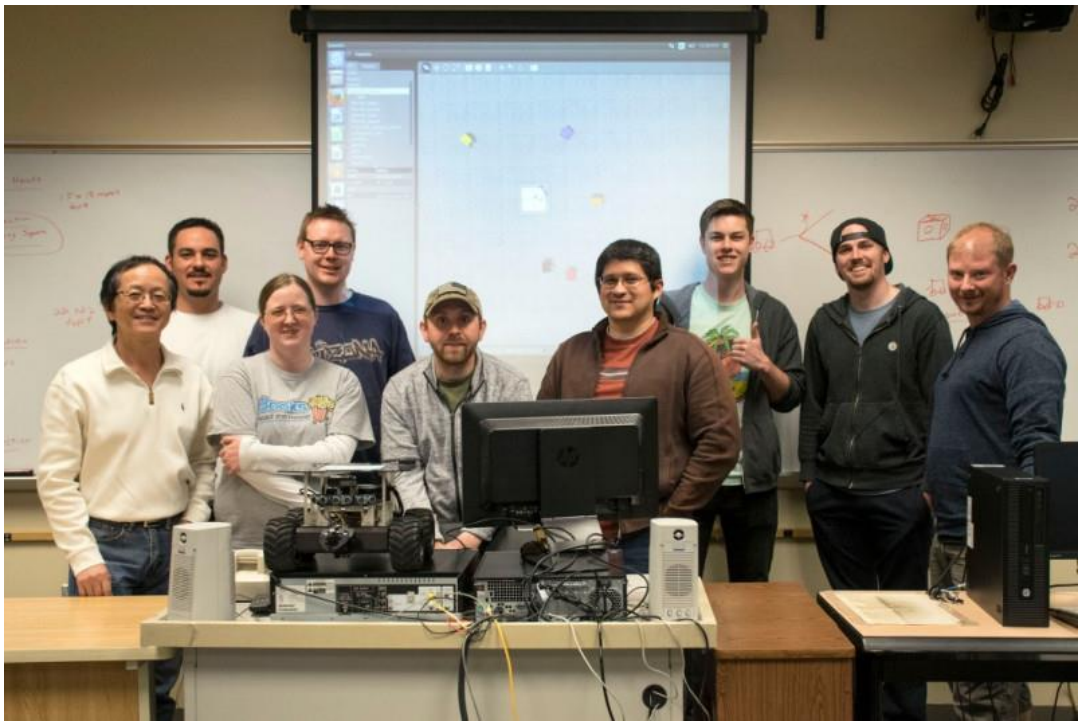

Outreach Report

BY CNM-SWARMATHON ROBOTIC WORKGROUP

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Purpose

Since the earliest age of man we have wondered about our place in the universe and our relationship to the cosmos. It is this quest for better understanding that fueled the great astronomers and scientists of the past to begin their research into the unknown. From Kepler to Galileo, the desire to seek out answers to those unknown questions has spurred a scientific revolution that continues to this day. With the CNM-Swarmathon Robotic Workgroup, we intend to relate the research we are doing to the desire for discovery and the fundamental nature of exploration. In this journey, it is not enough to simply further our own paths. It is our higher duty to pass on this fervor for exploration, to call to arms the future scientific minds that will carry on our grand tradition. It happened for us, and so, too, must we honor our mentors by passing the baton to the next generation, so that the whole may become greater than the sum of its parts. The Swarmathon Outreach is our small part of the sum. If we would reach even one student in ten, and alter their perception of robotics, coding, or even scientific thought as a whole, then our job would be well-satisfied.

