



N F P A

Fluid Power

=VEHICLE

Challenge



NFPA
Education and
Technology
Foundation

FAMU-FSU College of Engineering
Shayne McConomy
4/10/2026



Chassis and Powertrain Team



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Electronics Team



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Kyle Thompson
Hardware Engineer



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Sun Hydraulics Advisor



Dr. Camilo Ordoñez
Subject Matter Expert



Dr. Mohd Yousuf Ali
Subject Matter Expert



Dr. Shayne McConomy
Project Sponsor

Vehicle Goals

Key Areas of Improvement



Pre-Charging the Vehicle



Acceleration



Regenerative Braking

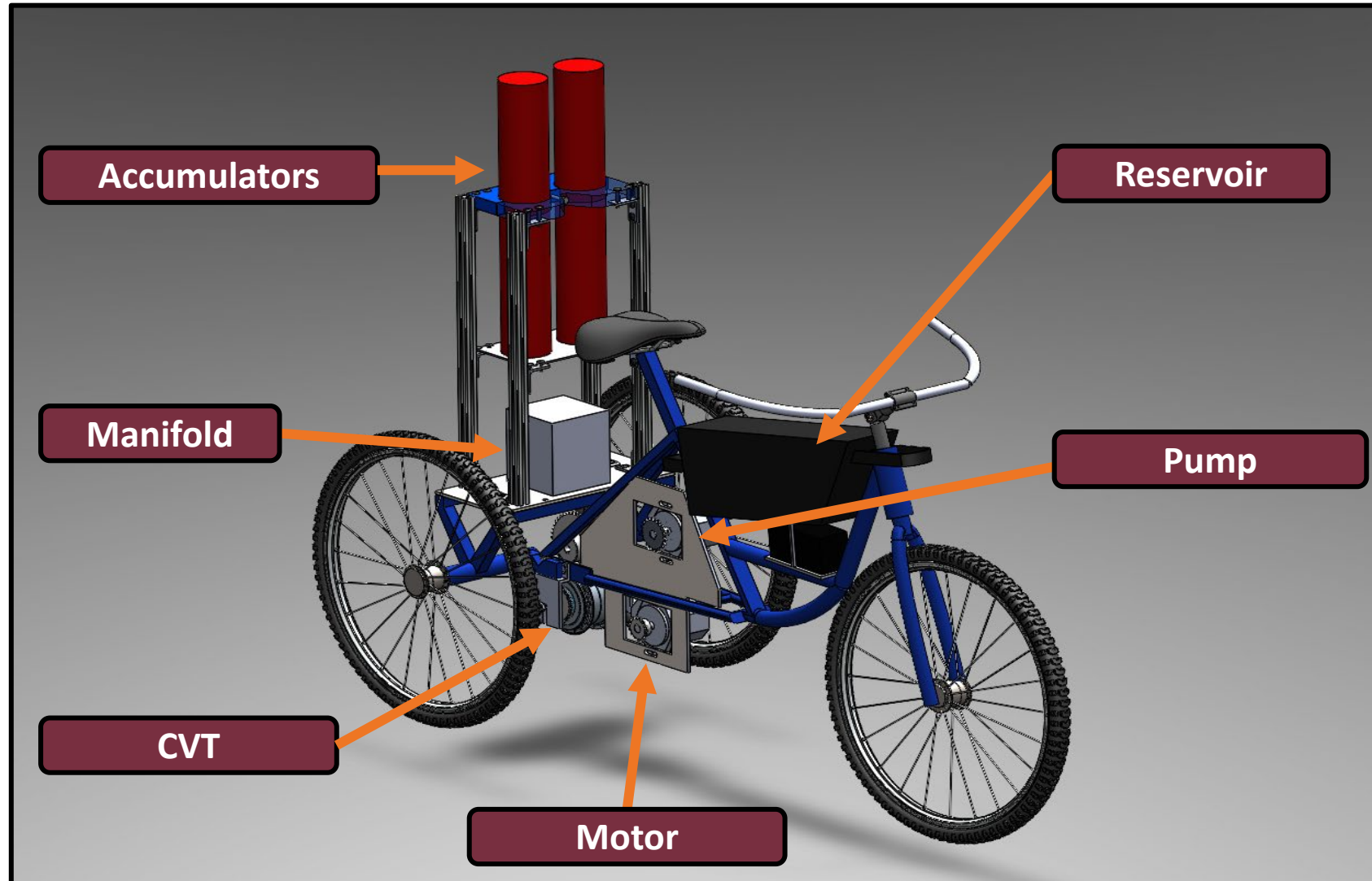


Data Collection



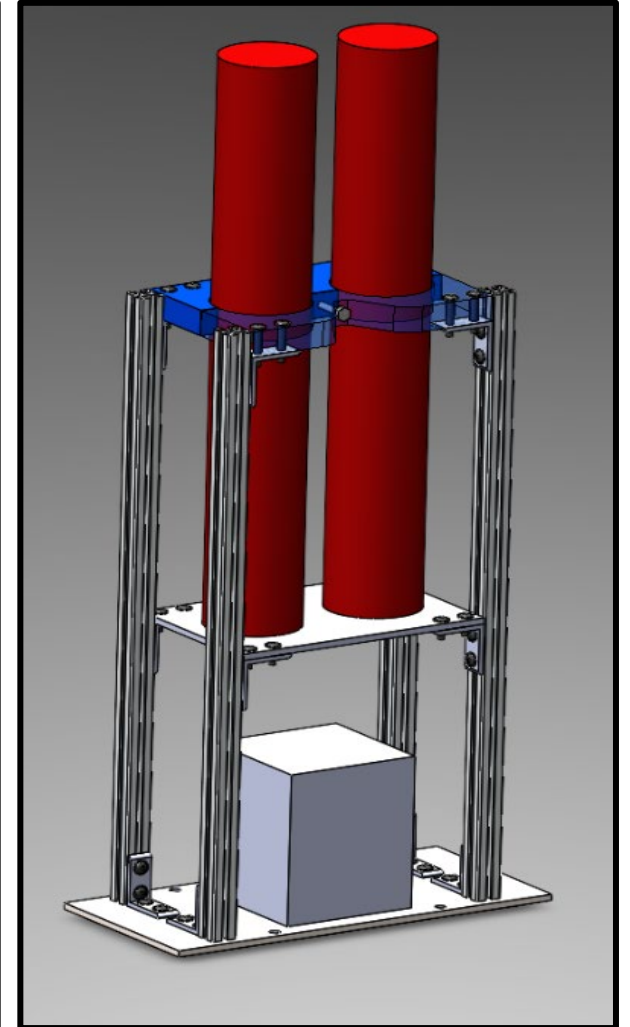
