Outreach Project

Written by CNM-ST

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Spring 2016

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Introduction

Every person, young or old, looks up to the vast expanse of seemingly never ending stars wondering what is truly out there in the Universe. However, are we really looking for what is just among the stars or are we searching for what is out there for us? Our futures are intertwined with the adventure and unknown that NASA and fellow explorers have asked and searched for countless ages. NASA, a forerunner in education and science, has constantly pursued innovative technology alongside our quest for bettering ourselves. Fortunately, NASA has given an amazing opportunity to several colleges around the country to chase similar dreams through the power of robotics. Creating a competition called the NASA Swarmathon, it is focused around a theory of robotics called swarm dynamics. Theory like swarm dynamics sounds complicated but is the simple theory of many robots doing one job very quickly. This competition went further than just the topic of robots; it stretched out to engage our youth. Such a goal of enriching future explorers with the knowledge and opportunity of the many programs STEM career paths provide for them is admirable and necessary. The Central New Mexico Community College was chosen to help push this very mindset. Having been accepted to the Swarmathon competition, we were also tasked with bringing the adventure to the local community with outreach programs and demonstrations of robotics and technology. The outreach portion of this competition truly opened our eyes. Forming the CNM Robotics team and tackling the monumental task of communicating and demonstrating new technology, that we ourselves were attempting to learn, seemed like an impossible goal. After our multiple forays providing demonstrations at a college career day to over 2000 high-school students, we were offered time at local schools. This outreach really showed the interest and demand in such a massive undertaking. Despite the challenges inherent in such an ambitious outreach program, the goals of the program itself, our college day presentations, becoming guest speakers at a local charter school, and how all these wonderful opportunities paved the way for future programs from CNM and STEM, not only enhanced but grew the community around us as a whole.

Building a Team

The CNM-ST team is made up of students of all ages and from many diverse degree plans. We have engineers, programmers, mathematicians, and system admins just to name a few. What brought us all together for this project was the desire to be a part of something much bigger than ourselves, to be on the ground floor of something so groundbreaking and exciting, to have the opportunity to work with an agency such as NASA and be able to add that to a resume, and to push ourselves to grow in a way never before offered. Some of us had very little to no experience in this type of work but our instructor Dr. Chu Jong believed in each person that he brought into the class and that made us work harder and maybe we weren't able to contribute as much as other, but we stretched ourselves and learned things we may not have otherwise. This could have also been one of our biggest struggles. We didn't have enough people who knew about algorithms and coding to create competitive teams. We were about half way through the competition before we realized that we were getting nowhere that way and restructured the

teams, while still giving those less knowledgeable an outlet to increase their skills. Once we were able to put each members' strengths to work, we began to see progress and success in our work.

Making Connections

Most of us had never participated in a competition of this magnitude and certainly not one potentially capable of impacting not only our individual futures, but also the futures of our own college and a younger generation. We asked ourselves many questions about how to get started: how were we going to connect with our local high schools? Who do we talk to? What's appropriate, what's not appropriate? Throughout this competition the use and execution of our ability to problem solve became more and more apparent. Our first step was to research administrative departments within our college in hopes of establishing a starting point for connecting to these students. We found the CNM Outreach department. The department was very supportive in showing us the correct steps in order to obtain a rapport with high school instructors. It provided us with information needed to effectively represent our school and team.

Refreshingly the process turned out to be very simple. First find teachers who already taught classes specifically centered around our topics, email them explaining who we are and what we proposed to do for them and their students. Unfortunately, we were met with some resistance. It was a constant struggle coordinating an agenda that fit both the schools schedule and ours. In order to combat this problem, we moved our focus from students and instructors currently involved in these topics, to all of the public, private, or charter schools throughout the Albuquerque, Los Lunas, and Farmington area not matter their experience with robotics. However, no matter how far our efforts stretched the complicating task of finding availability that worked for both sides became a major influence on the impact we were inevitably able to have. Overall the social network gained from the connection to CNM Outreach was highly beneficial to the outcome of our efforts.

CNM College Day Event

Fortunately, CNM-ST's connection to CNM Outreach provided us with an opportunity to be a part of CNM College Day Event. This event takes place every spring term for all high school communities in New Mexico. 2000 plus students, teachers, and faculty from a variety of cultures and backgrounds would be attended this event from cities as Cuba, Los Lunas and Farmington. The College Day event alone would turn out to be one of the most productive ways to reach a large amount of high school students at one time. Groups of people would be dropped off at the main entrance, and were guided throughout the school, stopping at booths, tables, or demonstrations. We were excited to learn about this event, and wanted to take full advantage of its significance. We formulated a presentation to promote STEM programs offered by CNM and to make a connection from those programs to career paths that change the world. As part of the presentation we introduced the role in which STEM programs play by providing students with new and exciting opportunities. Such as the NASA Swarmathon competition and its amazing connection to new technology and continued profound passion for space exploration.

