



# SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

## Future Faces of Physics Award Proposal

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Project Proposal Title	Uplifting Students with Hovercrafts: A Smooth Introduction to Physics
Name of School	Rhodes College
SPS Chapter Number	5940
Total Amount Requested	\$446.00

### Abstract

The Rhodes College SPS chapter aims to create an initiative focused on engaging underprivileged elementary students in the Memphis area. In an effort to inspire future physicists that may not have previously considered pursuing physics, we hope to create hovercrafts with students to demonstrate a fun application of physics.

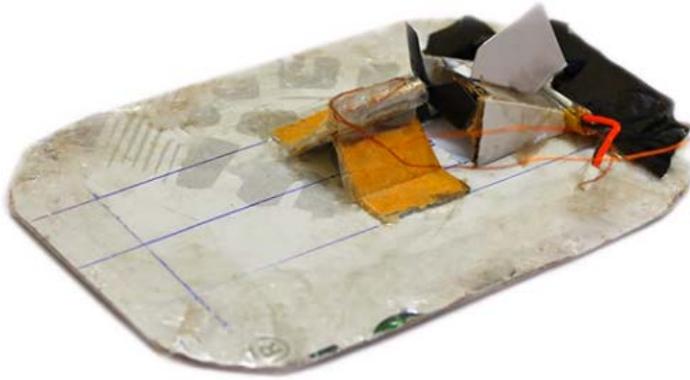
### Proposal Statement

#### **Overview of Proposed Project/Activity/Event**

This project will entail the construction of a large, human-supporting hovercraft along with many small-scale hovercrafts for the students. The large hovercraft will be built prior to the events with the students, and will improve upon our current hovercraft. Our current model is limited by the weak leaf blowers that power it; our new version would feature a larger, more powerful electric blower that is both long-lasting and safe to operate around children. During the events we will let the students ride this hovercraft and create their own smaller hovercrafts to take home, a version of which is pictured below. Throughout the events, we will teach the students about the basic physics behind the hoverboards: the balancing of the air's buoyant force and the gravitational force on the hovercraft. We would help them create their own simple hovercrafts from everyday materials, including cardboard, AA batteries, plastic wrap, and small toy propellers. We are modifying the small hovercraft shown below by using a AA battery, which are safe and readily available, instead of a Lipo battery, which are more dangerous and difficult to charge. By creating these hovercrafts, our goal is to show students that physics is both interesting and accessible to people of all backgrounds.



Our current, large hovercraft.



An example of the mini hovercrafts we plan to build.

We will be working with a 4<sup>th</sup> or 5<sup>th</sup> grade classroom from three elementary schools in the Memphis area: Snowden Elementary, Vollentine Elementary, and Treadwell Elementary. Each of these school’s populations are predominately minorities in America, as well as in physics. Their individual statistics are included below. Memphis is a majority-minority city, meaning that the majority of its population is underrepresented in physics.

As a chapter, our Rhodes College SPS is comprised of people from varied backgrounds, many of which are underrepresented in physics. We pride ourselves in our outreach endeavors and the relationships we have built in the great city of Memphis, TN. Because we are located in Memphis, we are in a great position to reach out to populations that may feel discouraged to pursue STEM fields, especially physics.

School Name	Student of Color Population	Low-Income Population	Proficiency in Science
Snowden Elementary	83%	71%	45%
Vollentine Elementary	94%	96%	35%
Treadwell Elementary	94%	95%	37%

### How Proposed Activity Promotes Physics Across Cultures

The problem of minority stereotypes persists in STEM fields and tends to dissuade underprivileged individuals from pursuing their interest in science. Through this project, we hope to encourage the next generation of physicists by showing them that anyone can succeed in physics and that they do not have to consider themselves “science nerds” to excel in that area. Many people still regard physics as an unattainable, difficult field that is accessible only to privileged people, such as the majority of famous physicists. We hope that by helping them create their own hovercrafts, which are exciting for most kids, we will help them become interested in physics and empowered to pursue science. Through their interactions with one another and our SPS chapter members, they will begin to develop the support network that is so critical for young people in science and see examples of unconventional physics majors.

