

10 YEARS

N F P A

Fluid Power
= **VEHICLE**
Challenge



NFPA
Education and
Technology
Foundation

Midway Review & Update
University of Louisiana at Lafayette: Ragin'
Rapids
Advisors: Yasmeen Qudsi & John Carroll
April 9th, 2026



Team Introductions



Kaiden Romein
Team Leader
and Fabricator
Lead



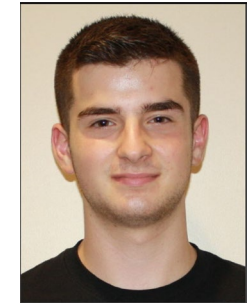
Brendan Oalmann
Hydraulics Lead



Jude Meaux
Computer Aided
Design Lead



Andrew Judice
Electrical
Components Lead



Logan Power
Communications Lead
and Test Designer

Support:

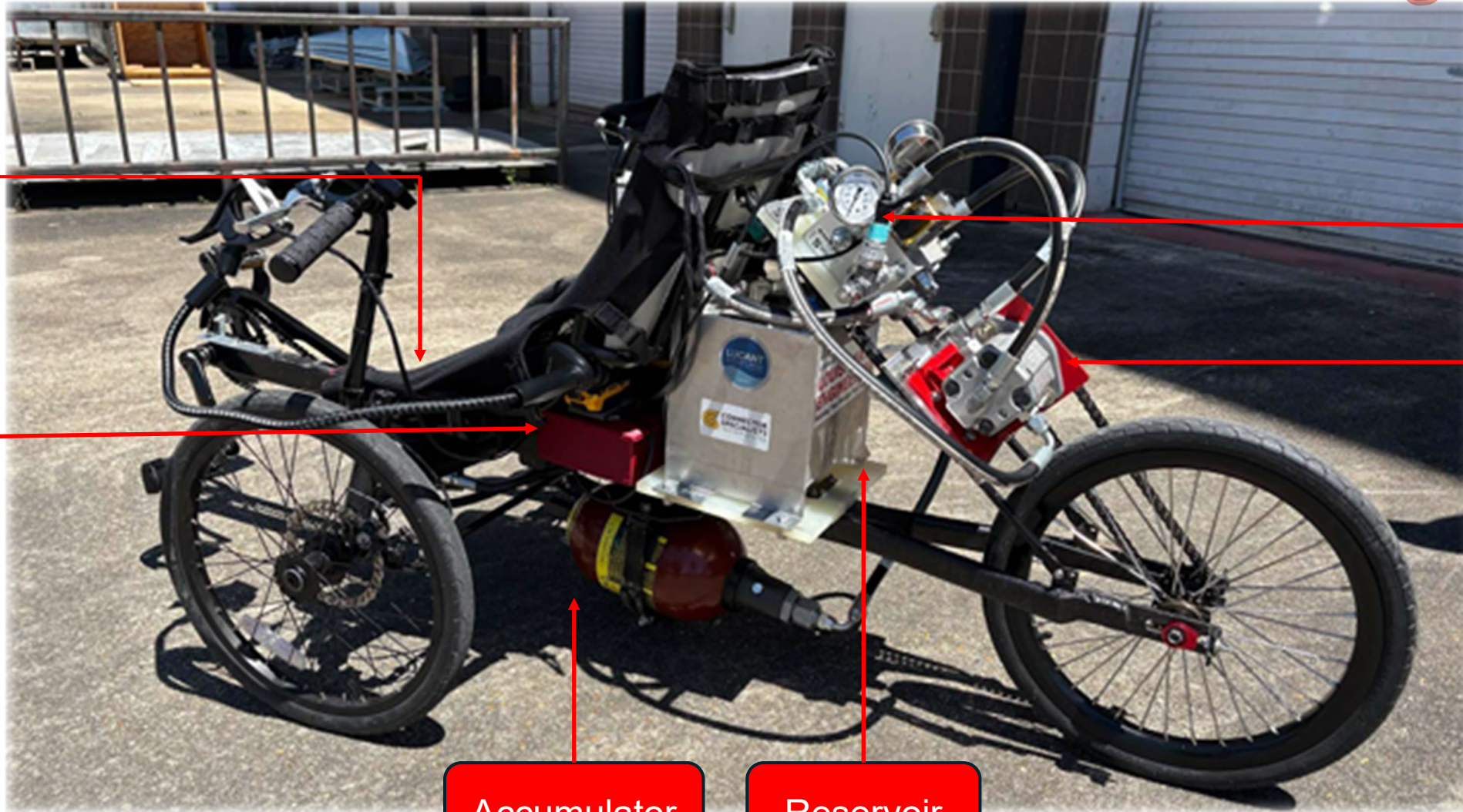
Yasmeen Qudsi and John Carroll: Faculty Advisors

