

IEEE HAC | IEEE SIGHT

Success Story Portfolio



IEEE

Humanitarian Activities
Committee

IEEE SIGHT

Special Interest Groups on
Humanitarian Technology



AN INVITATION FROM IEEE HAC/SIGHT

Friends,

Imagine the power of a network of 400,000 engineers and technologists around the world addressing humanitarian and sustainable development challenges in their local areas. That is what we are working toward every day at IEEE HAC/SIGHT. How are we doing this? By providing resources and frameworks to enable IEEE's substantial membership to gain awareness, receive training, participate in projects, and contribute to the greater sustainable development community. HAC has only been in existence since 2016, so this continues to be a work in progress.

In the last two years, HAC/SIGHT have made significant advancements in its Projects program and are pleased to showcase a selection of some of the best of the 2020 funded projects. We invite you to peruse this portfolio for a taste of what has already been accomplished and a glimpse of what is possible with HAC/SIGHT. Join us on the next phase of our journey as a volunteer, organizational partner, or donor.



Mr. Sampathkumar Veeraraghavan
Chair, 2021 – 2022 IEEE
Humanitarian Activities Committee



Mr. Lwanga Herbert
Chair, 2021 IEEE SIGHT
Steering Committee



Dr. Karen Panetta
Chair, 2021 IEEE HAC
Projects Committee

*With appreciation for what has been done,
and enthusiasm for what is to come.*



IEEE is the world's largest professional association advancing innovation and technological excellence for the benefit of humanity. IEEE and its members inspire a global community to innovate for a better tomorrow through its highly cited publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted "voice" for engineering, computing, and technology information around the globe.





Humanitarian Activities Committee

MISSION: IEEE HAC provides leadership as well as a suite of resources that inspire and enable IEEE volunteers around the world to carry out and support impactful humanitarian technology and sustainable development activities at the local level.

HAC's strategic areas of focus are:

- **Raising awareness** – HAC increases understanding of the role of engineering and technology in sustainable development. A major contribution to this focus area in 2021 was the inaugural IEEE HAC Global Summit.
- **Providing training** – HAC provides educational resources and opportunities so that humanitarian activities participants can have a greater positive impact. In the last two years, more than 540 individuals have participated in the free, online HAC/SIGHT courses on the IEEE Learning Network.
- **Supporting humanitarian technology and sustainable development activities** – HAC awards funding for grassroots IEEE member projects that utilize technology to address local challenges. In 2021, HAC received 385 project proposals from 45 countries, and selected 92 projects to support.
- **Building sustainable development community within and beyond IEEE** – HAC offers programs that engage over 22,000 members in 125 countries and all ten IEEE Regions.

IEEE SIGHT

Special Interest Groups on Humanitarian Technology

SIGHT is a program and subcommittee of HAC.

MISSION: The SIGHT global network of IEEE volunteers partner with underserved communities and local organizations to leverage technology for sustainable development.

There are over 22,000 SIGHT members throughout the world, and roughly 66% of them are Student Members and Graduate Student Members. Participants in SIGHT activities access rewarding experiences that allow for gaining hands-on knowledge, improving technical skills, networking, and making positive change in the local community.

SIGHT encourages its individual members to form Groups that come together to:

- **Learn** about sustainable development
- **Build** relationships within their local communities
- **Implement** humanitarian technology and sustainable development group projects that utilize technology to tackle key problems within the community

As of December 2021, 203 SIGHT Groups have been established in 53 countries.

The SIGHT program is supported in part by IEEE Foundation donors. For more information about supporting SIGHT through the IEEE Foundation, please visit [this page](#).



HAC Supports Grassroots Humanitarian Technology and Sustainable Development Projects

IEEE HAC and IEEE SIGHT provide funding to IEEE Members who prepare and implement humanitarian technology and sustainable development projects in their local communities. The projects are required to address one or more of the United Nations Sustainable Development Goals (UN SDGs). Project teams must build a relationship with the partner community to identify a specific need and develop a plan to address it through the development, customization, or deployment of technology. They take into account the relevant environmental, cultural, socio-economic, and infrastructural issues that could affect the project and its impact. Many times, teams partner with local government, NGOs, schools and universities, or companies to effectively deploy the solution.

There are many benefits for the IEEE Members who participate in IEEE HAC/SIGHT funded projects. HAC has developed training and educational materials for project teams, and participants can enrich their knowledge in topics such as project management, sustainable community engagement, assessment, monitoring and evaluation, and more to complement their technical skills. Students and professionals alike have an opportunity to learn and develop their capabilities outside the classroom or office in a

real-world setting. Joining in projects provides a connection to a global network of like-minded IEEE Members, as well as people and organizations close by. Finally, participants frequently find satisfaction in working toward a greater purpose that aligns with their personal ethos and are encouraged by the chance to make a lasting, tangible difference.

IEEE HAC Empowers IEEE Volunteers in Their COVID-19 Response

In early 2020, the unprecedented effects of the COVID-19 pandemic began to be felt around the world. HAC leadership recognized both the need for technologists to apply their expertise to the quickly arising challenges and the desire of many IEEE Members to help their local communities in whatever way they could. In 2020, IEEE HAC/SIGHT held two calls for proposals for grassroots IEEE member projects that utilized technology to primarily address local challenges of the COVID-19 situation.

An outpouring of submissions from IEEE Members around the world came in response. In 2020, HAC received 229 proposals, setting a new record since HAC and SIGHT were established. After careful consideration, HAC/SIGHT awarded funding to 102 projects from 29 different countries all over the world.

2020 Project Preliminary Assessment Information

All project teams selected by HAC/SIGHT for funding agree to certain reporting requirements to share the results of their work. As of early December 2021, approximately 70% of the projects from 2020 are fully complete. Through their final reports, HAC has collected the following aggregated data that demonstrates a part of the significant impact that HAC/SIGHT Volunteers have made by implementing their funded projects.

Overall, through HAC Project grants in 2020:

- **Over 35,000** individuals received personal protective equipment (PPE) to protect themselves against COVID-19.
- **Over 1,000** individuals in Africa were trained to make locally sourced sanitizer and other PPE.
- **Eight prototypes** were successfully built to increase safety measures and efficiency within hospitals.
- **Four regional tracking apps** were built, providing crucial, accurate COVID-19 case information in real time.
- **Four digital literacy curriculums** were created that will continue to be used to increase knowledge and skills.
- **Over 100 local partnerships** were developed, and success stories were shared by over half the projects through local news channels, newspapers, and various social media platforms.
- **80% of IEEE Member project leads** reported that their project met local needs as confirmed by locals, was realistic and addressed the full complexities of the population served, and considered possible risks comprehensively and planned accordingly.
- **Two-thirds (67%) of projects** met all of their specific, measurable, and time-sensitive outcomes, as evidenced by a mixture of qualitative and quantitative data.
- **Two-thirds (67%) of projects** demonstrated their positive impact on the daily experience of the target population/community, as evidenced by data, and that the initiative has affected people who otherwise would not have access to project benefits.

- **Almost all projects (94%)** considered other initiatives happening in the area and connected where possible, instead of working in isolation.
- **100% of IEEE Member project leads** reported that the members of their project teams listened to each other with patience and respect, relied on each individual's strengths to build the most successful project, and shared progress through consistent, open communication and shared documents.

Some of the projects awarded funding in 2020 are presented in this portfolio to showcase the diversity and initial impact of the IEEE HAC/SIGHT COVID-19 response. Each one has addressed a critical, complex problem within the project team's local community with a solution. HAC/SIGHT are proud to share the stories of these funded projects and a summary of each activity's initial outcome.

Thank you to all of the HAC/SIGHT Project Volunteers for your amazing efforts and ongoing contributions to your local communities. Your work makes a real difference!

EXAMPLES OF IEEE HAC/SIGHT FUNDED PROJECTS

The projects that IEEE HAC/SIGHT support contribute to many of the UN SDGs Goals; the three most relevant have been selected for each project.