FAMU-FSU FPVC Bike (2024-2025)

Prototype



Innovations - Dual Accumulators

- 2, ½ gallon accumulators
- Higher pressure buildup in regen demonstration.
- Vertically mounted to reduce footprint.
- Easy access to gas port.



Innovations - Rise and Fall of the CVPT



The Rise

- Instant change of gearing for mid-ride.
- Optimal gear ratio per event.
- Allows 12:1 target gear ratio for sprint race.



The Fall

- Multiple spacing constraints: Custom parts & modifications
- Struggled to allow regenerative braking.
 - Locked freewheel ratchet pawl mechanism with solder.
 - Inconsistent backdrive power output.



Innovations - Smart Drive

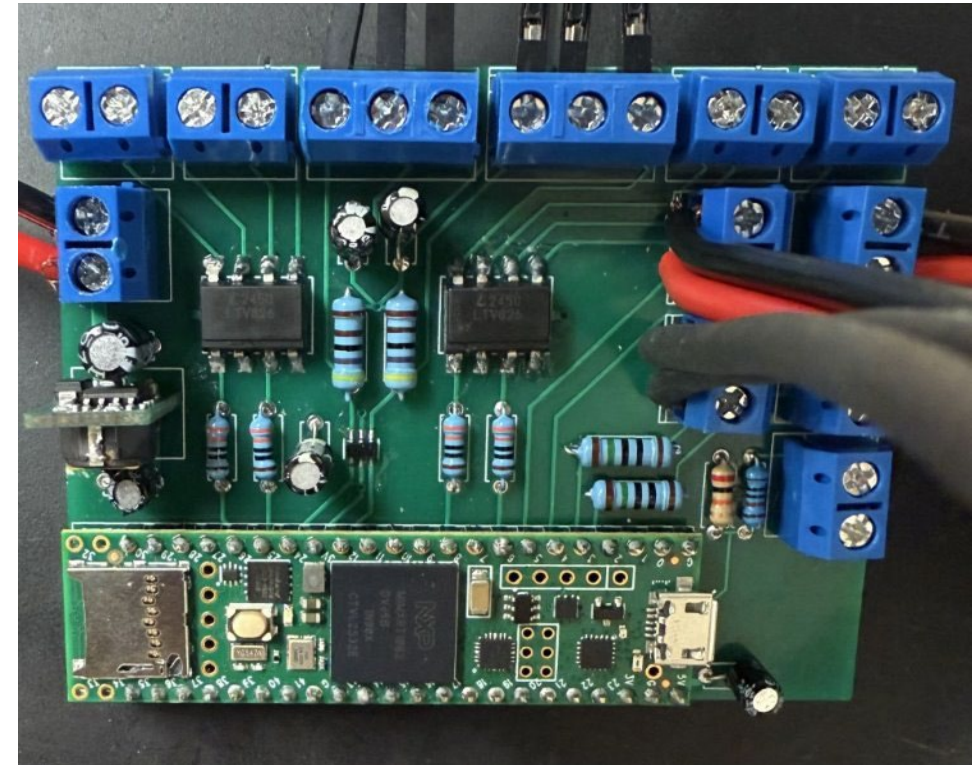
SmartDrive:

Automatically switches between Direct Drive, Regenerative Braking, and Regenerative Boost.

