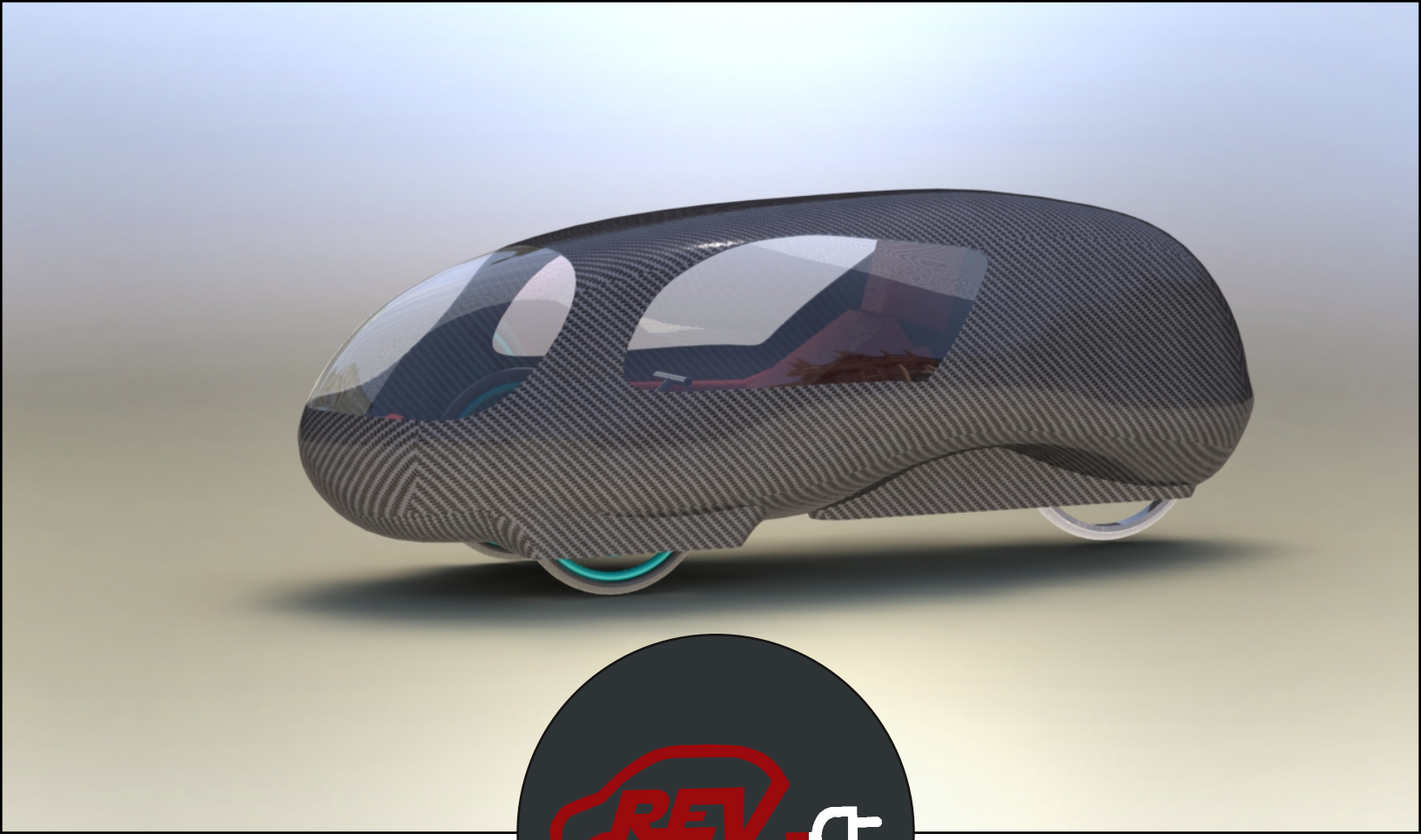


Newsletter

February 2019

The past twelve months at REV have seen a full-size car body take shape in our shop, and then disappear as it continued to the next phase in the manufacturing process. A new motor controller was born out of the ashes (literally) of the old one. Members have ascended into leadership roles and flourished in their new positions. Yet, this spring will mark the sixth year since REV last competed at its raison d'etre, the Shell Eco-marathon. What drives a team to persevere for so long, after all the members who have experienced a competition are gone?

