



## STUDENT SUSTAINABILITY COMMITTEE

### Funding Application – Small Projects (Under \$10K)

Please submit this completed application and any relevant supporting documentation by the deadline listed on the SSC website to [Sustainability-Committee@Illinois.edu](mailto: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>.

#### General Information

**Project Name:** InSPIRE Campus Solar Charging Station

**Total Amount Requested from SSC:** \$5800 preferred, \$4000 minimum

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

#### Contact Information

Applicant Name: Justin Habana

Unit/Department or RSO/Organization: InSPIRE

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#### Project Team

Name	Department/Organization	Email
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Financial Contact's Name:

Faculty/Unit/Department:

Email:

Phone:

(If Applicable)

Facilities Manager Name:

Email:

Phone:

## **Project Information**

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

We are InSPIRE, short for the Institute for Solar-Photovoltaic Innovation Research and Edu-training, an RSO that is dedicated to teaching the new generation of students about solar and renewable energy in hopes of making a brighter future.

Late spring 2017, the InSPIRE RSO decided on creating a cell phone charging station for public use and started brainstorming ideas. At first the station was a simple standing structure with lockers and usb ports where one can insert their phone for charging. A draft of this initial design still remains in the InSPIRE stored files. After the summer of 2017, a build team (lead by Tabare Torres and Chris Wong) for InSPIRE was assembled and began creating ideas to improve the station and resolve any potential problems. This process continued on for a few more weeks. Meanwhile, two members, Tab and Justin, began creating a structure for the team and delegation of responsibilities. Eventually, the Build team created three sub-teams -Electrical, Structural and Integration- each with their own tasks & objectives. Shortly after the groups structure was created, the group decided on a final product.

To increase the demand for its use and to have a more feasible & stable structure, the build team decided the desired outcome of the project will be an outdoors picnic table solar charging station that can provide students a place to sit and study while charging their laptops, cell phones, tablets as well as any other mobile devices. To accomplish this, the current design is to retrofit an outdoors commercial picnic table with a solar panel energy system, a metal pole, an electrical box and weatherproof power outlets. Resting on top of the pole is a solar panel. From this panel, thick cables will run through the pole, and into a weather proof metal box (under the table) which will contain almost all primary components of the Solar Energy system. More cables will leave the box and connect to power outlets and USB ports (on top of the table). From where people/students can safely plug in their devices.

### **How will this project improve sustainability at UIUC?**

Almost every student in UIUC owns a smartphone and laptop. A large number of those students also own a tablet as well as other mobile devices. Those students can also be seen using their devices as they accomplish their work on outside study tables or while sitting on a field of grass (in warm weather). Thus, the more direct affects a solar charging station has is that it will provide a source of clean energy to student/people who want to spend time outside. It also decreases carbon emissions and cost of electricity by allowing students to charge their devices using solar power instead of using the grid. However, there are also benefits from the psychological effects on students, staff and faculty.

Many student have not had a close up encounter with solar energy, nor have they directly siphoned power from solar panels that they can physically see in front of them. The solar charging station will give UIUC students an opportunity to do so. It will expose students, faculty and staff to solar energy. Showing them that it is real, it's not just something they see on TV or talk about like it was something far away. It's here and its spreading despite government and economic setbacks and it can directly benefit them by charging their devices. Such an encounter might even inspire them to pursue and/or contribute to the promotion of Solar Energy as well as other renewable energy sources.

Furthermore, the design for the solar energy system is easy for the general public to understand and replicate. A way to access the design documents will be made available somewhere on the charging station (via barcode scan, link to a webpage, person to contact, etc.) Therefore, if the first solar charging station with the offgrid solar energy system is a success, that opens the potential for more solar projects using the same or improved solar energy system design to pop up throughout the entire campus (either made by InSPIRE or another student group). It also increases the likelihood of people/students to create their own small off grid systems at home.

### **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.**

We currently do not have a location to place the charging station. We will cooperate with campus officials to find a location. Finding a location should not prove too difficult since there are a multitude of locations around campus in

which we can place an outside picnic table. Meanwhile, a team member will store the charging station in his front lawn (underneath a tarp) or porch until a proper location can be found. When it's time to move, the charging station will be easily disassembled and then reassembled on its permanent location.

Ideally we will try to place the picnic table on a location with a wide view of the south, the direction with the most sunlight potential in our latitude. Our currently preferred location is outside of the Undergraduate library because there is an open view of the south and there are already a few study tables scattered around that area. It's also a location that can provide high student traffic. Other locations include, outside the south side of the Illini Union, south of Grainger library, south side of Beckman Institute, the southside of Ikenberry building etc.

***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.***

The Sivananthan Labs is the organization that started UIUC RSO InSPIRE and its name might be physically included somewhere on the solar charging station. The Sivananthan Labs may also provide InSPIRE with small funding for the project's future maintenance and parts replacements.

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

The entire design & construction of the solar charging station will be conducted by the InSPIRE student project group. Finding a location to place the station will primarily be done by the student group with help and/or permission from campus authorities.

Designing and creating the electrical aspects of the solar charging station will impact students by providing students a working knowledge of solar energy systems which they can use in their own educational/professional goals or to create their own solar energy systems at home. Students also acquire transferable skills with electronics.

Designing and creating the structure of the station will involve the use of power tools, understanding of statics, autocad and more hands on experience in physically building free standing structures. The group will also consider many important elements that will appear multiple times in a corporate environment, such as reliability, effectiveness, durability and safety.

Learning how to integrate the electrical and structural aspects of the system will promote an understanding of the interdependence of multiple different disciplines and creativity in design.

