



## STUDENT SUSTAINABILITY COMMITTEE

### Funding Application – Step II

#### General & Contact Information

**Project Name:** Illini Solar Car, Project Brizo

**Total Amount Requested from SSC:** \$10,000\*

\*Please see **Appendix A** for further details about the amount requested.

**Project Topic Areas:**  Land & Water  **Education**  **Energy**  
 **Transportation**  Food & Waste

**Applicant Name:** Tara D’Souza

**Campus Affiliation (Unit/Department or RSO/Organization):** Illini Solar Car

**Email Address:** taraad2@illinois.edu

#### Check one:

- This project is solely my own **OR**  
 **This project is proposed on behalf of:** Illini Solar Car

#### Project Team Members:

*Illini Solar Car is a team of over 150 students. The following project team member list includes major group leaders.*

Name	Department	Email
Arijit Banerjee (Team Advisor)	Illini Solar Car / ECE	arijit@illinois.edu
Tim Damisch	Illini Solar Car / MechSE	damisch3@illinois.edu
Tara D’Souza	Illini Solar Car / ECE	taraad2@illinois.edu
John Han	Illini Solar Car / ECE	jsh3@illinois.edu
Rishi Mohan	Illini Solar Car / ISE	rishinm2@illinois.edu
Lucy Zhang	Illini Solar Car / ABE	lucyqz2@illinois.edu
Rohan Kamatar	Illini Solar Car / ECE	kamatar2@illinois.edu

#### **Student-Led Projects (Mandatory):**

Name of Faculty or Staff Project Advisor: Arijit Banerjee

Advisor’s Email Address: arijit@illinois.edu

#### **Financial Contact (Must be a full-time University of Illinois staff member)**

Contact Name: Beverly Curtis

Unit/Department: Department of Electrical and Computer Engineering (Business Manager)

Email Address: bcurtis@illinois.edu

## **Project Information**

### **Please provide a brief background of the project, its goals, and the desired outcomes:**

Illini Solar Car is a student organization that harnesses the skills from a diverse group of students in pursuit of creating the world's best solar-electric vehicle. Through hands-on, interdisciplinary work that fosters real-world applications, we spark sustainable thinking by designing and building a road-legal car to compete in international competitions.

After traveling thousands of miles powered by the sun, our first car Argo is no longer competitive for racing in cross-country races such as the World Solar Challenge and American Solar Challenge. These races are on the forefront of sustainable innovation and the fierce competition demands teams to bring their best to each event. We took a conservative approach to the design and build of Argo as it was the team's very first car. However, with our second generation vehicle, Brizo, you will see a very different design--one that is sleeker and faster than Argo could ever be. We are implementing new cutting-edge technology such as a highly-efficient solar array, carbon fiber composite shells and chassis, and energy efficient electronics.

We began manufacturing our second generation vehicle last year with the help of the SSC. This year, as we work to complete the vehicle, we are aiming to maximize efficiency, minimize body weight, and improve aerodynamics and reliability. With each improvement, we are working towards a future with sustainable transportation. Our goal is to bring this brand new solar vehicle to the 2021 American Solar Challenge to compete with the best of the best.

## **Where will the project be located? Are special permissions required for this project site?**

### Warehouse Space at N. Linview Ave.

Linview is the off-campus workspace that serves as the primary storage and workspace for Illini Solar Car. The team currently rents 2000 sq. ft. over 2 garages. In order to work in this Linview facility, members must pass the same safety test required for the Engineering Students Project Laboratory and sign an additional waiver. These requirements are to ensure the safety of all team members while working on the project. Additional measures have been put in place in order to ensure safety during the COVID-19 Pandemic. These precautions include new limits on work space occupancy, additional access to hand sanitizer and surface cleaners, requirements to wear a mask at all times, and requiring evidence of a negative test to enter the garage. All members are required to fully understand and agree to all safety measures as outlined in the Illini Solar Car COVID-19 Protocols developed by our team in conjunction with University guidelines.