Steve Gluck: Technical Liaison

1 **Lance Thibodeaux:** Industry Advisor



ULL's 2024-2025 Vehicle Design



Pump

Manifold

Electrical
Box

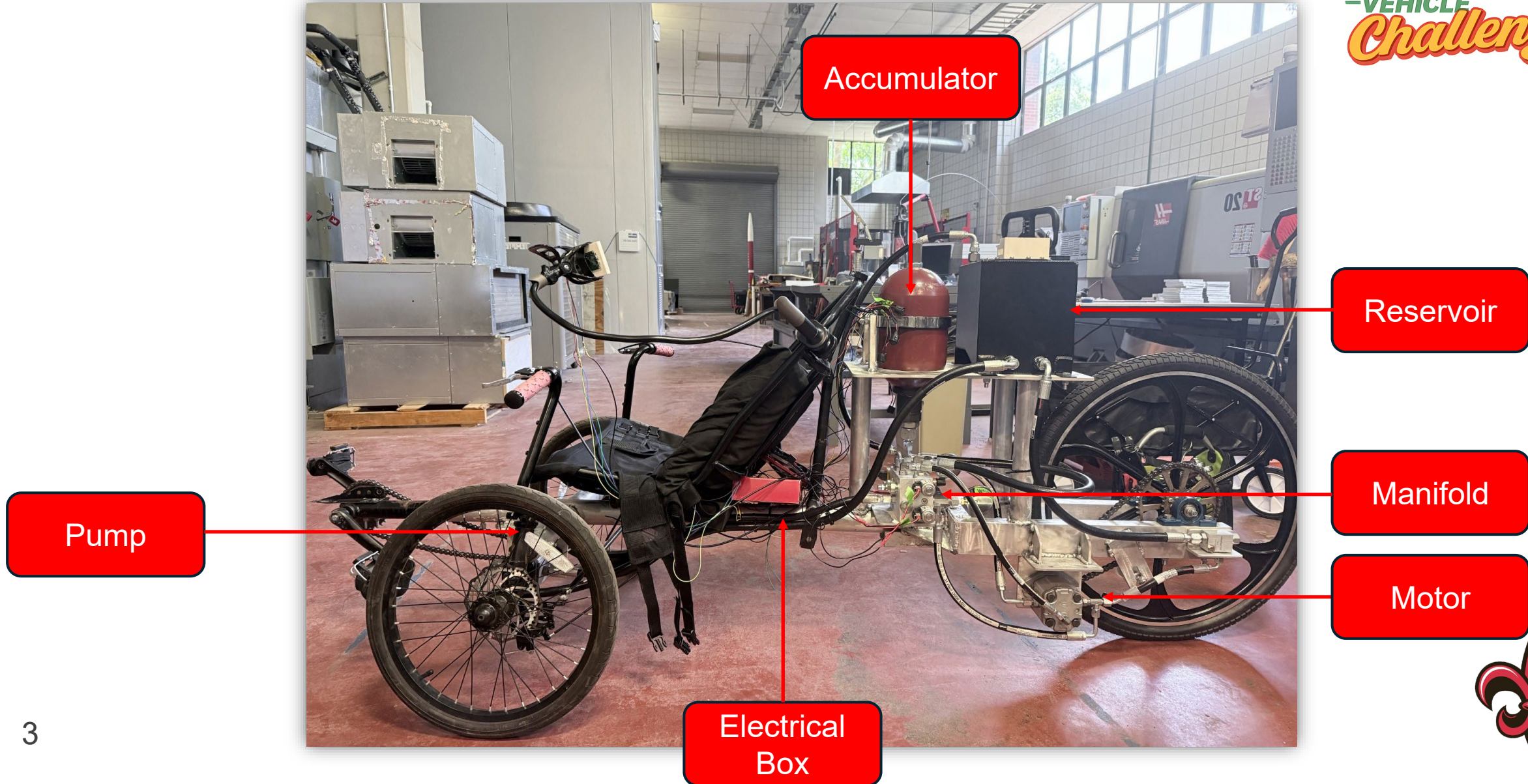
