2019 ANNUAL REPORT

Enabling Engineering

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Approximately 1 in 4 U.S. adults are living with a disability, with the likelihood increasing as individuals age. Supportive resources for individuals with disabilities are oftentimes costly, inaccessible, and reduce an individual's ability to perform specific tasks independently. Additionally, insurance often fails to cover expensive devices or services needed to carry out everyday tasks.

We seek to support this population via low cost, customized solutions that empower individuals by giving them greater independence, reducing medical burdens, and increasing social connectedness.

This annual report serves as an overview of our projects but is by no means exhaustive. Much of our work is dependent on our collaborators, clients, and supporters and we want to express deep gratitude for all of those who have helped us make 2019 such a successful year.

ENABLING ENGINEERING

Who we are: Enabling Engineering is a Northeastern University student group that designs and builds devices to empower individuals with physical and cognitive disabilities.

What we do: Our students collaborate with clients on projects that provide greater independence, reduce medical burdens, and increase social connectedness. We help family members, clinicians, and teachers care for people with disabilities.

By giving students the opportunity to participate in Enabling Engineering projects, we are training the next generation of engineers to be knowledgeable about, and aware of, the needs of individuals with disabilities.

an inside look at the

ENABLING ENGINEERING TEAM

The Management Team

The Management Team are Northeastern University undergraduate students that have been selected to help ensure that all project teams have the support needed to successfully work on projects. Our six management team members meet with project teams in the evenings and offer support, resources, and accountability. The Management Team recruits new members each semester and assigns them to suitable project teams. Other responsibilities include keeping the Enabling Engineering lab organized, monitoring client communications and updating the website. The 2019 Management Team members pictured above are (left to right): Kerri Lehmann, Pragnya Kalidindi, Tyler Hill, Kaylin Devchand, Jordan Fernandes, and Liam Sullivan.

Engineering Support Assistants

Our Engineering Support assistants include Jack Cardin (pictured above), our 3D printing technician, and Tushar Goel, our electrical engineering expert. These positions were developed to assist students with more technical aspects of the prototype development (ie 3D printing and electrical wiring).

Program Assistant

Our Program Assistant, Porter Warrick Hess, is a full time employed member of Enabling Engineering. The Program Assistant manages all administrative tasks, such as ordering parts, managing purchases, overseeing client/ collaborator communications, legal paperwork (ie working with minors), organizing the 2019 showcase, producing the annual report, and arranging bimonthly check in meetings with the management team. The Program Assistant is responsible for ensuring the Enabling Engineering group runs smoothly.

OUR IMPACT

- "Enabling Engineering has given me the opportunity to use and develop my engineering skills on a project with a direct community impact. Being a part of Enabling Engineering improved my project planning abilities and teamwork. I enjoyed volunteering my time to use what I've learned to make a difference in my local community." -Nicole DiMauro, Bioengineering Major

- "Without Enabling Engineering, I never would have had the opportunity to work on projects that are so meaningful. It's really empowering to have people tell you how important your work is. It feels great to use my skills to help people, and I never would have known how to best help people with disabilities on my own."-Kaitlyn O'Donnell, Computer Science Major

- "Working in enabling engineering both as a project member and now as a Management Team member has taught me so many different skills. It has allowed me to be exposed to other engineering fields and make connections with students outside my field. And more importantly, I'm able to directly see the impact I'm making on our society. I am extremely grateful for all the things it's taught me, and cannot wait for what's next." -Pragnya Kalidindi, Management Team, Bioengineering

- "Being part of Enabling Engineering has allowed me to apply the concepts and skills I learn in my classes to outside projects. Working on the Ponytail Helper has given me lots of opportunities to improve my 3D modeling skills in SolidWorks, which I normally do not get to do in many of my classes. Enabling Engineering's goal and purpose makes the experience even more rewarding. This club has allowed me to put my engineering skills to use to create products that will hopefully make a client's life a bit easier." -Chrissanthi Boutalis, Mechanical Engineering

- Enabling Engineering's number of projects has steadily increased throughout the year. As our capacity increases, we are able to take on a greater number of projects and thus make a larger impact.

- Throughout the years, more than **525** students have worked on Enabling Engineering projects. These students learn how to critically think about applying engineering principles to enable and empower others.

- Enabling Engineering has worked with over **40** clients (both individuals and organizations) to deliver customized assistive devices.