### ECE Department OpenLab

OpenLab is a workspace provided by the Department of Electrical and Computer Engineering located in rooms 2024 and 2026 of the ECEB. The purpose of OpenLab is to be a space for personal projects and RSO's that require the use of lab spaces and tools. Most electrical system assembly and debugging are done in this space, primarily by the electrical and solar groups. Due to limited access during the COVID-19 Pandemic, this work has primarily been moved to the team's garage space. Access to the lab, as determined by the ECE Instructional Lab Coordinator Casey Smith, requires the completion of two Departments of Research Safety (DRS) training modules and an OpenLab safety tour.

### Siebel Center for Design

It is expected that upon the completion and opening of the Siebel Center for Design (SCD), Illini Solar Car will occupy half of a shared garage space (1000 sq. ft.) with the Illini EV Concept team. This space will be used to house our car on campus and continuously make improvements to its design. The team would utilize the SCD space to work on the car while brainstorming, prototyping new ideas, testing, and problem solving.

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

Illini Solar Car's project is made possible through a number of University and corporate sponsorships. Below is a list of sponsors who have pledged support for our second generation vehicle, Brizo. These sponsorships are categorized into our sponsorship levels. Please see the attached Sponsorship Packet for more details about our sponsorship levels and corresponding benefits; SSC will also receive these benefits. Attached to this application is a compilation of letters of commitment from the following sponsors.

**Orange and Blue Level (\$40,000+)**

- Department of Electrical and Computer Engineering

**Gold Level (\$20,000+)**

- TekMill
- SORF
- Student Sustainability Committee\*
- Grainger College of Engineering

**Silver Level (\$10,000+)**

- 3M
- SimScale
- Bay Area Circuits
- Gies College of Business
- Visme
- ANSYS
- Solcast
- Mitsuba and Nomura Co.

**Bronze Level (\$5,000+)**

- Flying S
- Phoenix Contact
- Spirit Aerosystems
- Molex
- BP
- A&R Mechanical
- Livingston, Barger, Brandt, & Schroeder, LLP

**Friend Level (\$1,000+)**

- Illini Dad's Association
- MISUMI
- Texas Instruments
- RECOM
- PartsBox
- AgoraPulse
- Plexim
- Diab
- Digi
- Lake Cable
- AERO
- Stanley Black & Decker
- Littelfuse
- Saturn Electronics
- Ford
- Analog Devices
- Department of Computer Science
- Caterpillar
- TDK-Lambda
- Arctic

\*SSC will become a Orange and Blue Level Sponsor with further support.

## **How will this project involve and/or benefit students?**

Illini Solar Car is a multidisciplinary design team that includes over 150 members from across the University of Illinois. Team members are provided with an unparalleled opportunity to apply their education to hands-on projects. Students are given the opportunity to work with and gain deeper knowledge of advanced tools and softwares that are standard to industries across the world. Experience with these technologies allows our students to hone their skills in preparation for their further education or employment. Additionally, Illini Solar Car is a chance for students to broaden their horizons beyond their academic education through project work. Our team fosters sustainable thinking and development by designing and building a fully road-legal solar electric vehicle to compete across the world.

Illini Solar Car remains actively involved as one of the flagship Registered Student Organizations of the Electrical and Computer Engineering Department (ECE Department). We have been some of the strongest advocates for the continued success of the ECE OpenLab, one of the only places available to engineering RSOs on campus to ideate, design, and prototype electromechanical devices. Illini Solar Car engages with ECE Department leadership to keep this space active and thriving for the good of all. Beyond just the OpenLab, we create connections between the ECE Department and our corporate partners, which leads to greater corporate engagement with this campus. This opens opportunities for organization events such as recruiting tables, speakers at RSO events, etc.