KENYA

ELIMUSAFE

TEAM: IEEE Members from the IEEE Jomo Kenyatta University of Agriculture and Technology (JKUAT) Student Branch, the IEEE Power & Energy Society (PES) Kenya Chapter, and the IEEE Kenya Section



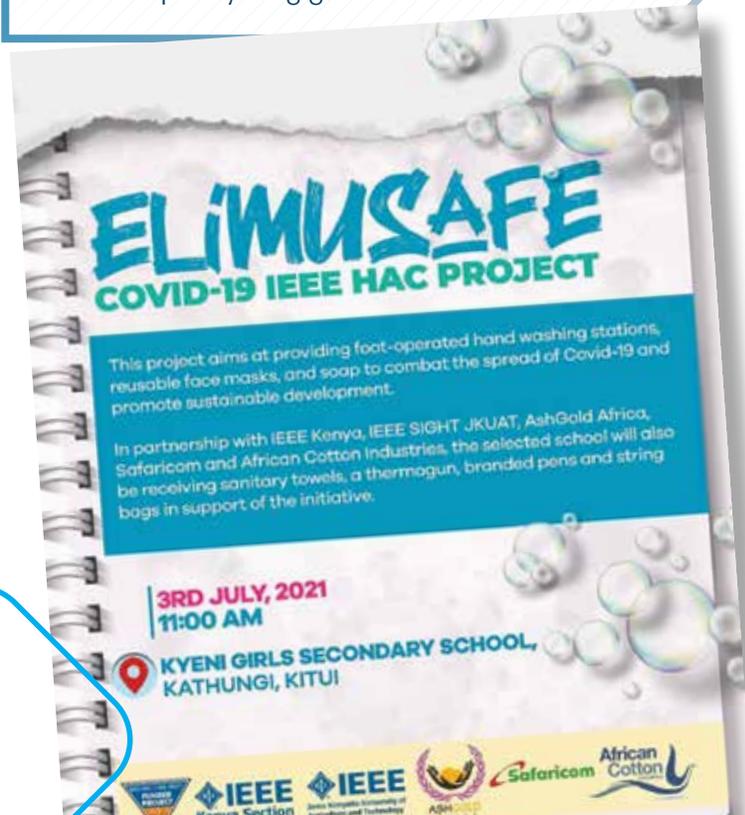
PROVIDING SAFETY AND MENTORSHIP

With the COVID-19 pandemic still affecting much of the world, the government in Kenya insisted measures be taken to curb the virus as schools reopen. Unfortunately, some rural primary schools in Kenya could not afford to comply with these measures. Members from the IEEE Jomo Kenyatta University of Agriculture and Technology (JKUAT) Student Branch, the IEEE Power & Energy Society (PES) Kenya Chapter, and the IEEE Kenya Section worked together to donate the needed equipment and supplies.

During the ElimuSafe project, volunteers partnered with the Kyeni Girls Secondary School to install six foot-operated handwashing stations and provide 200 reusable face masks, soap making training and ingredients, 100 string bags and pens, and 1,000 sanitary towels. The project attracted local partners such as AshGold Africa initiative and Safaricom PLC, which contributed donations. In addition, copies of a local magazine highlighting the journey of inspirational women engineers from Kenya, were delivered. The IEEE team members also organized a session for the students with mentors who shared their academic journeys and offered STEM career guidance.

IMPACT

By establishing water stations within the schools, the pupils could focus on their studies while observing the guidelines set by the Kenya Ministry of Education and Health. The IEEE team also enhanced collaboration and empowerment of the local community, which will be making the soap to be used by the pupils, providing a source of income. By all accounts, this was a successful and impactful initiative that helped support a marginalized community and the mentorship for young girls.





NIGERIA

IEEE COVID-19 MARKETPLACE ROBOT

TEAM: IEEE Members from the IEEE Nigeria Section and the local IEEE Consultants Network Affinity Group



PROGRAMMING A QUICK DETECTION ROBOT

COVID-19 poses a serious threat to health systems worldwide, but particularly in countries like Nigeria, where health systems are poorly developed. The near absence of testing and contact tracing systems in Nigerian hospitals has created difficulties for health-care workers. To prevent and mitigate the spread of COVID-19 in Nigerian hospitals, IEEE Members from the IEEE Nigeria Section and the local IEEE Consultants Network Affinity Group developed a robot that offers the quick detection of common COVID-19 symptoms.

Taking a human-centered approach, the project started with volunteers learning about leadership styles, resource management, and collaboration. They then focused on executing various aspects of the projects—from the 3D modeling to the hardware design phase. Finally, the first COVID-19 MarketPlace Robot was installed at the University of Calabar teaching hospital. Using contactless technology and a smart back-end analytic engine for accurate predictions, the simple service robot supports scaled fumigation, an automatic hand sanitizer, body temperature detection, an auto drive/control system, and SMS-alert notifications.



IMPACT

HAC/SIGHT recognized the success of the solution and approved two additional rounds of funding for the team to build and install additional robots. The first round of funding led to more than 150 IEEE young volunteers across twelve Nigerian universities being directly trained on robotics and its functionalities, and over 1,000 patients at the partner hospital benefiting from the installation. The COVID-19 MarketPlace Robot can also be deployed in shopping malls, offices, schools, and other locations, so it has a potential for impact far beyond the initial project scope.





NIGERIA

COVID-19 ANALYTIC DASHBOARD PLATFORM (CADP)

TEAM: IEEE Young Professionals from the IEEE Nigeria Section



INFECTION PREVENTION THROUGH INFORMATION ENGAGEMENT

Recognizing the need for truthful, fact-based health information relating to the COVID-19 pandemic, IEEE Young Professionals from the IEEE Nigeria Section partnered with the Nigeria Health Promotion Division (HPD) to create an online repository for all health promotion activities, campaigns, and resources coming from the Federal Ministry of Health. The IEEE team also implemented a social media campaign via the HPD Twitter account for three months and trained twenty HPD staff members on the use of social media.

In addition to contributing to the highly successful #MaskOnNigeria and #StayHealthy national awareness campaigns, the IEEE Young Professionals team produced graphical content on healthy living and COVID-19 preventive measures (in English and three local languages), implemented a platform to facilitate a government survey on the health status of citizens across the country, and designed and implemented a monitoring and evaluation platform to be used by HPD staff nationwide.

IMPACT

By using both traditional and social media channels to share information on containing the spread of COVID-19 and other matters of public health significance, the Nigeria HPD was able to improve engagement with the community. The work done by the IEEE Nigeria Section was covered by national media and the Nigeria HPD now serves as a one-stop shop for resources in health promotion in Nigeria.





