Engineering Students Unveil Projects to Help Santa Clara County

EPICS Expo provided a venue for students from San Jose State University (SJSU) and Santa Clara University (SCU) to showcase their projects, designed specifically to help the local Silicon Valley community. EPICS Expo was held at SJSU on February 18, 2019. This was the first of its kind event and plans are in motion for having EPICS Expo at other areas as well as continuing it in future years. The EPICS Expo was a collaboration between San Jose State University’s EPICS program, Santa Clara University’s Frugal Innovation Hub, and “EPICS in IEEE” program.

Major Bay Area Television network stations covered the EPICS Expo and provided coverage on the night of the event. KGO-TV: https://abc7news.com/technology/south-bay-college-students-showcase-projects-designed-for-silicon-valley/5144340/

Donate to EPICS in IEEE: https://www.ieeefoundation.org/Support_EPICS
Dr. S.K. Ramesh Master of Ceremony and Keynote speaker
Samarth Deo, Chair of EPICS in IEEE
Students Presentation:

Students were stars of the show and presented their project using poster boards and also had formal PowerPoint presentations. Faculty members from SJSU and SCU (including Julia Thompson and Silvia Figueira) were instrumental in the success of this event.

During the Expo, students networked with corporate and non-profit representatives and displayed various student-led projects, including:

- A warning system to detect imminent flooding
- An underwater drone to locate endangered species
- Pop-up smart lockers for homeless

Speakers:

- Dr. S.K. Ramesh, IEEE Fellow and Director of the AIMS Program at CSU Northridge
- Dr. Jinny Rhee, Associate Dean of the Charles W. Davidson College of Engineering at SJSU
- Dr. Jon C. Strauss, Interim Dean, Santa Clara University School of Engineering

Attendees:

115 of the 142 registrants attended the event. IEEE representatives included Michael Deering, Senior Development Officer at IEEE Foundation; Ray Alcantara, EPICS in IEEE Program Manager; Dr. S.K. Ramesh, Director of AIMS2; Samarth Deo, Chair of EPICS in IEEE; Mostafa Mortezaie, IEEE Region 6 Educational Activities Chair; Amber Orr, IEEE Region 6 Professional Activities Chair; Joseph Wei, Past Chair of Santa Clara Valley Section; Glenn Friedman, Chair of Santa Clara Valley Section; Daniel Lottis, Past Chair of SIGHT; Niru Prakash Kumar, IEEE Region 6 Humanitarian Activities Chair; and Jared Schoepf, Arizona State University (ASU) EPICS Faculty.

Local universities, non-profit organizations, and industry representatives participated in the event and as one of the objectives of EPICS 2.0 it’s expected that some of the participants would support the EPICS program.

Awards

Student teams were awarded financial grants to help bring their projects to market. San Jose State University students awarded $10K for two projects. Santa Clara University students awarded $10K for five projects. The grants are made possible by EPICS in IEEE through the IEEE Foundation. Dr. Jinny Rhee, Associate Dean of the Charles W. Davidson College of Engineering accepted the SJSU Award while Dr. Jon C. Strauss, Interim Dean of School of Engineering accepted the Santa Clara University Award.
San Jose State University Projects

Tech Museum Aquaponics System

Aquaponics system addresses urban agriculture, by having a closed loop system where fish are grown for food, and fish waste fertilizes plants. In this project, students are constructing an educational aquaponics, setup behind the visitor facing window of the Support Lab at the Tech Museum. The project will serve both as a backend tool to grow plants for hands-on STEM activities as well as provide a visually stunning display to promote the exhibit. The smart aquaponics system will integrate sensors, and cameras to convert a physical garden into a digital space that museum visitors can engage with. This will promote STEM education and urban agriculture.