Illini Solar Car is committed to engaging students across this campus who hold the same passion for learning and sustainable design - which is why we have no member caps, no educational restrictions, and no barriers to entry. We are enthusiastic about teaching everything our members need to know to be a successful team member in our comprehensive onboarding process. The fall semester recruiting season is generally our most successful time to bring new students into the team, and given the challenges of our present day we adapted our onboarding process to engage students maximally even through online methods.

Working with our vehicles places gives our members an incredible advantage in regard to project and hands-on experience. Recent team alumni have found jobs at Ford Motor Company, John Deere & Company, Apple, NASA, Northrup-Grumman, and many more prestigious companies.

**How will you bring awareness and publicize the project on campus? In addition to SSC, where will information about this project be reported?**

The Illini Solar Car is a quickly-recognizable vehicle around campus, which has consequently made our organization fairly prominent as well. Our first vehicle Argo has made appearances at notable campus events like Engineering Open House, E-Night, Quad Day, and Pygmalion. Argo has also been present at high-profile events like IlliniFest in downtown Chicago, University of Illinois Foundation luncheons, and for the Dean's Business Council. At these events, students and faculty alike are given an intriguing look behind-the-scenes at the cutting edge of green transportation. Additionally, Illini Solar Car has historically participated in community events like local Cars & Coffee meetups, Homecoming and associated parades, etc.

One major component of sustaining a team of our size is recruiting a new generation of students every year to join the team. RSO recruitment has been very challenging this semester given the cancellation of large recruitment-driving events such as Quad Day and E-Night, but our team restructured our approach to great success. Through a combination of digital messaging, usage of digital signs, and recruiting at online events Illini Solar Car reached over 250 students and successfully brought over 100 of those students onto our team. This outstanding milestone is one that we have historically come close to but not surpassed, making this a record year for recruitment.

Two of our team's five major subgroups are tasked with handling the day-to-day and long term operations of the team. These (the business and media groups) are composed of the team's core members along with a small cohort of dedicated students. This team of dedicated individuals maintains our social media presence, handles interactions with corporate sponsors and potential new sponsors, updates our team website ([www.illinisolarcar.com](http://www.illinisolarcar.com)), and sends out a periodic newsletter to sponsors and other interested individuals. We have been and will continue to post updates regarding the team and our new car on the following platforms:

- Instagram: *@illinisolarcarteam*
- Facebook: *@illinisolarcar*
- Twitter: *@IlliniSolarCar*
- LinkedIn: *@illini-solar-car*

The team intended to produce a large-scale (>300 attendees) event at EOH 2020 to officially unveil the new Illini Solar Car. This kind of event will of course not be possible given the current circumstances, so we are intending to unveil the new car through a series of videos and a live-streamed event in early 2021. This event will be advertised widely through various channels on campus, including reaching out to interested faculty and their classes, staff, and community members. Our goal is to show off the best innovation that Illinois has to offer and spark sustainable thinking and ideologies in people across the University of Illinois.

Every year, the team also aims to compete in international solar car competitions that are held around the world. Through these events, we travel thousands of miles across the United States and Australia, drawing thousands of eyes to our solar vehicle. During these high-profile events, we spread our message of sustainability beyond the campus community and show the world what the students at the University of Illinois are capable of.

## Financial Information

### **Have you applied for funding from SSC before? If so, for what project?**

Since the team's inception, the Student Sustainability Committee has been extremely supportive of our mission and efforts. SSC supported the funding of our first car Argo, which has achieved much since the project began in 2015. Argo has driven more than 7500 miles in its lifetime and has been seen at events and driving on the road by thousands of people around the world. Argo competed in the 2017 Bridgestone World Solar Challenge in Australia, the 2018 American Solar Challenge and the 2019 Formula Sun Grand Prix where it finished in fourth place. Throughout the years the team has shown continuous improvement and has learned much along the way.

