trace to shock pot and connect to 3.3v rail somewhere lol
- Pin 13 on teensy not connected to SPI clock line
  - Solution: bridge pin 13 and 14 on teensy

The purpose of the corner node board is to interface with i2c temp sensors, read several analog signals(shock pot),read wheel speed(tach signal), then send those reading over canbus
This is a quick review of whats on the schematic currently and if it checks out with those requirements
Schematic format needs to be cleaned up

- Make page normal size
- Use net labels, not ports
- Rev0, not rev1

I2c interface: looks fine--using one i2c port each for tire temp/ ADC
Wheel speed: sensors say 5v pull up minimum, but 3.3v will probably still work

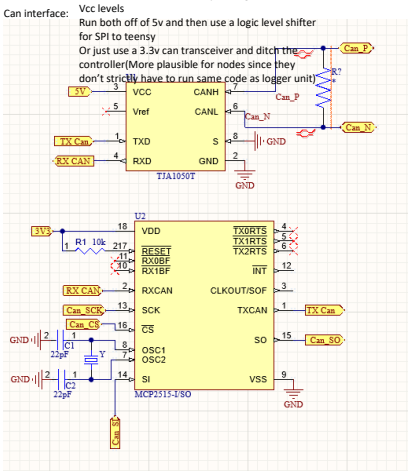
Analog signals interface:



External adc =j ust use one of teensy pins (A0-A9)
Add RC lowpass filters at a minimum

Can interface:

Transceiver and controller operating at different Vcc levels
Run both off of 5v and then use a logic level shifter for SPI to teensy
Or just use a 3.3v can transceiver and ditch the controller(More plausible for nodes since they don't strictly have to run same code as logger unit)



From TJA1050T datasheet

environment.

- Input levels compatible with 3.3 V and 5 V devices

MCP2515

13.0 ELECTRICAL CHARACTERISTICS

13.1 Absolute Maximum Ratings†

V_{DD} 7.0V
All Inputs and Outputs w.r.t. V_{SS} ..... -0.6V to V_{DD} + 1.0V
Storage Temperature ..... -65°C to +150°C
Ambient Temperature with Power Applied ..... -55°C to +125°C
Soldering Temperature of Leads (10 seconds) ..... +300°C

† **Notice:** Stresses above those listed under "Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Archived Pages

Monday, March 9, 2020 7:24 PM

DACC Planning over Sammiches

Tuesday, November 2, 2021 5:18 PM

Node Planning:

Item	Requirements	Schematic	Ordered Part	Mechanical Mounting	Bread Board	Proto Board	Make PCB	Assembled	Tested
Accel		N	Y		Y	N	N	N	N
Omni V2									
Tire Temp									
Corner Node	- Shock Pot - Strain Gauge								
Accel +Gyro	-	Y	y	y	y	y	n	n	n
Grouped Power Supply	- Determine Amperage?								
Strain Gauge		y	y	n	n	n	n	n	n

Inventory of items:
Keep things in stock for future projects

Doitch conectors
Teensies
ADC

Data Analysis:

Telemetry:

12/10/21 Meeting Outline/Notes

Friday, December 10, 2021 5:40 PM

- Plan For Winter semester
  - Finish Omni V2
  - Finish shock pot Pcb
  - Start Developing Accel pcb
  - Wheel Speed
- Upcoming plan for Data Acc in the spring semester
  - Which nodes will be developed
    - Brake temp
    - GPS
    - Gear Position output shaft
    - TPMS
  - How we will get people working on nodes
    - Spring Classes?
  - System for keeping track of current projects
    - Milestones?
- Ordering Stuff

Engine Test Stand

Monday, December 2, 2019 7:30 PM

What we want to test for and do:

- Overall stuff
  - Why the heck we only revving to 12k when the motor stock produces peak power around there
  - Is there any real difference between 636cc and 599cc
  - Compression ratio changing
  - Do we see a difference between ported and non-ported?
  - Make tune not bad
  - Teach people how to tune for in the future
  - Get dyno graphs for different brake percentages and stuff
  - Can we nail down a good engine dyno testing methodology?
- Intake
  - Intake runner length
    - Relationship between runner length and peak power RPM
    - What runner length produces the overall maximum peak power
    - What runner length produces peak power at 9000RPM
  - Intake plenum volume
    - What plenum volume keeps the power band open the best
    - Relationship between plenum volume and throttle response
      - Basically defining throttle response as a time function difference between the power being produced and the position of the throttle plate
  - Differences
    - Do we see a big difference between KS4 and KS5 parts' performance? Can we validate this improvement? Can we see any obvious areas of improvement for design cycle #2?
- Exhaust
  - Is there an appreciable difference between the log exhaust and the equal length header exhaust?
  - What header diameter maximizes peak power? (test ks3 exhaust vs ks4 exhaust)
  - What header length maximizes peak power? (modify ks4 exhaust to be variable length, introduced b/w header end and merge collector)
  - What power losses do the mufflers introduce?
  - we probably can't do this but muffler sound and also maybe be all sneaky with different tunes for different noise levels
- Driveline
  - Is there a difference between o-ring, x-ring, and no-ring chain?
  - Do different size drive sprockets cause larger driveline losses? (compare peak power b/w 9t, 10t, and 11t drive sprockets)
  - also maybe lube

Things to be measured (FOR DATA ACQ)

- Temperature Sensors on each runner of the header
- Intake pressure
- Rpm
- Fuel Pressure
- Coolant Temperature (Hot side and cool side)
- Knock sensor (THIS WOULD BE AWESOME)

Immediate to do's

- Drilling
- Get tuner studio / mega squirt6 licenses

Data Acq Planning

Friday, February 28, 2020 6:42 PM

Primary Goal
-All data collated to excel usable

Sensors:
- -Accelerometer
  - -CAN bus device
- -Steering angle
  - -OMNI Board
- -Tire temp
  - - CAN bus device
- -Shock Pot
  - -Both
    - - front board
    - - rear CAN
- -ECU Dump
  - -CAN bus device
    - - maybe not normal CAN protocol
- -Throttle Position
  - -Might be ECU
  - -Might be OMNI from sensor
- -Wheel speed
  - -If possible, investigate optical sensors
  - -If so OMNI
- -pitot Tubes
  - -OMNI in front
  - -CAN from rear sensor board
- -Brake Rotor Temps
  - -infrared?

-E&D wants stuff, list to come later

Refresh Rate: 10Hz

Code Status:
-Shmaybe
-Needs to adaptable to sensor suite
-Set column layout on CSV

OMNI Status:
- -Freddy designing new board
- -Current OMNI board as fallback

Jake to do:
-Enclosure for tire temp sensor
-rain proof prefer
-two bolt holes
-Accel Board

Priorities Order

Accel:
Shock pots:
Steering:
Tire temp:
Brake pressure:

Priorities:

Accel:
Machined case
Shock pots/:
Mounting
Tire temp:
Enclosure 3d print inside machined case
Brake pressure:

Accel:

CODE	PHYSICAL
Read from accel CAN	Machined Case DESIGN
	Machined Case MANUFACTURE

Shock Pots:

CODE	PHYSICAL
Read all four analog values	Determine mounting method FRONT
Characterize potentiometer curve/line	Determine mounting method REAR
Write to file	Mounting Manufacture

Steering:

CODE	PHYSICAL
Read from sensor	Attach steering pot
Write to file	

Tire Temp:

CODE	PHYSICAL
Read array for tire temps	3D printed inside case DESIGN
Output over CAN	Machined case outside DESIGN
	Manufacture/printing

Waiting on
Mounting setup

Brake Pressure:

CODE	PHYSICAL
Read from sensor	Attach Transducer
Write to file	

ECU:

CODE	PHYSICAL
Read from CAN	
Write to file	

OMNI Logger:

CODE:

CODE:
Read Analog: Shock Pot(4x)
Read Analog: Steering
Read CAN: Tire Temps(4x)
Read CAN: Accel
Collate Data into array
Write timing cycle
Write to file
Write file naming functions: Date Time file name

