

Instructionally Related Activities Report Form

SPONSOR: Jason Isaacs

PROGRAM/DEPARTMENT: Computer Science

ACTIVITY TITLE: Exploring Swarm Robotics To Mars and Beyond (COMP490)

DATE (S) OF ACTIVITY: 04/18/2017 – 04/21/2016

Please submit via email to the IRA Coordinator along with any supporting documentation at david.daniels@csuci.edu within 30 days after the activity.

Thank you for your commitment to engaging our students!

I apologize for failing to submit this report last semester. This was my first experience with sponsoring an IRA event, and I failed to remember this requirement.

A. ADDRESS THE FOLLOWING QUESTIONS:

- (1) PROVIDE A DESCRIPTION OF THE ACTIVITY;
 - (2) HOW DID THE ACTIVITY RELATE TO A COURSE(S) AND/OR LEARNING OBJECTIVES?
 - (3) WHAT DO YOU SEE AS THE STRENGTHS OF THE ACTIVITY?
 - (4) WHAT WOULD YOU SAY ARE/WERE THE ACTIVITY'S WEAKNESSES?
 - (5) HOW WOULD YOU IMPROVE THIS ACTIVITY FOR NEXT TIME?
 - (6) WHAT DID YOU LEARN FROM THE PROCESS?
 - (7) WHAT ARE STUDENT RESPONSES TO THE ACTIVITY? ATTACH STUDENT EVALUATIONS OR ASSESSMENTS (IN ACCORDANCE WITH FERPA RESTRICTIONS YOU MUST REMOVE ALL PERSONALLY IDENTIFIABLE STUDENT INFORMATION)
 - 8) GIVE A SUMMARY OF EXPENSES FOR THE ACTIVITY (DO NOT INCLUDE ACCOUNTING STRINGS)
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B. ATTENDEE LIST- SUPPORTING DOCUMENT:

In addition to the report form, *in a separate document*, attach to your email a list of attendees complete with each student major and grade level. This for IRA Committee reference only and will not be published on the IRA website. Include your name and the title of your IRA activity on the document.

C.IMAGES FROM ACTIVITY:

Please embed 3-5 images in this document (or attach in .JPEG format) that demonstrate student participation with captions/titles.

(1) PROVIDE A DESCRIPTION OF THE ACTIVITY

This instructionally related activity was a one week field trip to NASA's Kennedy Space Center in Cape Canaveral, Florida. CI was selected as one of twenty minority serving institutions to participate in a national robotics competition called the NASA Swarmathon Physical Competition. The following description of the competition is taken from www.nasaswarmathon.com.

As part of the competition teams developed their own search algorithms and tested them at their own university using the 3 Swarmie robots provided by NASA. Prior to the competition, we uploaded their code to contest organizers who loaded each team's code on to 3 Swarmies at the Kennedy Space Center to see how the search algorithm performed. Teams were ranked by the number of resources their search algorithm was able to locate in a specified period of time. The event was held in April 18-21, 2017 and was broadcast live via an online video stream.

Students were optionally invited to attend the competition at NASA's Kennedy Space Center in Florida and observe their robots in action. In addition to attending the 3-day competition, we spent the final day touring Kenned Space Center where we took part in the following activities:

- Space Shuttle Atlantis
- Special Viewing for Rocket Launches
- Meet an Astronaut
- Numerous Shows and Exhibits
- KSC Bus Tour

(2) HOW DID THE ACTIVITY RELATE TO A COURSE(S) AND/OR LEARNING OBJECTIVES?

Last Spring I offered a course COMP490: Exploring Swarm Robotics and Beyond which focused on the use of swarm robotics in space exploration. This course was open to all students at CI with no prerequisites. The intent was to run the course like a business where students could select different ways to contribute to the overall team mission based on their own backgrounds and strengths. There was tremendous interest in this course, and we reached the cap of 24 students easily. Ultimately this student team worked many more hours than the three units of credit for COMP490, and were rewarded with the opportunity to witness the fruits of their labor at the physical competition.

(3) WHAT DO YOU SEE AS THE STRENGTHS OF THE ACTIVITY?

Student Confidence. Students went to the competition unsure of themselves and were worried that we might finish last. They returned from the trip confident in their abilities and driven by the urge to improve our performance next year.

ARE/WERE THE ACTIVITY'S WEAKNESSES?

Unfortunately, the competition date was set during the CI semester and out of our control. Fortunately, CI professors were supportive of the event, so all students who wanted to attend the competition could make up missed work.

(5) HOW WOULD YOU IMPROVE THIS ACTIVITY FOR NEXT TIME?

A big part of the learning experience for the students was the history of NASA and the space program. The next time I will try to tie this part of the experience into my course to help set the context of the trip.

(6) WHAT DID YOU LEARN FROM THE PROCESS?

I learned that it is possible to travel with 20 young adults on a cross country trip. Our students represented CI with the upmost level of professionalism.

(7) WHAT ARE STUDENT RESPONSES TO THE ACTIVITY? ATTACH STUDENT EVALUATIONS OR ASSESSMENTS (IN ACCORDANCE WITH FERPA RESTRICTIONS YOU MUST REMOVE ALL PERSONALLY IDENTIFIABLE STUDENT INFORMATION)

As part of the COMP 490 course I asked students to write an essay reflecting the experience of participating in this competition and attending the trip to NASA in Florida. Some selected responses can be found below.

