# Outreach to Future Stars: Watsonville Robotics Club Watsonville High School & Cabrillo Robotics Club, Cabrillo College, Aptos California

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Cabrillo College is located in Aptos California along the central coast of California. Being the only community college in Santa Cruz County, it is the link between high school students of the low income farming community of Watsonville to the south and the high income technology hub of the Silicon Valley to the north in the neighboring Santa Clara County.

The field of engineering has traditionally struggled to obtain and secure minority students both in higher education and careers. Cabrillo's STEM program has made an every effort to attract and provide opportunity for minorities to have a chance at transferring to four year universities by taking classes from high quality instructors, many with graduate degrees in the sciences, in order to save money by taking these classes at community college prices and be well prepared for classes at the University when they transfer.

Our STEM centers study hall and modern engineering classrooms are busy all week and through the weekends during the semester. Students of all backgrounds and ethnicities come here to work on homework and use the free tutoring and other resources available. This also gives a place for students to network and meet others with similar interests. The STEM center is also the meeting area for many of the schools clubs.

A few of the sophomore level engineering students that are going to transfer next Fall were asked to speak to a class of visiting students from Watsonville High School and tell them about why and how Cabrillo has helped them prepare for their future education at a university and to eventually become engineers. The robotics club president Jaben Melville, told the high school students about how extracurricular activities such as being involved in the robotics club and Swarmathon helped him get more out of his educational experience. These projects give the opportunity to apply the math and computer science he was learning. Also the experience of working on something with a team that NASA could potentially use to help collect resources in outer space was exciting and fun. Jaben then showed them a quick demo of the Swarmathon. Watching the virtual bots cruise around collecting tags got the students interested. He then explained there was a similar project NASA and UNM wanted to offer to let those involved in the Swarmathon to teach high school students. Their teacher, Stephen Buchter, had recently started an after school robotics club Fridays. Seeing the students interest in the project, Stephen and Jaben made plans for a future collaboration. The two robotics clubs planned to meet the next couple of Fridays at their campus in Watsonville. Doing the outreach at Watsonville high seemed like a great fit. It is a local high school with a large hispanic student base and a newly founded after school robotics program.

With the outreach planned for the upcoming Friday, the club got together to go through the modules together and discuss the goals of the outreach. We decided to focus on captivating the student's interest in engineering. We would do this by finding out what got the students interested in robots. Then telling them what excites us about the field. We wanted to be sure to explain that their generation is going to be the ones actively taking part in these NASA projects.

**Outreach Day 1:**

We began by introducing our team to the students; stating name, major, and our interest in robotics. Then we discussed the swarmathon competition and the problems associated with autonomous search. Garrett brought a simple obstacle avoidance robot build on an arduino to demo for the kids. We explained the difference between a remote operated vehicle and an autonomous one. This led into a discussion about the code and upload process. Once the students understood that the bot was programmed to do what we wanted we went into a more general discussion of programming in general to get them ready for the first module.

This is when we gave a short demo of the Mars colony bot first module. We explained the Netlogo coding environment, basic variable/boolean descriptions, and the fun of programming. At this point the students seemed slightly overwhelmed by all this information. We took a short aside to describe the varied programming knowledge of our team, between one and three semesters of programming classes. None of our members had any coding experience prior to college classes. This did a lot to settle the students and show them that this was relatively new to all of us. To develop interest we made small errors in the code and asked to students to find and fix these problems. Initially getting the students to engage in the code was difficult, but once the first student touched the keyboard apprehension left and the ball was rolling. Allowing the students to work together to and try to interpret the first few lines of code went well.

At this time we were starting to run short on time. We had made an agreement with the teacher that we would have the first half of the time and after that they were going to work on their rov project. We finished with a demo of the completed module one. Showing the students the working collection “game” and explaining how the module would walk them through creating this project on their own seemed to peak their interest. We turned the students over to their own projects and said our goodbyes. The teacher told us he would have the students vote whether they were interested in the project and wanted us to come back next week. We heard back from the teacher a few days later and all of the students voted to have us come back.

**Outreach Day 2:**

We arrived early and set up the NetLogo software and UNM modules on their computers. The teacher was excited to have access to this and asked us to leave the programs installed for future coding projects. We had the computers in the lab prepped and ready before school was out. This week we had four students. Three of them had attended the meeting the week prior. It was encouraging to hear that one of the two female students had taken an interest in programming after our first meeting. She told us that she had researched programming over the weekend and had even began going through some of the tutorials on Code Academy.

Once the students arrived we had them dive right into the first module. We had four club members and four students allowing us to give personal attention to each of the students. Pulling up

the project and getting through the first few steps of instruction went smoothly. Before they knew it the students were writing their own code and creating their first programming project.

Christopher encouraged the scholars by telling them that they get to do cool projects like this at Cabrillo as part of some of the classes and definitely by becoming involved in experiences like the clubs and NASA competitions and as a career in the STEM field are possible because of persevering in the mathematics and science classes in order develop the skills necessary to tackle problems that take a while but are very rewarding when done

The UNM modules were easy to teach and the students immediately wanted to adapt the program to make it their own. They changed the color of the rocks and  some of the variable names. Most of the students were able to complete the first module in one day.

They have an ROV competition coming up in May that they are focusing on. We will be checking with them to see if they want any extra help.  We were happy with experience of teaching the first module, and hope to come back after they finish their ROV project and go through the other modules. It was exciting to encourage these kids to pursue an education in a STEM career and spark an interest in robotics.

**Outreach Video Summary:** https://youtu.be/NWFPMFMWBO4