Maybe REV members seek a higher goal than simply showing up and driving around the track. Leo, our new car, is different from its predecessor in every possible way. It is a testbed for techniques that could carry its successor farther on one watt-hour than today's best cars. REV's leaders would much rather struggle to build an exceptional car than make simple improvements to a mediocre one. In the rest of my term as President, I hope to honor this vision while guiding REV down the home stretch, back to SEM.

2018-2019 Leadership

President
Taite Clark

Vice President
Blair Blaire

Project Manager
Morgan Locandro

Electronics Lead
Kael Kauffman

Electronics Assistant Lead
Adrian-James Gevero

Mechanical Lead
Connor Smith

Mechanical Assistant Lead
Avi Zimet

Faculty Advisor
Joshua Hurst

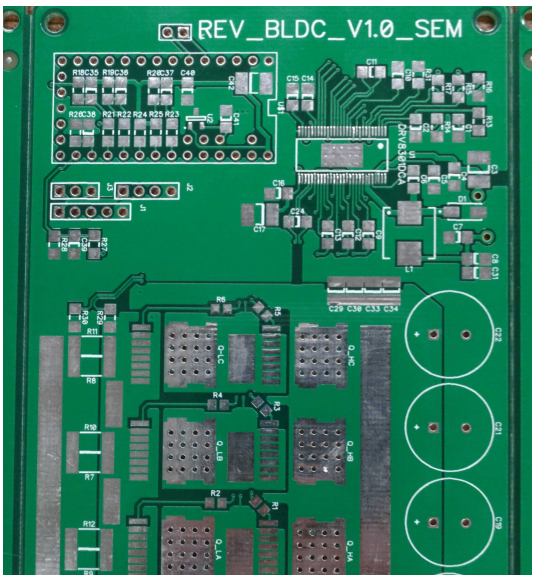
"Leo": A New Hope

REV's new car aims to fix the shortcomings of their old one

Leo Facts

Powertrain: Rear hub motor, driven at 36V
Battery: Lithium iron phosphate
Body/Chassis: Carbon fiber and Nomex monocoque
Windows: Drape-formed PETG
Expected weight: 120 lbs
Braking: Hydraulic, pedal-actuated
Steering: Go-kart style

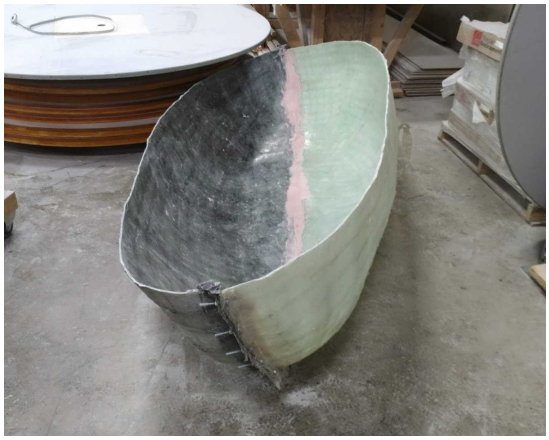
Design work for the new car began in the spring of 2017. A major milestone was reached the following year, when three copies of the new motor controller were received. Currently, we are building and testing minor electronic subsystems such as WiFi and GPS, and preparing to lay up the composite body. Other mechanical systems have been designed and are awaiting manufacture. At right: the foam, Bondo, and epoxy plug for building the fiberglass mold; and the new motor controller PCB.



Mechanical News

This year in mechanical, the first half of the semester was mainly focused on shaping the foam body plug, a critical part of the mold-making process which determines the final shape of the body. Each member was given hands-on experience using a random orbit sander to sand down the plug to the desired shape. Once the plug was shaped to our satisfaction, Bondo was applied to create a hard, smooth protective layer over the easily soluble foam. As Bondo hardens fast, members gained experience with having to work quickly and efficiently. After sanding the Bondo down to a smooth finish, the plug was taken to Gerome Technologies, a local sponsor, for final prep work before building the fiberglass body mold.

The second half of the semester was spent working on the fiberglass mold, and open design items like steering, the five-point harness, and the battery box. Thanks to an intense push by several members in the last two weeks of the semester, and generous donations of space and materials from Gerome, we started and finished the entire fiberglass mold in the space of nine days. This mold will be used in the spring to build the carbon fiber body. At the same time, every new member was assigned an open design item which they will take charge of through the design and build phases.