Our demonstration was a great success. Students gained hands on experience remote controlling the Swarmie, were amazed by the Swarmies ability to move autonomously, and learned how the interface illustrated key aspects of GPS location and speed. They were intrigued by the 3D imaging portraying its relation to the surface it was exploring and how the camera made it easy to view what the Swarmie was viewing and how it was reacting to its surroundings. We

explained our mission, how it takes many jobs and perspectives to contribute to the success and overall development of robotics, computer science, and engineering careers and also presented the concept of “we”.

We engaged the students by asking them to get involved with the presentation, ask questions, and provide ideas. Many of the high school students were receptive, and gave interesting ideas on how we could use this technology to influence the betterment of our community, such as the idea to use autonomous driving cars for drunk drivers. We began to ask the students how many of them were interested in these topic and how many felt they would pursue a career in these fields. As the day moved forward, more and more, hands were raised. As the groups moved in and out of our classroom we became more and more excited about our mission and were intrigued by the depth of the student’s curiosity.

Cesar Chaves Charter High School

We presented to a group of students from Caesar Chaves Charter High School. The instructor accompanying these students was Laurie Ilhm. Laurie was fascinated by our project and asked us personally if we could come to her school and provide the same demonstration for all of the students currently enrolled. Cesar Chaves Charter High school is a free charter public school that offers a non-traditional platform for students struggling to finish high school. These students often juggle family obligations, jobs, and school at the same time. Many of them have had life obligations prevent or postpone their educational advancement. Cesar Chaves provides a non-traditional schedule for these students so that they can meet the obligations to family and work yet still have the opportunity to succeed in their educational goals. At first we presented to a student’s coming and going in the cafeteria. During this time, we walked around the room trying to grab the attention of these students to get them excited to learn more. Some of the teachers came together and provided us with a room where we were able to present and we were able to reach three classrooms of students at one time. We struggled to get involvement from this group, this only reinforced our need to reach out. A few of us then took it upon ourselves to offer our support for these student’s educational success by providing ourselves as a direct connection to CNM, CNM’s programs, and a connection for opportunities in competitions such as the NASA Swarmathon. We came away from this presentation feeling uneasy about the level of impact we left on these students, and it made us want to reassess our efforts, go back to the drawing board and come up with ideas that would better reach these types of students.

Outlook for The Future

We faced many challenges with the outreach portion of this competition that have led to significant revisions and reformulation of our plan. Our goals for the future NASA Swarmathon competitions would be to set up a team of both college and high school students that may work together competing in each of their own types of competitions. Being able to work side by side would give the high school students the chance to fully immerse themselves in learning the skills and knowledge it takes to succeed, and the college students would then be able to directly impact the student’s ability to achieve that success. We would like to create a robotics program or club that would allow both college and high school age students to work together, building projects from the ground up and get hands on experience with all aspects involving the topic of robotics, computer science, engineering and what they have to offer. When it comes to social networking and achieveing our mission goals, we would like to get permission to send a mass email to all of the local schools as well as the surrounding school districts inviting them to come and participate

in a seminar that would promote CNM's programs, NASA Swarmathon's mission, and the combined effort to promote the interest of STEM programs and opportunities.

Conclusion

The CNM college day event was an exceptional way of reaching a large number of students at one time. It provided our CNM-S team a chance to assess and impact the knowledge of our local high school community. The event provided a connection to faculty interested in bringing this essential information to the students they have mentored for the betterment of our society's progression in these specific topics. Once a connection was made, CNM-ST was able to bring our knowledge and tools directly to Cesar Chavez Charter High, and reach students in a more conductive setting. Preparing for the future success in this portion of the NASA Swarmathon competition will focus on the increasing communication, collaboration, and participation between CNM and our local high school community. Collaborating across multi-educational institutions, and conducting an inspirational and hands-on demonstration of world changing technology, useful programming, and robotic simulation proved to be an effective approach for our outreach challenge.

Appendix of Team Members

Members	Contribution
Usan Shrestha	Obstacle Avoidance
	Search Algorithm
Samuel Choy	Obstacle Avoidance
	Public Relations
Rachel Young	Obstacle Avoidance
	Search Algorithm
Jose Del Torro	Map Task
Quynh Do	Move Task
Dominic Baca	Public Relations
	Search Algorithm
LaDonna Mayville	Public Relations
	Outreach
	Reports
Shane Kennard	Target Identification
	Outreach
Jeffery Schlindwein	Search Algorithm
	Map Task
	Public Relations
	Outreach
	Reports
Jarett Jones	Search Algorithm
	Map task
Maximo Lazo	Move Task
	Outreach
Rebecca Becker	Outreach
	Public Relations
	Reports