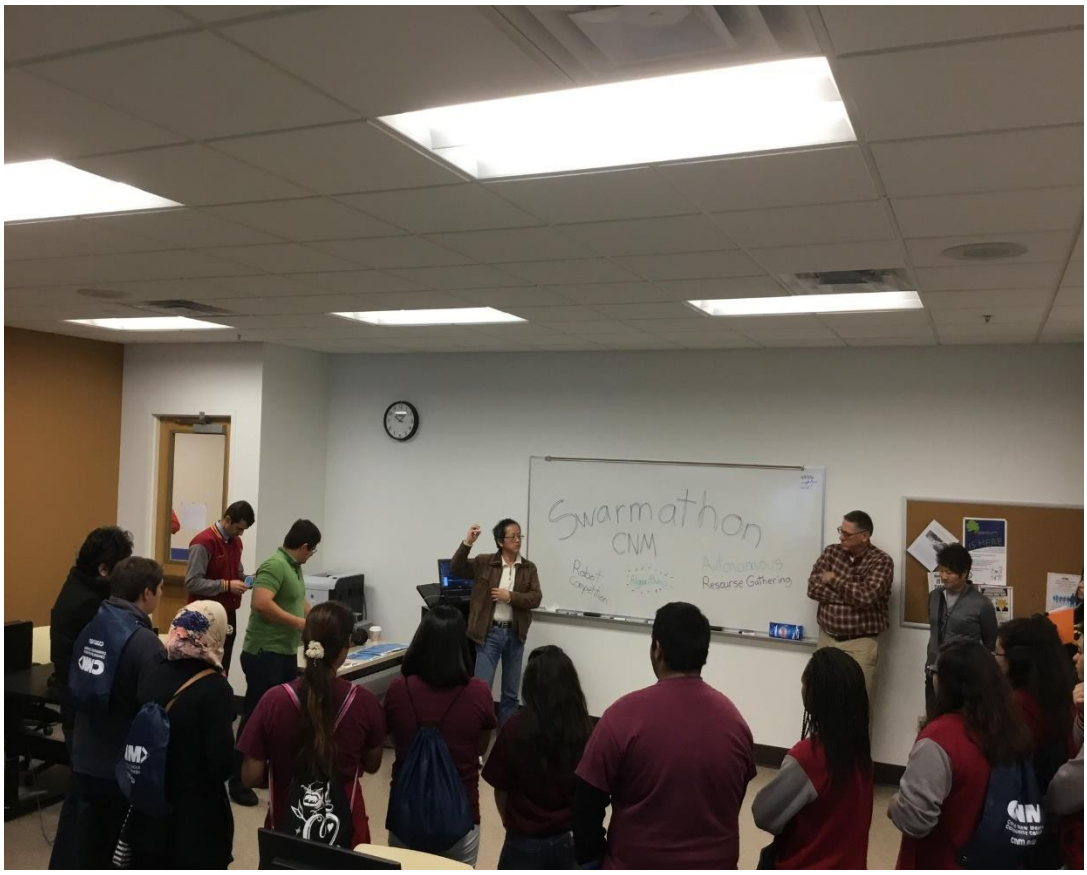
Outreach Recipients

Amy Biehl High School

The CNM-Swarmathon Robotic Work group went to Amy Biehl High School, which is a female and minority majority charter school in downtown Albuquerque, New Mexico. We introduce the students to various opportunities in science, technology, engineering, and math. We also elaborated about the NASA Swarmathon and its role in developing groundbreaking technology for the future of space exploration. Our robotic work group discussed the concept of swarm technology and how this technology is being designed to mimic the behavior of a colony of ants working together to collectively accomplish a greater goal. The idea of having robots working together autonomously as a swarm, looking for resources on another planet really got the students mind working. As we discussed all the elements of the “swarmies”, the students became more and more interested in our presentation. The idea of space, mars, and exploration really caught the student’s attention. The outreach at Amy Biehl High School was a good experience for both our Swarmathon team as well as the High School students. We let some of the students drive the “swarmies” which was a fun experience for the students. We encouraged everybody to get involved in computers and programming. It was encouraged to the students to enter robotics and programing competitions where they could improve and showcase their skills. At Amy Biehl Charter High School, the student body makeup is 40 percent male and 60 percent female, and the total minority enrollment is 65 percent. Our team feels that our outreach to these students sparked an interest in STEM fields, and was very successful.

