



Senior Design Projects Facilitated by FIH  
2018-2019



Project name	Project short description	Organization	Location	Depart.	Students	Advisor
<b>Health and wellbeing related projects</b>						
<b>HELP Hand: Human-centered Electric Prosthetic Hand</b>	Many amputees lack access to prostheses and are therefore unable to sustain employment. Additionally, the amputation presents them with a social stigma that leads to discrimination and even ostracization. Through iterative design and prototyping and interdisciplinary collaboration, our team will build an anthropomorphic electrically powered, accessible prosthetic hand. This solution aims to empower, enable and encourage amputees in India to carry out the activities of daily life needed to live their lives with minimal impairment.	Japerfoot	India	Interdisciplinary-partnered with Engineering World Health	Shiyin Lim- Bioeng Jamie Ferris- Mech Michael Mehta- Mech Evan Miscuraca- Mech Mira Diwan- Public Health Kirsten Dodroe- Public Health/Biology Maddie Bolinger- Public Health/Biology	Asuri, Ph.D., Prashanth Kitts, Ph.D., Christopher
<b>CERVIS: Cervical Cancer Early Response Visual Identification System</b>	Cervical Cancer, the fourth most devastating cancer for women, disproportionately affects women in developing countries. Eighty-five percent of cervical cancer deaths occur in third world countries. The burden of disease has been significantly reduced in western contexts since the introduction of the Pap Smear screening test in the 1940s. However, this test is expensive and requires laboratory analysis making it unavailable in low resource settings. Through the development of CERVIS, we hope to design a low-cost, non-invasive, point-of-care cervical cancer screening method by analyzing bacterial concentrations in the vaginal microbiome. The implementation of such a test will dramatically expand current screening options beyond Pap Smear, Visual Inspection by Acetic Acid (VIA), and Human Papilloma Virus (HPV) testing.	Actively looking for partner organization	TBD	Bioengineering-partnered with Engineering World Health	Claire Hultquist- Bioeng Hallie Mcnamara- Bioeng Julia Lanoha- Bioeng Rosie McDonagh- Bioeng Mason Seely- Biology Dave Heil- Public Health/biology Nicola Gerbino- Public Health/Spanish	Asuri, Ph.D., Prashanth Parker, PhD., Michele

<b>Remote Medical Diagnosis for Skin Cancer</b>	We aim to make an application that enables access to medical care in developing countries by developing a medical diagnostic application that is accessible to people around the world. Our project is based on research focused on training Convolutional Neural Networks to identify skin cancer, but we aim to expand the application to diagnose more medical diseases. Additionally, an app will be built to enable people to use our service. Our software is based on Deep Learning, a subfield of Machine Learning. It involves training the neural network on thousands of medical images per medical disease so that the algorithm is able to make an accurate medical diagnosis based on the image.	TBD	TBD	Computer Engineering	Gregory Maulick- Comp. Eng Juliana Shihadeh- Comp. Eng	Ogunfunmi, Ph.D. Tokumbo Figueira, Ph. D., Silvia Yan, Ph. D., Yuling
<b>NavSense: Computer Vision for the Visually Impaired</b>	This project will increase independence and mobility in those who are affected by visual impairments through Electronic Traveling Aids (ETAs). It will use computer vision to notify the user if there are obstacles in their environment. By identifying and classifying objects such as stairs, people, vehicles, and stationary obstacles, the device will allow the user to safely progress along their intended path and significantly lower the risk of injury.	Andalo	Puebla, Mexico	Computer Engineering	Michael Dallow- Comp. Eng Daniel Okazaki- Comp. Eng Jack Ryan- Comp. Eng	Dezfouli, Ph. D. Behnam
<b>Smart Doorbell System for the hearing impaired</b>	The goal of this project is to create a low cost, effective doorbell system for the hearing impaired. The system will consist of a low cost IoT board and a button that together acts as the doorbell. When the button is pressed, it will alert the user. The chosen solution will be adaptable to multiple configurations according to the financial ability of the user.	Andalo	Puebla, Mexico	Computer Engineering	Dominic Magdaluyo- Comp. Eng Shannen Edwin- Comp. Eng	Dezfouli, Ph. D. Behnam
<b>Education and training related projects</b>						

