

# Request for VSGC Support

UVM AERO

2007-Nov-11

## 1 Introduction

The University of Vermont Alternative Energy Racing Organization (AERO) is developing a hybrid-drive technology which endeavors to improve the efficient use of energy resources with suitable applications in transportation engineering. This particular design will be eventually deployed in a race car custom built for the 2008 International Formula Hybrid Competition to be held on 2008-May-05 in Loudon, NH. The technologies utilized in this project are applicable to a wide range of domains, including aerospace, where energy efficiency is paramount.

## 2 Roster

Galen Alleger	ME	Andrew Kalinen	ME
Chris Beck	ME	Alyssa Kennett	EE
Derek Bibeau	EE	Julie Kwok	Undeclared
Brian Cappello	EE	Andrew Laing	Eng. Mgt.
Amanda Chary	Undeclared	Dan Lajoie	EE
Mary Cox	Adviser	Brian Leach	ME
Chris Farmer	EE	Robert Lecuyer	ME
Mason Fischer	CS	David McCloskey	ME
Mark Freedman	Undeclared	Mike Murray	ME
Thatcher Friant	ME	Keith Myers	ME
Jeff Frolik	Adviser	Mark Oliver	Econ.
Katie Gallo	EE	Paul Robertson	CE
Dennis Godfrey	ME	Peter Roy	EE
Marc Jijina	English	Ashley Truax	Mathematics
Ed Johns	EE	Floyd Vilmont	Adviser

## 3 Achievements

Over the past twelve months, AERO has coordinated cross functional teams of students for the design and delivery of a cutting-edge hybrid-drive system which will be deployed in an open-wheel race car. Students with diverse interests and backgrounds have come together to work on this problem and develop a system that seeks to innovate in a field of great interest, all with a very small budget.

This effort has attracted a considerable interest from both the University and local communities. Numerous outside experts have been approached or, as

in several cases, have approached us to consult on our work or share support in some other way. Their responses have been very encouraging, and very instructive.

AERO began its effort last Fall with a short list of goals members believed would create the most value for them both as competitors and also as engineers whose aim it is to create cutting-edge technologies that work toward a sustainable future.

Through a rigorous design cycle, drafts emerged of the following technologies:

1. Parallel Hybrid-Drive
2. All-wheel Regenerative Braking
3. Re-chargeable Energy Storage System
4. Driver Assist Control and Monitor System

In these designs, AERO has used the same technologies that drive advanced aerospace engineering including a modular energy storage system, efficient DC/DC converters, and electronic control and monitoring systems that give the driver better capability with dramatic increase in efficiency over non-hybridized counterparts.

Every system in the car is being continually re-factored and improved for simplicity, efficiency, and lower weight. The AERO Team is quite proud of its work and looks forward to proving each design on the track.

Already, our team has assembled much of the components necessary to build its design. With the help of generosity from interested organizations, an internal combustion engine has been purchased and modified, most of the necessary chassis components have been sourced, and about half of the Hybrid-Drive System's coupling unit has been sourced or fabricated. The electronics team has completed its first generation control boards with revision two due within a week.

Although, it feels like we are just getting started we have already gotten so much done.

## 4 Tasks Remaining

Most of the build sequence remains in front of us. Looking forward, the team must still accomplish the following tasks:

1. Complete Hybrid-Drive System
2. Manufacture frame
3. Source electric motor and controller
4. Source energy storage system
5. Source driver safety equipment
6. Source driver interface components

7. Complete chassis
8. Complete electrical systems
9. Complete Driver Assistance System
10. Test, debug, and revise all systems
11. Win the race!

Our schedule pushes us to finish the car by the beginning of April and conduct tests and driver training until race day.

## **5 Budget and Funding**

AERO has successfully raised over \$17,000 with a projected total budget of \$31,500. This is the largest sum that any engineering project at UVM has ever endeavored to raise itself and I am happy to report we have been steadily working toward our goal.

The process of requesting community support through sponsorship has been very useful to the team as a means of being held to account for our spending decisions and the quality of our work. This has made operations run much leaner than we first anticipated and made the actual process of getting things done more important to team members.

## **6 Thank You**

The previous support from the Vermont Space Grant Consortium was invaluable to get things started. As one of the first sponsors, VSGC made a huge impact on our success. The support was used to make the initial internal combustion engine purchase and getting started with a hands-on portion of the project early-on was integral to preliminary success.

Any future support would assist us in completing our Hybrid-Drive System including the electric motor and controller assembly.

Thank you for your support!