COVID-19 VISUALIZATION AND ANALYTICS FOR SOUTHERN AFRICA

TEAM: IEEE Members from the IEEE South Africa Section



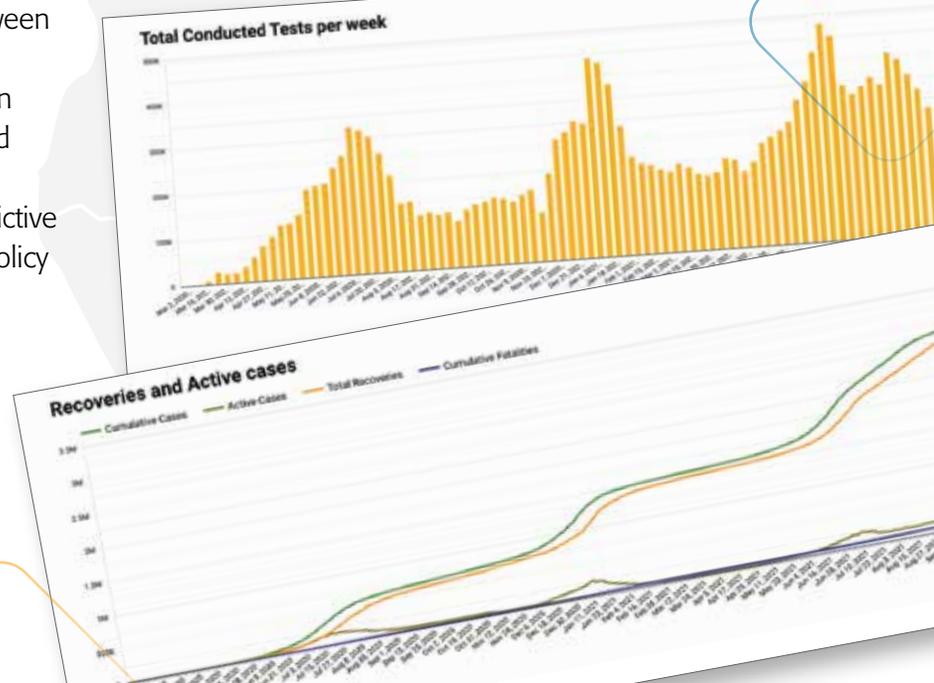
PREDICTING A BETTER WAY

Lockdown measures have been effective in curbing the spread of COVID-19—but they can be crippling to fragile economies. IEEE Members from the IEEE South Africa Section sought to find a way to predict the spread of COVID-19 while easing certain aspects of the lockdown. An interdisciplinary group of volunteers including epidemiologists, physicists, statisticians, software engineers, and data scientists launched a comprehensive dashboard to cover the development and modelling of COVID-19 in South Africa and other African countries.

The project team developed advanced visualization and analytics for the dashboard and organized webinars to enhance coordination of efforts between different stakeholders. The team was supported pro-bono by IBM in geo-visualization and Amazon in cloud services. The chief goal of this dashboard is to predict the number of subjects infected, hospitalizations, and mortality in the region. Predictive tools developed by this project will be used by policy makers to enact rules and regulations, which will allow for economic activity while dealing with an outbreak of the virus.

IMPACT

The IEEE project team's work has been featured on TV, radio, and all the main newspapers of South Africa. As of November 2021, the website (covid19sa.org) had over 500,000 visits and continues to be a resource for decision makers. The IEEE team's work has impacted the way local government views and relies on data to enact policy making—saving tens of thousands of lives. The team is also collaborating with the provincial government for a post-COVID engagement on managing gender violence, femicide, and food security.





SOUTH AFRICA



CWSMAP: COMMUNITY WATER SYSTEM MAPPING TO REDUCE COVID-19 TRANSMISSION BY IMPROVING WATER

TEAM: IEEE Members from the South Africa Section and the University of the Witwatersrand



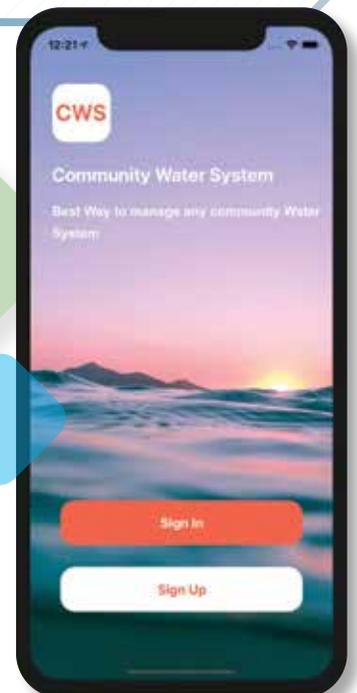
EMPOWERING COMMUNITIES WITH USER-CENTERED DESIGN

Providing access to clean water is critical to curbing the transmission of COVID-19. In rural settings, water is primarily delivered by community water systems (CWSs). However, millions of CWSs function sub-optimally due to the lack of data on operating conditions. IEEE Members from the South Africa Section and volunteers from the University of the Witwatersrand developed CWSMap, an information and communications technology (ICT) app, to empower local communities to map and analyze their rural water systems.

With CWSMap, rural communities will be able to improve maintenance, facilitate sustainable network expansion, identify operational characteristics that lead to pipe breaks, identify low pressure zones at increased risk of contamination, and identify optimal locations for water treatment installation and projected impacts on the system. This will improve system efficiency, decrease operating costs, and improve water quality. The IEEE project team integrated community-based participatory research and a user-centered design approach, allowing engagement with stakeholders in three different countries on the project in a way that encouraged shared learning.

IMPACT

Residents of a partner community piloted the app, providing good reviews and even better feedback. This enabled the IEEE team to bring the testing of the app to a broader user base and go beyond what was first envisioned regarding some functionality aspects. Future versions may look quite different, but it is through user-centered design and community-based participatory research that the CWSMap platform can evolve. There is potential to engage with the broader IEEE community to implement this project in local water sectors around the world.



IEEE HAC | IEEE SIGHT

FUNDED
PROJECT

COVID-19



UGANDA



PROTECTION FOR FRONTLINE WORKERS IN THE COVID-19 RESPONSE

TEAM: Student and Professional Members from the
IEEE Uganda Section



USING 3D PRINTING TO SAFEGUARD MEDICAL PROFESSIONALS

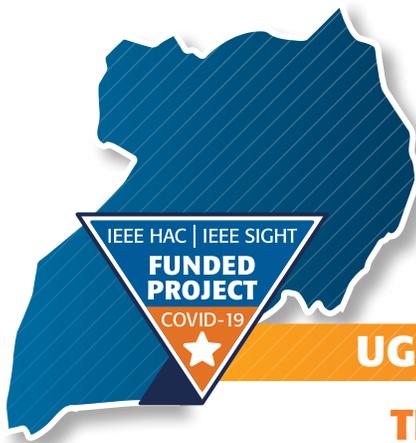
As the COVID-19 pandemic engulfed the world in 2020, reports soon followed that many hospitals were not adequately prepared and that doctors were working in unsafe conditions with limited personal protective equipment (PPE). In response to this crisis, a team of Student and Professional IEEE Members in Uganda donated over 3,300 3D-printed full-face shields to 220 staff members at two local hospitals.

Working with Silver Bullet, a local non-profit organization that contributes to the development and expansion of engineering capacity in Uganda, the IEEE Uganda Section used 3D printing technologies to fabricate full-face shields based on open-source designs by 3D Verkstan. After exploring several prototypes and incorporating user feedback from medical professionals—the IEEE team delivered a product that is lightweight, comfortable for the health workers to wear for long hours, without creating any optical distortion.

IMPACT

With the contributions to the Uganda national supply of PPE, medical workers in the participating hospitals can report for duty to serve patients and caregivers with reduced risk of contracting COVID-19. It is expected that several hundred more health workers will get to use the face shields, serving thousands of patients, when the units are redistributed across the country.





UGANDA



THE HANDS-FREE OPENING DOOR SYSTEM

TEAM: Members of the IEEE Kyambogo University Student Branch and SIGHT Group; Uganda Section, Kyambogo University WIE Chapter; Makerere University, Mbarara University, and Cavendish University Student Branches



ENGINEERING AN INNOVATIVE SOLUTION

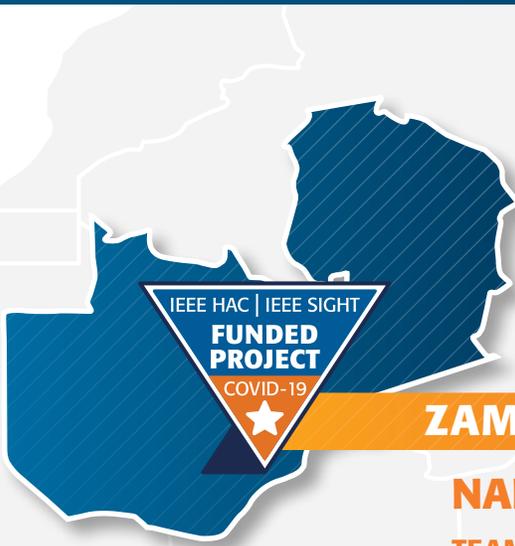
During the COVID-19 pandemic, there has been an emphasis on using sanitizers and washing hands—still individuals are often touching high-contact places such as door handles, elevator buttons, and payment terminals. Members of the IEEE Kyambogo University Student Branch and the IEEE Women in Engineering (WIE) Chapter, along with other volunteers, designed and produced a hands-free opening door system that allows people to handle high-contact surfaces while minimizing exposure to germs and viruses.