<b>GalapaGuide</b>	The Galapagos Islands host over 250,000 visitors every year, but the protected habitat that attracts all those people restricts their access to only 3% of the archipelago. Around 800 naturalist guides give tours of this limited area throughout the year, all of them well trained to both identify threats to the environment in the form of invasive species and notice certain hazards that could result in trail closures or require maintenance. Easy access to this information is vital for the guides to effectively do their jobs, but with the limited technological infrastructure on the island, this is difficult to achieve. The current solution to this problem is insufficient and prone to error. In order to better serve the naturalists on the archipelago, we will build a mobile application as well as a backend which will have many features that solve several problems on the islands.	Minister of Turism (Galapagos Island)	Galapagos	Computer Science and Eng	Paul Ahrens- Comp. Eng Mason Bruce- Comp. Eng Stephen Pacwa- Comp. Eng Neel Sampemane- Comp. Eng	Figueira, Ph.D., Silvia
<b>GalapaGo!</b>	Our goal is to develop an application that will educate tourists visiting Galapagos Islands on how to interact with the nature and local people in a sustainable way. The application also will provide tourists with local information about tours, restaurants and hotels.	Chacay Org. (Ecuador)	Galapagos	Computer Science and Eng	Jeffrey Nguyen- Comp. Eng Sally Park- Comp. Eng Manuel Sanchez- Comp. Eng	Figueira, Ph.D., Silvia
<b>UFEEEL: Understanding Feelings Effectively and Enhancing Life</b>	Mental illness kills silently. Many people, especially the youth, who are affected by mental health issues are confined by social stigmas around exposing one's emotions and state of mind. As a result, many friends and family experience the above scenario. We wish to break this stigma and help people suffering from mental illnesses connect and reach out for help from those who are willing to listen. We will create a mobile application that will allow users to connect to mental health resources at Santa Clara University as well as provide the necessary tools for recovery.	Santa Clara University	Santa Clara, CA	Computer Science and Eng- partnered with Engineering World Health	Paul Jin- Comp. Eng Dara O'Sullivan- Comp. Eng Bobby Kresge- Comp. Eng Claire Capeloto- Public Health Tatiana Valentine- Biology	Figueira, Ph.D., Silvia Parker, Ph.D., Michele
<b>Agora Teaching App</b>	Agora is an organization that helps teachers in North America and Latin America to have access to the latest teaching methods through an extensive network of teachers and schools dedicated to providing quality education. This application will help Agora clients have easy access to those contents in a fast and user friendly way.	Agora	Peru	Computer Science and Eng	Casey Xuereb- Comp. Eng Sam Burns- Comp. Eng Daisuke Kurita- Comp. Eng	Figueira, Ph.D., Silvia

<b>Web-based Mesh Manager</b>	<p>In today's world, information is more important than ever for solving problems. This problem is especially exaggerated in Africa where the percentage of internet users is 17% lower than the global average. We plan to build a web-based system for the setup and configuration of local networks with respect to medical devices. Through a variety of methods, this system provides a robust method of connecting disparate network elements into one group. This system will also be able to regulate up and down link network usage to ensure data gets to its destination in a reasonable time. Additionally, it will provide a large amount of data and graphics on the state of the network.</p>	Rose Academies	Uganda	Computer Science and Eng	Tristan Islam- Comp. Eng Matt Jasaitis- Comp. Eng	Dezfouli, Ph. D. Behnam
<b>Synergy: An electricity usage monitoring system and visualization dashboard</b>	<p>Synergy is a locally hosted energy/electricity monitoring system that keeps data of your energy usage safe within the walls of your own home while monitoring multiple devices. The data is generated by various subsystems for processing and storage, and only after processing, uploaded to the cloud. The system will also have an integrated electricity usage visualization dashboard that displays real time power usage statistics and will be able to connect to mobile devices over bluetooth or wifi. Furthermore, the system will be able to detect sudden spikes or irregularities, informing users to the possibility of a blown fuse or other energy leakage by enabling fast alert generation.</p>	Santa Clara University's Center for Sustainability	Santa Clara, CA	Computer Science and Eng	Pearce Ropion- Comp. Eng Sarah Johnson- Comp. Eng	Dezfouli, Ph. D. Behnam

<b>Home Book</b>	<p>Having a reliable address system is something that is often taken for granted, but simply having one comes with immense benefits. People can easily find locations of friends and family, services like taxis know exactly where to pick customers up, and emergency response units can accurately find the scene of emergencies quickly. However, in many developing countries, these are luxuries only afforded by the wealthy and privileged neighborhoods. Locations are given haphazardly through description, often leading to late arrivals. In some cases this can be a dire problem. Our solution aims to change this by developing a mobile application that anyone can download onto their mobile device. The application uses GPS coordinates to generate a permanent address, which can then be shared with other people and services.</p>		Cameroon	Computer Science and Eng	Stephen Poth- Comp. Eng Simon Stauber- Comp. Eng Jake Vargas- Comp. Eng	Figueira, Ph.D., Silvia
<b>Improving Livelihoods</b>						
<b>Frugal Innovation for Bridge Housing Community Initiative</b>	<p>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 designed such that these improvements are simple additions to the existing homes when they become fiscally feasible.</p>	City of San Jose	San Jose, CA	Civil Eng	John O'Hagan- Civil Jackson Bordelon-Civil	Nilsson, Ph.D Tonya

