Electro-Mechanical Continuously Variable Transmission
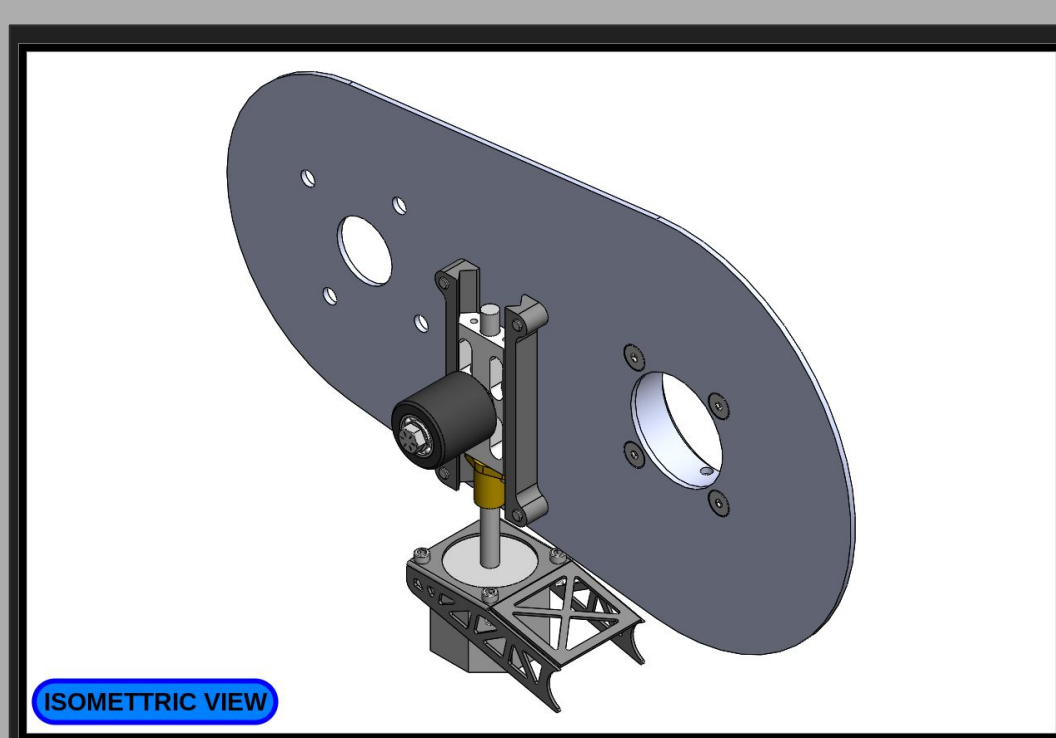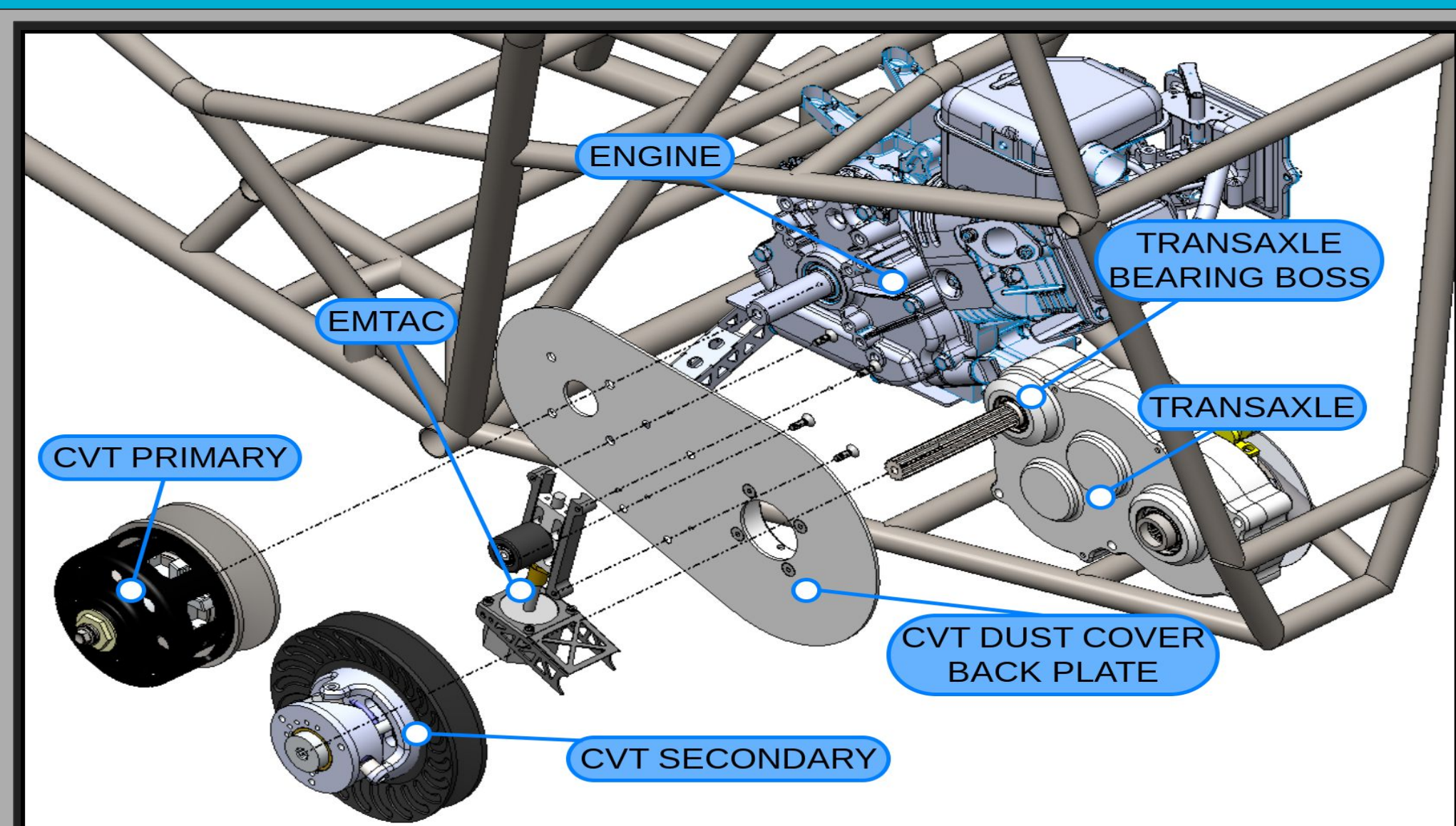
Team Electric Makos