Motor

Accumulator

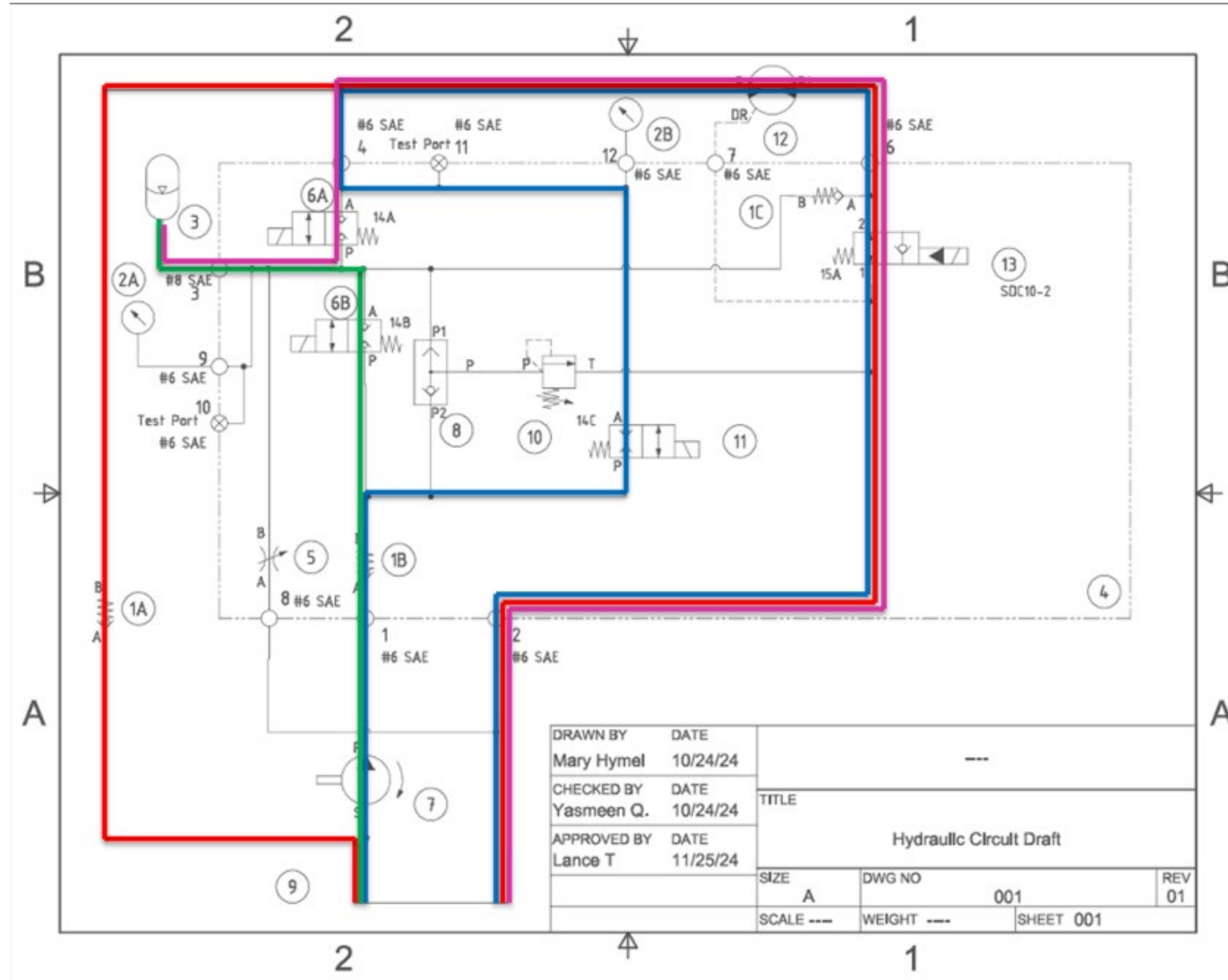
Reservoir



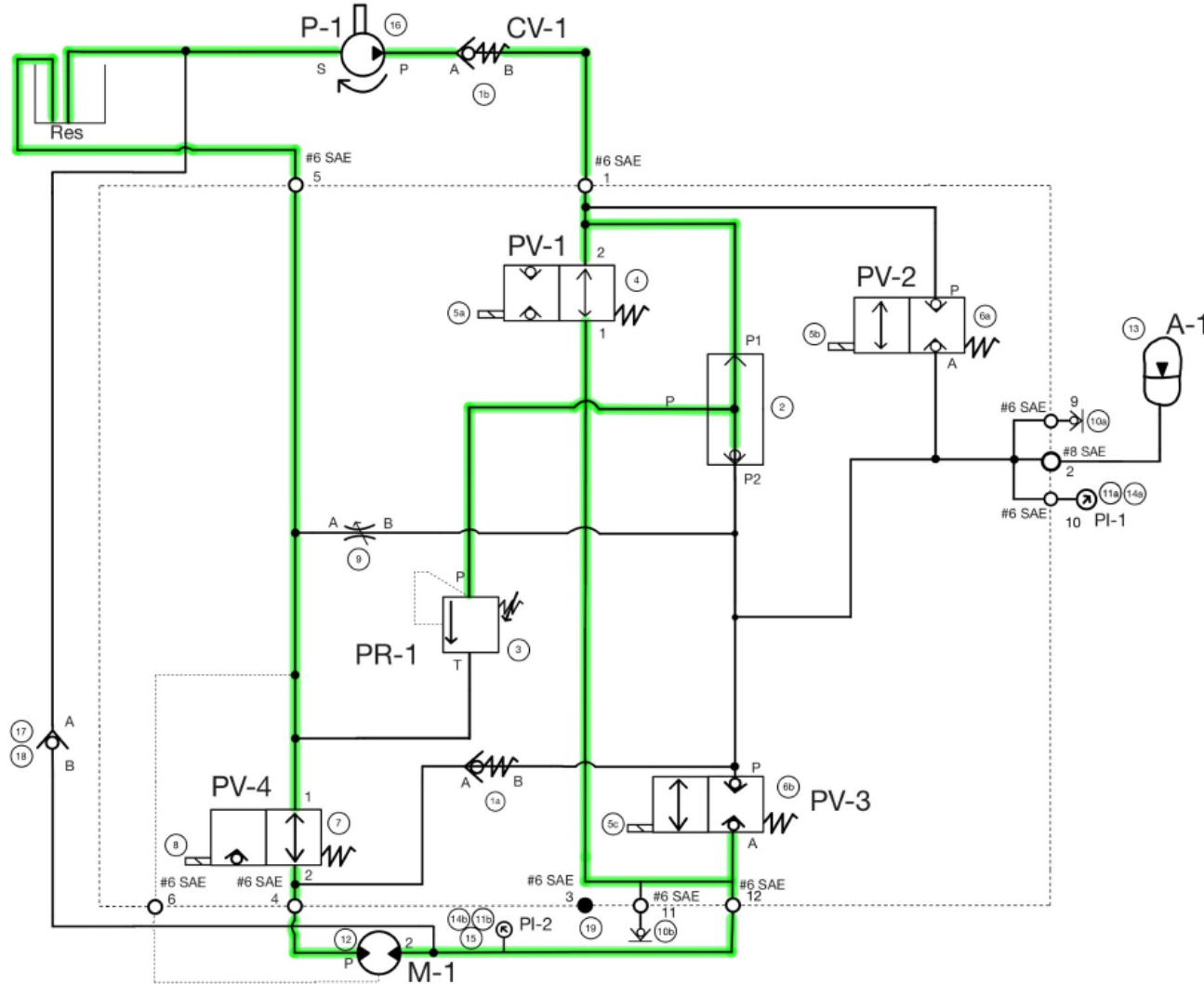
ULL's 2025-2026 Vehicle Design



ULL's 2024-2025 Hydraulic Circuit