Data Collection:

Records key performance metrics

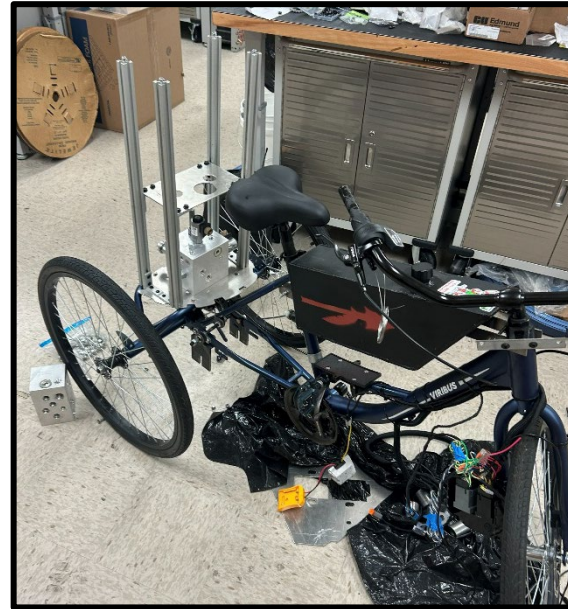
- Relative Time
- Drive mode
- Accumulator pressures
- Wheel and pedal speed



Controller: Custom PCB + Teensy 4.1



Vehicle Construction

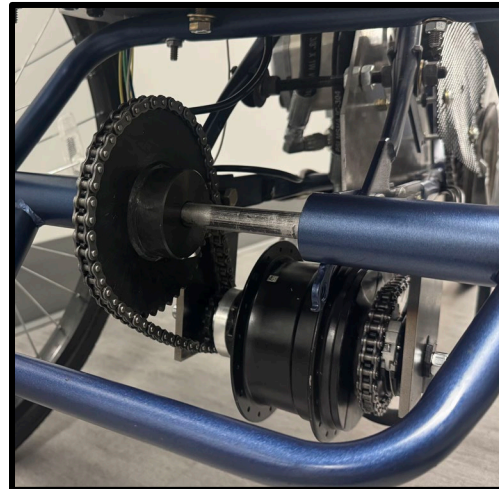
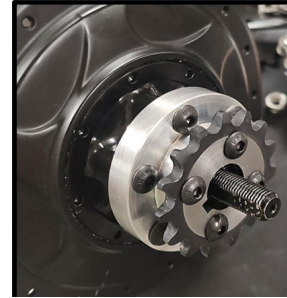


