



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	Physics Outreach with Thermal Imaging
Name of School	Sewanee: The University of the South
SPS Chapter Number	6482
Total Amount Requested	\$300.00.

Abstract

Sewanee SPS will illustrate and promote physics' applications by using an infrared camera for thermal imaging in the local community. We will image various building's thermal integrity and report our observations to the owners, including why the integrity is physically how it is and how it can be improved.

Proposal Statement

Overview of Proposed Project/Activity/Event

Using a FLIR i7 Compact Thermal Imaging InfraRed Camera, Sewanee SPS members will acquire thermal images of various workplaces and homes around the local area (after obtaining permission from the buildings' owners). These images will be analyzed to determine where the buildings are thermally insecure, that is, where heat tends to leak out during cold weather, etc. The results of our analysis will be presented to the community members who own the buildings, with emphasis on how the insecurities in their building may be happening and how it might be improved. This project would accomplish a two-fold goal: assisting the local community by improving the quality of their workplace/residence and promoting an interest in physics and its' applications to the general public.

Our target audience for this project is, simply put, anyone in the Sewanee community who are willing to accept our services. We believe that providing a free, partial home improvement inspection service (many programs similar to this project cost money) will attract a good amount of participation, given an appropriate marketing strategy. We expect at least 20-30 people will be affected by our project. We also chose this project specifically for its concentration in thermal physics. Previous work by our club has included demonstrations of thermal physics activities in local schools, which were a great success. We believe the area of thermal physics is a relatively easy field to generate interest in, as it has a basic familiarity to most people, yet still has aspects of which the populace has much to learn. We plan to generate even more interest in physics by showcasing how it can be understood and utilized to benefit the general public.

How Proposed Activity Promotes Interest in Physics

The University of the South is located atop the Cumberland Plateau in Franklin County, TN. It is a very rural area; the University is often seen as a segregated area of academia surrounded by a far less sophisticated environment. Sewanee's Outreach Program makes many efforts to undo this stereotype and extend its beliefs of education and service to the greater community in the nearby towns of Monteagle and Cowan. The Sewanee Physics Department believes that this project is an excellent way to contribute to that effort. While many community members around Sewanee likely wouldn't see the direct benefit in a public lecture on physics or a flashy demonstration of scientific principles (though both of these project styles do have their merits) a project involving a directly applicable benefit based upon simple thermal physics would have a broader appeal.

The thermal images obtained with the infrared camera will promote interest in physics by giving an illustration to community members of how physics principles play a part in their day-to-day lives by showing them where their buildings are thermally less secure. These pictures will also show how they can use similar physics principles to improve the thermal security of the workplaces, homes, etc. In an area in which science, especially

physics, is seen as a cold, mathematical institution kept to lecture halls, a program showing how physics can be used by anyone in a useful way is greatly warranted. It is the goal of the Marsh W. White Award to spread interest in physics to the general public, and we believe this project would do just that in the greater Sewanee community.

Plan for Carrying Out Proposed Project/Activity/Event

Personnel:

- Taylor Morris (Chapter Vice-President and Student Leader/Project Coordinator)
- Paul Campbell (Chapter President and Project Overseer)
- Caroline Roberts (Chapter Secretary/Treasurer and project Marketing Coordinator)
- Keshonn Carter
- William Jenkins
- Daniel Rosales
- Dr. Randolph Peterson (Chapter Advisor and Project Advisor)

Marketing – The project will be marketed in several different ways to ensure maximum participation. Other than the obvious word-of-mouth efforts that will be utilized by our volunteers, we will also submit stories to the campus and local newspaper as well as send emails explaining our project through a community message system that reaches large numbers of people in the greater Sewanee area.

SPS member participation – We currently have six students working on this project, though that number will likely increase to around ten once further recruitment is performed. Morris will direct the overall project flow, Campbell will oversee the project and make sure it is being handled in the optimal manner, and Roberts will be in charge of project marketing and communication. The entire team will serve as data collectors and analyzers and consult with clients to ensure they are exposed to the two major elements of this project: lifestyle benefit and an interest in physics.

Expertise - All the student volunteers have had or are currently enrolled in our University's Electronics class. This is an intensive engineering/applied physics course with a focus in proper use of electronic equipment, etc. A research project concludes the class. The skills acquired in this class, as well as other lab-based course in the sciences here at Sewanee, have provided the students with much experience in scientific equipment usage and problem solving. Dr. Peterson has also had some experience using an infrared camera similar to the one that will be used during this project, so his knowledge might also benefit the efficiency of the project.

Project/Activity/Event Timeline

Imaging and consultation sessions will be conducted throughout as much of the spring semester of 2014 as possible in order to image with respect to the colder temperatures of the early months of the year and the warmer temperatures of the middle months, maximizing the usefulness of our results. Thus, we will need to be ready to obtain and analyze data as quickly as possible once 2014 begins. Initial marketing of our project is already underway so that we will have several clients lined up as soon as we obtain all the necessary resources. An adequate number of volunteers from Sewanee's SPS chapter have already been obtained (see list of

proposers), and more will likely be recruited as we move forward with planning. Student volunteers will obtain and analyze the data acquired with the infrared camera and communicate the results to project participants. This only leaves obtaining the camera itself before we are ready to begin the project. The moment our chapter has enough money to purchase the camera, it will be purchased. Funding is planned to be acquired through the Marsh W. White Award as well as other sources mentioned in the Budget Justification section of this application. Once this is done, we will dramatically increase our marketing efforts to help spread the word of our project's services and benefits to the community. We therefore intend to have the project fully underway by January 31, 2014 at the latest.

Activity Evaluation Plan

We will evaluate our progress in our efforts to promote physics and its benefits through thermal imaging by receiving feedback from the community members affected by the project. Participants will be surveyed about three weeks after their building has been inspected (in order to allow adequate time for any of our suggested improvements to be implemented and any necessary follow-up to then be done) about their experience with our service and their thoughts on it. Specifically, participants will be asked about our explanations of why exactly the thermal integrity of their building in various locations are the way they are, and how these explanations have helped their understanding and appreciation of how and why principles of thermal physics are important. Based on the feedback we receive, our procedure will be improved as necessary.

Budget Justification

The FLIR i7 Compact Thermal Imaging InfraRed Camera is obviously essential to this project, as the thermal observations required cannot be performed without it. We are applying for a Marsh W. White Award in order to partially cover the cost of this camera. The information it gives will be shared with members of the greater Sewanee community in order to not only help improve the quality of their lives, but also directly illustrate an easy to understand and beneficial application of physics. This project plans to show and promote to non-physicists the importance of physics topics learned in the classroom and their relevance outside of the classroom, a key mission of Sewanee SPS and the Marsh W. White Award. The infrared camera is the key component we need to put this plan to action, and is thus the only item we request funding for.

As the camera's retail cost is \$800.00 (on sale from \$1995 due to an educational discount program), we obviously require additional money than that being requested in our budget. We plan to supplement the money

received from SPS with money from the Sewanee Physics Department, as well as the University's Outreach and Education Committees, in order to raise all the funds necessary to purchases the camera.