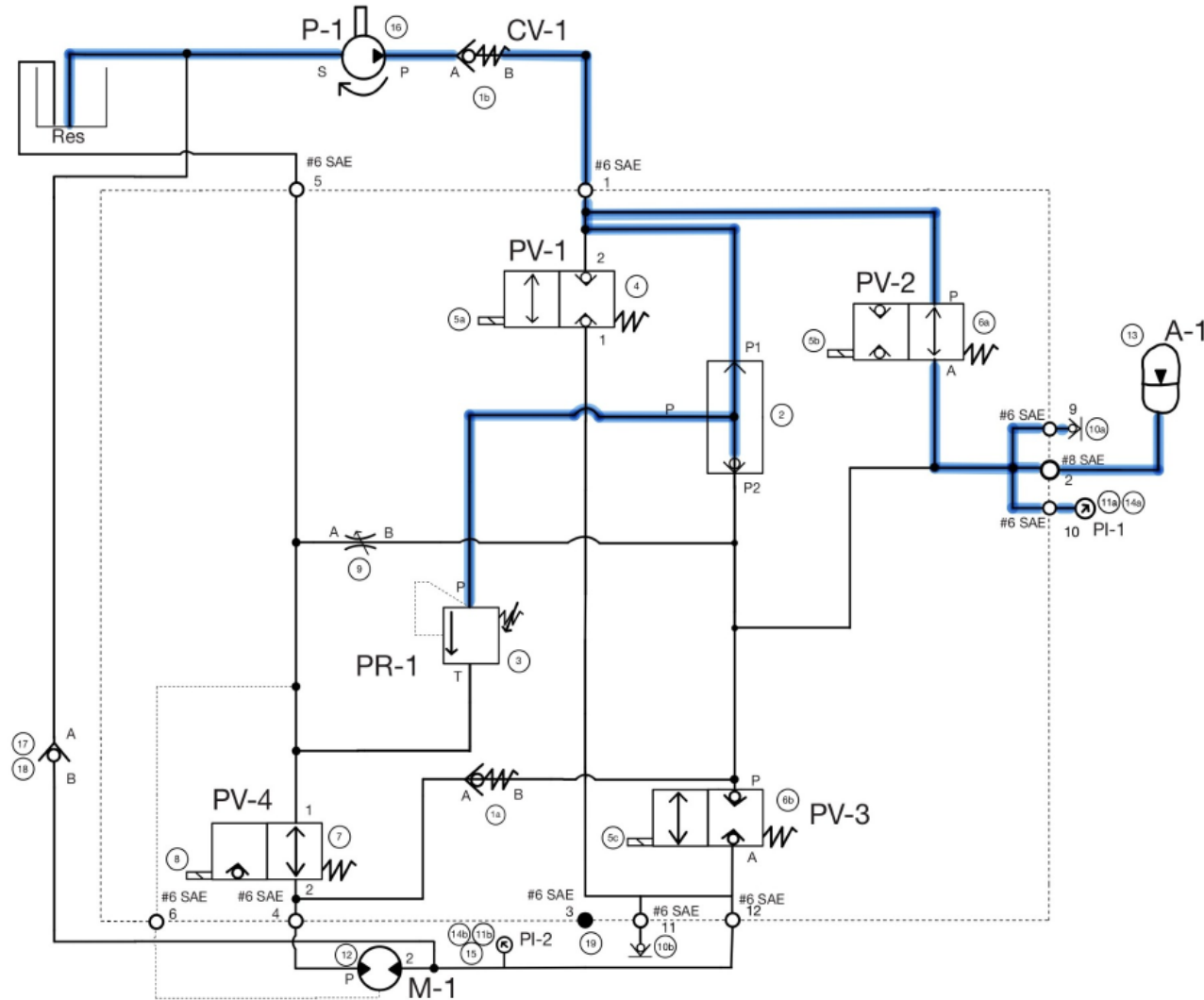
Hydraulic Circuit



- Drive Mode:**
- Direct Drive-N/A
 - Accumulator Charge
 - Accumulator Drive
 - Regenerative Braking
 - Coasting