Roadblocks/Testing

Accumulator Pre-Charge

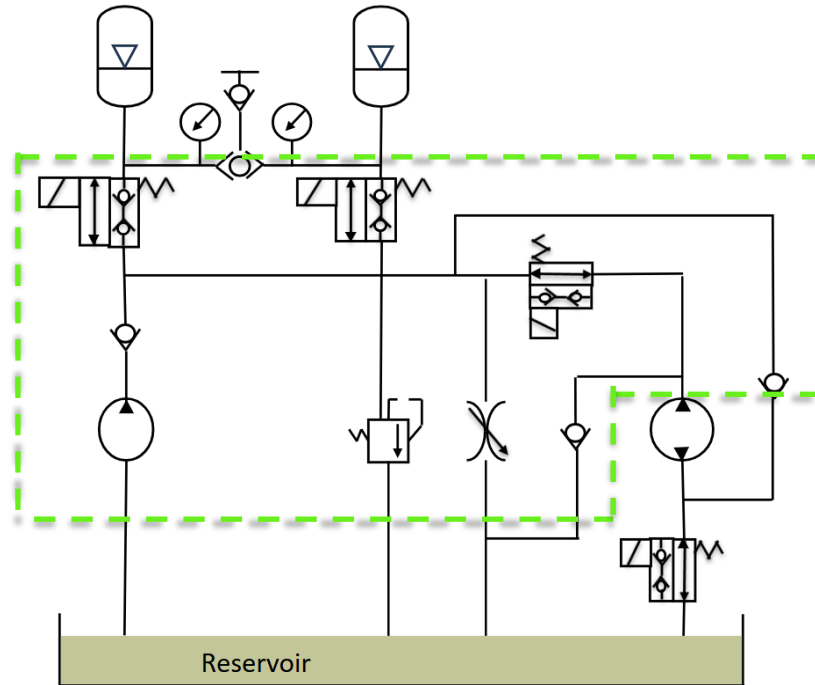


Double Sided Gear in Place of CVPT

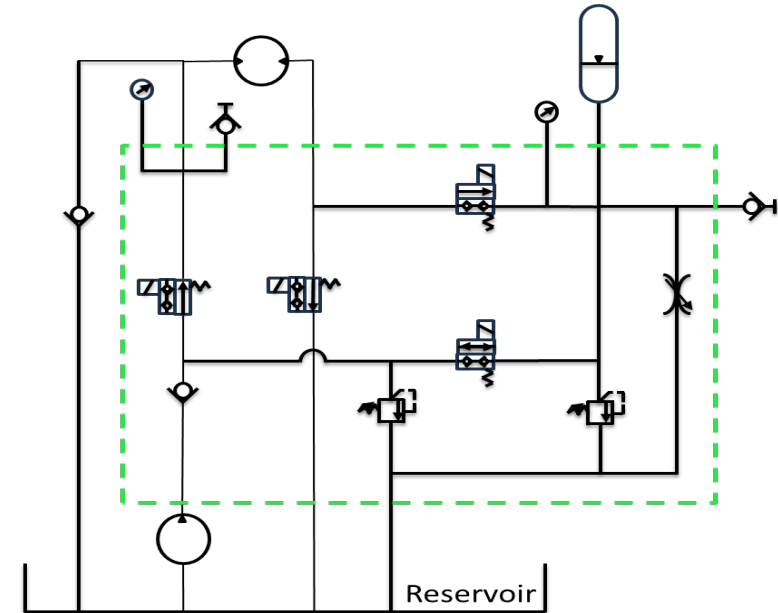












Hydraulic Circuit: Comparison

Current Circuit



Last Year's Circuit



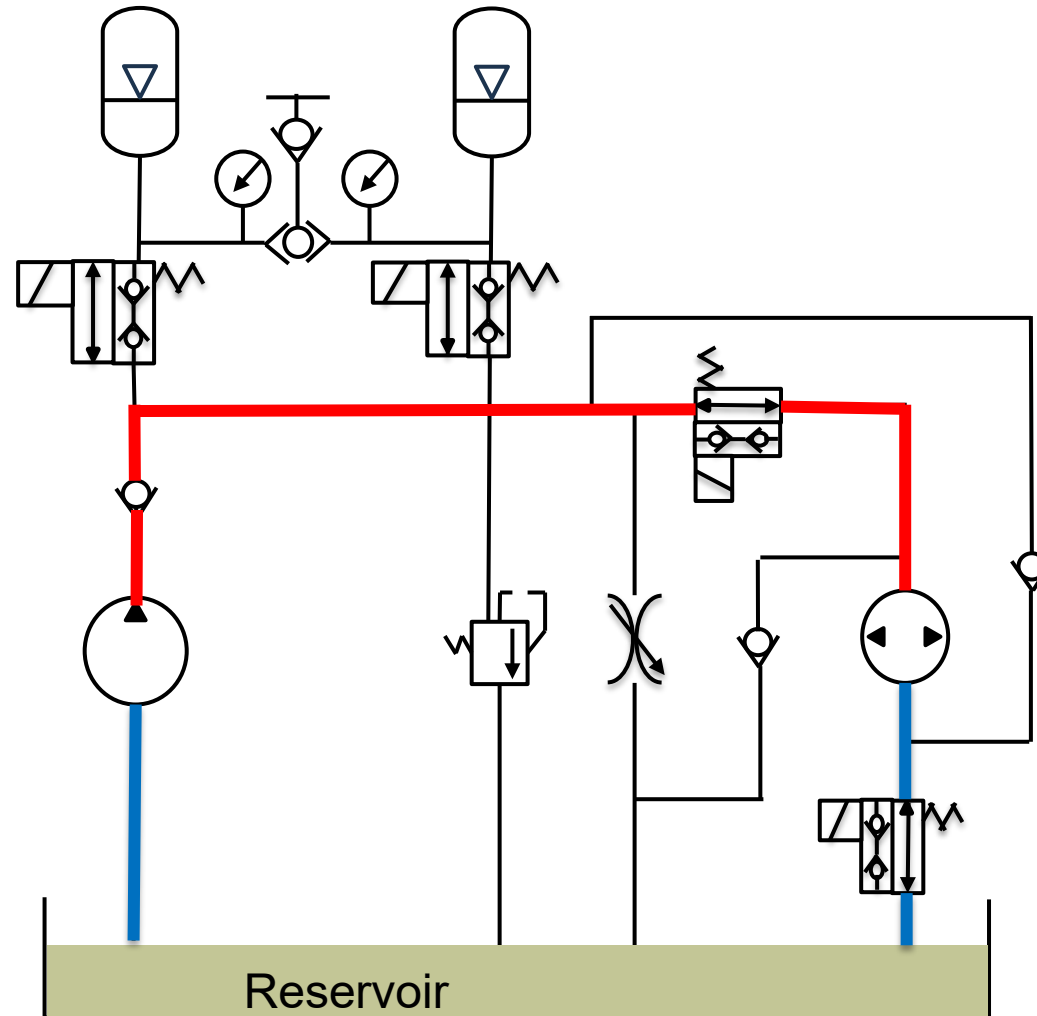
-  ½ Gal. Accumulator
-  Pressure Gauge
-  N.O. Valve
-  N.C. Valve
-  Test Point
-  Check Valve
-  Motor
-  Pump
-  Flow Control Valve
-  Pressure Relief Valve

