

San Jacinto College and University of Houston – Clear Lake

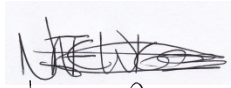
Outreach Report

Team UHCL-SJCN

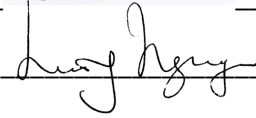
This document is in submission of partial fulfillment of obligation of the NASA Swarmathon. The faculty advisors hereby certify that the information contained in this documentation is accurate and correct and that the information has been reviewed prior to submission.

Team Advisors

Nathanial Wiggins



Dr. Luong Nguyen



## Introduction

The purpose of outreach and recruitment is to disseminate information about the participation of San Jacinto College and University of Houston – Clear Lake in the NASA Swarmathon so that a clear pathway from high school to industry is demonstrated. In many cases, pictures are not taken during outreach since the students involved are minors and a photo release cannot be obtained. All numbers are approximate and rounded downward to ensure truth in reporting. All students in honors courses and robotics courses are encouraged to perform service learning as a component of their project and include it in their individual documentation.

## Summary of Swarmathon Outreach Activities

Date of Outreach	Outreach Method/Event	No. of Faculty Involved	Approx. number of students reached	Notes
2/19/2016	BSC Swarmathon Tech Friday	6	45	Hosted at UHCL, students signed up at <a href="http://bsc.uhcl.edu">bsc.uhcl.edu</a> - open to any high school or undergraduate student.
2/25/2016	UHCL Press Release	4	500	<a href="http://newsroom.uhcl.edu/news/university-robotics-team-preps-for-nasa-competition">http://newsroom.uhcl.edu/news/university-robotics-team-preps-for-nasa-competition</a>
2/26/2016	Engineering Week - robotics demo table	6	300	Hosted at SJC South Campus by engineering department
3/10/16-3/11/16	MindTrekks - robotics demo table	5	6000	Hosted at SJC Central Campus by Dow Chemical (6130 kids, 363 adults)
3/25/2016	UHCL/SJC vs UH Local Swarmathon	5	50	Hosted at UHCL during a non-school day
3/28/2016	High School Recruitment Flyer - Collaborative (UH)	4	1000	Sent to high schools in the Houston metro area and handed out at events
4/7/2016	Houston FIRST Lone Star Regional	3	1000	Hosted at George R. Brown Convention Center
4/10/2016	SJC Press Release	3	-	In press

## **BSC Swarmathon Tech Friday**

The BSC Tech Fridays are under the heading of an NSF grant titled Bridges to STEM Careers, where students are taught skills in an industry-related area. The purpose of the grant is to increase the number of STEM graduates by at least 7% over 5 years. For the Tech Friday on February 19, 2016, the theme was the Swarmathon, where students were introduced into the ROS system using the turtlebot. The students were informed about the opportunity through the BSC membership system and a classroom flyer. The intended audience for the activity included students interested in being involved in the Swarmathon who may be lacking in knowledge and is open to any high school or college student in the region. Sign-up is restricted to 45 people with a waitlist of 15 people, for which we had a 45 person turn-out, maximized because of the number of computers available.

The activity was led by Miguel, a peer mentor in computer science and a software team leader. The two faculty mentors acted as tutors during the event, helping the crowd keep up with the student instruction.

Post-activity surveys showed a desire to further their knowledge in the area, with more than 90% of participants expressing interest in moving forward with the ROS project. Subsequent meetings confirm this excitement.

## **UHCL and SJC Press Releases**

The purpose of the UHCL press, done right away, and the SJC press release which was done towards the end of the project, was to inform the general community of the activities. Released on the websites and the link sent to students and alumni, the information allowed students to find their way into participation with the clubs and gives the students a chance to check the legitimacy of the research and bring excitement about the current project.

