STUDENT SUSTAINABILITY COMMITTEE

Funding Award and Acceptance Letter

December 9th, 2022

Project: **Towards a Battery-Free Environment Sensing System for Urban Heat Island Identification**

Dear **Diego Calderon**,

On behalf of the University of Illinois at Urbana-Champaign Student Sustainability Committee (SSC), we would like to thank you for initiating a project that improves the sustainability of our campus. SSC is pleased to inform you that your project will receive **$39,994.00** in grant funding.

In order to remain eligible for this award, you must agree to the following conditions:

1. The project must be completed within two years. A final report of all work completed should be provided to the SSC Assistant Director by **December 9th, 2024**.
2. Project status updates and detailed account statements must be provided at the end of each semester, in the method requested, until the project is completed.
3. The Contact Person will be individually responsible for all official communication and the execution of this agreement.
4. The awardee will take the appropriate steps to create a CFOP with OBFS UAFR University Accounting Services. The CFOP provided for this award shall strictly be used for the money awarded in this proposal.
5. Any substantial modifications to project scope, budget, or timeline must first be approved by SSC. These requests must be submitted in a formal letter to the Chair and the Assistant Director.
6. All projects will be expected to follow campus policies and procedures as well as any applicable State and Federal laws.
7. SSC reserves the right to revoke funding if the project does not comply with the terms and conditions outlined in this letter.
8. Any press releases or educational/promotional materials involving the project should acknowledge SSC funding.
9. Any signage involving the project or events surrounding this project should include SSC's logo and/or a statement of which fee funded the project. Projects must coordinate with SSC to ensure promotion appropriately highlights the SSC's contributions to the project.

If you agree to the terms and conditions for the funding, please sign on the designated line at the bottom of this letter. If you have any questions regarding these requirements please contact the SSC, at sustainability-committee@illinois.edu. You will be notified when the Institute for Sustainability, Energy, and Environment and Vice Chancellor for Student Affairs officially approves this project. Again, thank you for your interest in improving the sustainability of the University of Illinois at Urbana-Champaign. We look forward to working with you in the future.

STUDENT SUSTAINABILITY COMMITTEE

SSC Signatories

Jack Reicherts, Chair
Student Sustainability Committee

Awardee Signatory

Diego Calderon
Applicant

Faculty or Staff Project Advisor (for Student-Led Projects)

Dr. Elahe Soltanaghai
Faculty/Staff Project Advisor

iSEE Signatory

Dr. Madhu Khanna, Director
Institute for Sustainability, Energy & Environment

Student Affairs Signatory

Dr. Danita Brown Young, Vice Chancellor
Division of Student Affairs

STUDENT SUSTAINABILITY COMMITTEE

Project Information

Project: Towards a Battery-Free Environment Sensing System for Urban Heat Island Identification

Funding Source:

[ ] Cleaner Energy Technologies Fee (302571)

[X] Sustainable Campus Environment Fee (303692)

Funding Amount: $39,994.00

Receiving Campus Unit: CS

Unit Financial Contact: Jonathan Manuel

E-mail: jonathon@illinois.edu

Project Description:

Several urban and suburban areas report higher temperatures than their surrounding rural areas, a phenomenon known as the heat island effect. The combination of rising temperatures, frequent and harsher heat waves, and the heat island effect are increasingly harmful to air and water quality and, consequently, to people's health [2,3]. Prior work indicates that surface and air temperature are the best indicators of the conditions people experience with warmer weather [2,3]. Satellites can monitor surface temperature over large areas, and standard weather stations and mobile traversers can measure air temperature [2,3]. However, the methods for monitoring air temperature are expensive to deploy and maintain (they are power-hungry and rely on cellular networks for collecting data [4,5]). Therefore, we propose **developing low-cost and battery-free sensing systems to reduce deployment and maintenance costs**. By harnessing power from existing radio frequency signals, we can deploy battery-free tags that cost cents per unit, are scalable, and are environmentally friendly. We can leverage public transportation to collect the data from these tags.

By the end of this project, we aim to identify and monitor heat islands in Urbana-Champaign. We will:

1. Develop battery-free sensors to collect air temperature
2. Develop a prototype for the collection of data
3. Analyze the data to gain insight into hot spots in Urbana-Champaign

4. Compile our findings, display them in interactive maps, and communicate them to decision-makers
5. Develop an outreach program to engage with the community and discuss the benefits of urban planning and green infrastructure
6. Open source our code and hardware so anyone can use it

This proposal directly funds:

- laptop for data collection: $1,500.00
- RFID tag with temperature sensors: $1,500.00
- RFID reader: $2,214.90
- Graduate stipend - 50% appointment: $34,780.00