The biggest success of the project is that IEEE members were able to come up with a simple tool that solves a problem in their community. While faced with multiple challenges due to COVID-19 lockdowns and closures, the IEEE team worked together to find an innovative solution—while learning communication, teamwork, and technology skills. Going through several prototypes, the final product was a 3D-printed, laser cut, “hook” device. The IEEE team delivered more than 800 door-opening devices to local government ministry offices, banks, and media houses.

IMPACT

The Hands-Free Opening Door System is not just limited to a pandemic situation. It can be kept for the years to come to help prevent the spread of other infections. The product itself has received outstanding feedback, with the IEEE team appearing on national TV UBC, Star TV news, and multiple radio shows to highlight the project and IEEE’s support of technology and humanitarian activities. In addition, most of the project team members were women, making the project a great way to showcase IEEE’s commitment to women in engineering.





ZAMBIA



NAKONDE COVID-19 RESPONSE

TEAM: IEEE Student Members from the Zambia Section SIGHT Group



STUDENTS RESPOND TO A NATIONAL CRISIS

In May of 2020, the Nakonde district in Zambia was declared the national epicenter for COVID-19 after it recorded 43% of what the entire country had recorded in previous months. Nakonde is one of Zambia's most underdeveloped districts and lacks the resources to help fight against the spread of COVID-19. A survey demonstrated that just 10% of inhabitants had a clear understanding of COVID-19 and its impact, and only 3% were using face masks as a protective measure. IEEE Student Members from the Zambia Section SIGHT Group partnered with three local schools and the local government commissioner to offer a solution.

The IEEE project team designed, produced, and distributed 10,000 high-efficiency, reusable face masks to students, teachers, and community members in the region. They also created fifteen information campaigns on measures to reduce the spread of the virus. Due to the opening of school and deliberations with the administration of the district, the IEEE project team decided to distribute 7,069 masks to the schools and the remaining 2,931 to the public around Nakonde.

IMPACT

A total of 10,000 people were directly impacted by the project, with numerous more indirectly impacted. A 7% increase in the number of people in the region with access to face masks was recorded in a follow-up survey. Additionally, a month after the team's information campaigns, positive behavioral changes were noted—60% of pupils in the schools visited continued to adhere to the official COVID-19 health guidelines (sanitizing, using face masks, and social distancing).





UNITED STATES

**COVID-19 INFECTION PREVENTION:
AN INTERACTIVE DIGITAL TRAINING TOOL**

TEAM: IEEE Professional Members from the San Diego Section SIGHT Group



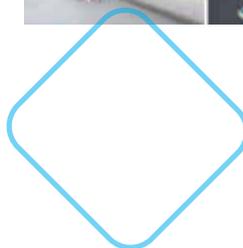
GAMING FOR INFECTION PREVENTION

The COVID-19 pandemic highlighted the importance of public awareness and proper practices in infection prevention. This is especially true among school-aged children who have close contact with family members. The San Diego SIGHT Group created a digital training tool that educates school children on COVID-19 infection prevention.

Working with staff from five local school districts, the San Diego SIGHT Group designed their interactive training tool to be a series of games that school children can play to demonstrate multiple scenarios of COVID-19 infection hazards. The kids are challenged with practicing prevention guidelines correctly to avoid getting and spreading the virus—allowing them to self-learn about correct practices with the COVID-19 virus. The training tool has been released in web-based, desktop-based, and mobile app-based versions so that it is readily available for school kids in the San Diego metropolitan area.

IMPACT

The training tool was successfully implemented in San Diego, California. Since the initial release, several IEEE members have offered advice on how to adapt the tool to international environments—and the program has spread extensively to benefit communities worldwide in English, Spanish, and Chinese-speaking regions. More than 20,000 students in more than forty schools are using the training tool to learn about COVID-19 prevention and mitigation. The project’s stakeholders have formed a sustainable group to promote use of the tool, where they continue to provide feedback for the development of future versions.





ARGENTINA

COVID-RC: CENTER OF OPPORTUNITIES TO ALLEVIATE INEQUALITY AND DETERIORATION OF RURAL COMMUNITIES

TEAM: Student and Professional IEEE Members from the IEEE Argentina Section



TECHNOLOGY TO BENEFIT ONE COMMUNITY

The Chaco province is the poorest in Argentina, with extreme living conditions and a lack of employment, health, and educational resources. The arrival of COVID-19 only worsened the situation. Student and Professional IEEE Members from the IEEE Argentina Section worked to mitigate various aspects of the pandemic in one local village by installing technologies that would improve daily lives in the community.

The first activity was the purchase of a tower and transmission system for internet service to the entire area of "La Medialuna." A virtual course was held to provide technical support to the community—with sixty teachers and students from a nearby city receiving training on rural electrification systems to allow them to maintain the installed system. The IEEE team also worked with community members to build a cistern that allows the collection of rainwater as well as a storage tank to help with municipal water delivery. The last stage was to bring power to the community center. Along with two sets of solar panels, an electrification system was installed on-site in La Medialuna by the IEEE volunteer team.

IMPACT

While long-term outcomes have yet to be assessed, the two sets of solar panels installed allow 25 families in the region to access renewable energy, 11 families to access clean water from the cistern, and 23 students to benefit from the installation of the Wi-Fi tower. The community center also serves as a local healthcare center and classroom for school and workshops.





BRAZIL

ENGINEERS ASSISTING VENTILATOR MAINTENANCE

TEAM: IEEE Members from the Rio de Janeiro Section and the IEEE Rio de Janeiro Young Professionals Affinity Group



ENGINEERING TO SAVE LIVES

With the current pandemic scenario for COVID-19, hospital centers around the world face several challenges to treat patients. In Brazil, many ventilators are out of use due to a lack of maintenance and repair. IEEE Students, Graduate Students, and Professional Members from the IEEE Rio de Janeiro Section and the Section's Young Professionals Affinity Group set their minds and talents to help rectify the situation.

The IEEE project team assessed mechanical ventilators by addressing a backlog of 398 ventilators awaiting repair in the Rio de Janeiro state. They also trained other volunteers to help in the future. The project was implemented in different stages: from online training and mentoring to the repair of ventilators at maintenance spots. With a methodology for autonomy and the exchange of knowledge, the training of volunteers grew at each new stage, resulting in a network of people trained to assist in the fight against COVID-19. The IEEE team worked with local universities, professional associations, industry representatives, and the Brazilian government to implement the project.

IMPACT

The project benefited six hospitals which received the repaired devices. Due to the sharing of knowledge and the networking that arose from this initiative, it can be replicated in all places where IEEE has a presence. The project team received an IEEE Member and Geographic Activities (MGA) Achievement Award for engaging IEEE volunteers to work collaboratively with external institutions and the community.





EL SALVADOR



3D FACE SHIELD FOR MEDICAL AND AUXILIARY STAFF

TEAM: Students from four IEEE Student Branches and Professional IEEE Members from the IEEE El Salvador Section



BUILDING PARTNERSHIPS FOR THE COMMUNITY

In 2020, El Salvador was exponentially affected by the COVID-19 pandemic. When faced with the grim statistics overwhelming their country, four IEEE Student Branches and Professional IEEE Members from the IEEE El Salvador Section took the initiative to manufacture visors for PPE. The IEEE team worked to produce 3D-printed visors for frontline medical personnel to address the shortage of PPE in the country.