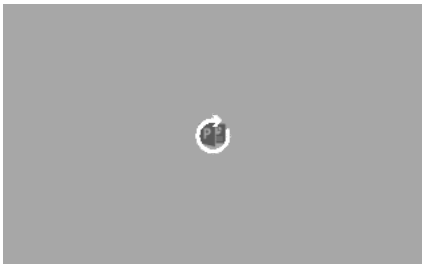
OMNI Mounting

To do:
OMNI board - freddy
Accel - has board, needs code
Shock pot - needs code
Ecu dump - needs code
Throttle position - ask EnD (available through ECU?)
Wheel speed - look into mounting solutions with optical sensor

Progress to look for by 3/10/20
- Look into accelerometer board code
- Shock pots (what kind of board will we need)
- Ask aero if they want anything - dylan
- Ask EnD if they want anything - dylan
- Are we going to split up rear and front boards? (if we can find more sensors for the rear then maybe) We have more 4?
- Tire temp can board

Meeting 3/6/2020 Notes:
-Temp Probe on Brake Rotors requested

Data Acq Design review 3-6-2020.pptx



Data Acq Meeting 3/10/2020

-Take caliper to shock pot to verify
-velocity of shock pot
  Three frames accel average
-improve naming convention
  Log number per day not per file directory

- Add millisecond timing to logs

Stage 2:
ECU
- CAN

Tire temp
- housing and mounting

Create test sheets for various tests utilizing shock pots, accelerometer, and steering sensor - VD

How power is distributed

Wednesday, December 8, 2021 6:17 PM

We were faced with 3 options to choose from

1. Regulate voltage on the omni and use it to distribute to the nodes
2. Regulate voltage on the pdu and send node and omni power from the pdu
3. Regulate voltage on a node to node basis

We went with option 3 because we would be able to individually regulate how much power is going into each node for sensors that require different voltages. Also this keeps the omni from distributing power into nodes.

Wheel Node:

Powertrain Cell Testing
Meeting Notes

Monday, September 28, 2020 7:08 PM

- Single cell 2170
- thermo data
- q_x
- 2 point on body
  - eg. resistant
  - 3 around
- 1 on each end
- arduino
- Voltage trigger

Thermo

1 cell

cell rig

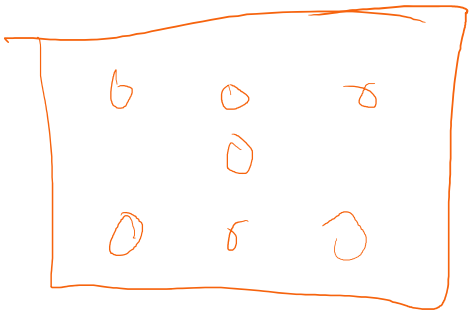
- temp at *4
  - cathode
  - anode
- 2 cells

temp

2 cell

Module

- temp
  - 6
- endurance
  - 1 lap
- single cell
  - 8 thermo on 7 cells



Data acc meeting deliverables

Tuesday, March 10, 2020 7:01 PM

- Test sheet for
- Chamber
- Shock travel
- Spring rates
- Toe
- Ackerman
- Arb

Knowledge & Resources

Sunday, January 19, 2020 10:03 PM

Projects in progress

Tuesday, December 17, 2019 6:27 PM

- Omni logger
- Tyre temp sensors
- Thermocouple board
- Data intake procedure
- Wheel Speed Sensor

Data acc plan 10/11

Monday, October 11, 2021 5:32 PM

Omni plan

Main omni

Nodes

Accelerometer node:

Temp nodes:
Temp sensor

Wheel node:

- ADC
    - Shock pot
- Room for load cell amp

Petal box node
- BOTS
-F line pressure
-R line pressure
- In due time (strain gauges)