College Day at Central New Mexico Community College

Central New Mexico Community College hosts groups of high school students from across the state to come visit and get a closer look at all the fun and exciting career fields that CNM helps prepare students for. Over 2000 students, faculty, and teachers gathered at CNM for this event. Student would tour through campus and classrooms exploring the idea of attending college and pursuing one of the many career paths that Central New Mexico Community College has to offer. Having this kind of a platform to be able to reach so many high school students and educate them on some of the exiting things happening in STEM. One of these exciting things that we talked about was the NASA Swarmathon. We introduced the students to a "Swarmie" and explained to the students what the NASA Swarmathon is and what the "Swarmies" do. We did some hands-on activities that included letting some of the students operate the "Swarmie". We also demonstrated to the students how the robots work autonomous. The happy faces, hanging on to every word showed that this outreach opportunity was a success that brought more wonder and curiosity to the students, hopefully sparking the interest of the next Elon Musk, Ada Lovelace.



Future Outreach

New Mexico Junior & Senior Division Regional Science Fairs

On March 31st and April 1st, New Mexico Tech will be hosting the New Mexico Science and Engineering Fair, for both high school students and middle school students. It is a gathering of several hundred students, who are interested in many different fields

of science and engineering. While it is too late to attend this year's Fair for outreach, our team plans to attend regional competitions in our area over the next year. By attending regional science fairs, our actions could potentially reach thousands of students. We plan to introduce students to both the rewards and challenges of robotics by demonstrating our swarmies, both the physical and virtual versions. Our team can explain the purpose of the rovers and what progress we made in the previous competition.

We can field questions while presenting the rovers, explaining what the rover is doing, and how the younger students can get involved in not just the competition, but robotics as a whole. We know our contribution is only a small portion of what can be done in robotics. Depending on the interests of the individual student, our team can split up and explain various portions of our work—the mobility code, the networking aspect, the teamwork required, or the reports and documentation of our work.

Of course, our work means little if it doesn't serve a greater purpose. So, we introduce the ways the rovers and the work our group, in particular, has done can affect and contribute to the future of science and society. NASA is currently working to send missions to Mars, and our rovers—and the rovers of the other teams, and the rovers the students may one day work on themselves—could be a part of those missions.