Direct Drive Mode


 Pump


 Motor


 N.O. Valve




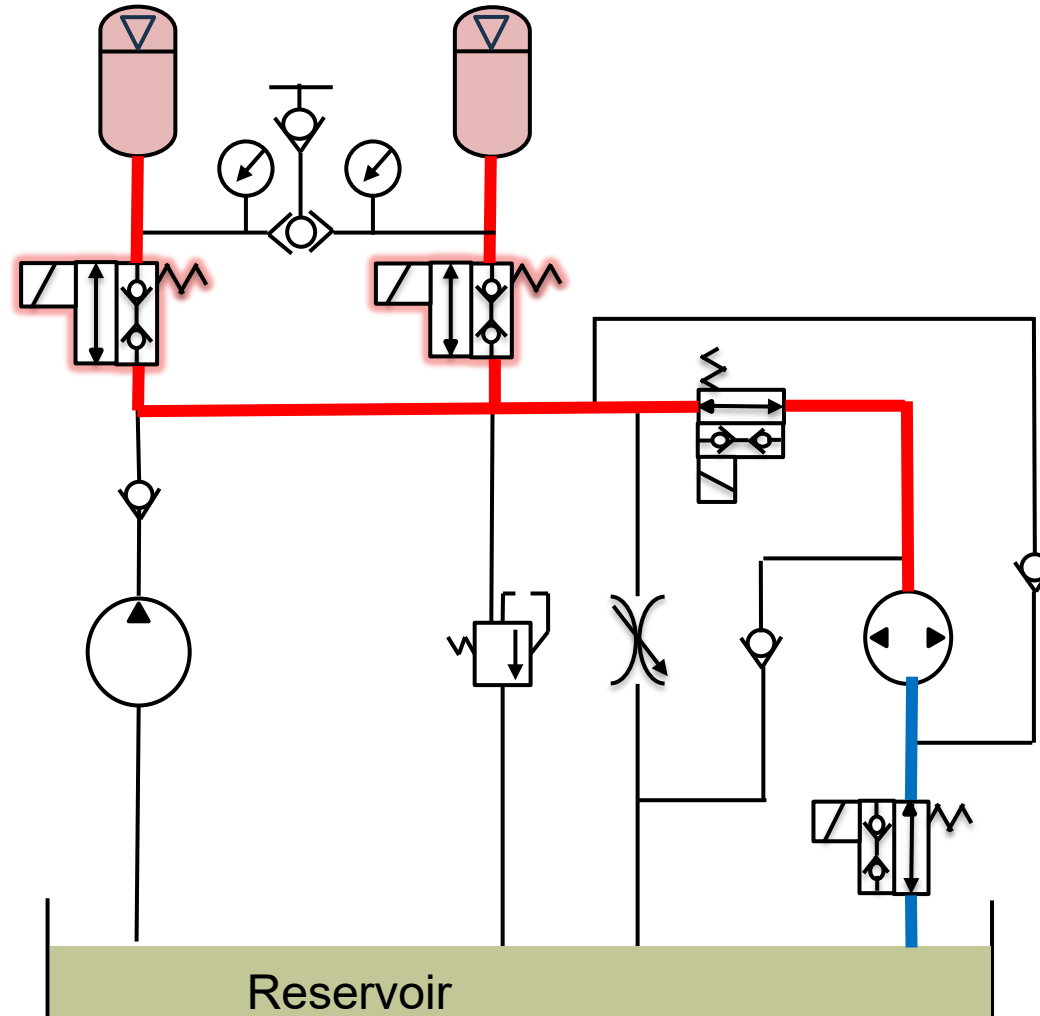
Discharge Mode

 Motor





 N.O. Valve

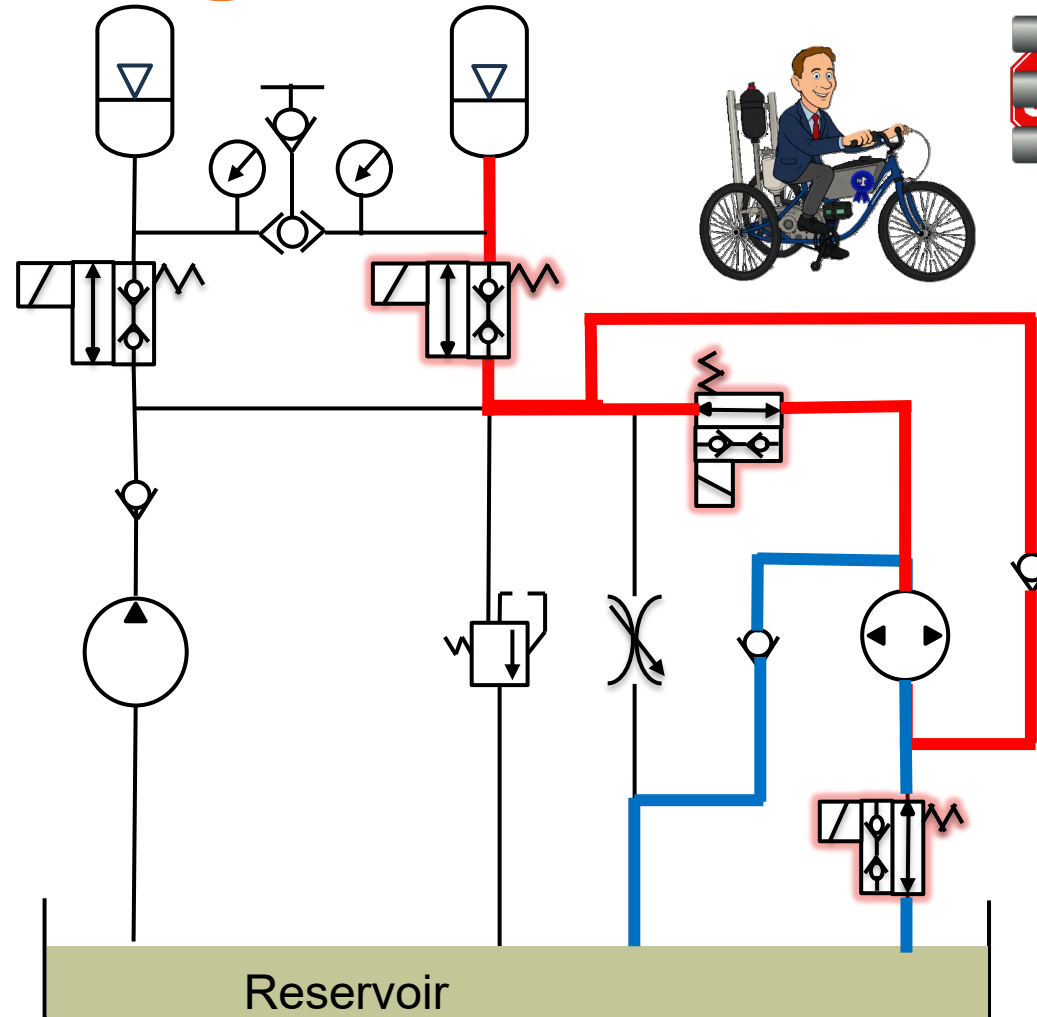