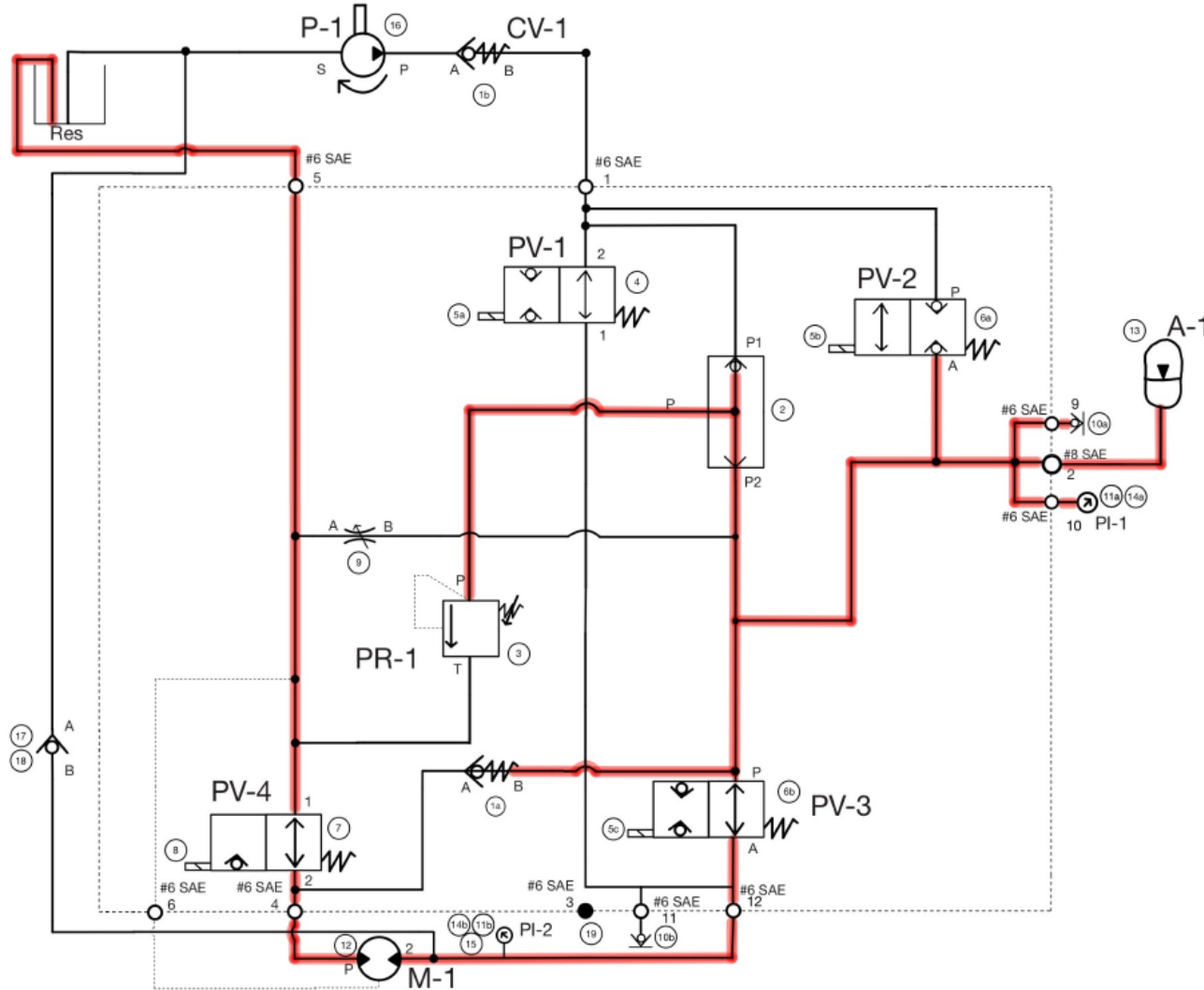
Hydraulic Circuit



- Drive Mode:**
- Direct drive
 - Accumulator charge-1,2
 - Accumulator Drive
 - Regenerative Braking
 - Coasting