With so much learned and developed throughout Argo's lifetime It became time for the team to move on to developing a new and improved solar vehicle. This vehicle, named Brizo is currently in development and nearing completion. The SSC made a significant contribution to the initial development of this vehicle by providing funding for the solar array, motor and rims. This funding provided much needed support to obtain critical components for the construction of the vehicle and will make Brizo magnitudes more efficient and capable than Argo ever could be. Further funding of Brizo will support its continuous development and improvement. As our team grows, we seek to improve the efficiency and sustainability of our vehicles by developing and improving our technologies.

### **If this project is implemented, will you require any ongoing funding required? What is the strategy for supporting the project in order to cover replacement, operation, or renewal costs?**

*Please note that SSC provides funding on a case by case basis annually and should not be considered as an ongoing source of funding.*

Past the completion of the construction of Brizo, funding to compete in races, attend events and ongoing improvements will come from a variety of sources. The business group within Illini Solar Car continuously seeks support in both in-kind and monetary support. These efforts ensure that the vehicle can continue to be used for years to come for the benefit of many team members and countless community members as a learning and teaching tool.

### **Please include any other obtained sources of funding. Have you applied for funding elsewhere?**

*Please attach any relevant letters of support as needed in a separate document.*

Illini Solar Car is supported by more than 60 companies and organizations at a number of different levels. These partnerships result in both in-kind and monetary donations and help us spread our sustainable message to a wider audience. Our more than 60 sponsors include a number of organizations within the University, local companies, and a variety of engineering and other related corporations from across the country and the world. Moving forward, the team will continue to seek new partnerships to continue the funding of our regular operations and to expand our impact.

## Environmental, Economic, and Awareness Impacts

**How will the project improve environmental sustainability at the Urbana-Champaign campus? If applicable, how does this project fit within any of the Illinois Climate Action Plan (iCAP) goals?**

The Illini Solar Car team is finishing up its second-generation solar-powered vehicle by the spring semester. The team is currently seeking funds for more efficient components, lightweight parts, and less environmentally impactful resources. All of these components will result in a more energy efficient car, while also encouraging sustainable thinking and innovation. The Illini Solar Car project aligns with many iCAP goals, and are outlined below.

### **iCAP Objectives:**

- 3.2 Expand on-Campus Solar Energy Production
  - The Illini Solar Car team directly contributes to this objective by proving the feasibility of a solar powered vehicle. The team is using a highly efficient solar array for its second generation vehicle in addition to raising awareness of renewable solar energy on campus.
- 10.3 Add New Sustainability-focused Courses
  - Aside from providing hand-on educational experience for our members, Illini Solar Car also administers the course ECE 298. This course explores the methods to building and driving a solar vehicle and includes sustainability-focused topics such as solar panels, power system optimization, aerodynamic efficiency, and battery usage.
- 11.1 Support Co-Curricular Student Sustainability Programs
  - One of the goals of Illini Solar Car is to emphasize innovations in sustainability and forward thinking. The team helps to educate students from all across the university to design and build a sustainable solar vehicle.
- 11.2 Strengthen Sustainability Outreach Programs
  - The team engages with the community in various outreach events to raise awareness about sustainable technologies. This includes visiting schools, displaying its car on campus, and driving the vehicle across the country to promote environmental thinking.
- 12.3 Launch Thematic Research
  - In the pursuit of building the world's best solar powered vehicle, Illini Solar Car coordinates students from all over campus to actively research the feasibility of solar powered and high efficiency electric vehicles.

### **iCAP Themes**

The Illini Solar Car team embodies many of the central iCAP themes. Education is a core part of the team. By providing a direct application of topics learned in curriculum, Illini Solar Car enables over 150 students to design and build innovative sustainable technology. The project also encourages sustainability through community outreach and education with young students as well as the general public. The Illini Solar Car project is constantly researching new technologies towards the ultimate goal of promoting sustainability and innovation.