Team members will also work with campus, city and/or state officials to ensure the station is within the state standards for free standing electrical structures and that the station has a place to legally stay on. This provides students an opportunity to conduct real-world communications and perhaps even negotiations.

Lastly, the project also provides an opportunity to apply knowledge from classes, increase team working skills, promote a sense of responsibility, and overall greater preparedness in their desired career.

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

No, our organization has not previously applied for funding with SSC.

## 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.***

Note: The InSPIRE build team will showcase a fully functional prototype of the solar energy system in the Engineering Open house. The prototype is not part of our funding request and therefore only a post-prototype timeline has been provided.

Note2: Planning and brainstorming for the project began on **Sep. 2017**, Construction of the final product will not begin until funding has been acquired. The below table assumes funding is granted and available for use on or before April 14 2018. If there are any delays, our plans will change accordingly.

Note3: Designing the structure began on Nov. 2017. Designing the final electrical system will begin on late Feb, however since the final system will look very similar to the prototype, most of the design has already been completed.

From Feb 1st and onward:

	<b>Task and Description</b>	<b>Due date</b>
Electrical Team Timeline		
	Finalize final draft of solar energy system Design.	3/31/18
	Finalize purchase list for Solar Energy System	4/21/18
	Construct Solar energy system (integrated into Metal box)	5/5/18
	Finish Testing of Solar energy system and resolving any additional problems	5/19/18
Structural Team Timeline		
	Create final draft of Structure design	3/31/18
	Finalize Purchase list for final structure	4/14/18
	Finish constructing Structure (picnic table w/ poles and empty electrical box) without electrical components.	4/28/18
	Finish Testing Stability of Structure	5/19/18
Integration/policy team timeline		
	Finish a list of requirements for the Electrical Box	3/3/18
	Gather legal requirements for free standing electrical standards	3/10/18
	Finish creating or buying electrical Box	3/24/18
	Final Review on Designs from Electrical team and Structural team to ensure they can be integrated into each other.	3/31/18
	Finish testing electrical box for weather resistance	3/31/18
All teams (after their individual responsibilities have been done)		
	Integrate Energy System into Structure	5/26/18
	Finish 3 months summer Test Run and ensure all quality indicators are met.	8/18/18
	Finish cleaning system	8/25/18

Transport to permanent location.	9/1/18
Finish conducting final periodic quality checks and resolve issues while the station is used by the public	9/29/18
Target Completion Date	10/6/18
Final Report Submission	10/19/18

**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.**

Note1: Each team has their own list of costs and thus the bellow lists are separated accordingly.

Note2: Items known as “other” represent the estimated magnitude of any unforeseen costs.

Last Updated:	2/4/2018		
<b>Itemized Estimated Expenditure List for InSPIRE Build team</b>			
<b>Structural Team</b>			
<b>Item</b>	<b>Unit Price (\$)</b>	<b>Qt</b>	<b>Total (\$)</b>
Picnic Table	800	1	800
12ft Steel Pole	200	1	200
Solar Panel Mount	400	1	400
2in x 4in x 8ft Wooden Board	12	1	12
36" x 36" non-corrosive metal sheet	22	4	88
Pole Stand/Base	60	1	60
Other	500		500
Totals		9	2060
<b>Integration Team</b>			
<b>Item</b>	<b>Unit Price (\$)</b>	<b>Qt</b>	<b>Total (\$)</b>
Weather proof Metal Box	250	1	250
Outlet Covers	20	2	40
Outlets/US modules	20	2	40
Other	100		100
Totals		5	430
<b>Electronics Team Final System</b>			
<b>Item</b>	<b>Unit Price (\$)</b>	<b>Qt</b>	<b>Total (\$)</b>
300 watts Solar Panel	250	1	250
40 amp Charge Controller	200	1	200
200 amp hour, 24v Battery	250	2	500
Low-Voltage disconnect	50	1	50
1000 watt Inverter	500	1	500

Cable Brancher	5	8	40
Battery Capacity Meter	10	1	10
Circuit Breaker (Auto)	8	2	16
10 gauge Cables	210	1	210
Battery Charger	100	1	100
Battery Desulfator	100	1	100
Other	500		500
Totals		20	2476
<b>Cost of parts replacement (for more sensitive components)</b>			
<b>Item</b>	<b>Unit Price (\$)</b>	<b>Qt</b>	<b>Total (\$)</b>
Charge Controller	200	1	200
1000 watt Inverter	400	1	400
Battery Capacity Meter	10	1	10
Circuit Breaker (Auto)	8	2	16
Low-Voltage disconnect	50	1	50
Outlets	30	2	60
Battery Desulfator	100	1	100
Totals		9	836
<b>Totals w/ out replacement parts</b>		<b>34</b>	<b>4966</b>
<b>Totals w/ out replacement parts and "other" costs</b>		<b>34</b>	<b>3866</b>
<b>Grand totals w/ all expected costs</b>		<b>43</b>	<b>5802</b>

***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)***

The estimated cost of replacement for components more susceptible to damage and/or with an expected warranty of one year or less is included in the Budget list.

The InSPIRE RSO (which is separate from the InSPIRE build team) will conduct fundraisers and allocate a portion of that funding to any additional future replacement parts or any unforeseen costs. We will also negotiate with the Sivananthan Labs to fund any additional cost of replacements.

The Solar charging station will not have any other operational/maintenance cost except for the cost of replacement parts.

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

We have no other sources of funding for the initial construction of the Solar charging station at this time.

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

The InSPIRE RSO (which is separate from the Build Team) conducts monthly meetings and will provide updates on the project to any students who attend (all students).

Information on the charging station will be displayed in the Engineering Open House along with a working prototype.

We may consider placing posters on bulletin boards around the location in which the charging station will stand, after a location has been found and before actual transfer to that location.