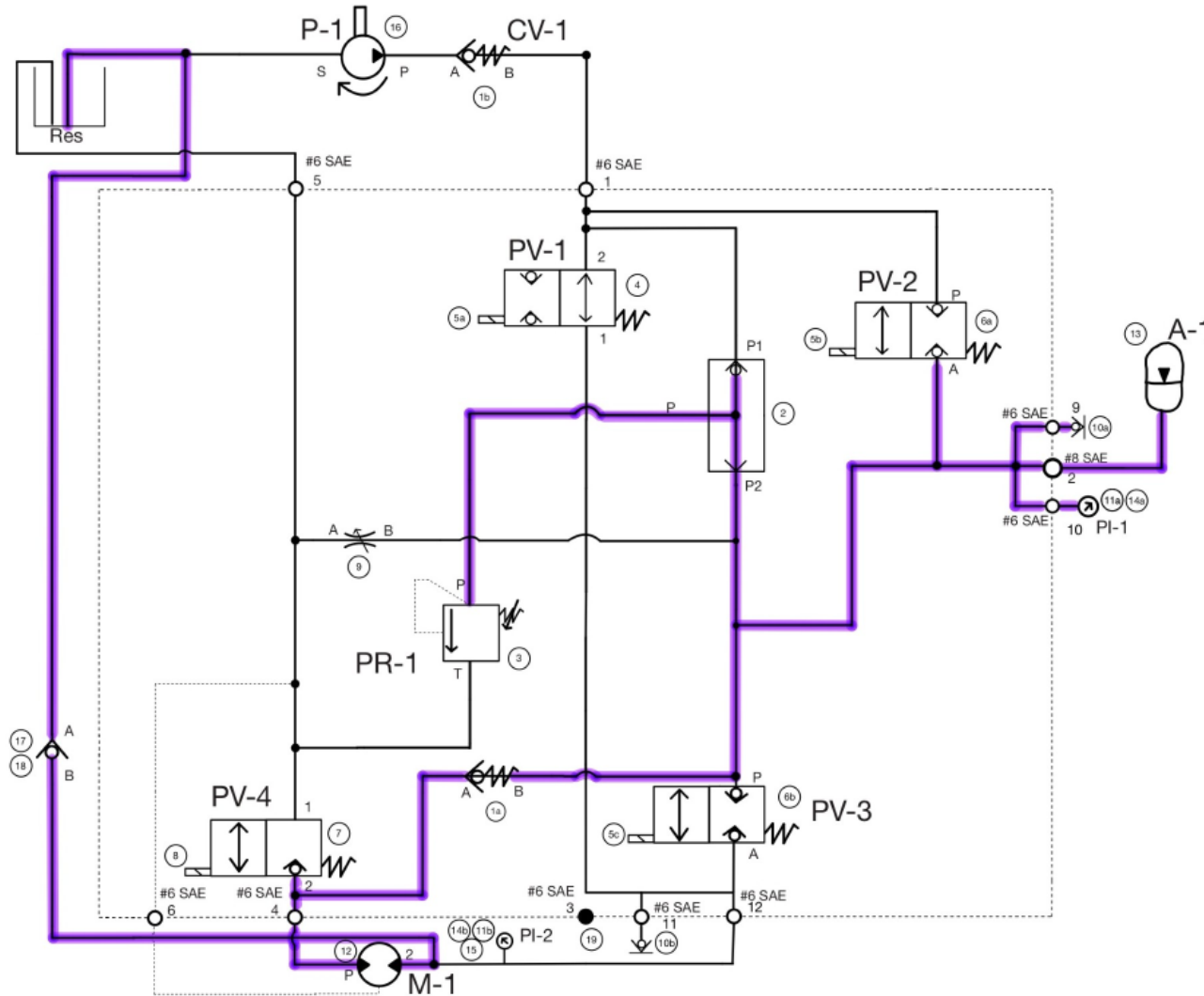
Hydraulic Circuit



- Drive Mode:**
- Direct drive
 - Accumulator charge
 - Accumulator Drive-3,1**
 - Regenerative Braking
 - Coasting