## Plan for Carrying Out Proposed Project/Activity/Event

This program will be fully run by SPS members. The leaders of this initiative are as follows:

- Evan Main  
Evan is our current Outreach Coordinator and previous Demo Officer. Through these positions, he has personally coordinated and run many outreach events, some of which involved the specific schools we will be working with through this initiative.
- Anna Murphree  
Anna is our current Demo Officer. She planned and ran our annual Egg Drop last year and helped build our current hovercraft prototype.
- Dr. Brent Hoffmeister  
Dr. Hoffmeister is our chapter advisor and department chair, and is deeply invested in our outreach activities. He will be supervising the planning and execution of this event, and making sure that it achieves its goals.
- Joe McPherson  
Joe is one of our Machine Shop instructors, and he helped Anna build the hovercraft prototype. He has agreed to help us create a fully-functioning hovercraft for this project.
- Josh Ortega  
Josh is our current SPS President, and as such has experience coordinating volunteers and events.
- Alden Raymond  
Alden is our current SPS Vice President that also planned this year's Pumpkin Drop event, which requires extensive volunteer and resource coordination.

This initiative will be planned by Evan Main interacting with our contacts at the schools we plan to work with. Specific times and dates will be determined by each teacher's schedules. We will be creating a poster to send both to the teachers, to get the students excited about the event, as well as to students in our physics department, to encourage them to volunteer. Overall, we plan to have at least 10 SPS members volunteering in this program. These volunteers would help put together the large hovercraft before the events, as well as help the students create their own hovercrafts during the events.

## Project/Activity/Event Timeline

We will be implementing this initiative in spring semester of 2019. The specific deadlines for each step of this project, as well as the SPS members responsible for completing them, are included below.

Date	Action Completed	Coordinator
February 1, 2019	Reaching out to each school and establishing the event with teachers	Evan Main
February 10, 2019	Ordering the supplies for the large and small hovercrafts	Alden Raymond
February 28, 2019	Completing the large hovercraft and ensuring its	Anna Murphree and Joe McPherson

	operation and safety	
March 10, 2019	Finalizing logistic details with teachers (location, time, date, etc.), as well as volunteers for the events	Evan Main and Josh Ortega
March 18-29, 2019	Putting on the events at the schools; the specific date within these two weeks will be decided on by the teachers	Evan Main, Anna Murphree, Alden Raymond, Josh Ortega, and more SPS volunteers
April 15, 2019	Evaluating the event in officer meetings and compiling event photos and documents	SPS officers
April 30, 2019	Completing and submitting the final event report	Evan Main and Anna Murphree

## Activity Evaluation Plan

To evaluate the effectiveness of this project, we will first look at engagement: how engaged did each classroom of students appear? We will take into account the way that the participants interacted with each other and SPS members. Since the event has the proximate goal of encouraging underprivileged students in physics, we will consider how the students respond to the event and physics in general. We will ask for reviews from the teachers after the events and use those to gauge how well the events were received. At the end of each event, we will ask the students to complete a short, 2 or 3 question quiz assessing their understanding of the physical principles of the hovercrafts, as well as their attitudes towards physics. Although much of this evaluation is qualitative, we will keep accurate records of the comments made by the teachers and the students's quiz responses as part of our evaluation plan. This feedback will help us improve our concept for future expansion. We will also consider how well the event was implemented logistically. This evaluation will be discussed in-depth at the officer meeting after the event, as well as with the rest of the chapter members and especially everyone involved in the hovercraft events.

## Budget Justification

A majority of the budget will be used to purchase the materials required to build the large, human-supporting hovercraft. The materials for the small hovercrafts that we will help the students build and let take home will comprise the rest of the budget. These materials include small fans, AA batteries, and battery holders. The necessity of the \$500 award lies in the sheer number of students we plan on constructing miniature hovercrafts for, as well as the construction requirements for the main example hovercraft. We will not need any of the funds for anything not directly related to our project, as we already have t-shirts and other outreach related items. We also already have lots of cardboard, tape, and plastic wrap to complete the mini hovercrafts.