 N.C Valve

 Accumulator



Regenerative Braking Mode

-  Motor
-  N.O. Valve
-  N.C. Valve
-  Accumulator



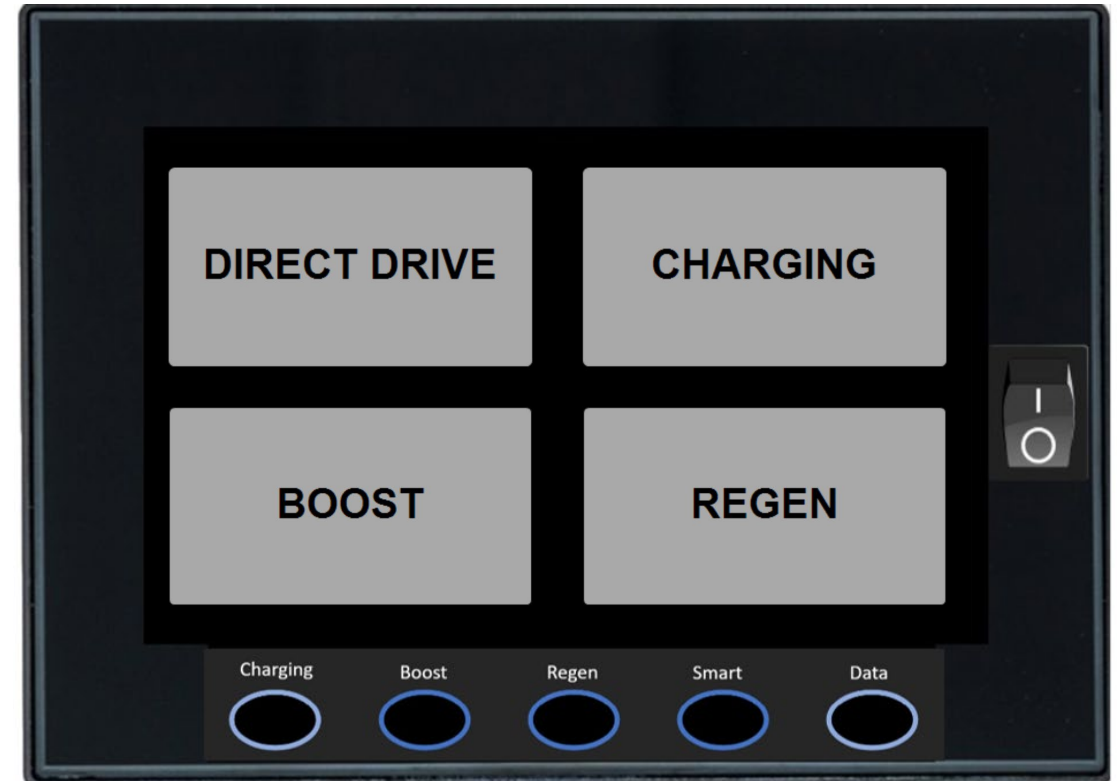
Human Machine Interface (HMI)

