CUNY Open Source DIY Rover Project

Bringing JPL Educational Technology to the CUNY Community

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Overview

In August 2018, NASA's Jet Propulsion Laboratory (JPL) released an open source educational prototype (a.k.a. "Rovee") of the Mars Exploration Program Rovers. Rovee was engineered to be built with off-the-shelf parts and uses the affordable Raspberry Pi computer as its CPU. JPL also provides a robust set of instructions and tutorials in an open digital forum that clearly documents the building and tuning of Rovee, which is engineered with a similar suspension system as the rovers currently deployed on Mars. If funded at City Tech, Rovee will give our students an exceptional and low-cost opportunity for hands-on, collaborative learning. Under faculty supervision, participating students across multiple departments and disciplines would build, test, tune, and operate the College's own Rovee as a mobile testing and instrumentation platform.

Resources Requested

$3,500

Project Rationale

Rovee provides our campus academic community with a faculty-supervised, robotic building project for students that is aligned to the College's mission and education objectives. Rovee would provide students with the opportunity to apply disciplinary expertise relevant to their majors and future careers in a supported, hands-on environment where they will work on a complex, but accessible, robotics project.

This project will leverage the many valuable resources City Tech has to offer its students, including faculty with appropriate expertise, specialized technology labs, and engaged peers with complementary technical skill sets. The flexibility of this project allows implementation in a classroom setting as part of program curriculum, as an extracurricular club/team project that fosters the interdisciplinary work that City Tech prides itself on, or a combination of both.

Building Rovee will use City Tech's water jet cutting, fabrication, and modeling capabilities, as well as the mechatronics lab. Rovee would allow faculty to provide an innovative learning community experience, especially among advanced students in the programs. By working on an open source project, City Tech students will have an opportunity to contribute their own work to the existing documentation for Rovee.

Outcomes

Incorporating this interdisciplinary project into City Tech's curriculum will align with the institution's educational goals as they are designed within an urban, opportunity granting educational environment to serve a student body marked by linguistic, economic, and ethnic diversity. Specifically, the Rovee project will focus on the following goals:

1. Students will engage in a focused, in-depth program of study that drives their curiosity and broadens their knowledge within their major and across the disciplines.

   Knowledge*: "Develop knowledge from a range of disciplinary perspectives and develop the ability to deepen and continue learning."*

2. Students will acquire skills needed to succeed in their education goals as well as everyday life. This project promotes productivity, analytical thinking, teamwork, and communication towards a tangible outcome.

   Skills*: "Acquire and use the tools needed for communication, inquiry, analysis and productive work."*

3. A wide range of disciplines can participate in this project. This includes students majoring in Career and Technology Teacher Education, Computer Science, Computer Systems Technology, Electrical Engineering Technology, Mechanical Engineering Technology, Physics, Telecommunication Engineering Technology. Every student will have a unique skill set to offer the project.

   Integration*: "Work productively within and across disciplines."*

4. This project promotes personal responsibility while building consensus within a team environment. Students will work with diverse teams and communicate in a way that promotes respect and communication.

   Values, Ethics and Relationships*: "Understand and apply values, ethics and diverse perspectives in personal, professional, civic and cultural/global domains."*

Deliverables

As a multi-disciplinary student project, Rovee will accomplish the following:

1. **The "Rovee" Rover**
   a. The project will produce a completed DIY Robot Rover constructed from commercially sourced and student-fabricated materials.
   b. When completed, Rovee will give City Tech students the opportunity to collaborate with professors on projects that use the rover as a testing and instrumentation platform.
2. **Educational Support Materials**
   a. The Rovee project will produce curricular assignments and co-curricular projects that will be collected as part of the L4 Living Lab assignment repository (sample assignments provided).
   Rovee can be used as a demonstration platform both within the College and the larger CUNY and MetroTech communities. .
3. **Dedicated Project Website**

a. Landing page for City Tech's rover project, resources for collaboration and networking.
  b. OpenLab website will include the documentation and information of the project.
      - How students work together to create the Rovee as well as the departments in City Tech that assist in completing this project.
  c. Instructional videos of City Tech students and professors would be readily available for other CUNY colleges to create the Rovee.

Budget & Resources

Items	Cost
Parts (*breakdown provided in appendices*)	$2,500.00
Storage and Travel Case	$600.00
Branding and Promotional Materials	$400.00
Assembly	300-500 hours[1]
Total	**$3,500.00**

1) Based on average of at least 15 students contributing 1.5 hours a week over 12 weeks

Future Goals

Maintaining the goal of bringing JPL Educational Technology to larger CUNY Community, this proposal will be shared as an open source document for funding requisitions. Adaptation for collaboration with High Schools who will benefit from this kind of project can also be explored. This project could implement a bridge program for eligible high school seniors to experience a college level program that will motivate them to continue their educational career at City Tech. Students will have the opportunity to gather knowledge and gain confidence to foster their greatest potentials.

Appendices