*Please submit this completed application and any relevant supporting documentation by the deadline listed on the SSC website to* *Sustainability-Committee@Illinois.edu**. The Working Group Chairs will be in contact with you regarding any questions about the application. If you have any questions about the application process, please contact the Student Sustainability Committee at* [*http://sustainability-committee@illinois.edu.*](http://sustainability-committee@illinois.edu.)

**General Information**

Project Name: Eco Illini Supermileage

Total Amount Requested from SSC: $9,720

Project Topic Areas: [ ]  Land & Water [x]  Education [ ]  Energy

[ ]  Transportation [ ]  Food & Waste

**Contact Information**

Applicant Name: Joseph Grigus

Unit/Department or RSO/Organization: Eco Illini Supermileage

Email Address: jgrigus2@illinois.edu

Phone Number: 224-500-7834

Project Team

|  |  |  |
| --- | --- | --- |
| *Name* | *Department/Organization* | *Email* |
| Joseph Grigus | Aerospace Engineering | jgrigus2@illinosi.edu |
| Ir-Jene Shan | Physics | shanirjene@gmail.com |
| Vincent Wong | General Engineering | vmwong3@illinois.edu |
| Varun Punjabi | Mechanical Engineering | vpunjab2@illinois.edu |
| Dinaz Bamji | Agricultural Engineering  | bamji2@illinois.edu |
| Anders Cox | Electrical Engineering | ajcox2@illionois.edu |

Financial Contact’s Name: John Wierschem

Faculty/Unit/Department: MechSE Department

Email: jwiersch@illinois.edu

Phone: 217-333-6741

(If Applicable)

Facilities Manager Name: Bruce Flachsbart

Email: mems@illinois.edu

Phone: 217-244-4445

**Project Information**

*Provide a brief background of the project, its goals, and the desired outcomes.*

Eco Illini Supermileage is a RSO that designs and builds a prototype gasoline vehicle. Our focus is to make our vehicle as fuel efficient as possible and to compete in the Shell Eco Marathon Competition. We compete in the internal combustion category, the largest category at Shell. The competition has been growing every year, with last year over 100 teams from 9 countries and 1200 students competing. The prototype category has few design restrictions to allow teams to experiment to try to get the highest efficiency possible. The winning mileage is around 3000 mpg each year with the American record being 4100 mpg. We compete in the gasoline category because it is the most competitive category at competition and uses a fuel source already found in present day cars, making it more applicable and better understood by members of the public.

Our team was founded in 2010 as a senior design project. Since then, we have expanded to include STEM majors of all backgrounds and even business majors. The team has designed and built four generations of cars and six cars in total. For the past three years we have placed in the top 10 in our category. Our record at Shell was 1079 mpg in 2015 and our team record was set in 2016 at SAE Supermileage with 1,137 mpg. Last year at Shell we placed 10th with 815 mpg.

This year, our team is designing and building a new car in partnership with a Mechanical Engineering senior design team. We are designing the car so that it has less aerodynamic drag and better rolling resistance. We are also using a smaller engine and taking other steps to take off unnecessary weight from our vehicle. We are creating a fixed windshield to make the front of the car more rigid and aerodynamic. We are looking to purchase an Eddy Current Dynamometer and use it in a chassis dyno. This would give the engine a more realistic loading and allow for better tuning. We are also making the car more accessible and modular, so parts can easily be repaired or replaced, and future modifications can easily be made. Our first-year goal is 1500 mpg and our hope is that in subsequent years this car will be able to break the 2000 mpg mark and be competitive with the top teams in our category.

*How will this project improve sustainability at UIUC?*

This competition encourages students to think about efficiency and how to improve it. It focuses on the burden of personal mobility and challenges students to lessen this burden. While as of now only gasoline consumption is measured, Shell is transitioning to measure electrical energy consumed to encourage teams to use as little total energy as possible.

The students on our team are challenged to think about efficiency. Everything on the car must be optimized for the best aero, friction, weight, power output and power efficiency. We also strive for production efficiency to minimize waste and prevent excess man-hours. While most members won’t graduate to work on a fuel-efficient car, the lessons of efficiency are carried with them into future studies or industry.

Our car also challenges students around campus to think about the future of mobility. While it may look ridiculous to some, it makes them think about the direction of future cars. Current cars are too powerful and often too big for what they are needed for. The future is smaller and lighter cars that have a smaller impact on the environment.

*Where will the project be located? Do you need special permissions to enact the project at this site? If so, please explain and attach a letter of support to your application.*

Our team’s central location is in the Engineering Student Projects Laboratory. We have had that space for years and will continue to work there for the foreseeable future. We are also looking to temporarily use some space in Talbot Laboratory to build the frame of our car.