S50 Display

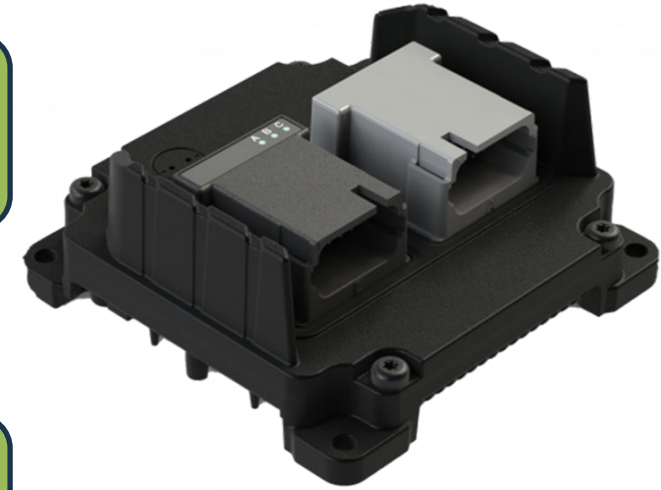
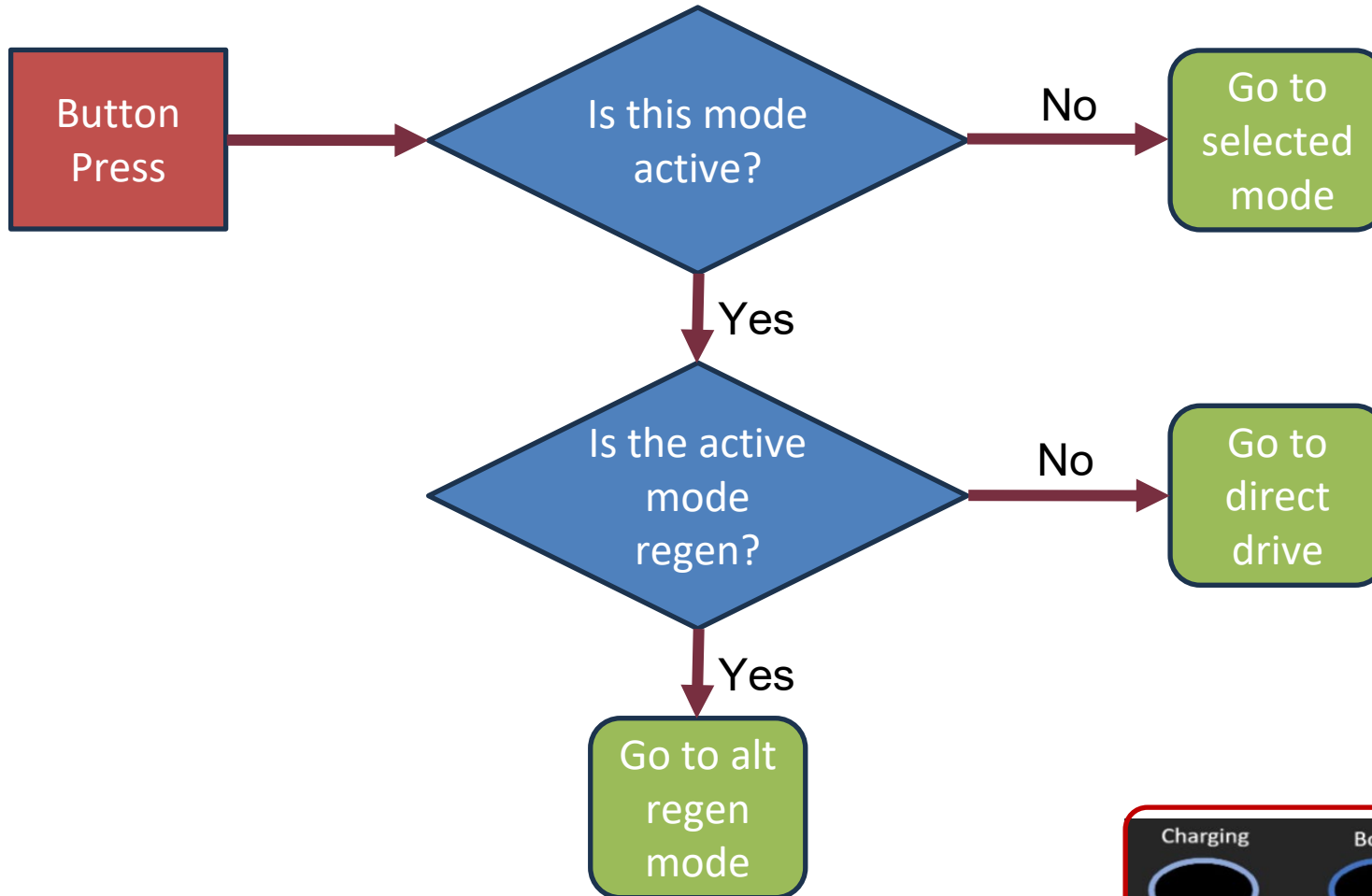
Home Screen