Electrical News

The electronics system has been preparing for the arrival of Leo, with a focus on the design and testing of the major electronics sub-systems, including the motor controller, interface, and power supply. We have also welcomed several new members who are eager to learn and who are helping out with various systems.

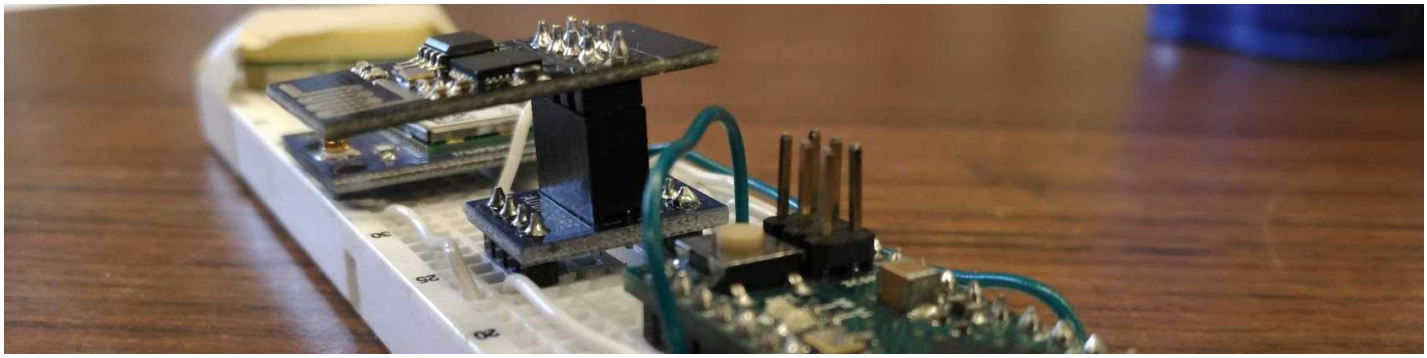
The motor controller for Leo is being approached from two fronts: completing the evaluation of the existing motor controller, which was desined by past REV team members, and making a new 48V design to serve as a backup. Last year, we were left with only one full copy of the motor controller, so much of our effort until now has been spent ordering more copies, in order to test them to failure. We are pleased to announce that this acquisition is complete, and the testing will continue in the near future.

The secondary effort for the motor controller is a last-resort backup design, in the event that the existing motor controller is found to be flawed or otherwise unsuitable for operation. This controller is being designed from scratch to accommodate a 48V supply, up from 36V on the existing design. This design has moved through the concept, component selection, and circuit design phases, and is currently in the PCB layout phase.

Several of the new members are getting involved in the motor controller system, with the recent introduction of a miniaturized motor controller project. This project involves the design, implementation, and programming of a controller to operate a 12V brushless motor at low currents. This is a fun and low-risk way for new members to take their first steps into the world of brushless motor control, and there are currently three separate instances of this project well on their way to completion.

The interface system has been broken down into individual features, including a display; telemetry from acceleration and inclination sensors, wheel RPM, and GPS; accepting data transmissions from the motor controller; and storing all this data for diagnostic review on a microSD card. The next step for the interface system is to combine all of these features into a single working prototype, in preparation for installation into Leo.

Finally, the power supply system has made significant progress recently, with the decision to purchase batteries that feature an integrated BMS, rather than attempting to build our own. This has saved months of design and testing. Four 12V, 10Ah lithium ion batteries were obtained from Dakota Lithium, with two being free of charge thanks to their sponsorship. These batteries have arrived and we look forward to using them in upcoming tests for various Leo systems.



We are grateful for the generous support of:

- RPI School of Engineering
- RPI Department of Mechanical, Aerospace and Nuclear Engineering
- Gerome Technologies
- OSH Park
- Dakota Lithium

We also have an **ongoing crowdfunding campaign** at *impact.rpi.edu/project/13660*. Every donation, no matter how large, gets us closer to Shell Eco-marathon. For inquiries about corporate and more significant sponsorship, please reach out to us at rpirev@gmail.com, and we will be happy to provide more information.

More about us:

Facebook: *www.facebook.com/revrpi/*
Website: *rev.union.rpi.edu*
About the competition: *www.shell.com/make-the-future/shell-ecomarathon/americas.html*
Contact: rpirev@gmail.com