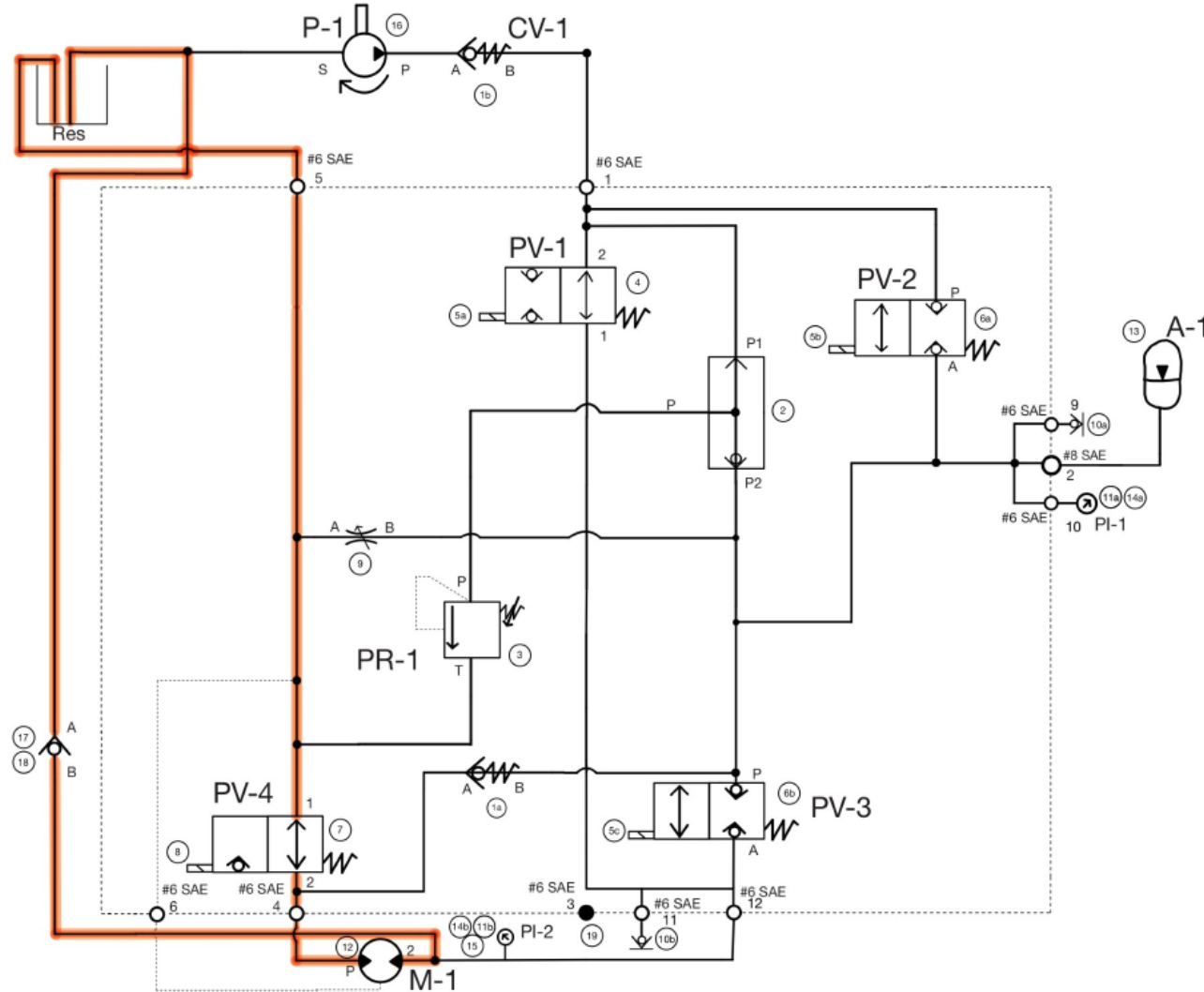
Hydraulic Circuit



- Drive Mode:**
- Direct drive
 - Accumulator charge
 - Accumulator Drive
 - Regenerative Braking-4,1
 - Coasting



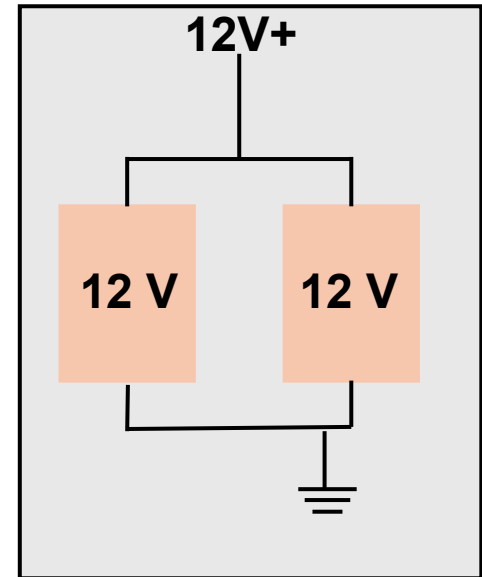
Hydraulic Circuit



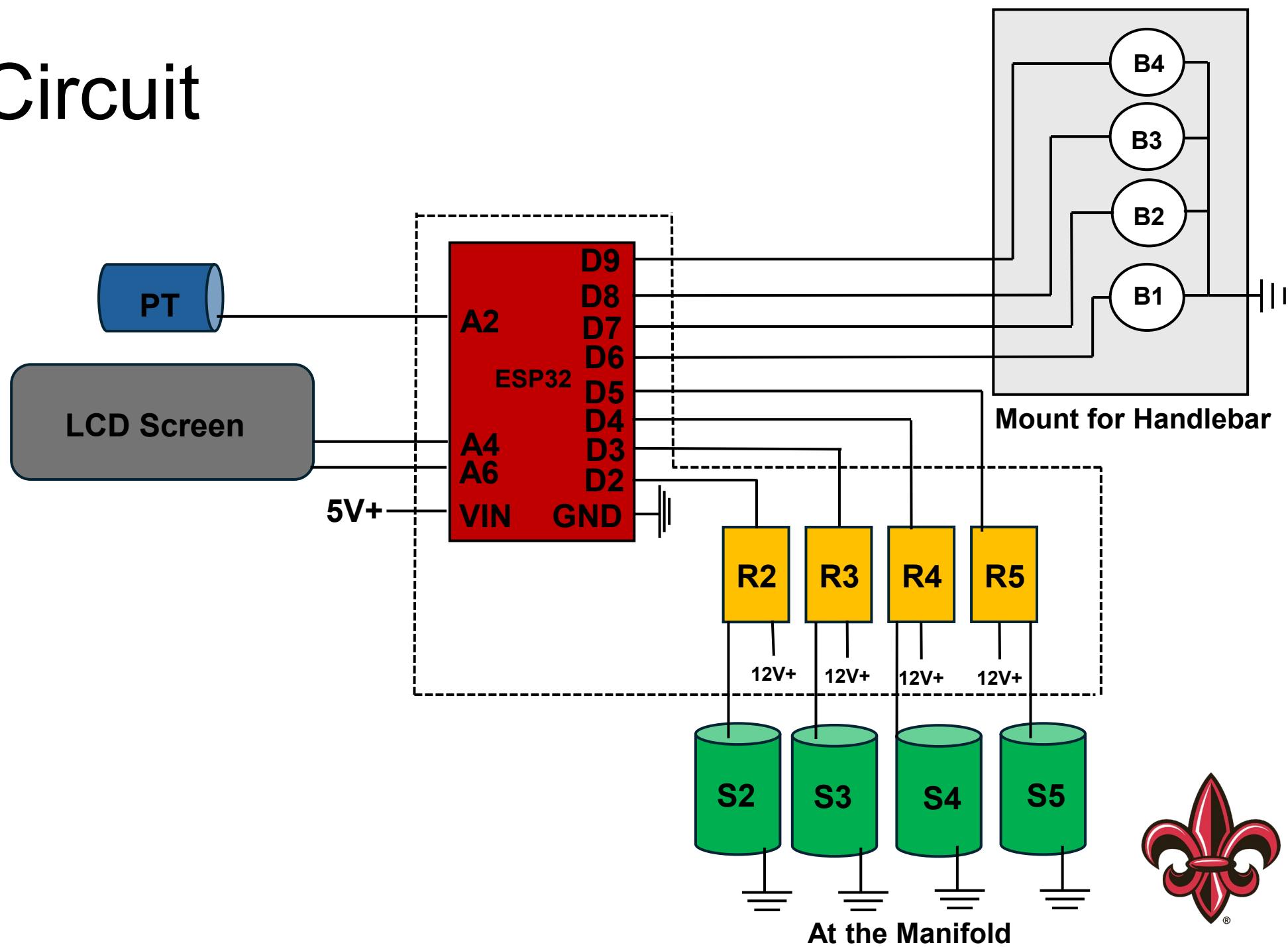
- Drive Mode:**
- Direct drive
 - Accumulator charge
 - Accumulator Drive
 - Regenerative Braking
 - Coasting-1