Safe Storage 2.0
Grant Recipient
(http://blogs.sjsu.edu/smartlockers/)

The Bay Area has a growing homeless community. In EPICS@SJSU is working with Gilroy Compassion Center and AtHack, to design storage units. When homeless people have to carry their belongings with them, they are often vulnerable to exploitation and harassment, cannot access jobs and services, and they have no way of charging their mobile devices – which is often their life lines. The engineering student teams are designing and building low cost storage units, complete with multiple electrical charging plug options that the homeless can secure and access their belongings, anytime, day or night.

Santa Clara University Projects

Frugal Innovation for Bridge Housing Community Initiative

The City of San Jose (SJC) is currently working with Habitat for Humanity (Habitat) to construct a Bridge Housing Community (BHC), a development of around 40 "emergency cabins" to provide shelter for the temporarily homeless. The goal of our project is to work alongside Habitat to design a more efficient, frugal, and versatile home unit, as well as improve land development methods (i.e. issues with connecting to utilities). Further work could potentially include designing a "Phase X" tiny house that will use the same footprint and frame, but with either significant renewable energy and water improvements or a design such that these improvements are simple additions to the existing homes when they become fiscally feasible.

FLOMOSYS project

The objective of this project is to provide the S.C. Water District with a real-time information system that will deliver water height information of Coyote Creek in order to facilitate the prediction and evacuation decision-making process. This project is being developed for the San Jose Mayor’s Office and the Santa Clara Water District.

HiveSpy

Due to the high demand yet shortage of labor for agriculture, much research in the automation of agriculture via so called “smart technologies” has been conducted. An emerging idea is the usage of an interconnected network of sensors or so called Internet of Things (IOT). One sector of agriculture that is of interest to us is beekeeping and honey production.

Our project is designing and implementing an IOT solution to monitor the production yield effectively. In contrast to the current market options, our solution collects individualized frame weight data rather than whole hive weight data and constructs a harvest schedule/plan for the beekeeper that reduces the amount of manual labor necessary to maintain the hives.

The task of monitoring every single frame in a hive has not been attempted in industry due to its difficulty, cost, and resource heavy nature. Our rudimentary prototype has already won 2nd place in Forbs Agtech’s 2018 ThriveX challenge: Automation for labor shortage in agriculture.

HA (Hydro-System Automation)

Energy Efficient Modern irrigation systems are equipped with an assortment of water reserves to store water for later use and/or to manage the flow,
time, or quality of the water delivered to the crops. In comparison to expensive, huge, complex, proprietary, often manual, and very energy hungry industrial solutions out on the market, HA is a system for automation of water systems including water tanks, pumps, etc. affordable, smaller, simpler, modular, smart, and sustainable Hydro-System.

At the bird's eye level, the project design entails sensing and actuating units as well as wireless communication between said units.

**Design of a Sustainable Integrated Farming System**

Food insecurity describes the state of having unreliable access to nutritious foods that allow someone to live healthily and happily. An aquaponics system is one of the best options to combat food insecurity for communities in need in urban areas and provide people with more nutritious food options. The proposed aquaponics system will provide a community center with the ability to give their customers more fresh vegetables and a source of protein with less impact on the environment and reliance on water.

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**About EPICS in IEEE**

EPICS in IEEE https://epics.ieee.org/ empowers students to work with local service organizations to apply technical knowledge to implement solutions for a community’s unique challenges. In this way, EPICS in IEEE not only assists communities in achieving their specific local community improvement goals but also encourages students to pursue engineering for community improvement as a career.

**About EPICS at San Jose State University**

EPICS@SJSU http://www.sjsu.edu/epics/ is a service-learning program in the Charles W. Davidson College of Engineering at SJSU.

Multidisciplinary teams of students serve local community partners by designing and building custom engineering solutions.

**About Santa Clara University and the Frugal Innovation Hub**

Sponsored by the School of Engineering, the Frugal Innovation Hub (FIH) https://www.scu.edu/engineering/labs--research/labs/frugal-innovation-hub/ mission is to engage students and faculty in humanitarian and sustainable projects through partnerships and programs.

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For additional information contact Mostafa Mortezaie, Region 6 Educational Activities Chair.