To make the production of the visors a reality, a nationwide call was issued for 3D printing equipment. Working with organizations and individuals across El Salvador, the IEEE team identified 24 3D printers and defined two manufacturing modes, centralized and decentralized, to move the project forward. The centralized mode featured 3D printers that were moved to the same building, while the decentralized mode featured volunteers working from their homes with their own 3D printers. Both manufacturing modes worked to deliver medical visors for the personal protection of healthcare workers—and the IEEE team was able to deliver 1,300 visors to twelve local health centers and hospitals.

IMPACT

The main beneficiaries of this project are the health centers for which 1,300 anti-splash visors have provided protection for frontline workers. In the course of the project, the IEEE El Salvador Section formed impressive collaborations with different universities, local companies, non-profits, government entities, and the national Ministry of Health—all working together to successfully address an urgent need in their community.

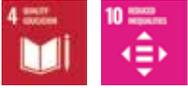




GUATEMALA

DISTANCE EDUCATION PROGRAM ADAPTED TO COVID-19

TEAM: Professional Members from the IEEE Guatemala Section and the Guatemala Section SIGHT Group



ADAPTING EDUCATION FOR VIRTUAL LEARNING

Like much of the world during the COVID-19 pandemic, Guatemala suspended in-person elementary school classes to help combat the spread of the disease. To help with the situation, members of the IEEE Guatemala Section and the Guatemala Section SIGHT Group developed a pilot program of education classes adapted for COVID-19. The IEEE team provided training and equipment to facilitate virtual classes for elementary school students and their teachers at the “El Reformador” school in a rural community in Guatemala.

The team of IEEE volunteers worked with the teachers to adapt the curriculum’s content to be delivered virtually. During the 10-week pilot period, 28 students from fourth grade and their teachers held 45 days of classes using electronic equipment and a modified curriculum.

The program’s success was evaluated by monitoring several result indicators: commitment of parents, adoption of technology by the student, the teacher’s ability to adapt the curriculum to the virtual modality, and the academic performance of the students. The ability of students and teachers to use technology for learning was high, as the participants adapted to deficiencies in their electrical installations, internet access, and lack of educational resources.

IMPACT

While not a long-term replacement for in-person learning, the virtual classes performed well.

The pilot program showed that students used their equipment appropriately, and that this technology was a useful tool for their learning. The IEEE team proved that virtual classes could help reduce the digital divide and improve education in Guatemala—and this pilot project showed that with the right tools, positive changes can be achieved.



IEEE HAC | IEEE SIGHT

FUNDED
PROJECT

COVID-19

MEXICO



UV-A LED ARRAYS AND PHOTOCATALYTIC TiO₂ COATINGS ON PROTECTIVE SCREENS FOR SARS-COV-2 INACTIVATION

TEAM: Professional Members from the IEEE Puebla Section SIGHT Group



RESEARCHING FOR BETTER PROTECTION

While doing experimental work in a global pandemic is a huge challenge, the IEEE SIGHT Group in Puebla, Mexico was able to conduct accurate research and create an innovative solution to a real-world problem. The IEEE team developed large-area folding screens that protect medical staff from large concentrations of SARS-Cov-2 virions at a local hospital—reducing hospitalization time of Covid-19 patients by about 20% (from 25 days down to 20 days on average).

In collaboration with the Universidad de las Americas, Puebla, and the University of Texas at San Antonio (UDLAP, UTSA), the research team was able to confirm the efficacy of using UV-A LED arrays and photocatalytic TiO₂ coatings for inactivation of the virus that causes COVID-19. The screens can contain the cloud of coronavirus microdroplets expelled by an infected patient during coughing, talking, or breathing—enabling safe interaction with medical staff. In addition to the large area screens, the team also donated more than 400 plastic face shields coated with this photocatalytic material.

IMPACT

The IEEE SIGHT Group in Puebla, Mexico is currently developing a simplified process for the enhanced photocatalytic coating on plastic face shields, with the aim of a lower fabrication cost. They have received an additional round of funding from HAC/SIGHT in 2021 to deliver 2,000 face shields with the coating to individuals working at crowded and high-risk places like local hospitals, schools, churches, public offices, and vaccination sites.





UVC LIGHTING PROTOTYPES FOR HEALTHCARE PROVIDERS

TEAM: IEEE Members from the IEEE Nicaragua Section SIGHT Group and IEEE Nicaragua Section Engineering in Medicine and Biology Society (EMBS) Chapter



LIGHTING THE WAY FOR HEALTHCARE PROVIDERS

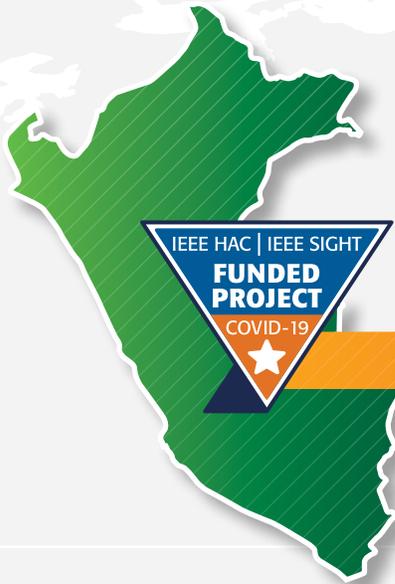
The COVID-19 pandemic exposed many healthcare needs that require attention. IEEE Members from the IEEE Nicaragua Section SIGHT Group and IEEE Engineering in Medicine and Biology Society Chapter, along with several local partners, focused on the creation of sterilization stations for healthcare providers. After testing several prototypes, the IEEE project team designed and installed 51 UV type-C lighting lamps for the sterilization of medical protective equipment (such as N95 masks) exposed to COVID-19.

The IEEE project team assembled and tested the lamps at the Universidad Catolica de Nicaragua (UNICA) and validated the lamps in partner hospitals and the microbiology laboratories of the national Ministry of Health to demonstrate their effective response. The Ministry of Health identified local hospitals and healthcare centers in Nicaragua where the IEEE team installed the lamps. In total, the team established 29 sterilization stations in hospitals (intensive care units, operating rooms, microbiology laboratories, infectious disease wards) where the lamps can be controlled by motion sensors and Wi-Fi remote control via smartphone.

IMPACT

The five hospitals where the lamps were installed extend services to 30,000 people every month. In just one month's time, the lamps could benefit an average of 150,000 patients and 4,000 health collaborators. Additional stations were installed in several state universities, where more than 5,000 people per month can benefit. This project is a perfect example of how good relationships with local partners—universities, nonprofit and government organizations, and IEEE groups—can lead to significant results and countless lives saved.





PERU

SIAMA: INTELLIGENT SYSTEM TO IDENTIFY, REPORT, ANALYZE, MONITOR, AND ASSIST

TEAM: IEEE Members from the IEEE Peru Section



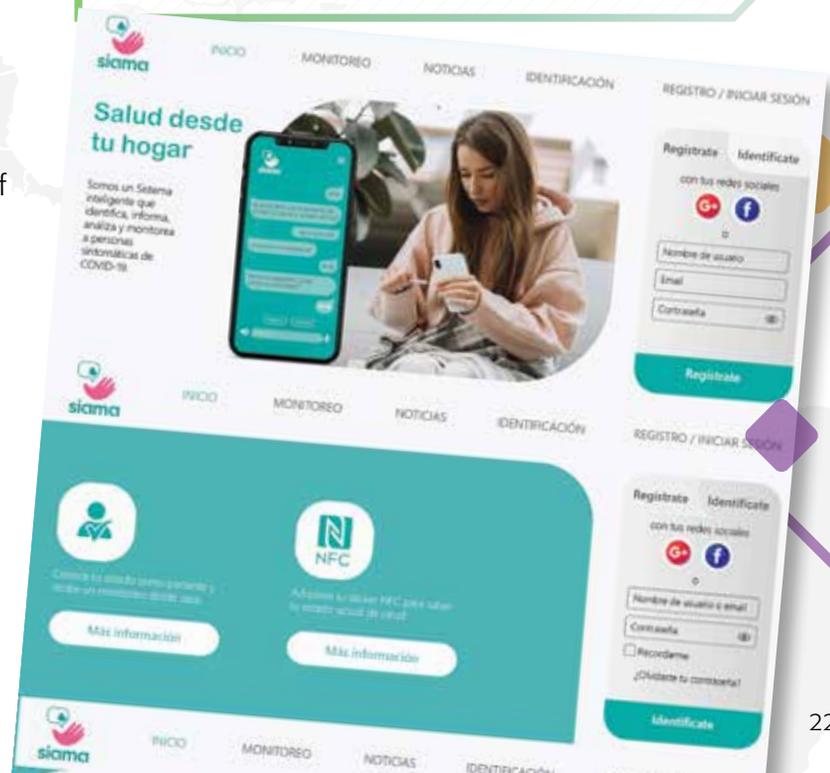
DESIGNING AN INTELLIGENT MONITORING SYSTEM

