MERA Team

Outreach Paper

NASA Swarmathon

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Since 1966, the Polytechnic University of Puerto Rico (PUPR) Hato Rey Campus has been forging professionals in STEM areas. Today more than 40% of the graduating engineers in Puerto Rico are alumni of "La Poly" as it's commonly called. PUPR emphasizes in reaching and attracting kids from elementary to high schools with open houses and summer camps where they are taught several engineering principles and how to apply them with projects and activities. We also have several facilities that are not seen in our everyday lives such as The Plasma Laboratory that is the only one in the Caribbean and a flight simulator in the Aerospace laboratory.

The Polytechnic University of Puerto Rico has been linked to NASA Swarmathon for almost two years now and this year, we as a team, have new goals and new aspirations to reach and thrive during the process. The university will be competing for the third time since we joined the program a year ago. The team has cooperated alongside students from other engineering departments such as electrical, computer, mechanical and other students from computer science department. Also, we have members who take part in other clubs such as robotics who give us an insight of how robots work.

Our main purpose as members of the swarmathon team is to promote the field that brings being part of STEM, promote students to join the engineering world and to promote the opportunities and benefits that NASA offers to bring motivated students to integrate into the world of engineering and who can grow into great professionals. Also, we want more women to join the engineering field with the purpose of creating awareness of gender equality in the field.

We began by introducing ourselves to each other; stating name and major. Then we went right to the rules and problems we will confront in the swarmathon competition. We made sure everyone understood the difference between an autonomous robot and a remote operated robot. Discussing the program NASA gave us, led to three presentations about recognized major programs used for coding. These were Python, MATLAB and C++. Some of our members had coding experience prior to college, but most of us had no experience before college classes. After the presentations took place, we gave ourselves the task of searching for additional sources to learn to encode in the other coding programs that were presented.

Team members who have participated on past swarmathon competitions explained the important concepts of the rovers and help clarify doubts about them and any question we had about the rules of the competition. Our team leader made sure every member has the platform for the simulation of the rovers in our personal computers. During the past, few weeks, we have been modifying the structure of the codification to reach a more efficient system of rovers.

Having different backgrounds on our team, we came across different levels of skills and knowledge of programming. Some only knew MATLAB, others C++, and some knew nothing of programming. The team ensured that all our members were equipped with knowledge of all three languages by showing several websites and resources like Code Academy, Udacity, etc. We also divided into three groups to research on the programming languages and create presentations to show our findings and explain to our team members what was the language, what was it primarily used for and how will it aid on our project that is our swarmies. We also got introduced to Ubuntu and learn a little more about Linux and its applications.

During our meetings, we have worked thoroughly on the code handed by NASA. The study of how the rover's behaviors changed by the alteration and modification of the code was eminent. The nature of the rovers has been observed when our team worked on codes in the areas of mobility, search controller, pickup controller, drop off controller, and obstacle controller to name a few changes.

The PUPR Swarmathon team has had collaborations with other teams and associations to ensure a good performance. The Association of Women Students of Mechanical Engineering (AEMIM in short in Spanish) and VEX robotics to name a few. They helped us further our knowledge of computers, codes, robotic and gave us advice on how to better our programming skills.

STEM programs are one of the most important programs for the economy, technology, and for countries wellbeing. One would expect that only by that fact the percent of the STEM mayors would be in high demand, but sadly this is not the case. There are less STEM mayors every year and even more startling there are lesser female students interested in STEM. This is an astonishing reality since on the field there are more male scientist and engineers than female on the industry. Because of this we have a responsibility as STEM mayor students and as American citizens to attract more students to pursue STEM programs and to show the importance of having more women in the industry. This way we will give the respect that science and engineering deserve and hopefully better our education system and improve as a country. Even until this day, there are more questions unanswered than they are answered and it is our job as a species to answer them.

Outreach:

PUPR has many associations and teams that do their top best to reach to young students to spark the scientific curiosity that are needed for STEM programs. AEMIM is a prime example. This association's objective is to ensure a future where there are the same numbers of women in STEM and that they are treated as equals alike men. In this association has women and men that have the same mission and vision. AEMIM has gone to schools to offer lectures and workshops were students participate in activities that teach science and engineering related topics. At the end of the activity, there is the construction of a functional rocket that liftoffs. AEMIM does an excellent job at bringing STEM to schools and making it fun and interesting to spark that curiosity that we need now and in the future. We did not bring Swarmathon to schools this year, but the next one we will lecture and bring workshops to schools so that students can learn the importance of computer science and coding and hopefully motivate them to learn how to code.