High School Career Days

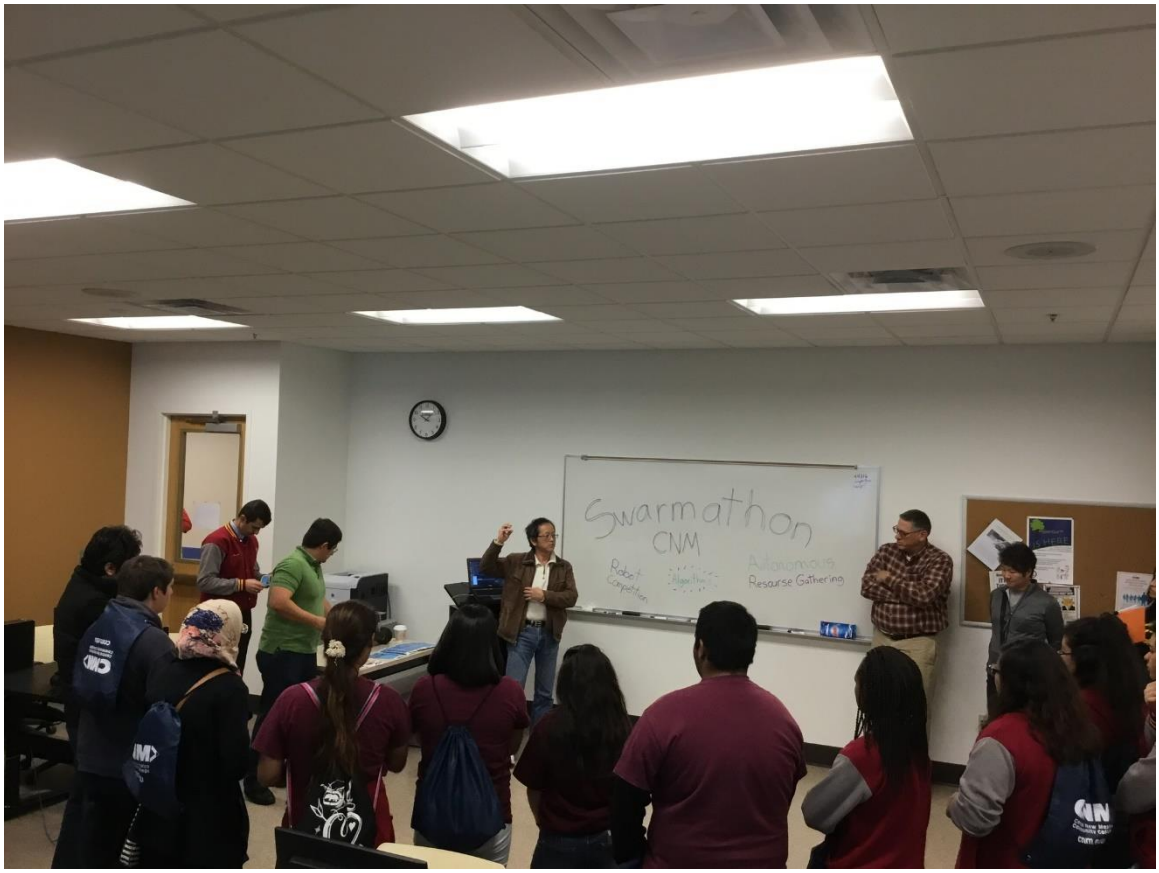
Many high schools around New Mexico host career fairs, where professionals come from all over the region or state to discuss their work and impact, and how students can also get involved. A single career fair can easily bring an attendance of 100-200 students, and we could talk to at least half, if we attend. If we attend several throughout the year, we could potentially reach about a thousand students, especially if we demonstrate the swarmies on site. Autonomous rovers are great attention getters.

As the students at a high school career fair may not be scientifically-inclined, we may not be able to explain our work on quite as much of a technical level, but we can introduce students of all interests to computer science and algorithm design, as well as inspiring curiosity and excitement for the future of robotics and the space program. In an activity like this, we can also allow the students to drive the robots themselves, or design a simple program that allows students to create their own basic movement algorithms. Nothing inspires a student like personal achievement and wonder.

Central New Mexico Outreach Office

On our school grounds, there is already an office dedicated to reaching high school students. Our team plans to work with the Outreach Office after the close of the competition to participate in demonstrations for high school tours or college celebration days. Whole grades of high schools visit a single campus on a field trip today, so we could reach up to 300 students at each major event.

In being available for questions and presentations, our team plans to inspire high school-age students to pursue STEM education. Even if only a single course—it's in that single course that a student's entire life could be altered, and their educational goals shifted. We can find, by talking to students, what facet of STEM might interest them most, and show them how our work and robotics can be used to further explore and learn in that field.



Conclusion

The outreach at Amy Biehl was a huge success. Having an audience of mostly female and minority students, we were able to encourage the least represented population in our state and hopefully get more females and minorities to become educated in STEM career fields and excel in the math's and sciences. The outreach opportunity at Amy Biehl High School was exactly the kind of outreach our mid and high school students need in order to become inspired to do big things in science and engineering. This kind of outreach is not only good for the students, but for our community and economy.

College day at CNM was also a huge success because we got to speak to many different students from all over New Mexico. We were able to tell them about how they too can get involved in Science Technology Engineering & Math. Young, fresh ,educated minds full of creativity and inspiration is exactly what our world needs. The students of this community are our future and if we can steer them in the right direction and create a domino effect for the better of humanity, starting locally, then we are doing our job!