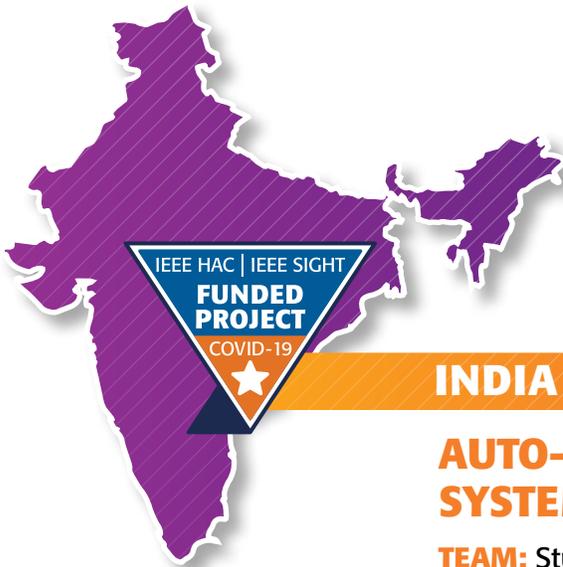
The COVID-19 pandemic represented multisectoral challenges for Latin America. Scenarios of limited economic resources, dissatisfaction with social demands, and oversaturation of healthcare systems are just some of the difficulties of this humanitarian crisis. IEEE Members from the IEEE Peru Section developed a system to address the country's difficulties in diagnosing, monitoring, and recognizing COVID cases, coined SIAMA.

The IEEE team planned, designed, and produced an intelligent system that offers reliable information to the healthy population, tracks diagnostic test results of suspected cases, and monitors confirmed COVID-19 cases to promote isolation at home to ensure the health of both the population and first responders. The platform was developed to have four main modules: Informative, Evaluation, Monitoring, and Identification. SIAMA includes a thermometer, NFC sticker, and oximeter all working in a multisystem platform with a voice assistant. The information module provides daily news, and the monitoring module works in coordination with healthcare personnel to facilitate patient assessment while they remain at home.

IMPACT

The project was successfully implemented in the Aliviari clinic in Peru, and its use will be expanded in the future to cover the Arequipa region. A key benefit of this program was reducing the human resource gap as well as the mortality of patients who could not easily access healthcare. SIAMA has been used with more than fifty patients, and the team is still working on improvements and refinements to better meet the needs of its users. During the project implementation, four members of the team became members of IEEE.





INDIA



AUTO-IRRIGATION AND SOIL MONITORING SYSTEM FOR COVID-19 MIGRANT ENGAGEMENT

TEAM: Student and Professional Members from the IEEE Indian Institute of Technology (IIT) Dhanbad Student Branch



USING SMART AGRICULTURE TO FOSTER COMMUNITY INTERESTS

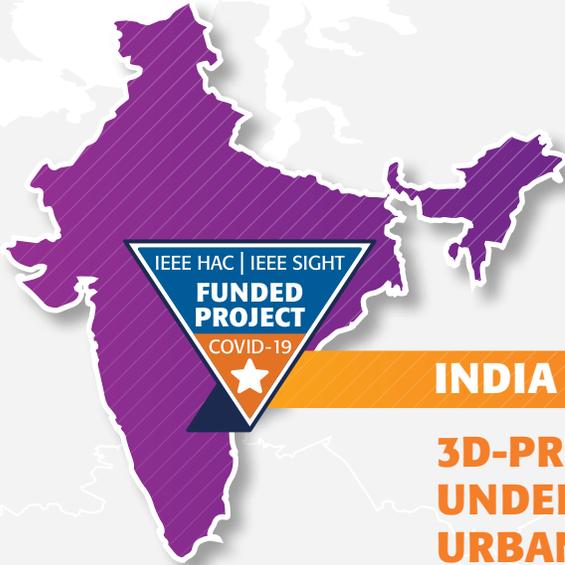
Student and Professional IEEE Members used technology to help migrant workers in India during the COVID-19 pandemic. The initiative educated locals about smart agriculture and how using technology can generate considerable profits with very few required inputs. IEEE team members designed a smart auto-irrigation and app-based soil monitoring system that was installed at four locations in Dhanbad, India.

The new system—with features including multilingual control Android app, farmerless-irrigation support, 24/7 monitoring, smart adjustments according to environmental conditions powered by AI, and a modular design with support for multiple sprinklers/pumps—demonstrated the true power of technology in making lives easier. Old irrigation techniques waste a lot of time and water. With the smart auto-irrigation and app-based soil monitoring system, various sensors are used to monitor soil parameters—humidity, temperature, and soil moisture—which can be sent directly to a smartphone, allowing the system to be controlled from anywhere.

IMPACT

The project was praised by the local community of Dhanbad and was extensively featured by both national and local media. Replacing the older irrigation technology with the new smart technology encourages residents to remain in the Dhanbad area instead of migrating to other cities for employment. The project also helps those with limited farming skills to deploy efficient irrigation with a sprinkler system, enhancing crop yield, and contributing to the economic wellbeing of the farming community.





INDIA

3D-PRINTED SELF-CARE KIT FOR UNDERSERVED COMMUNITY IN URBAN SLUMS

TEAM: Members of the IEEE Bangalore Section SIGHT Group and the IEEE B.M.S. College of Engineering Student Branch



USING TECHNOLOGY TO HELP UNDERSERVED COMMUNITIES

Social distancing is one of the best ways to combat the spread of COVID-19. In Bangalore, India, the poorest individuals often live in a small joint-family dwelling—and maintaining social distance is impossible. It is estimated that 20% of the Bangalore population resides in these slums (as officially recognized by the government). Members of the IEEE Bangalore Section SIGHT Group and Student Members from the IEEE BMSCE Student Branch helped the situation in India's slums by producing 3D-printed items so that residents could avoid touching high-contact surfaces.

The self-care kits included a finger protection cover; a "handy," for people who buy groceries or do a lot of touch-based work; a door opener, where people can use their elbows for frequent opening and closing; and an elbow-activated sanitizer/soap dispenser. The BMSCE Student Branch provided 3D printers, and the IEEE project team partnered with a local NGO to distribute the kits to 250 households. The kits also included masks, alcohol swabs, hand sanitizer gel, latex gloves, and a carrying pouch.



IMPACT

Approximately 250 households benefited from this project. Given an average of five people per household, this means approximately 1,250 people were impacted—helping to break the chain of COVID-19 spread. In addition, the partner NGO will be adapting the technology for scaling in other slums across India. Beyond the pandemic, this kit can be used to help the underserved community understand the value of health and hygiene.