- Last year, we completed **10** projects. This year, we're excited to announce we increased our number of completed projects to **16**

ADAPTIVE GUITAR

Overview: *Build a custom guitar that will help an individual with restricted motor skills play guitar*

Status: In progress

Members:
Amanda Haines, Yajing Wang, Zhonghao Liu, Sam Baumgartel, Brandon Zhang

Clients:
Brenda and Brian Manning

The Need

The client has limited use of the left side of his body, but wishes to play the acoustic guitar. We have been tasked with creating an apparatus that allows the one-handed usage of an acoustic guitar. The design would be able to press chords and allow the client to strum at the same time with his right hand.

The Solution

Rather than creating an apparatus that strums and holds down the chords, our new approach involves making an apparatus that has a foot pedal, so the client is free to hold the chords down with his hands. The new structure includes making an attachment (photo included above) that holds the pick and can move up and down the guitar. It will be attached to a motor controlled by a foot pedal. Although this will not allow for individual strings to be plucked, it allows for chords to be played easily. In the future, we hope to explore ways for both individual strings and chords to be played simultaneously.

AMPUTEE WORKOUT

Overview: *Improve the mental and physical health of a trans-radial amputee by enabling them to exercise in the gym*
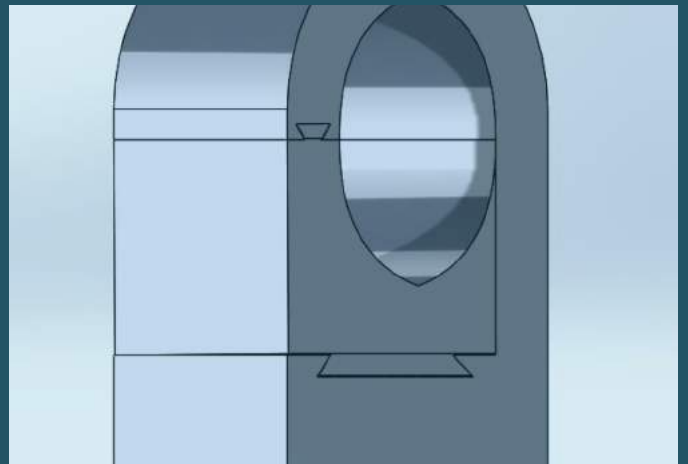
Status: In progress

Members:

Jeremy Su, Winston Ge, Adeena Moghni

Client:

Michael Benning

The Need

For amputees the lack of exercise or inactivity puts one at more of a risk of high blood pressure and high cholesterol, both of which contribute to vascular disease. If those who lost a limb due to vascular disease are not able to workout and improve their vascular health, they are at risk of losing another limb.. For some, it acts as a coping mechanism after a traumatic event, and for others, the need to get back into a routine is what drives them to go to the gym. Whatever the case, working out is an important need for people who have experienced limb loss.

The Solution

One solution to this issue is creating a terminal attachment to an existing prosthetic that allows the user to participate in pushing and pulling exercise, also referred to as the Prosthetic Workout Device. After brainstorming, designing, creating multiple iterations, and testing, the group came to a prototype that satisfied the design requirements of use with the chest press, shoulder press, low row, lat pull-down machines, as well as body weight exercises. The design includes a tapered curve that allows for different diameter machine grips, compatibility with the quick wrist disconnect system, and a strap that allows for pushing and pulling motions. The completed design will allow the user to engage in physical exercise in a gym setting, while being comfortable and safe.

BLIND CULTURE ARTIFACTS

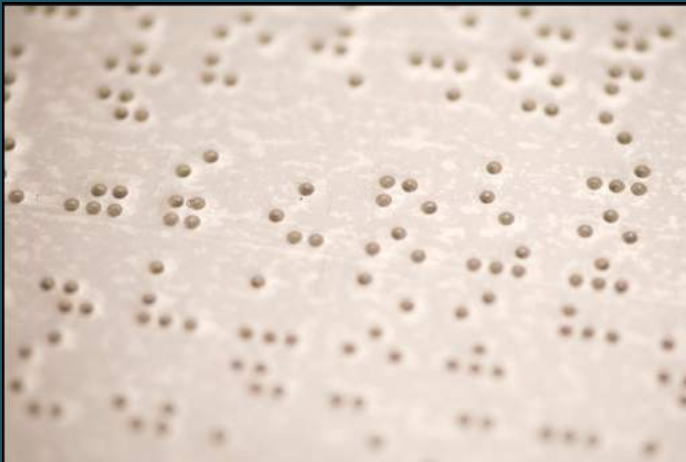**Overview:** *Make historical artifacts more accessible via 3D printed models*

Status: Completed

Members:

Nicolas Fong, David Ewen, Akira Watanabe, Julian Slade

Client:

Sari Altchular and Dave Weimer

The Need

Various textual artifacts held at the Perkins School for the Blind archives are largely inaccessible to the public and have no current means of reproduction. These books for the blind pre-date braille and feature raised letters and shapes intended to be read through touch, similarly to how braille is read today. To make these artifacts more accessible, 3D printed copies of the text were asked to be created that simulate the experience of the original documents.