ELECTRIC MAKOS

SDSU San Diego State University

Final Design

Labels: ENGINE, TRANSAXLE BEARING BOSS, EMTAC, TRANSAXLE, CVT PRIMARY, CVT DUST COVER BACK PLATE, CVT SECONDARY

Mechanical Disconnect

Testing

Labels: Motor, CVT Primary, Magnets, Transaxle, Tension Roller, CVT Belt, Bench Testing, Test Bench, CVT Secondary, Support Arm, Load Arm

Desert Testing
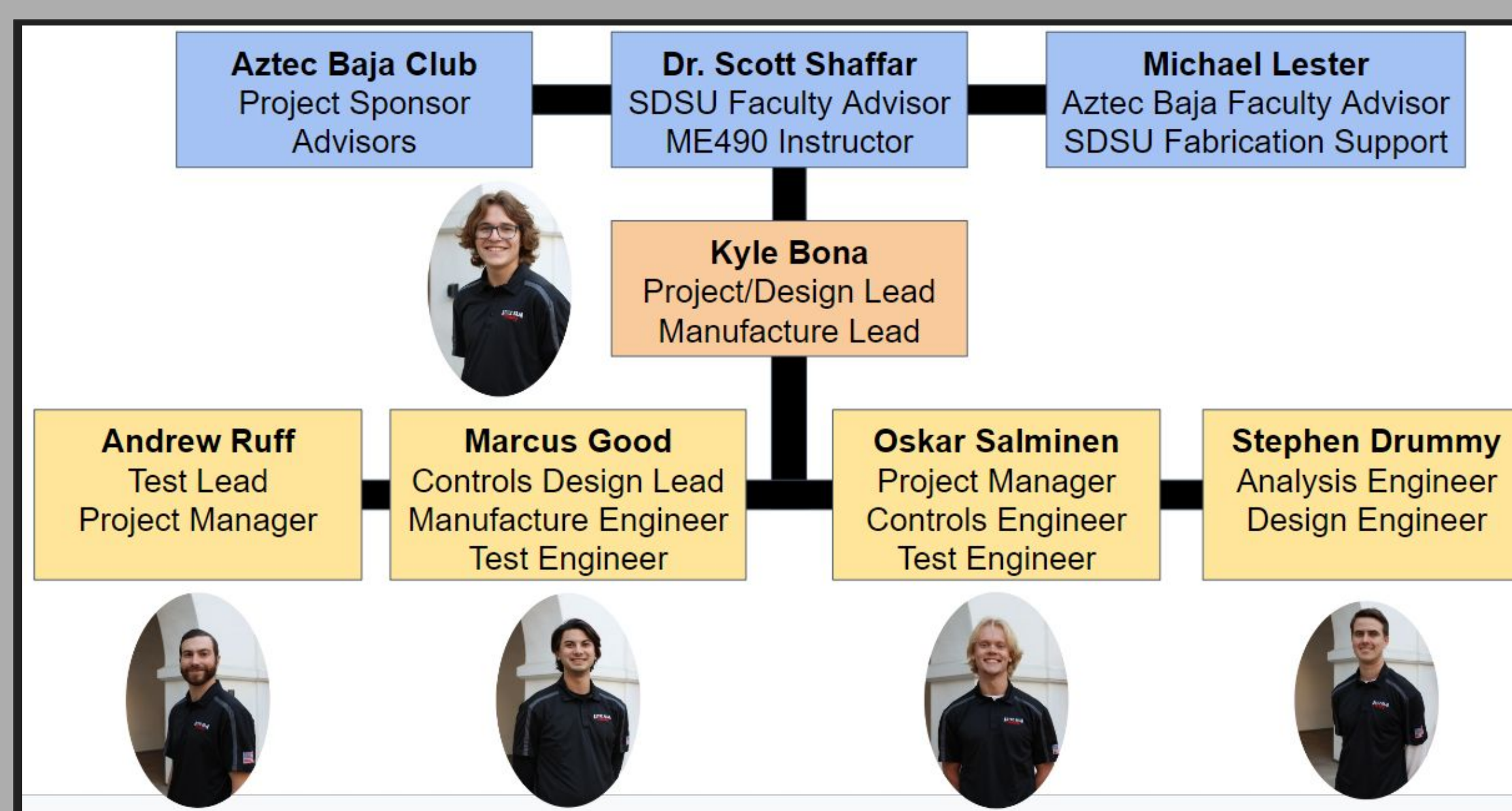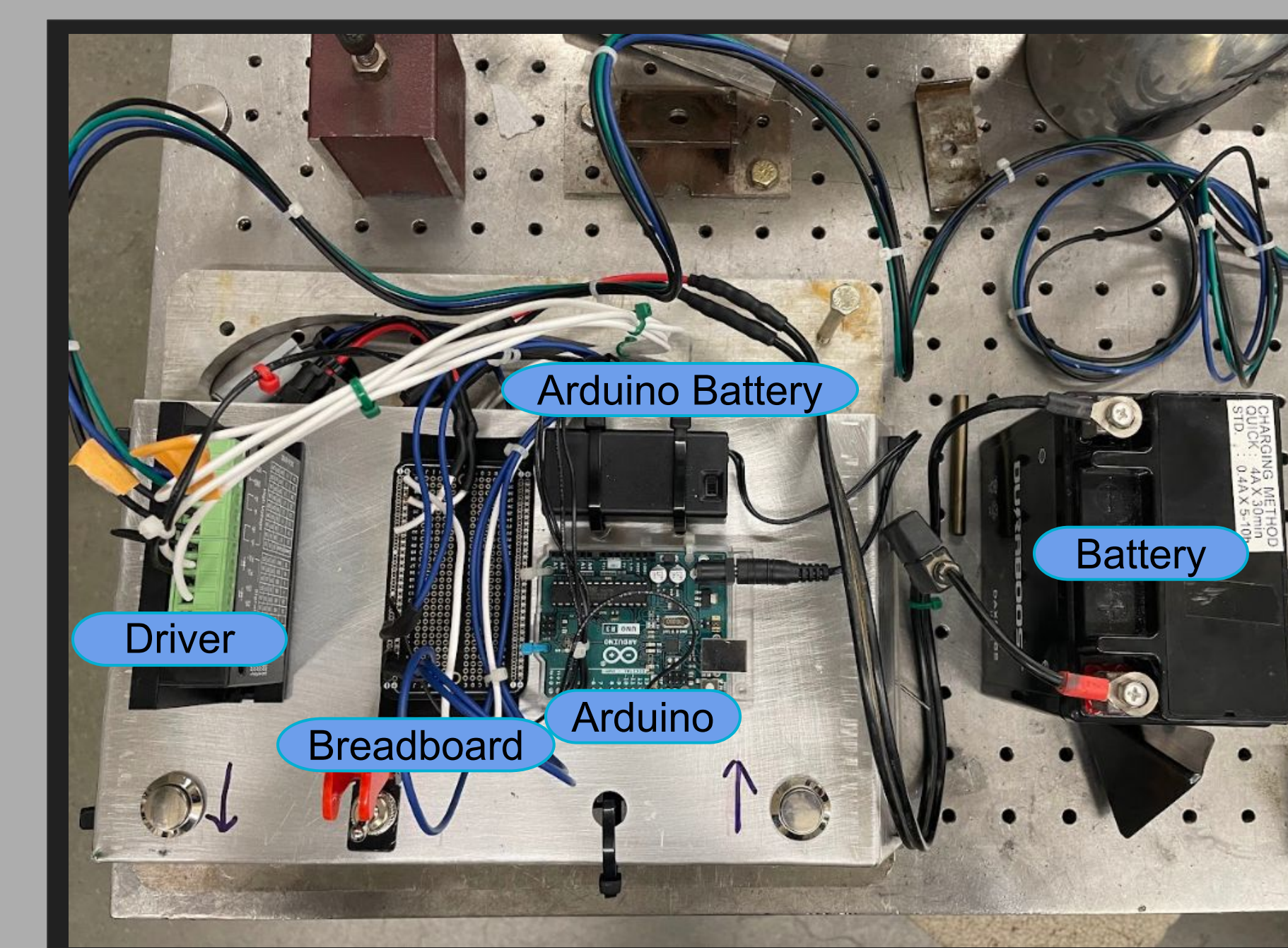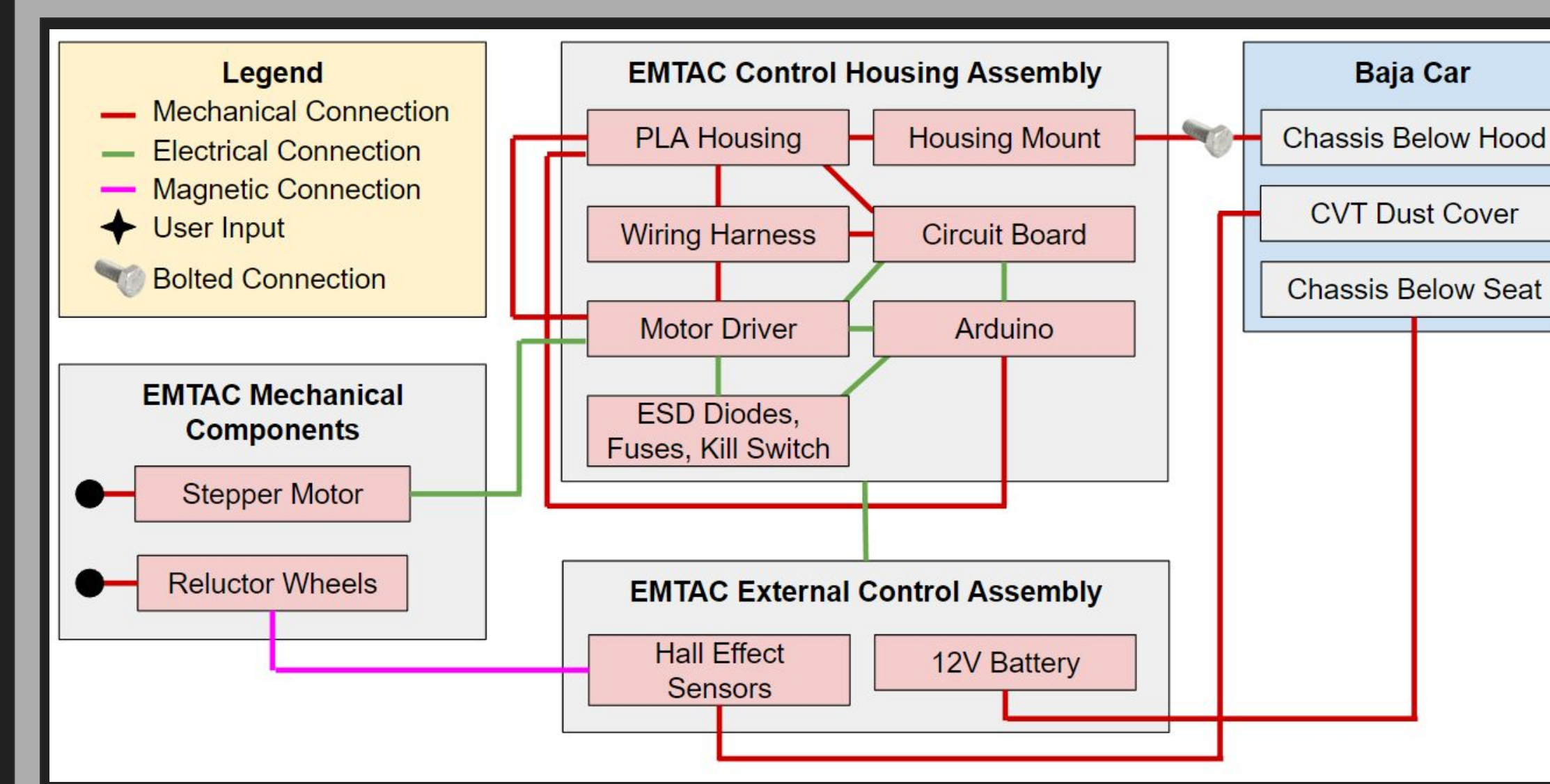
Project Overview

