SOCIETY OF PHYSICS STUDENTS
An organization of the American Institute of Physics

Marsh White Award Report

Project Proposal Title	Physics Outreach with Thermal Imaging
Name of School	Sewanee: The University of the South
SPS Chapter Number	6482
Project Lead (name then email address)	Taylor Morris morrita0@sewanee.edu
Additional Project Leads (two lists: names then emails)	Paul Campbell, Caroline Roberts, Thomas DeMars, Keshonn Carter, William Jenkins, Daniel Rosales campbtp0@sewanee.edu, roberca0@sewanee.edu, demartc0@sewanee.edu, cartekd1@sewanee.edu, jenkiwt1@sewanee.edu, rosald0@sewanee.edu
SPS Chapter Advisor	Dr. Randolph Peterson
Total Amount Received from SPS	$300.00
Total Amount Expended from SPS	$300.00

Summary of Award Activities

The SPS chapter at Sewanee: The University of the South illustrated and promoted physics' applications by using an infrared camera for thermal imaging in the local community. A public display of the camera and its abilities was done in conjunction with the physics department's seminar series. Future projects with the camera will involve studying buildings' thermal integrity and reporting our findings to the owners.

Statement of Activity

Overview of Award Activity

The ongoing mission of this project is to use our infrared camera to thermally image local buildings and share the results with community members to show how physics can be utilized practically in everyday life. We originally planned to have our camera in hand and our project begun by the end of January, but unforeseen delays with the camera shipping company caused us to not even receive the infrared camera until March. Because of this significant delay, our ultimate activity was also pushed back into the Fall semester of this year, though we held a public demonstration of the camera and its capabilities for analyzing buildings' thermal protection. We gave a guided tour around central campus with the camera to a group of Sewanee community , analyzing academic buildings on the inside and outside, following a session of the physics department's weekly seminar series. Despite these difficulties, we have still made progress in our outreach project due to our efforts thus far. Our demonstration has not only given multiple members of our chapter expertise in the utilization of the infrared camera, but also allowed the physics department (a department at Sewanee that is all too often overlooked due to its small size) to attract attention it otherwise might not be able to (see our press release in the campus newspaper below). This progress will be greatly expanded on in the coming semester, as we will move forward with our original and ultimate goal, to use the capabilities highlighted in our demonstration and experiments to thermally image local buildings and show community members how physics can improve their buildings' thermal protection. The target audience for this project was any and all members of the greater Sewanee community. Through our presentation, approximately 20 members of the Sewanee community were exposed to this practical application of physics. These included University faculty and students from various departments. The day-to-day benefits of thermal imaging technology, such as the discovery of ways to improve insulation of buildings, give this project a more broad appeal than other methods of outreach such as public lectures. As our demonstration was done in conjunction with our department's weekly seminar series, it integrated seamlessly into our department and chapter's operation. Upon our receiving of the Marsh White Award, a large portion of our next SPS chapter meeting was devoted to planning out our project. So our preparation and integration of our project with respect to departmental and chapter operations was well done, but the unforeseen circumstances regarding the camera's acquisition posed a problem that we could not anticipate. A couple of interesting discoveries were made during our demonstration that illustrate the effectiveness of this project and the continued successes we will see through it in the outreach activities of the coming months. While examining a few of the windows in an academic building on campus, we found one window released quite a bit more heat than the others. Upon closer examination, this was found to be due to this window's frame being metal, while the others being made of plastic. We suspect this window is older than the others, that had been replaced at some point. While examining another building from the outside with our group, we also found that windows have a tendency to act as a "thermal mirror" when viewed from a certain angle. The cold night sky reflected off of higher windows, giving them a much colder appearance then they actually would be. Heat from the nearby library also gave a falsely higher reading on some of the lower windows. These phenomena can be accounted for to give us accurate readings; our demonstration showed to us and community members how we can expand our project and give meaningful results to the Sewanee area at large.