## **High School Recruitment Flyer**

Created both in digital and print, the recruitment flyer has the intention of promoting the NASA project and to increase the desire to go to college. This is done in collaboration with UH Main Campus, UHCL, SJC, BSC, and AIT. The idea is that if the students can be persuaded to go to college through an appeal of their gaming and robotics skills and dreams, then the quality of the programs at SJC and the UH System will sell themselves. This was sent to more than 50 high schools in the region with information about how to get involved and a direct invitation to any dual credit students to directly participate. Some dual credit students have already become involved. The approximated outreach number is 1000 because it has been printed 300 times and sent to several thousand students, so a 5% success can be approximated. Several schools have made contact and further partnership is underway.

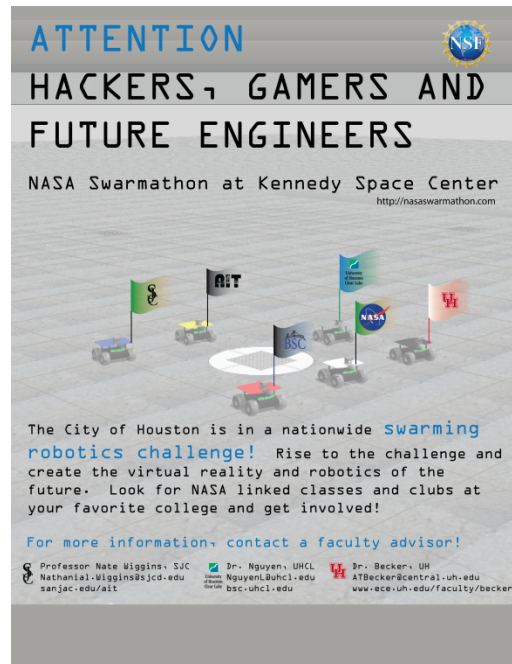


Figure 1: Flyer intended to recruit high school students. Collaborative with UH.

## Engineering Week

Engineering week is an activity held by the college each year to increase participation in the engineering program on campus. This allows other colleges to talk to our students about transferring and for the students to interact with industry. The AI-Tech Labs at all three campuses were present. Three students had the Swarmathon Simulation running next to the UHCL computer engineering table, who was running the Swarmathon bots with the X-Box controllers so that the students could try driving. Other students had hooked up an Oculus Rift and were running a demo game that they had created. Both wanted to create excitement for the SJC programs and for the NASA projects by providing hands-on activities that they can just walk up and participate in.

The large family evening session had about 300 high school students and their families, which are formally included above. Beyond that, there were several hundred college students that could not really be counted due to the proximity in the middle of campus, who walked through the activities between and outside of class.

Of the students and faculty helping, there were 5 faculty members helping with the AI-Tech and Swarmathon tables, including UHCL faculty, as well as 8 students.

## MindTrekks

MindTrekks is a collaborative activity between SJC and Michigan Institute of Technology and is funded by Dow Chemical and partners. The purpose of the activity is to bring STEM knowledge and community connections to local intermediate and high schools. With multiple gyms and outside tents, the activity was large and well-funded. The AI-Tech labs had two areas set up. One used the Tetrix/NXT Robots

with Playstation controllers in a competition field, where students could receive a 'robot driving license' upon successful completion of the course. The other area had the physical and simulation for the Swarmathon bot as well as some humanoids to play soccer with. The number of K12 students totaled greater than 6000, with 150 faculty and 320 student workers to assist. The AI-Tech spaces were placed in prime position for attraction, with a puzzle labyrinth set up to occupy students while the wait for their turn to try the robots through the ticketing system. This allowed for the college students to interact directly with the K12 students so build an essential connection and promote college.

The students who participated are in the general region, including districts of Pasadena, Houston, Deer Park, and LaPorte directly bringing their students in by bus. The Dow engineers and college students were selected to have proportionate demographics to the target audience to maximize involvement.

### **UHCL/SJC vs UH in Local Swarmathon**

The purpose of this activity is to test our readiness against our local competition to find where both teams can improve. This is especially important to SJC since most students are planning to transfer to one of the two schools and this gives the opportunity to interact with faculty from both schools. It was a non-school day and not mandated for participants, so the turnout was about 50 students. Some came late and others left early, so the photo captures everyone there at the end of the event.