The goal of the Electro-Mechanical Continuously Variable Transmission project is to develop a system that can electro-mechanically shift the GX9 CVT on the Aztec Baja Racing car. On its own, the GX9 CVT experiences shift delay from high to low ratios. The team designed an electro mechanical transmission assist component (EMTAC) which is capable of influencing CVT ratio through belt tension. A stepper motor and power screw are used to linearly actuate a pulley, allowing belt tension to be adjusted. The system is controlled electronically and utilizes hall effect sensor input.
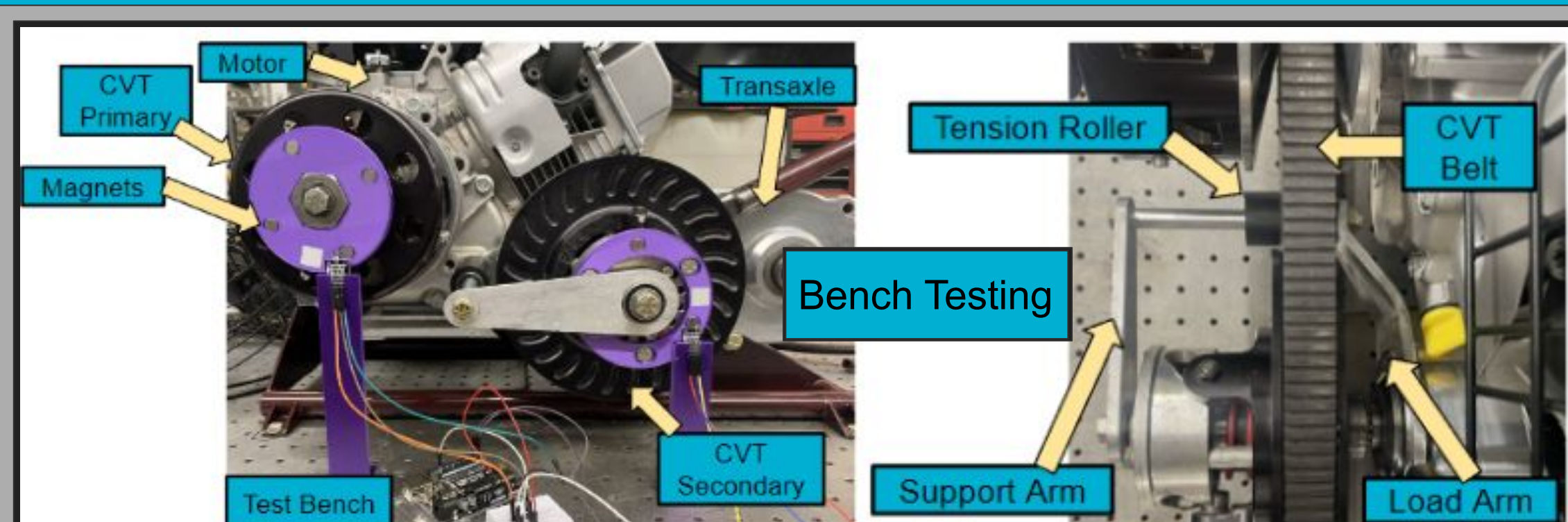
Team Members

