A MESSAGE FROM SAMARTH DEO
OUR CHAIR

2020 was an extraordinary year, that many will never forget. Throughout this report I would like to focus on our EPICS in IEEE family, and all that we accomplished during what can best be described as a uniquely challenging year at home, at work and at school. For many around the globe, home, work, and school has been the same place. This tested not only our resolve but also the technologies that have been the backbone for many of us to be able to work normally.

At EPICS in IEEE, we responded to the challenges 2020 brought by focusing on improving several aspects of the program. From enhancing our website, to working on improving our metrics and data collection, the volunteers and staff at EPICS have been tirelessly working towards positioning the program for continued success in 2021.

We would like to thank all those who have supported the program in 2020, our industry partners, donors, volunteers, university & NGO partners, and most of all our student volunteers. In 2021 we look forward to building upon our successes and advancing our mission!

Sincerely,

Samarth Deo
2020 Chair of EPICS in IEEE
OUR VISION

“To create a world where engineering education is intimately connected to community service”
IMPACTING STUDENT EDUCATION THROUGH SERVICE LEARNING

Today, the world faces significant challenges. Communities suffer from inadequate education systems, environmental issues, vulnerable infrastructure, and lack of access to essential services. These issues aren’t concentrated in any one area. They can be found anywhere around the globe, from the heart of the United States to sub-Saharan Africa; from remote villages in Asia to bustling cities in Latin America.

Engineers are uniquely equipped to develop solutions to today’s challenges, which ultimately allows them to change communities. EPICS in IEEE (Engineering Projects In Community Service) facilitates that change now and for future generations by creating a world where Engineering education is intimately connected to community service.
SUPPORTING LEARNING THROUGH REAL WORLD PROJECTS

157 TOTAL SUPPORTED PROJECTS SINCE 2009
SUPPORTING ADVANCEMENT IN THE EDUCATION OF STUDENTS

Solving community challenges through the power of technology and education, EPICS gives students a platform to work with engineering professionals to develop solutions that transform communities across the globe. We are committed to fulfilling the IEEE core purpose of fostering technological innovation and excellence for the benefit of humanity.

We champion a unique, service-learning approach to Engineering Education that focuses on hands-on experience and holistic skill development.

Technology can change the world, but it takes people working together, using skills such as communication, collaboration, and creativity to apply technical solutions to community challenges.
<table>
<thead>
<tr>
<th>Category</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects Approved since 2009</td>
<td>157</td>
</tr>
<tr>
<td>Pre-Univ. Students Impacted</td>
<td>8,000+</td>
</tr>
<tr>
<td>IEEE Volunteers Impacted</td>
<td>900+</td>
</tr>
<tr>
<td>People Impacted Globally</td>
<td>291,000+</td>
</tr>
<tr>
<td>University Students Impacted</td>
<td>3,000+</td>
</tr>
<tr>
<td>Invested in project support</td>
<td>$700k+</td>
</tr>
<tr>
<td>Student participants that are women</td>
<td>33%</td>
</tr>
<tr>
<td>Of donations go to direct project support</td>
<td>82%</td>
</tr>
<tr>
<td>Academic papers citing EPICS in IEEE</td>
<td>60+</td>
</tr>
<tr>
<td>Average cost per person and student impacted</td>
<td>$2.25</td>
</tr>
<tr>
<td>Of students who took part in an EPICS in IEEE project showed improvements in leadership and communication skills</td>
<td>100%</td>
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</tbody>
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EPICS in IEEE operates on a global partnership model where students actively collaborate with local service organizations and community leaders to address localized challenges. Around the globe, members of local IEEE sections, knowledgeable and experienced engineers, volunteer their time to deliver the program in partnership with Non-Profits, K-12 schools and Universities.

**157 Projects**
**34 Countries**
**3 New Projects in 2020**

**Distribution of Projects**
- 18% AFRICA
- 29% ASIA
- 5% EUROPE
- 25% NORTH AMERICA
- 23% SOUTH AMERICA

**Project Categories**
- 32% ACCESS & ABILITIES
- 34% EDUCATION
- 14% ENVIRONMENT
- 20% HUMAN SERVICES
“EPICS helps fulfill the IEEE core purpose of fostering technological innovation and excellence for humanity. EPICS provides funding, support, mentorship and visibility for engineering projects.”
WORKING WITH PARTNERS TO ADVANCE OUR MISSION

In 2018, The EPICS committee developed a two-year pilot initiative, that completed in 2020. The initiative was a success in accomplishing its goals of:

- Support university educators teaching service learning.
- Foster stronger ties between universities, communities and local IEEE sections.
- Provide technological solutions to community needs.
- Support the education of students.

EPICS is working with faculty at these universities to consider an extension of partnerships in 2021.