-ADC
-2 pots inputs
- Steering pot

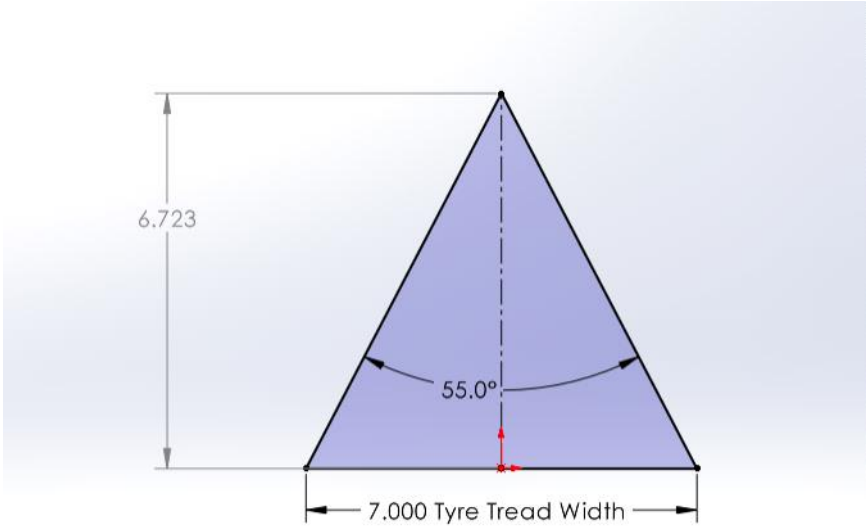
Tire Temp Mounts

Saturday, August 13, 2022 8:12 PM

https://www.melexis.com/-/media/files/documents/datasheets/mlx90640-datasheet-melexis.pdf
Temp sensor data sheet

55 deg sensor

- (NETD) 0.1K RMS @1Hz refresh rate
- I²C compatible digital interface
- Programmable refresh rate 0.5Hz...64Hz
- 3.3V supply voltage
- Current consumption less than 23mA
- 2 FOV options – 55°x35° and 110°x75°
- Operating temperature -40°C ÷ 85°C
- Target temperature -40°C ÷ 300°C
- Complies with RoHS regulations



Making current Boards PCBS

Wednesday, October 6, 2021 6:28 PM

To do first

Diagram and photo archive existing boards

Create standard for connectors

- Power connectors
- CAN
- Signal delivery

Create standard for boards & board template

- Power conditioning
- Teensy location
- ADC
- CAN board

Vehicular Dynamicals

Monday, December 16, 2019 9:05 PM

BH Node bringup explanations

Thursday, August 25, 2022 4:34 AM

Two sections: code and hardware

CODE:
The bh nodes send imu/accelerometer data as well as some analog inputs
For the initial bringup I am focusing on the accel/imu that are currently populated.
The 10dof library gives us signed floats which are cancer to send over CAN

- This is because sending a floating point value requires a certain binary pattern to indicate where the decimal point is

We can get rid of the decimal point by scaled the values by 100, giving us 2 decimal points of precision

Hardware:

- Jumped pin 13&14 together on teensy because schematic/layout are wrong
- 10-dof header pins were RUSTY so I replaced them
- Caps on crystal are sus as frick but seem to be working
-

This then makes it a breeze to send the data over can. We have two messages so far

BH NODES									roll,heading, and pitch are signed 32bit
			A	Roll	Heading				
		A	B	Pitch	uint8_t	uint8_t	uint8_t	uint8_t	
			C	accel shit					
	5		A	Roll	Heading				
		B	B	Pitch	uint8_t	uint8_t	uint8_t	uint8_t	
			C	accel shit					

Snippet from tentative daq setup excel sheet in teams
Messages id 0x5AA and 0x5AB belong to the front node--
0x5BA and 0x5BB belong to the rear node (does not yet exist)

```
Roll: -34.4877304077
Heading: 118.5892028809
Pitch: -8.8327770233
ScaledRoll: -3408
ScaledHeading: 11858
ScaledPitch: -883
Roll: -37.9032363892
Heading: 84.5186920166
Pitch: -13.3494205475
ScaledRoll: -3790
ScaledHeading: 8451
ScaledPitch: -1334
Roll: -33.5538662537
Heading: 92.6978073120
Pitch: -17.9082183838
ScaledRoll: -3355
ScaledHeading: 9269
ScaledPitch: -1790
Roll: -38.6359329224
Heading: 108.6669082642
Pitch: 3.3377027512
ScaledRoll: -3863
ScaledHeading: 10866
ScaledPitch: 333
Roll: -5.5898189545
Heading: 189.7105712891
Pitch: 0.2426589410
ScaledRoll: -558
ScaledHeading: 18971
ScaledPitch: 24
```

```
/* Calculate pitch and roll from the raw accelerometer data */
if(getSensorData.check()){
  accel.getEvent(&accel_event);
  dof.accelGetOrientation(&accel_event, &orientation);
  mag.getEvent(&mag_event);
  dof.magGetOrientation(SENSOR_AXIS_Z, &mag_event, &orientation);
  scaledHeading=(orientation.heading*100);
  scaledPitch=(orientation.pitch*100);
  scaledRoll=(orientation.roll*100);  }
```