*Other than the project team, who will have a stake in the project? Please list other individuals, groups, or departments indirectly or directly affiliated to this project. This includes any funding entities (immediate, future, ongoing, etc.) and any entities that will be benefiting from this project.*

Directly involved:

Team Members: Shie-Jene Shan, Kevin Dvorak, Matthew Jedziniak, David Tan, Thomas Phelps, Matthew Daminato, Charlie Mistrata, Bailey Costello, Thomas Satrom, Anjali Kavthekar, Dylan Estrada, Alex Webster, Alex Chen, Nirmal Prakash, Michael Berutti, Sankruth Kota, Guosen Chen, Ethan Tran, Alex Ortwig, Anshul Doshi, Sunita Kavthekar, Michelle He

ME 470 Senior Design Group: Jiehao Chen, Taylor Tucker, Nicholas Mark

MechSE department

Indirectly involved:

College of Engineering, Colleges of LAS, College of Business

Levin Associates, Composite Envisions, Costal Enterprises, and any future sponsors

*Please indicate how this project will involve or impact students. What role will students play in the project?*

Our team is entirely student lead. Our faculty sponsors only serve advisory roles and make sure we have the resources we need to succeed. Our car is entirely designed and built by students, most of whom are undergrads. Our sub system leaders set their own deadlines and determine what is worked on in any day. Students will often get involved in multiple projects and 6+ hours a week to work on the car.

We are open to all students from all majors and backgrounds with no experience required. Students can join anytime they want and show up to any of our meetings.

*Have you applied for funding with SSC previously? If so, for what project?*

We have not applied for SSC funding in the past.

**Scope, Schedule, and Budget verification**

*What is the plan for project implementation? Describe the key steps of the project including the start date, target completion date, target date for submitting a final report, and any significant tasks or milestones in the table below. Please be as detailed as possible.*

While most of our deadlines are soft, our one hard deadline is April 19th, the first day of Shell Eco Marathon. The car must be built, running, and be able to pass tech inspection by this date. Ideally, we would like to ship the car out a week or two in advance, so a soft completion deadline would be around April 9th. We also have the goal of having a rolling chassis (body and wheels) completed by the end of the fall semester and a running car by EOH.

A final report on this year’s progress can be submitted by then end of May this year detailing the car’s initial successes and desired improvements. The expected lifecycle of this car is 3-4 years, so a final report detailing the car’s best performances and statistics around mid summer of 2021.

*List all budget items for which funding is being requested. Include cost and total amount for each item requested. Please be as detailed as possible.*

Eddy Current Dyno: $8000, estimated cost of an Eddy Current Dynamometer

Tires: $250, 6 new shell competition grade tires, Michelin 44-406

Batteries, $550, 3 new lithium ion batteries, Ballistic Batteries Evo2 8 Cell

Battery Management System: $180, Ballistic Batteries EVO Professional BMS Charger

MicroSquirt connector: $130, 3 Microsquirt AMPSEAL connectors

Oxygen Sensor: $410, 2 new LC-2 Wideband Controller and Sensor

Wires and Sensor harnesses: $200, new multistring wiring, wire connectors, sensor connectors

*If the project is implemented, will there be any ongoing funding required? What is the strategy for supporting the project in order to cover replacement, operation, or renewal costs? (Note: SSC provides funding on a case by case basis and should not be considered as an ongoing source of funding)*

While most of our costs are in building the car, there is a constant need for funding for the team. Our biggest cost is travel, especially since Shell Eco Marathon has moved to San Francisco for competition this year. We will be relying on departmental funding and sponsorships to cover our travel expenses. After the car is built, we will try to implement changes in an effort to improve efficiency, usually at a minor cost. We have discussed the possibility of building an electric prototype car to compete under the electric category in the next year or two, which we would submit as another SSC project.

*Please include any other sources of funding that have been obtained or applied for, and please attach any relevant letters of support.*

Received:

Engineering Design Council: $995

Levin Associates: $200

ME 470 design budget: $2000 – carbon fiber and resin

Costal Enterprises - $13,000 – estimated cost of donated high density foam

Applied for:

MechSE Department: $15,900 – travel, carbon fiber, machined inserts

Going to seek additional sponsorships throughout the year.

*What is the plan for publicizing the project on campus? In addition to SSC, where will information about this project get reported?*

Our biggest public event is Engineering Open House where we plan to do live runs of our vehicle. This is where we show off our progress to the campus and prepare for competition. We also plan on participating in the Homecoming Parade and are present at smaller MechSE events throughout the year. We are occasionally featured on the MechSE website or Facebook page. We post regular updates on our Facebook page with a plan to post updates on our website as well.