**Figure 2: UH, UHCL, and SJC at UHCL for a local competition.**

### **Lone-Star First Competition**

First Tech Robotics and First Tech Challenge is where groups of intermediate and high school students test their robotics skills. These students have potential to make a direct impact quickly in the activity and are learning both the building and programming of the robotics. The outreach size is large, with the championship held in the downtown Houston George R. Brown Convention Center, giving a strong recruitment base. With flyers, a simulation, physical bot, a humanoid, and a spider bot, and several 3d printed designs, the students went out to perform recruitment for the colleges.

### **Future Recruitment Efforts**

With the expansion into the high schools, the next step is to create learning modules using NASA resources and created resources to plug directly into intermediate and high school courses. The development will be made as a scorm to be easily deployed into the learning management systems into individualized learning and auto-grading for instant feedback. The pilot partner school district appears to likely be Pasadena ISD, though several have expressed in working with AIT because of our low-cost high-interaction model.

Funds have been secured to create new sets of bots. These bots will become a new tool in the recruitment efforts, as modified versions of the robotics emerge with increased ability, including cell-phone control. This will help reach students by directly involving technology they already own.

## Appendix A: Contributions

Table 1: UHCL and SJC classes linked to the Swarmathon

UHCL	SJC
CENG 4391: ROS	ENGR 1201: Intro to Engineering
CENG 4265: Senior Design 1	ENGR 1304: Engineering Graphics
CENG 4266: Senior Design 2	ENGR 2304: Programming for Engineers
	MATH 2320: Differential Equations

Table 2: Student and general role in the Swarmathon. Note that \*<sup>m</sup> indicates the student is a mentor, \*<sup>s</sup> indicates senior

Name	College	Role
Darshan Patel * <sup>s</sup>	UHCL	Hardware
Muhammad Khan * <sup>s</sup>	UHCL	Hardware
Jahan Khoja * <sup>s</sup>	UHCL	Hardware
Alyssa Casas * <sup>s</sup>	UHCL	Hardware
Charles Kendrick * <sup>s</sup>	UHCL	Software
Chris Huerta	UHCL	Software
Melissa Bell * <sup>m</sup>	UHCL	Software
Aya Fadel * <sup>m</sup>	UHCL	Software
Austin Hill	UHCL	Software
Miguel Rosales * <sup>m</sup>	UHCL	Software
Andrew Aycoth	UHCL	Software
José Velazco * <sup>m</sup>	UHCL	Software
Kasey Clark	UHCL	Software

Name	College	Role
Elizabeth Dimopoulos	SJC	Hardware
Jose Alvarez	SJC	Hardware
Atai Trevino	SJC	Hardware
Bernardo Ramos	SJC	Hardware
Santiago Orozco	SJC	Hardware
Jesse Munoz	SJC	Hardware
Hector Estrada	SJC	Hardware
Kevin Sagastegui	SJC	Hardware
Luis Pantoja	SJC	Hardware
lorje reyes	SJC	Hardware
Julio Herrera Jr.	SJC	Hardware
Josue Otero	SJC	Hardware
Laura Delgadillo	SJC	Hardware
Eddie Cabrera	SJC	Hardware
Samuel Norman	SJC	Hardware
Luis Zavala	SJC	Hardware
Travis Ketchum Alvarez	SJC	Software
Amalia Pena	SJC	Software
Dat Tran	SJC	Software
Salvador Cuevas	SJC	Software
Brianna Nicole Siller	SJC	Software
David Garcia * <sup>m</sup>	SJC	Software
David Torres	SJC	Software
joaquin gonzalez	SJC	Software
Adriel Arias	SJC	Software
Josue Zuniga	SJC	Software

Name	College	Role
Miguel Ramirez	SJC AIT	Hardware
Eugenio Garate	SJC AIT	Hardware
Tai Tran	SJC AIT	Hardware
Jeremy Penny	UHCL AIT	Hardware
Joshua Lewis	UHCL AIT	Hardware
Kevin Fuentes * <sup>m</sup>	SJC AIT	Software
Chris Stewart	SJC AIT	Software
Pedro Rangel	SJC AIT	Software
Phillip Victor	UHCL AIT	Software
Greg Hemenway * <sup>m</sup>	UHCL	Software