INDIA

RELIABLE AND ACCESSIBLE WATER WITH CLEAN ENERGY

TEAM: Student and Young Professional Members from the IEEE Kerala Section Power & Energy Society (PES) Chapter



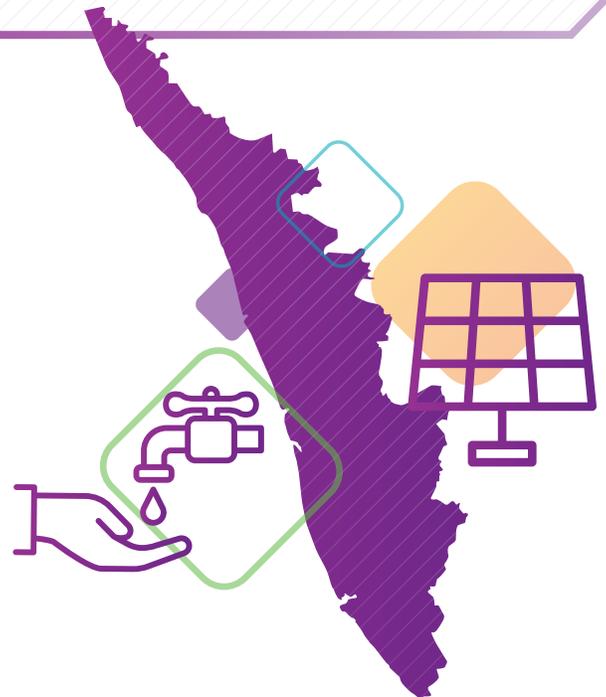
USING CLEAN ENERGY TO PROVIDE CLEAN WATER

The people of Laksham Veedu Colony of Manjapara Grama Panchayat, Kerala, India have had limited access to hygienic water resources for over three decades. Access to clean water is a basic human right and, amidst the COVID-19 pandemic, it is essential for meaningful healthy living conditions. Student and Young Professional Members from the IEEE Kerala Section Power & Energy Society (PES) Chapter partnered with the community to install a solar-powered pumping system with a 4,500-liter storage tank and a water purifier.

A total of eight taps were installed in the area that could be used for pumping about four times a day. Along with the water system, the IEEE team set up an off-grid solar power system. Since weather variations can affect the performance of the system, the placement of the panels was selected to receive the maximum amount of sunlight possible. As a backup, a line from the electric supply was also provided. The project included a USB charging station to provide access to online educational resources for students during the virtual classes necessitated by the COVID-19 pandemic.

IMPACT

This project was the first of its kind in Kerala amidst COVID regulations. The community of around 300 people—26 families, including children and elders—saw almost immediate benefits after the installation of the clean water system. The IEEE team gained practical, hands-on experience—with students, young professionals, and women equally playing meaningful roles in this project.





INDONESIA



WOMEN AGAINST DISRUPTIVE INFORMATION ON COVID-19 PANDEMIC IN INDONESIA

TEAM: Professional Members from the IEEE Indonesia Section Women in Engineering (WIE) Affinity Group



WOMEN AGAINST DISRUPTIVE INFORMATION

Funding for this project was provided by the COVID-19 Response Fund of the IEEE Foundation. Thanks to the generosity of more than 240 donors, more than US\$50,000 was raised to support the IEEE community in various ways. See the full impact of support from the COVID-19 Response Fund online on the IEEE Foundation website.

COVID-19 hoaxes and disruptive information have spread significantly around the world due to social media and the rapid transmission of information on the internet. To help stop this spread of misinformation, a team of volunteers from the IEEE Indonesia Section Women in Engineering (WIE) Affinity Group provided a series of virtual workshops on information literacy.

Thirty-seven women from 21 cities in different regions of Indonesia participated in the workshops, where attendees learned how to recognize false information and classify it, how to deliver appropriate responses, and how to utilize technology to prevent the spread of the information. The participants were then recognized as Women Against Disruptive Information (WADI) trainers, and each trainer further disseminated the information—allowing hundreds of people to be impacted in some way. The IEEE Indonesia Section WIE Group also held a webinar for information literacy attended by 142 participants from all over Indonesia.

IMPACT

The Indonesia WIE Group is still working to prevent the spread of disinformation by collaborating with the community, communication media, and government. All the materials and visual campaigns used in the project are free and open access so they can be disseminated across the country. As part of their project, the volunteers organized focus groups to measure the impact of the virtual workshops, and they published a book with a compilation of stories and experiences of the WADI trainers.





A NUTRITION GUIDE AND RECIPE REPOSITORY FOR FAMILY RESILIENCE IN COVID-19

TEAM: Student and Professional IEEE Members from the Indonesia Section SIGHT Group and the Indonesia Section Women in Engineering (WIE) Affinity Group



KNOWLEDGE LEADS TO BETTER HEALTH

It is known that physical distancing and good hygiene are the best protection against COVID-19. Another aspect of combating COVID-19 is good nutrition as a healthy diet is vital to a strong immune system. Poor metabolic health, such as in those with obesity and diabetes, is linked to higher hospitalization and death risk in COVID-19. Student and Professional IEEE Members from the IEEE Indonesia Section SIGHT Group and the Section's Women in Engineering (WIE) Affinity Group developed a web platform and social media campaign for healthy nutrition and meal planning during COVID-19, in hopes of strengthening the health capacity of the general population in Indonesia.

The platform includes a recipe repository, nutrition facts, recipe and other knowledge tutorials, nutrition information for COVID-19, a nutrition converter, nutrition hoax buster, and simple budgeting functionality. The social media campaign targeted a population with access to social media, but who remain vulnerable to misinformation and low nutrition literacy. The IEEE team also collaborated with a local Rotary Club Chapter and The Women's Organization of Indonesia's Finance Department to hold webinars for their constituents.

IMPACT

The project increased nutritional and basic family health literacy and provided a practical and actionable guide for implementation for families in Indonesia. Over thirty volunteers grew their professional capacity through the project's implementation. More than 300 participants from the community participated in the webinars. Social media posts received a good deal of exposure with more than 7,000 post engagements. The webinars were well received, with significant engagement, as well as requests for follow-up workshops.



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FUNDED
PROJECT

COVID-19



MALAYSIA



COVID-19 CHILDREN AWARENESS AND SUPPORT MATERIALS FOR CHILDCARE CENTER

TEAM: Professional Members from the IEEE Malaysia Communications Society and Vehicular Technology Society Joint Chapter (MyComVT)



LEARNING TO PRACTICE THE NEW NORMAL

Practicing the “new normal” during the COVID-19 pandemic, such as wearing face masks, frequent hand sanitizing, and keeping social distance, can be a challenge, especially for children. Members from the IEEE Malaysia Communications Society and Vehicular Technology Society Joint Chapter (MyComVT) wanted to make this adjustment period a little easier—for both the children and their caregivers.

The IEEE project team responded to this challenge by developing awareness and providing materials to childcare centers after their reopening. Working with childcare centers in Selangor, Malaysia, the IEEE team listened to the needs of the childcare center management and caregivers—and produced COVID-19 awareness kits for 1,000 children in twelve childcare centers. Each kit included a coloring book, colored pencils, a face mask, and a face shield in a folder or non-woven bag. They also provided the centers with packs of support materials such as hand sanitizers, face masks, and face shields for their employees.

IMPACT

During the project, the IEEE project team formed a partnership with Persatuan Cakna Anak Malaysia and Faculty of Electrical Engineering, MARA University of Technology. Several members from these organizations dedicated their time to produce the COVID-19 awareness kits. Feedback on the COVID-19 awareness kits has been positive from children, caregivers, and parents. All childcare centers agree that the program brings awareness of COVID-19 to the children, and they are satisfied with all materials provided.





SRI LANKA

Code With WIE Let's Rise Together

SUGGEST ANY SOLUTION FOR HEALTH CARE OR SOCIAL ISSUES RELATED "COVID-19 PANDEMIC" AND "STAY AT HOME".