OUR UNIVERSITY PARTNERSHIP INITIATIVE BY THE NUMBERS

- 33 Student lead projects supported
- 200+ University students impacted
- 350+ Pre-university students engaged
- 33 Non-profits directly impacted
- 20,000+ Community members directly impacted
- 27 University faculty members engaged
In early 2020, EPICS held its 3rd EPICS Expo in the heart of California’s Silicon Valley on the beautiful campus of Santa Clara University. The Expo brought together students from San Jose State University and Santa Clara University to showcase their service learning projects that provided solutions to environmental and social problems in Silicon Valley and beyond.

The event featured presentations of student led projects as well as talks from the Master of Ceremony for the evening Dr. Tom Coughlin (IEEE-USA Past President), Dr. S.K. Ramesh (IEEE Fellow and Past IEEE VP of Educational Activities), Hon. Karen Hardy (Santa Clara City Vice Mayor), Erna Grasz (CEO Asante Africa Foundation), Jim Fruchterman (CEO of BeneTech and TechMatters), Dr. Jinny Rhee (Associate Dean San Jose State University College of Engineering), and Dr. Ruth Davis (Associate Dean Santa Clara University School of Engineering).

The Expo was also recognized by United States Congressional members Anna Eshoo and Ro Khanna, through a Special United States Congressional Recognition.

At the event, both Universities received a $10,000 grant from EPICS to support student solutions. Projects such as Disaster Relief Communication Box, MilkGuard, and Automated Water Testing System for Aquaponics, that, through technology, will directly impact people within the community.
At the beginning of 2020, EPICS in IEEE along with volunteers, teachers, and administrators were looking forward to the launch of another EPICS pilot initiatives’ second phase, an initiative that focused on enhancing the educational experience of thousands of pre-university students in underserved public schools in the U.S. cities of Baltimore and Chicago.

In collaboration with our partners at Purdue University’s EPICS program, school administrators from Chicago and Baltimore, local IEEE sections and volunteers; the initiative was prepared to begin its work in providing a unique learning experience for students.

Due to the global pandemic, efforts towards this initiative have been paused, but the EPICS committee has developed other ways to impact pre-university students and will continue developing creative ways to advance service learning for pre-university students until this initiative can be re-launched.

2020 Stats Prior to Covid-19

12 Public School Partners
34 STEM Teachers
27 IEEE Volunteers
1,000+ estimated students directly impacted
Though the EPICS pre-university initiative had to be paused due to the global pandemic, the EPICS in IEEE team hosted several ‘Engineering Spotlight’ episodes. The episodes provided a glimpse into the careers and lives of engineers and engineering students. It offered pre-university students opportunities to hear from leaders in different fields of engineering and ask questions in real time. Over 1,000 students logged in to join the conversation.

2020 EPISODES:
- Burt Dicht - Aerospace
- Dr. William Oakes – Education
- Mariah Manzano & Brianna McGovern – Student Life
- Hari Vishnu & Grace Chia – Oceanic Engineering
- Dr. Erik Brewer – Biomedical Engineering
- Whurley – Quantum Computing
- Prof. Hal Walker – Apollo 11 & Aerospace
ENGINEERING SPOTLIGHT BY THE NUMBERS

• 7 Distinct Episodes
• 57 Average Number of Live Attendees Per Episode
• 118 Average Number of Views of Recordings
• 6 Classrooms in Chicago IL, Used Recordings of 1 or more Episodes During Class Time

To view past Engineering Spotlights, please visit: https://tryengineering.org/news/tryengineering-live-webinar-series/
Though many EPICS volunteers were unable to advance their programs due to lockdowns and quarantines, volunteers remained active in the virtual space, academic papers and articles around the globe. Some notable events and articles during 2020:

• Dr. Stephanie Gillespie, EPICS committee member was a featured speaker at the 2020 Rising Stars Conference.
• Samarth Deo, the EPICS Chair, was a featured speaker at the 2020 Global Humanitarian Technology Conference.
• Kai Goodall a former EPICS project leader received the 1st place in the annual SAIEE (South African Institute of Electrical Engineers) National Student Project Competition.
• EPICS in IEEE was cited in 7 Academic Papers and 1 published book.
• Dr. Victoria Serrano, an EPICS committee member, was featured in The Institute discussing her work in STEM outreach and the EPICS in IEEE project she developed in 2016 while pursuing her PhD at Arizona State University.
Throughout the summer of 2020 several EPICS volunteers took up the challenge to improve and update the existing EPICS in IEEE website.

After several months, hours of planning, and numerous committee meetings the volunteers unveiled their work, and the new EPICS website was born.

Launched in November of 2020, the website features an engaging blog, updates on ongoing and complete projects, and opportunities for those interested in EPICS to quickly find the information they are searching for.

A fresh new look to promote the accomplishments of students, improvements deployed in communities, and advance service learning.

Visit us at https://EPICsinIEEE.org
PROJECT SPOTLIGHTS: BRINGING CLEAN DRINKING WATER TO 700 FAMILIES

Purdue University Students Continue Collaboration During A Year At Home

In 2020 work began on a collaboration between EPICS in IEEE, Purdue University, local IEEE volunteers in Colombia, and IEEE’s SIGHT program. The purpose of the collaboration is to address the need for clean and filtered water in Carpinelo Colombia.