**How will you monitor and evaluate the project's progress and environmental outcomes? What short-term and long-term environmental impacts do you expect?**

As an organization that designs and builds a solar powered vehicle, we hope to spark sustainable thinking to the greater population. Illini Solar Car wants to accelerate towards a future that involves environmentally positive technologies. Through research, innovation, outreach, and education, the Illini Solar Car team is helping to bring green energy to the forefront of an imagination for the future. Therefore we engage with our local community and around the world via outreach and community events. Amidst the COVID-19 Pandemic, we aim to continue this outreach in a virtual format. To increase the visibility of sustainable innovation we participate in many events such as the homecoming parade, Urbana St. Patrick's Day parade, Champaign Cars and Coffee, and more. We also take part in more engaging events such as Engineering Open House and organize our own outreach events, usually with local schools. Lastly, we engage with an even larger audience at our competitions and via social media.

One of the more tangible and immediate ways we measure our progress and the potential environmental outcomes is through performance at our competitions. Our first car, Argo, was a conservative design, intended to ensure Illini Solar Car brought a working product to competition. Despite this, Argo has a top-10 finish in an international competition and top-5 in a national competition. In its lifetime, Argo has driven over 7,500 miles using only power from the sun. Our second generation car will be lighter and have a more efficient solar array and motor. Specific innovations made for our second car include a carbon fiber rod suspension, more efficient aerodynamics, and better optimized electrical components.

**What are your specific outreach goals? How will this project inspire change at UIUC?**

Illini Solar Car seeks to inspire and challenge the next generation of creative thinkers, engineers, and innovators in solving this difficult design challenge. Our goal is to educate beyond the typical University academic system and engage students.

Specifically, our team is looking to complete our next generation vehicle and unveil it at a high-profile event. We were intending to unveil this vehicle at Engineering Open House 2020, but given that this event was cancelled, we are aiming for a similar (online-based) event in early 2021. This event will showcase our team's (and this University's) commitment to exploring and innovating with regards to sustainability and advanced transportation methods.

**If applicable, how does this project impact environmental injustice or social injustice?**

The goal of Illini Solar Car is to explore and research technologies that will support a sustainable future, including high-efficiency and green powered vehicles. Although electric vehicles are an important step towards slowing climate change, they are still powered by a grid that is run off of fossil fuels. A solar vehicle, however, is completely detached from being powered directly or indirectly by any carbon emissions. With the world on the cusp of transitioning to electrified vehicles, it is especially important to spur innovations that will push the envelope of what was previously thought impossible, such as solar-powered vehicles.

## Appendix A - Details of Funding Request

Included in this section is a breakdown of the funds requested by Illini Solar Car. We've adjusted our funding request lower to \$10,000. While the remainder of our budget for project Brizo exceeds this amount, we would like to request funding only for materials that directly relate to the Student Sustainability Committee's goals of sustainability and student advancement. SSC's contribution to the team in 2019 was integral to our project. There are a few major items remaining that will enable us to complete Project Brizo this year.

Item	Description	Cost
Energy-Efficient Racing Tires*	Illini Solar Car aims to purchase tires which have a low rolling resistance and a narrower profile than standard tires. This will greatly increase vehicle efficiency and performance. These tires are currently marketed solely to solar car teams but with the data and mileage we collect, they will soon become widely available, having the potential to increase the efficiency of gas and electric cars alike. Three sets of tires will allow for sufficient testing prior to the race and spares to rotate during competition to maximize vehicle performance.	\$3,000
Electrical Components	These electrical components will include surface-mount components for printed circuit boards and larger components that make up the electrical system of the car. The system runs entirely on solar and battery power and with new improvements this year will yield the most efficient Illini Solar Car to date.	\$3,000
Mechanical Supplies	These mechanical supplies will include lightweight and composite materials used to build the suspension of the vehicle as well as various parts that will be used in final assembly. The mechanical system is designed to be especially aerodynamic and light in order to maximize efficiency of the vehicle.	\$4,000
<b>Total</b>		<b>\$10,000</b>

\*The expense of tires is a priority for our application.