Impact Assement: How the Project/Activity/Event Promoted Interest in Physics

Our one and only overall goal for the project was the same as that of the Marsh White Award itself: to promote interest in physics and its applications to the community. We decided we would determine whether or not this goal was met by a method of assessment. Our original plan of assessment to see if our project promoted an interest in physics in the greater Sewanee community was to survey the owners' of local buildings we imaged several weeks after the initial consultation, so that they could hopefully improve the thermal efficiency of their buildings based on the findings of the imaging. However, due to the aforementioned delay in acquired the infrared camera, this was obviously unable to be performed, as the findings of our demonstration around campus were not utilized to potentially improve the buildings' thermal efficiency in any way. We will still nevertheless implement this method as our project continues this Fall. Our demonstration on campus seemed to be a success based on the active participation and interest of community members involved, so the progress of our outreach project thus far as still contributed to the overall goal of promoting an interest in the uses of physics to all. Simply put, the infrared camera is a very interesting and even fun device that essentially everyone that has been a part of the project thus far, from physics Ph. D.s to laymen, after taken an interest in this unique project. We believe this is a

most encouraging sign, and that our continued efforts with our outreach project, actually utilizing the camera's capabilities in the local area around campus, will be received with the same level of support and enthusiasm that our previous demonstration has. These efforts are already underway, as we are currently communicating with industry officials at Tennessee Valley Authority and similar organizations with for-profit programs similar to ours so that we can learn the optimal way to use the technology we have been able to purchase with our Award funds.

Key Metrics and Reflection

Who was the target audience of your project?	Greater Sewanee community
How many attendees/participants were directly impacted by your project? Please describe them (for example "50 third grade students" or "25 families").	Approximately 20 members of the Sewanee community, with plans to expand the project in the future.
How many students from your SPS chapter were involved in the activity, and in what capacity?	7 students involved in image acquisition and analysis.
Was the amount of money you received from SPS sufficient to carry out the activities outlined in your proposal? Could you have used additional funding? If yes, how much would you have liked and how would the additional funding have augmented your activity?	Yes, the $300 we received was enough to purchase the infrared camera, when combined with other departmental funds. Had these funds not been available, however this amount of money would not have been sufficient, as the camera cost approximately $1000.
Do you anticipate repeating this project/activity/event in the future, or having a follow-up project/activity/event? If yes, please describe.	Yes, we aboslutely plan to continue our thermal imaging projects. The camera is not an expendable resource, so despite our initial difficulties, we can continue to work with it beyond this semester indefinitely.
What new relationships did you build through this project?	We have acquired contacts at TVA and other professional agencies that have shared with us how they perform similar projects.
If you were to do your project again, what would you do differently?	The time it took to actually acquire the camera has limted what has been accomplished thus far. If the order could have somehow been placed earlier, or with a different company, we could haver received it much quicker and had more time this semester to work on our project.

Press Coverage (if applicable)

http://thesewaneepurple.org/2014/02/15/society-of-physics-wins-national-grant/

Sewanee's chapter of the Society of Physics Students has just been named a recipient of this year's Marsh W. White Awards. This national award is a monetary grant given "to (collegiate) SPS chapters to support projects designed to promote interest in physics among students and the general public." Under the supervision of Dr. Randolph Peterson, SPS submitted a full proposal and budget to be reviewed by a selection committee. The club was selected for a grant to be used for the purchase of an infrared camera for use in a community outreach project.

By thermally imaging local houses, potentially houses still under construction by initiatives such as Housing Sewanee, the club plans to reveal weaknesses in the homes' insulation and suggest methods to optimize the heat flow. In this way, appreciation for physics and the natural sciences can be spread around the greater Sewanee community.

"This award is really a great way for us to showcase science to the local area," says SPS Secretary-Treasurer Caroline Roberts (C'14). "Physics is one of those fields that doesn't get as much representation at Sewanee as it should, so it's really wonderful that we've been selected for this award to help get our ideas out there." Other physics students involved in the award process include Paul Campbell (C'14), Keshonn Carter (C'16), Will Jenkins (C'16), Daniel Rosales (C'17), and Taylor Morris (C'16). "I'm very excited for the project we'll be able to undertake thanks to this grant," says Rosales, "it'll be interesting to apply the concepts we've been learning outside of the classroom."

Expenditures

Expenditure Table

Item	Cost
FLIR i7 Compact Thermal Imaging InfraRed Camera (140x140, Partial Cost)	300.00
FLIR i7 Compact Thermal Imaging InfraRed Camera (140x140, Remaining Cost)	800.00
Total of Expenses	1100.00

Activity Photos

Sewanee Society of Physics Students Members: (Left to Right) Jean Shirimpaka, Paul Campbell, Dr. Randolph Peterson, William Jenkins, Caroline Roberts, Daniel Rosales, Taylor Morris, Wilson Fricke. Photo Credit to Timothy Gfroerer.

If you have any questions, please contact the SPS National Office Staff
Tel: (301) 209-3007; Fax: (301) 209-0839; E-mail: sps-programs@aip.org