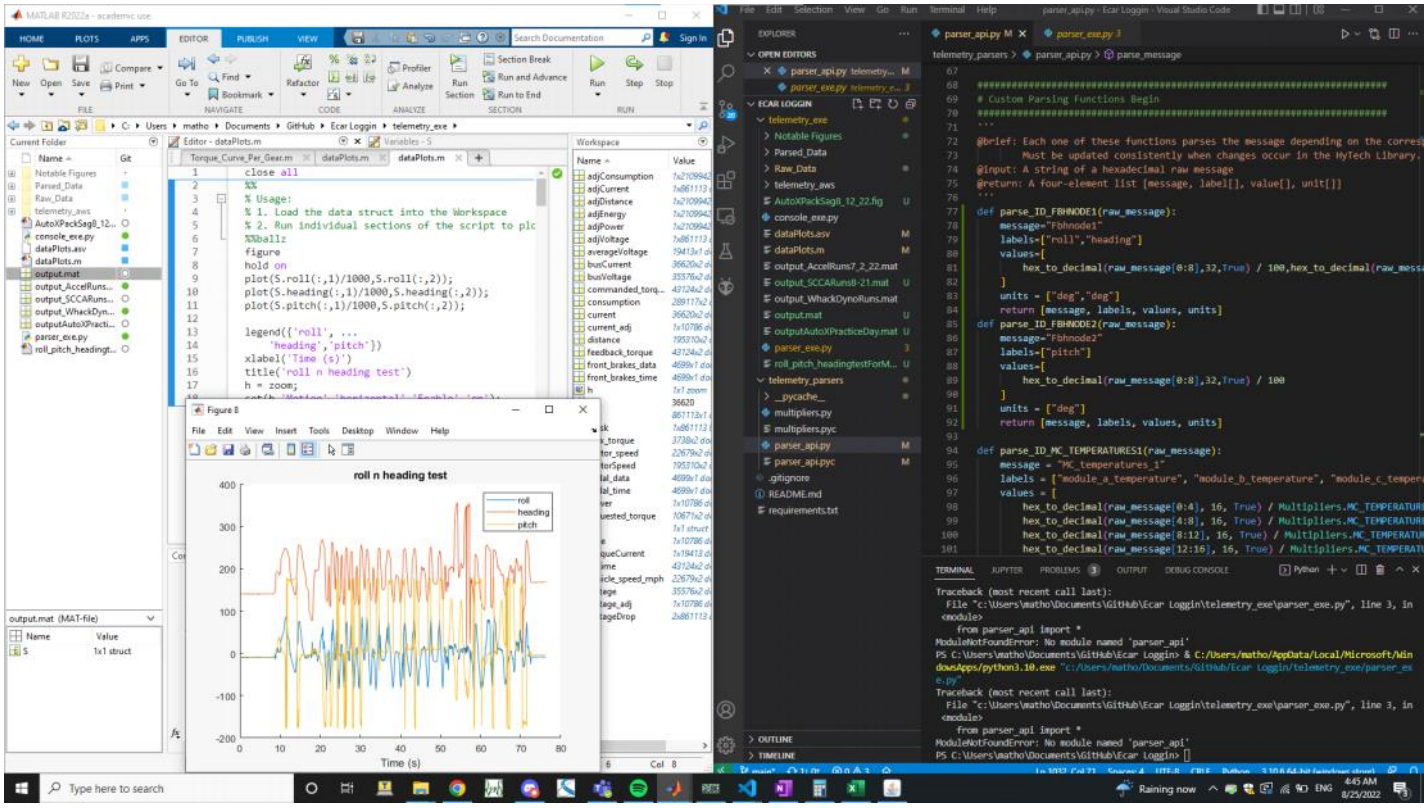
File name
tentative daq setup .xlsx

Location
Data Acc
team-KSB C

Version History

ID	Length	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Count	Timestamp
5AA	8	3A	FB	FF	FF	30	47	00	00	56	-1
5AB	8	A6	FE	FF	FF	00	00	00	00	55	-1

Successful message reception on the candapter



Successful data plotting using Hytech's parser with functions added to parse our 10-dof can messages

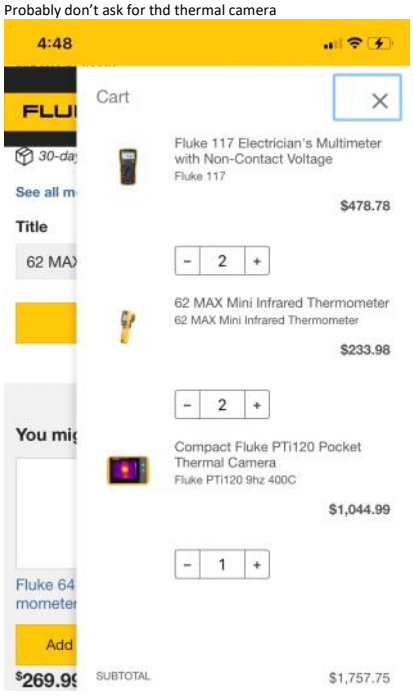
Fluke stuff

Wednesday, November 23, 2022 4:22 PM

https://www.fluke.com/en-us/learn/student-discounts-and-resources/tool-donations

From :https://fsae.eng.wayne.edu/newshtml/Newsletter%20archives/PDF%20Files/WSU%20FSAE%20Newsletter%2013-2014-10.pdf

Fluke will sponsor nonprofits with tools that they request. Don't want to ask for too much and get ignored
Probably don't ask for thd thermal camera



Revival

Thursday, April 6, 2023 2:33 AM

Objectives

A:
Log shock
Log gyro
Log to SD card

B:
Log gets exported to trackside

Log wheel speed
Brake pressure
Steering angle

C:
ECU data
Log tire temp

Checkpoint one:

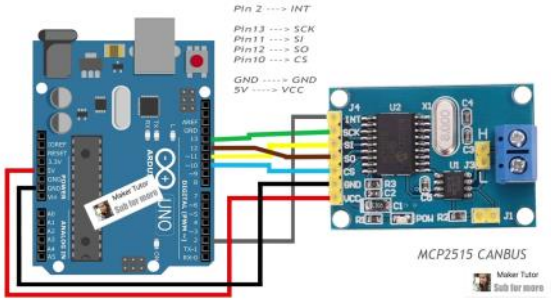
A:
Assemble corner node on bread board
Get shock pot data broadcasted out over can

B:
get separate logger reading can and saving to SD
Implement 2nd node

Checkpoint 2:
Get corner nodes in PCB form
Breadboard frontal node
Read data to main

Checkpoint 3:
Have network of corner nodes & main reading and logging
Get 2 xebees talking

Corner node bread baord
Blue can chip MCP2515
ADC and Gyro (LIS3DH)



https://learn.adafruit.com/adafruit-lis3dh-triple-axis-accelerometer-breakout/pinouts

https://www.digikey.com/en/products/detail/nte-electronics-inc/NTE1929/11655805?utm_adgroup=NTE%20Electronics&utm_source=google&utm_medium=cpc&utm_campaign=Dynamic%20Search_EN_DK%2B%20Suppliers&utm_term=&utm_content=NTE%20Electronics&gclid=Cj0KCQjw27mhBhC9ARIsAIFsETFrA-_bCcmFP4VhJUYsxGJn1wgstUMJNtWfQwi1EKEz3zzND5LwPtkaAq7dEALw_wcB