Student 1: "This swarm experience helped me grow as a person, before taking this course and going on the trip to Florida. I wasn't sure, if I wanted to continue my education after I receive a B.S in Computer Science but when we went to Florida my mentality changed. NASA brought out an engineer to talk to us and explain what his job at NASA was. He made me realize that obtaining a Masters or Doctors degree, didn't have to be in the same major you're in but it could be obtained in another subject. As of today, I would like to get a Master's degree in Computer or Electrical engineering and maybe I'll even try to get Doctorates degree in the foreseeable future."

Student 2: "The trip to Florida is when I started thinking critically about how much opportunities are out in the world. This was the first time that I've gone anywhere outside of California. This trip was a wonderful time to get to know the rest of the class outside of class, and to get some good life experience. ... Also, walking around the Kennedy Space Center was also a wonderful experience. It is basically a collection of mankind's greatest achievements, where every exhibit tells the stories how people were motivated to make seemingly impossible tasks, possible. It was an inspirational visit each day. Some more inspirational moments happened during the competition, when our heats were going. The first day of the competition I was thinking if we don't get last, that would be a victory. But, at the end of the day, we had made it to the quarter finals. I remember talking, that night, to my roommate about how we were in sixth place out of 20 schools. The next day, for the quarter finals, they changed the layout with clusters near the



We thought that the bots wouldn't be able to reach any of the clusters, but by some miracle, one robot managed to reach a cluster and remembered where the waypoint back was and saved the day, if it was for the other swarmies pushing out the collected blocks out of home, leaving us with 2 collected blocks. Then it came down to the most intense part of the competition, in my opinion, the 3-way tie breaker round, were the first team to collect a block advances to the semifinals. The two teams preceding us gave us a pretty long time to collect a cube, but one swarmie found a cluster but dropped the cube before getting to home and didn't remember its way back, costing us a lot of time. And then watching as another swarmie got to the same cluster, picked up a cube, and went straight to home, dropping it off, getting us into the semi-finals, made me think that this is one of the most amazing things that I've been a part of. Getting third place with all the setbacks that happened got me excited for next year's competition. I want to help more, and I feel like I'll be able to with what's to come in the rest of this year. I had an amazing time in this class and learned about working with robots and how to work efficiently with other people as well."

Student 3: "When we arrived to the Kennedy Space Center on the first day of the competition I honestly just wanted to get one cube. I hoped that we would at least be on the scoreboard but I expected that we wouldn't get past the preliminaries. I certainly didn't expect that we would make it to the quarterfinals" let alone semifinals. What I expected to be a weeklong beach trip ended up being an intense but exhausting week of watching and waiting to see how our algorithm stacked up."

Student 4: "At the Kennedy Space Center in Florida we were able to talk to engineers and scientists about their experiences and how to apply for internships. Talking to the engineers and scientists made me grow as a professional by being able to ask them questions about their daily lives. Not only was there scientists and engineers but, being able to talk to other students who were competing in the competition helped me grow as a professional individual as well. Overall I amazed to be apart of the teams accomplishment as shown in Figure 2. Through doing the Swarmathon competition I understand more about the difficulties of programming robots and am more appreciative of the amazing work that people do with robots every day because the task is no small feat and requires hundreds if not thousands of hours of testing. This competition also made me more interested in the engineering aspect and I have considered getting my Masters degree in becoming an aeronautical engineer."

(8) GIVE A SUMMARY OF EXPENSES FOR THE ACTIVITY.

Given this was my first experience with IRA funding I made a huge mistake in my proposal submission. I submitted the application as if it were a UNIV391 course, so we were only funded for 2/3 or the budget. With the great help of David Daniels we were able to get very creative in making the budget for trip work out. I was able to negotiate a reduced rate with the manager of the motel where we stayed and we were able to find a flight that was less than budget to make up for the 1/3 of unfunded expenses. Additionally, I failed to budget for a second CI faculty member to act as the driver / chaperone. In all we managed to accommodate 20 students and 2 faculty members for under \$26420.52. This works out to be around \$1200 per person.

Room Number	Occupant 1	Occupant 2
1	Jason Tony Isaacs	Kevin Teruo Scrivnor
2	Alexandra Marie Collette	Nicole Ruby Dubin
3	Claudia Alexandra Alamillo	Maria Guadalupe Contreras
4	Heather Ocasla Bradfield	Jessica C Perez
5	Crystian Manuel Marron	Luis Alberto Torres Martinez
6	Matthew Ambriz	Joseph Daniel Contreras
7	James Richard Morris	Michael Hubert-Earl Wisener
8	Mathew William Atcheson	Thomas Hiroshi Yamasaki
9	Alexander Ryan Collins	Timothy Indrieri
10	Robert Aroutiounian	Gevork Gevoian
11	Jeremiah Isaac Paltridge	Dylan Charles Hart



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**IT, PLEASE ATTACH ATTENDEE LIST
(PERSONAL IDENTIFIABLE INFO REMOVED)**

See attached file.

**C. PLEASE INCLUDE UP TO 6 IMAGES IN THIS DOCUMENT TO DEMONSTRATE
STUDENT PARTICIPATION**





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