The Solution

These 3D printed replicas should be tactility legible, utilizing the iterative nature of additive manufacturing to optimize user experience. The original documents were scanned and further modified using Fusion 360 to adjust scaling, trim excess material, and reduce/optimize the tessellation on the models. The team then further extruded the 3D scanned files to created multiple prototypes. These 3D printed prototypes encapsulated a range of resolutions, scales, and text heights before an optimal combination of features was found. Further exploration was done on how to smooth the 3D prints. The exhibition of the final project was featured at Northeastern University, Harvard University, Boston Public Library, and Perkins School for the Blind.

BOW AND ARROW FOR THE VISUALLY IMPAIRED (BAVI)

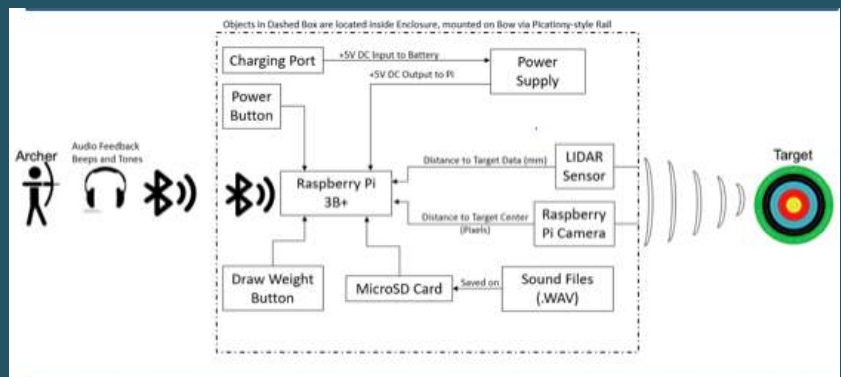**Overview:** *Produce an accessible device that fosters user independence and control for archers with visual impairments*

Status: Completed

Members:

Kevin Leiser, Marcus McKenzie, Alexendar Zoraian, Chris Gast, John Kang

Client:

Brian Mac Donald from National Braille Press

The Need

The WHO estimates that there are 285 million people who are visually impaired, many of whom struggle to find new activities to participate in. In collaboration with the National Braille Press, our project made archery more accessible to those with visual impairments. Traditionally, archery has been hard due to the need for visual accuracy and precision, yet our team believes that by providing audio feedback, we can enable visually impaired individuals to find a new hobby.

The Solution

BAVI was developed as a device that can detect a specified target regardless of user sight. The system provides audio feedback of the target location and can communicate the accuracy of the shot. The device also takes into account the draw weight of the bow, the trajectory of the arrow, and the distance to the target. This was done by implementing technologies such as Computer Vision, LIDAR, and Bluetooth into a compact, 3D printed enclosure. The enclosure is mounted to the rail of the bow as an attachment, allowing it to be easily mountable onto any bow, The enclosure is lined with braille, making the device easy to operate for blind users.

BRAILLE BLOCK

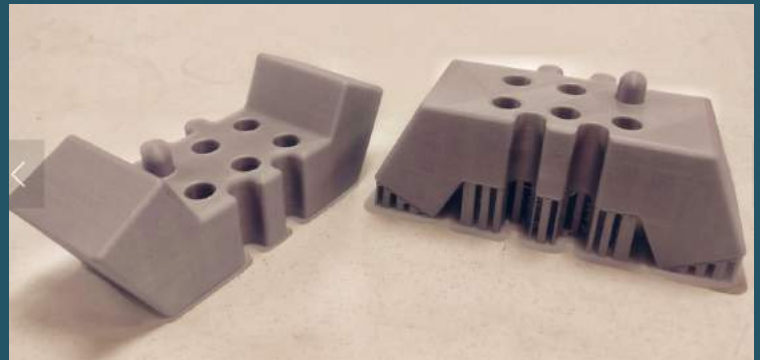**Overview:** *Create interconnected, tactile braille blocks to foster the learning of braille*

Status: Completed

Members:

Luke Drennan, Jafar Mirza, Emma Rugg, Oscar Chen, Chris Cicalo

Client:

Brian MacDonald from National Braille Press

The Need

People with visual impairments who are just beginning to learn how to read braille need a simple and enjoyable way to practice the tactile experience of learning braille. Using these interactive braille blocks, users can create words by attaching the braille blocks together.