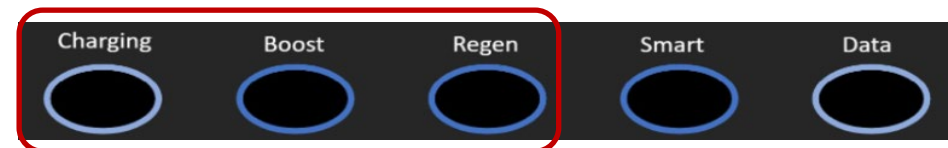
Mode Switching Screen



HMI – Buttons



Controller: MC2-18-6 PLC



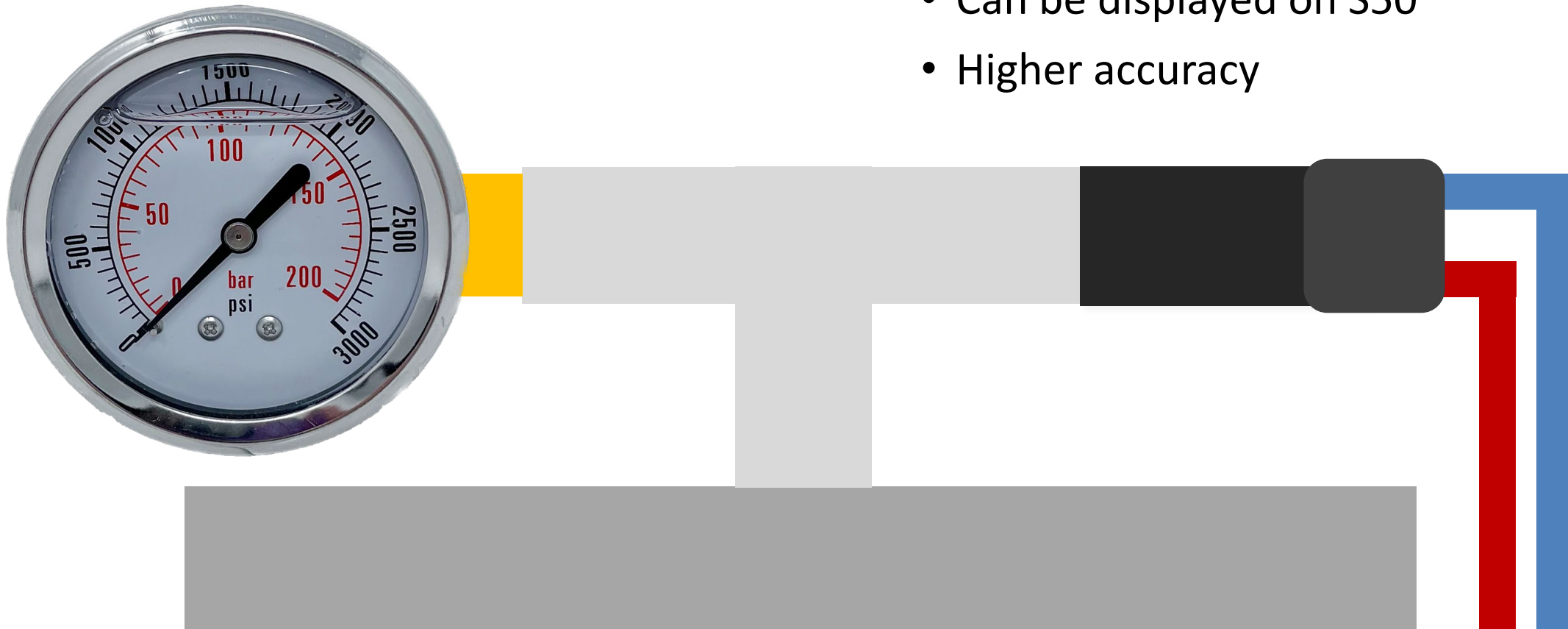
Pressure Sensors

Analog Pressure Gauge

- Validates digital reading
- Adds redundancy

Digital Pressure Transmitter

- Communicates with control systems
- Can be displayed on S50
- Higher accuracy



Summary

- Designed a unique competitive vehicle
- Innovations
 - Dual Accumulators
 - Unique Hydraulic Circuit
 - Smart Drive Mode
 - Data Collection
- Roadblocks/Setbacks
 - CVPT
 - Faulty Equipment



Lessons Learned



"Balancing school and work life." - Tafari



"Don't hesitate to ask for help."
- Dylan H.



"Do as much research as you can early on." - Christopher



"No question is insignificant."
- Mateo

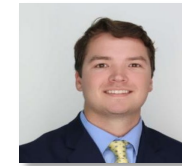


"Don't overestimate your knowledge or underestimate your resources." - Kyle

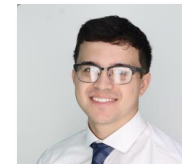


"Communication & Scheduling Importance." - Richard

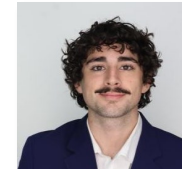
"Bolts go on easier in your head." - Josh



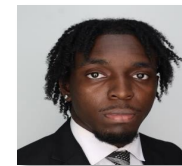
"Pressure turns students into experts."
- Joseph



"The first attempt is just a prototype (so is the second)."- Ausband



"There is always room for more questions." - Ishmael



"Measure three times and cut four." - Dylan W.