Like many other student led projects, the Covid-19 Pandemic made the project harder to complete. That did not stop the students from using this time to engineer something better. Students were able to work collaboratively online with their professors, IEEE volunteers, and each other to improve on their initial solution.

Students improved their initial design and were also able to create a ‘user manual’ and easy to follow design plans so that this project, once deployed, can be easily replicated, and sustained by local citizens. In 2021 the students plan to deploy their prototype and deliver clean drinking water through technology to a community in need.
PROJECT SPOTLIGHTS: PLANTING SEEDS OF CARROTS, CUCUMBERS, AND COMMUNITY

Ohio State EPICS in IEEE Project Finds A Way to Work Through Quarantine

The EPICS in IEEE project from Ohio State University titled “farmbot” was a huge success in 2019, with OSU students developing a functioning farm robot for a local Ohio community.

The team, in 2019, held a successful summer camp to introduce students to robotics and engineering. Due to Covid-19 they were unable to hold a similar camp in 2020. That did not stop the students from sharing their love of engineering with a younger generation.

In 2020, they held, in collaboration with the local community, a virtual town hall to share their knowledge with local students. The virtual town hall was well received, and in a time when building community is especially difficult due to the Covid-19 pandemic, this project continues to plant seeds of community as well as carrots and cucumbers.
PROJECT SPOTLIGHTS: INSPRING THE NEXT GENERATION OF INNOVATORS

Training High School Students To Develop Inclusive Software In Colombia

In 2020, a team from the Univ. Del Norte in Colombia, set out to create components for those with disabilities to be able to play video games on existing consoles. The team realized they can do much more.

They realized that there were not many curriculums available for teachers who teach students with disabilities. The EPICS team set out to develop a STEM curriculum for high school students in Colombia with disabilities.

The result is a 75-page curriculum for teachers to use during a school year that engages students to learn how to code and make video games.

During 2021, using the prototype game console controls the team engineered for those with disabilities, the EPICS team plans to test this curriculum. In collaboration with the Apanedxa Institute, the team is looking forward to introducing their curriculum across a dozen schools in Colombia, should the schools return to in person learning.
MEET THE 2021 EPICS in IEEE COMMITTEE

Samarth Deo  
Chair

Dr. Stephanie Gillespie

Gina Carrillo

Dineshkumar Singh

Dr. David Oyedokun

Penny Wirsing

Dr. Y. Vijayalata

Dr. Victoria Sorrano

Dr. Leah Jamieson

Michael Andrews

Ray Alcantara  
Program Mgr.

Daniel Dilebrato  
Development Officer
LOOKING TO THE FUTURE: GOALS FOR 2021

2020 was a trying year for many around the globe. No one could have predicted the upheaval that the Covid-19 pandemic would cause to everyday life, let alone the challenges faced by students and educators in educating the next generation of engineers.

EPICS in IEEE, like the constituencies it serves, had to pivot and adapt to the reality that we all faced in 2020. It is through the innovation, and leadership of the EPICS in IEEE committee, that EPICS was able to continue its mission during the toughest times in 2020.

In 2021, more than ever, the mission of EPICS in IEEE is imperative. As communities around the world begin to re-open and begin to rebuild after the pandemic; engineers that share an ethos of community service will be in high demand.

Technology assisted in the delivery of vaccines to herald the beginning of the end of the pandemic. Technology will also be a driving force to help communities rebuild and come out the other side of this pandemic. The world, in the upcoming years, will need innovative engineers to facilitate that rebuilding, and EPICS in IEEE is proud to assist in the education of those engineers.

- Return to pre-pandemic support of 15-20 innovative and impactful student led projects
- Introduce new metrics, proposal, and reporting forms for EPICS project teams
- Expand EPICS in IEEE’s social media and communications reach to promote EPICS and encourage participation
- Foster collaboration and partnerships with NGO’s, Universities, and other IEEE programs
We hope, that through this report, we have been able to share the impactful work our volunteers have been able to accomplish through all the challenges of 2020.

EPICS in IEEE is more than a project-based program that encourages students to pursue engineering and other STEM careers. It offers a unique experience that blends knowledge gained in the classroom with original project design and implementation, service learning and civic engagement. This experience provided at a key developmental stage in the lives of the students, promotes an ethos of service within them.

Through the program, the students gain skills essential to the current and near future workplace environment. Participating students also see improvements in confidence, increased content knowledge and fuller understanding of the engineering profession, and its ability to have significant impact on the daily lives of individuals around the globe.

With the support of our donors, industry partners, university and community partners, and most of all our student volunteers, EPICS in IEEE has been successful in enhancing the educational experience of thousands of students within the United States and globally, while also providing technological solutions that have impacted communities around the world.

The team at EPICS in IEEE would like to thank all those who participated, supported, and encouraged the program in 2020!