Initial proposal submission deadline is on
15th April, 2020

CODE WITH WIE – LET'S RISE TOGETHER

TEAM: IEEE Members from the Sri Lanka Section, Sri Lanka Section Women in Engineering affinity group, and the Section's Student Branches



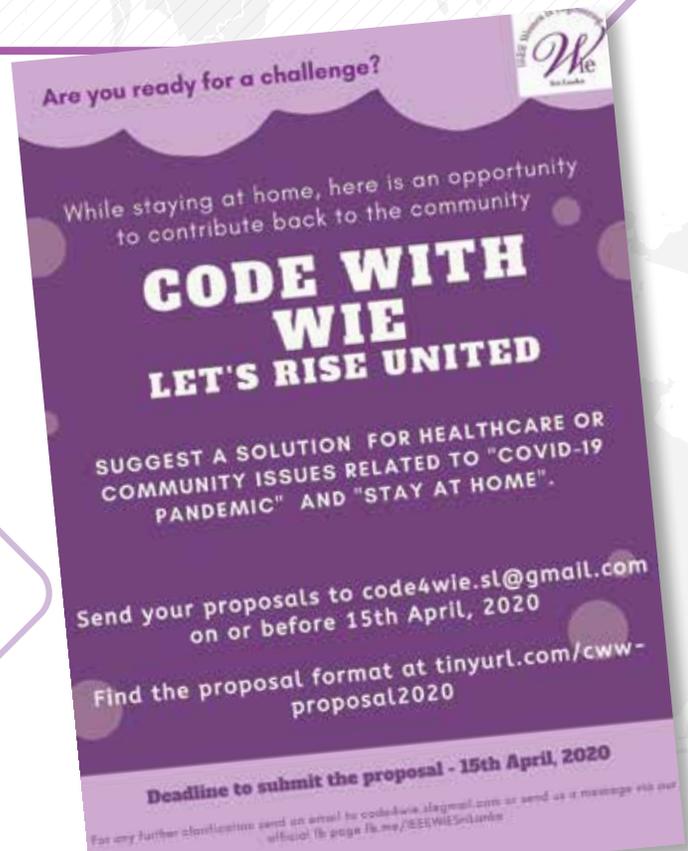
COMING TOGETHER TO CODE SOLUTIONS

In Sri Lanka, different geographical areas suffer from day-to-day life issues in addition to health concerns caused by COVID-19. Identifying the current problems that each local community is facing is very challenging with the limited infrastructure available. "Code with WIE—Let's Rise Together" was created by IEEE Members from the Sri Lanka Section and Sri Lanka Women in Engineering (WIE) Affinity Group for nineteen of the Section's Student Branches to encourage university students to develop products that solve the critical problems arising due to the COVID-19 pandemic.

IEEE WIE is a global network to advance women in technology at all points in their lives and careers. The IEEE project team hosted a virtual competition in which students were asked to find cost-effective, user-friendly ICT solutions for healthcare or social challenges related to COVID-19. As the students were from many different locations, they were well-suited to analyze local issues and find solutions with practical information. The first winning application will help to identify COVID-19 patients using a special camera; the second is a mobile and web-based tracing application, and the third is an application to improve mental health during lockdowns.

IMPACT

The three winning ideas made connections with industry representatives who will support and guide the applicants as they implement their solutions, providing mentoring and evaluation. The virtual competition created awareness among students, while giving them a chance to demonstrate social responsibility. In this way, IEEE produces knowledgeable and values-driven graduates.



See what HAC/SIGHT project leaders have to say about their experiences.

IN YOUR OWN WORDS, PLEASE DESCRIBE WHAT, IF ANY, IMPACT YOU FEEL YOUR HAC/SIGHT TEAM HAS HAD ON THE COMMUNITY IT SERVED.

“ It plays a very vital role in [the] community. HAC helps rural areas to be aware of the speed of new technology and science this world is embracing.

“ We’ve developed some technologies that help [improve] the overall quality of life for people under the COVID-19 situation, especially to the healthcare professionals working at the frontline.

“ Beyond the humanitarian efforts, it was quite inspirational to see the girls interested in STEM since they could relate to their peers and suddenly, their dreams felt ideal by seeing ladies in STEM.

“ The impact is way beyond description! [Our project] seems to be achieving more compared to what the HAC/SIGHT team initially expected.

IN YOUR OWN WORDS, PLEASE DESCRIBE WHAT, IF ANY, IMPACT YOUR EXPERIENCE AS AN HAC/SIGHT PROJECT LEADER OR TEAM MEMBER HAS HAD ON YOUR LIFE PERSONALLY AND PROFESSIONALLY.

“ My team...learned that we as engineers can provide solutions to social problems in a practical way and without reinventing the wheel; [we] learned that it is possible to apply technologies that are within our reach to improve the quality of life of communities, but always with the help of other disciplines; [we] learned to formulate and develop technological projects with social impact and, above all, [we] learned that this is our main mission...to expand [our] vision and presence to truly needy communities where IEEE has never been. ”

“ ...even if it seems that you don’t have time, you can always find it to make a difference in your community. It’s not easy, especially with the pandemic still ongoing. However, it is also possible to create new collaborations and foster innovation, virtually, from your living room. ”

“ It has provided a great avenue to meet like-minded individuals and make tangible differences. ”

“ The main impact is the feeling of knowing new things, being involved in our community and making differences in order to advance technology for humanity. I got involved and made my own way, learning things, failing, discovering, but always being accompanied by the HAC Committee, my project team, and everyone in IEEE. ”

Getting Involved with HAC/SIGHT

HAC/SIGHT are uniquely positioned to bring together individuals and entities within and beyond IEEE to advance humanitarian technology and sustainable development in local communities around the globe. Those looking to take action will find a number of opportunities to do so with HAC/SIGHT.

Ready to begin your own humanitarian technology and sustainable development project? Visit the HAC website hac.ieee.org to learn about current funding opportunities. Or, if you are looking to create the structure of a team first, establishing an IEEE SIGHT Group in your Student Branch or Section may be a good starting point. There are a variety of ways in which you can get involved, even if you do not currently have the time or team members to implement a project directly.

For Individuals:

- **Join the HAC Education Committee** to create resources that will guide funded project teams during their planning, implementation, and assessment of their work. Write to hac-office@ieee.org to express your interest.
- **Become an HAC/SIGHT project proposal reviewer:** use your expertise and experience to ensure HAC/SIGHT invest in projects with a high probability of success. Write to hac-office@ieee.org to express your interest.
- **Make a donation** to the IEEE SIGHT Fund of the IEEE Foundation. Your contribution of any amount helps HAC/SIGHT transform the lives of individuals and communities around the world through support for new SIGHT Groups or projects such as those highlighted in this portfolio.
- **Interested, but not quite sure where to start?** Become an IEEE SIGHT member to receive the monthly HAC/SIGHT Sustainable Development Newsletter, full of notices and information about humanitarian activities at IEEE.

For Organizations and IEEE Entities:

- **Join forces with HAC** to provide an awareness raising or training opportunity for your members and/or hold joint **funding opportunities** to maximize your impact. Humanitarian and sustainable development activities can increase IEEE organizational unit (OU) vitality, attract potential members, and provide a greater value proposition to existing and prospective volunteers. By partnering with HAC, your OU can benefit from a proven model that will allow you to reach your members and their communities with meaningful and impactful solutions. Write to hac-office@ieee.org with your idea.
- **Sponsor or participate in the HAC Global Summit 2022:** Write to hac-office@ieee.org for further information.
- **Make a donation** to the IEEE SIGHT Fund of the IEEE Foundation. Significant contributions to the IEEE SIGHT Fund could be structured to support projects in a certain region or field of interest. Write to hac-office@ieee.org with your idea.
- **Other areas of collaboration?** Please contact us directly at hac-office@ieee.org. We look forward to connecting with you to discuss.

For all interested in learning more about HAC's work and accomplishments in 2021, we invite you to read the IEEE HAC Annual Report and quarterly reports, available on the HAC website.



Humanitarian Activities
Committee

IEEE SIGHT

Special Interest Groups on
Humanitarian Technology

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