RIT Electric Vehicle Team

2014-2015 Sponsorship Packet

Contact: evt@rit.edu

Website: evt.rit.edu

TABLE OF CONTENTS

I. About the Team Page 3

II. Sponsorship Levels Page 4

III. Sponsorship Benefits Page 5

IV. Projects Page 6

About the Team

The RIT Electric Vehicle Team is a student run organization dedicated to promoting the viability of electric vehicles through real world demonstrations of electric drivetrains in action. The team aims to educate people on the principles of electric vehicle design by engaging students in challenging and rewarding projects that cover a wide variety of academic disciplines. The team's main project is to design, build, and race a high performance electric motorcycle for competition in the 2015 eMotoRacing all-electric race series. The current bike is based off of the frame from a 2005 Kawasaki Ninja ZX6RR, and a Zero Z-Force 75-7 motor paired with a Sevcon Size6 controller. In house engineering includes the design and fabrication of a battery management system, battery containment modules, structural framing for the mounting of the powertrain, as well as advanced data collection and analysis software.

The three main subgroups of the team are mechanical engineering, firmware engineering, and electrical engineering. Each discipline has a lead engineer to guide and oversee the project. Within each group, advanced design tools are used in order to produce the best vehicle possible.

The team's philosophy is to foster the available talent in members as much as possible. New members are challenged to innovate early on through the design and optimization of electric bicycles. This provides them with the chance to learn about the fundamental concepts of electric drivetrains. After this introductory project is complete, members move into working on intermediary development vehicles. Currently, these vehicles include an electric Go-Kart, and an Electric Moped, both built to participate in Imagine RIT competitions. The intention of these projects is to provide both a more advanced learning experience for members, as well as a test bed for technologies that may be implemented on the electric motorcycle in the future.

SPONSORSHIP LEVELS

Gigawatt Level Sponsor: $4,000 and Above

The Gigawatt level sponsor receives a large logo that will be prominently displayed on the bike, as well as on team event t-shirts, posters, and our website. You will receive an invitation to see all the technology behind the motorcycle at our annual sponsor day.

Megawatt Level Sponsor: $1,000 - $3,999

The Megawatt level sponsor receives a medium sized logo that will be prominently displayed on the bike. Company logos will also be displayed on our posters, website, and t-shirts. This level includes an invitation to our annual sponsor day.

Kilowatt Level Sponsor: $250 - $999

The Kilowatt level sponsor receives a logo on the bike, as well as on posters, and the team website. An invitation to the annual sponsor day is included at this level.

Contributor: $100-249

The contributor receives their name on the team website and on event posters.

SPONSORSHIP BENEFITS

Motorcycle

The body of our motorcycle represents the greatest potential for advertisement. Everywhere we race or present the bike, logos of our sponsors will be proudly displayed. This year, we will be competing in at least one race of the eMotoRacing series. This is a new series that takes place at some of America's most iconic raceways, and is competed in by the most innovative electric motorcycles of today. We are aiming to generate a large media footprint by attending the race.

Posters

At all events that we attend, posters with logos from all of our sponsors will be proudly displayed alongside the EVT insignia. This includes all races, presentations that we may give about the bike, the annual Imagine RIT festival, and constantly on the windows of our club space.

Website

All sponsors will receive public mention on our website through rotating logos on the homepage. All sponsors will also receive a small write up about how their contribution was used, with a link to their website included. Sponsors of in-kind donations will receive a mention on our Facebook page alongside a picture of the team putting their technology into use.

T-Shirts

At every public event that we attend, members of the team will wear T-Shirts bearing the logos of our sponsors, as well as our own logo. This provides an opportunity for the public to gain awareness and engage team members in conversations about the contributions that you or your company made to the team.

PROJECTS

ELECTRIC BIKES

New members with little experience are introduced to the world of electric vehicles through electric bikes. These relatively simple machines, which utilize hub motors to directly drive the rear wheel, provide a solid foundation of electric vehicle concepts. Our members are encouraged to work on the design of streamlined battery and controller containment modules in order to learn the basics of electric vehicle design. They are challenged to balance different design considerations such as weight, battery capacity, operating voltage, and size in order to produce a final product.

INTERMEDIARY DEVELOPMENT PLATFORMS

The team maintains various development vehicles for testing new designs and technologies. Two current examples of this are an electric moped, originally built for the Imagine RIT E-Dragster competition, and an electric go-kart, built for the Imagine RIT E-Vehicle Autocross Challenge. These vehicles allow the team to test technologies mainly related to battery pack construction and monitoring. They are also able to provide essential learning experiences for team members who are ready to move on from electric bicycle design. Team members can learn more in depth about how electric motor drive systems operate through working on updated designs for our development vehicles. They analyze current designs and determine how they can be modified to provide as much quality and reliability as possible. In this manner, the team always has advanced vehicles to utilize in the testing of their designs.

SUPERBIKE

Battery Management System

The battery management system is intended to effectively mitigate the risks associated with lithium ion batteries. Its purpose is to constantly monitor the individual cells in the battery pack in order to prevent dangerous conditions such as under-voltage, over-voltage, or elevated temperatures. The prevention measures vary per situation, but usually include balancing the

voltages of the battery cells across the battery pack, and operating a safety cutoff switch in the event the battery pack approaches dangerously low charge voltages.

Battery Module Design

The battery pack of the superbike is composed of twenty-six lithium ion battery cells connected electrically in a twenty-six series configuration. These cells are approximately the size of a piece of letter paper and about half of an inch thick. The battery pack is made up of different sized modules that provide the best fit within the constraints of the frame. The modules themselves are made of sheet aluminum. They are initially created in advanced computer-aided design software and then fabricated using high-precision CNC machines. The battery modules are designed to dissipate excess heat via air cooling. They are also designed to compress the cells along their faces in order to prevent them from expanding when put under load. The modules undergo advanced computer simulation and analysis before they are put into use on the motorcycle.

Motor Sub-frame and Final Drive

The conversion of electrical energy to mechanical power is performed by a large, permanent magnet AC synchronous motor rated at 50 horsepower. The frame that the team is using for the project was designed for use with an internal combustion engine, thus a separate sub-frame was designed to which the motors and battery modules can mount. This sub-frame incorporates structural support not only for the electric drive components, but also compensates for the structural integrity that was lost when the internal combustion engine was removed.

Data Collection and Logger

Each device on the motorcycle collects data relevant to its various operating conditions. Some examples of this include the voltage and temperature of each battery cell, the current draw over time, and the speed of the motorcycle. This data is valuable for better management and interactive operation of the motorcycle. Collecting this data will allow the team to monitor the telemetry and electrical characteristics of the motorcycle’s operation in real time.