Aztec Baja Club — Project Sponsor Advisors
Dr. Scott Shaffar — SDSU Faculty Advisor — ME490 Instructor
Michael Lester — Aztec Baja Faculty Advisor — SDSU Fabrication Support
Kyle Bona — Project/Design Lead — Manufacture Lead
Andrew Ruff — Test Lead — Project Manager
Marcus Good — Controls Design Lead — Manufacture Engineer — Test Engineer
Oskar Salminen — Project Manager — Controls Engineer — Test Engineer
Stephen Drummy — Analysis Engineer — Design Engineer

Acknowledgments

The electro-mechanical CVT project would not have been possible without the contribution of our sponsor and advisors. We would like to thank our instructor Dr. Shaffar, faculty advisor Michael Lester, and Baja President Manuel Aldana. Project funding was made possible by Aztec Baja Racing. Furthermore, we would like to thank the staff that made Senior Design Day possible.

Control System

Legend
- Mechanical Connection
- Electrical Connection
- Magnetic Connection
- User Input
- Bolted Connection

EMTAC Control Housing Assembly: PLA Housing, Housing Mount, Wiring Harness, Circuit Board, Motor Driver, Arduino, ESD Diodes Fuses Kill Switch

Baja Car: Chassis Below Hood, CVT Dust Cover, Chassis Below Seat

EMTAC Mechanical Components: Stepper Motor, Reluctor Wheels

EMTAC External Control Assembly: Hall Effect Sensors, 12V Battery

Labels: Arduino Battery, Battery, Driver, Breadboard, Arduino

System Level Diagram

GX9 CVT: Primary Driving Unit, Secondary Driven Unit, Enduro 100 Belt
Reluctor Wheels
EMTAC Tensioner Pulley Assembly: Guide Rails, Pulley Slider, Pulley Spacer, Pulley Bearings, Tensioner Pulley
Transaxle: Bearing Boss
Baja Car: Dust Cover Backplate, Chassis Near Seat, Rear Transaxle Crossmember
EMTAC Stepper Motor Assembly: External Linear Nut, Power Screw, Stepper Motor, Motor Mount
EMTAC Neutral Position Tensioner Assembly: Sleeve Cable, Lever Assembly, Lever