<b>Design of a Groundwater Irrigation System in Zwedru, Liberia</b>	<p>The aim of this project is to relieve food insecurity in rural Liberia. This will be accomplished by designing a groundwater extraction, recharge, and irrigation system in order to facilitate year-long crop-growing. The irrigation system designed for this project will allow villagers to grow certain crops, such as cassava, okra, chard, and squash, during the dry season. This will help alleviate food insecurity with the goal of providing a source of income for the farmers. This project will be designed for a one hectare plot, which can be scaled up or down depending on land area. A minimum of 4 wells will be constructed and water will be pumped out of them using solar pumps. Drip irrigation lines will be laid throughout the one hectare to provide 1.2 litres/second to the plot for 6 hours a day during the dry season.</p>	BRAID Africa	Zwedru, Liberia	Civil Eng	Ciara Murphy- Civil Ricky Matthews- Civil Peter Koros- Civil	Maurer, Ph.D., P.E., Edwin Doyle, Ph.D., Laura
<b>Design of a Household Water Catchment and Purification System in Puebla, Mexico</b>	<p>Clean water is a necessity and a basic human right. In this project, we are partnering with Universidad Iberoamericana, a Jesuit University in Puebla, Mexico. We plan to create a water catchment system with an attached purification device that will be implemented in the rural community of Calle del Paraiso. Calle del Paraiso has no access to clean water, and the majority of the community buys bottled water daily from the main city, which is expensive, inefficient and not sustainable.</p>	Ibero University	Puebla, Mexico	Civil Eng	Nikhita Jingar- Civil Angela Chang- Civil	Doyle, Ph.D., Laura
<b>Design of a Sustainable Integrated Farming System</b>	<p>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 options for nutritious food choices. 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 to the environment and reliance on water.</p>	Loaves and Fishes	San Jose, CA	Interdisciplinary	Sydney Thompson- Mech Riley Albright-Borden- Mech James Wang- Electrical Petra Nelken- Public Health/Poli Sci Sophia Sparagana- Public Health/Gender Studies	Doyle, Ph.D., Laura Lee, Ph.D., Hohyun Wilson, Ph. D., Sarah

<p><b>Electricity generation and transportation accessibility for communities in Puebla, Mexico</b></p>	<p>Our team's ultimate goal is to provide rural Puebla (known as Villa del Paraiso) with a sustainable source of energy and access to transportation. Puebla City is a major city southeast of Mexico City. We will be designing a bicycle attachment to transport 1 or 2 other people in addition to the driver. The attachment will be designed with a solar panel, and extra sets of pedals working in tandem with an assistive electric motor. Our hope is to also have a stationary configuration for this attachment, so the bicycle can be used to provide additional energy for small appliances.</p>	<p>Universidad Iberoamericana</p>	<p>Puebla, Mexico</p>	<p>Mechanical Eng</p>	<p>Alesis Gonsalves- Mech Brenden Stone- Mech Sean Flanagan- Mech Tianhao Jiang- Mech</p>	<p>Restivo Ph.D., Gaetano</p>
<p><b>Water Bike Pump Purification and Transportation Device</b></p>	<p>While there are many products that can make water potable, 1 in 9 people in the world do not have a clean water source close to their home. In many cases bicycles help ease the journey; however, it is nearly impossible to carry a significant amount of water while riding a bicycle. To address the need for clean drinking water, we are proposing a water tank attachment that can connect to any bicycle. The device will draw power from the bike pedals to pull water from a fresh-water source, through a filter and into a tank. This newly collected and purified water can then be transported back home over the back wheel of the bike. The attachment would come with a simple gear-shifter that would switch the pedals to then power the pump while the bike is supported by a kickstand. The tank is intended to collect and transport 5 gallons of water so that the average family can have potable drinking water for the day without sacrificing the bicycle's maneuverability while carrying a full tank.</p>	<p>Actively looking for partner organization</p>	<p>TBD</p>	<p>Mechanical Eng</p>	<p>Coleton Rodd- Mech Matt Lograsso- Mech Cory Yamagata- Mech Jonathon Keyes- Mech</p>	<p>Restivo Ph.D., Gaetano</p>
<p><b>For more information, visit us online:</b> <a href="http://www.scu.edu/engineering/frugal">www.scu.edu/engineering/frugal</a></p>						<p>Email us at: <a href="mailto:fih@scu.edu">fih@scu.edu</a></p>