Electrical Circuit



Top of the Electrical Box



Component Selection

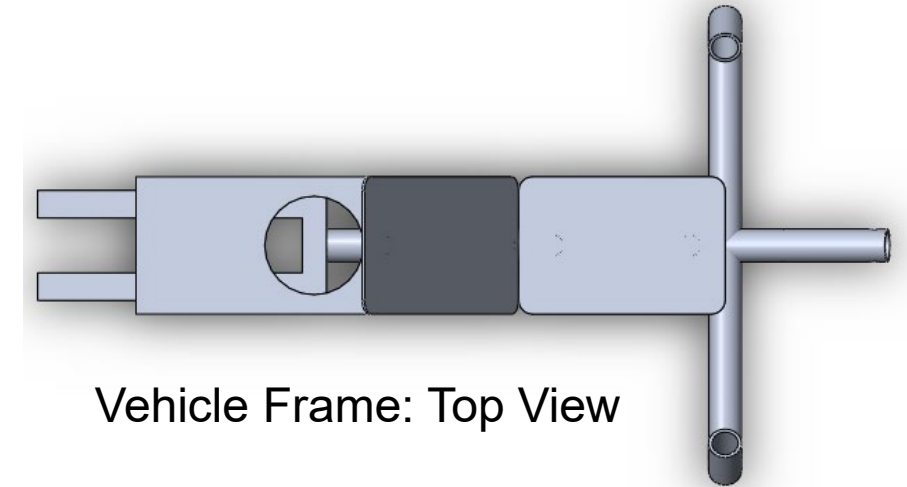


- Frame material: Aluminum 6061

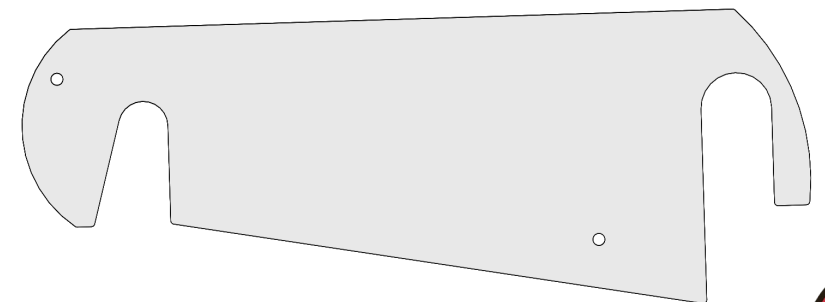
Frame	Description
Circular Tubing	2.38" OD, 0.22" Thick
Rectangle Tubing	1.50"x3.00", 1/8" Thick
Plates	0.25" Thick
Gussets	0.25" Thick
Support Tubing	1.90" OD, 0.45" Thick

- Sprocket Material: Low-Carbon Steel

Component	Description	Gear (0.5" Pitch)
Back Wheel	29" Diameter	48 T
Front Wheels	24" Diameter	-
Motor	0.508 CID, Keyed Shaft .625" Bi-rotation	15 T
Pump	14 cc/rev Displacement, Right Hand Rotation	9 T
Pedals	-	30 T
Chain	ANSI 40	-
Chain Guard	Plexiglass	-



Vehicle Frame: Top View



Chain Guard



Vehicle Fabrication

- Vehicle design and fabrication completed in-house
- Hydraulic hosing, connections, and adapters were provided and pressure tested by Connectors Specialists Inc.
- Reused parts:
 - Front wheels and steering system
 - Pedals
 - Seat Frame



Vehicle Fabrication



Welding aluminum frame



Water jetting custom sprockets



Vehicle Fabrication



Reinforcement gussets connecting front and rear of frame



Final picture from fabrication process



Vehicle Testing



Race	Pre-Charge (psi)	Max-Charge (psi)	Distance Traveled (ft)	Time (s)	Weight (lbs.)	Pedal Distance (ft)	Efficiency (%)
Sprint	1200	≈3000	300	17	410	-	-
Regen. Braking	1000	-	48.88	-	450	46	-
Efficiency	500	800	370	-	450	-	20



Lessons Learned



- Variance between design and fabrication application
- Welding aluminum presents significant challenges, and the fabrication process is time-intensive.
- Begin vehicle assembly earlier to allow for more time for testing and sufficient time for solving overlooked problems.
- Round tubing for the frame may have a higher strength to weight ratio, however it is harder to fabricate with when welding. This led to use more round tubing than predicted offsetting the advantage of a lower weight vehicle.
- Ask questions earlier. Learning and problem solving was easier during the second semester due to help from our advisors.



Thank you!



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**Mechanical
Engineering**