The Solution

The project team has designed a braille block that is easy to use, comfortable to hold, and can connect to other braille blocks. All iterations of the braille blocks were 3D printed, while the final version will use injection molding. The braille block offers the following features: a modular design that allows multiple blocks to snap together, a smooth and sleek design that is comfortable to hold, and a cost effective solution so it can be easily manufactured in bulk.

CUP FOR THE BLIND

Overview: *Design a way to indicate a full water level to users with visual impairments*

Status: Final prototyping stage
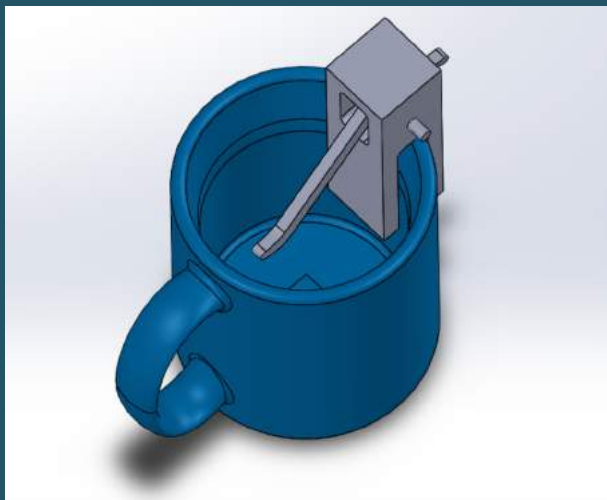
Members:

Rebecca Reals, David Ewen, Joseph Von Holten

Client:

Richard Rosskam

The Need

When pouring beverages, individuals who are blind or visually impaired may place their finger inside the rim of a cup in order to determine when the cup is full. This method can be injurious if the liquid is hot or and isn't ideal if the drink is being served to others. While there are devices that emit sound as the liquid level rises, the batteries must be replaced frequently and the sound is ineffective if the individual has any hearing impairments. The user needs a small, easy to use device without batteries that can aid in pouring beverages by notifying them when the liquid in the mug is at a certain height.

The Solution

Previously, another group of students 3D printed a mug with a small horizontal lever that would move in response to the buoyant force created by the rising liquid level. However, the movement of the lever was too slight for the user to notice. Our group decided to modify this design by increasing the length of the lever such that the movement is easier for the user to feel with their hands. In addition, a magnet embedded in the lever will hold it in place once the buoyant force reaches a specific value. Finally, instead of 3D printing the entire mug, we will only 3D print the device itself and add a cinching screw that can be adjusted such that the device can be placed on almost any vessel regardless of height or width.

EMOTIONS & ME

Overview: *Create an interactive website to help children with ASD recognize emotions*

Status: Completed
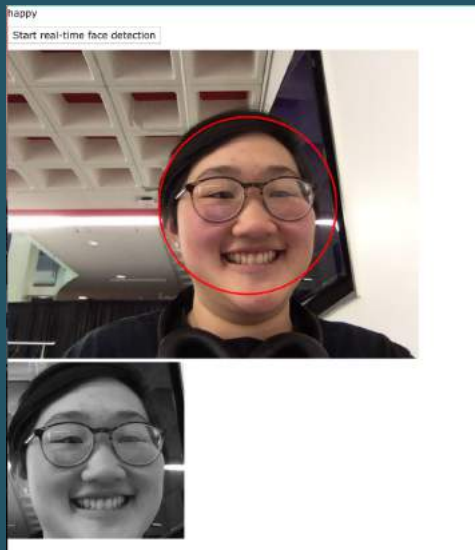
Members:

Mary Forde, Naveen Seghal, Cassandra Smith, Babatunde Egbantan, Jenny Cheung

Collaborator:

Quannah Parker-McGowan

The Need

Autism spectrum disorder (ASD) is a developmental disorder that induces challenges with social skills and repetitive behaviors. Children with ASD are treated with specialized classroom instruction to help foster emotional intelligence. Most existing resources are grossly outdated and significantly lack personalization, interactivity, and 'fun" for the user-base of children, diminishing their impact. Recent progress in emotion detection research has made it possible to develop a program that does not suffer these problems.

The Solution

Our solution is to create a website that both students and teachers can access to equip students with tools to aid in emotion recognition. Students will be able to stream YouTube videos of their choosing and our system will identify the emotions of the people on screen. They will also be able to use their webcam or microphone to practice expressing emotions and get immediate feedback from our system about what emotion they are expressing. Our system will also have a huge selection of sample images and audio, categorized by emotion, for students to explore and learn. Finally, a teacher can guide their students' use of our site with our Assignment Creator, and customize quizzes and task lists to best fit the needs of each student.

EYEGAZE

Overview: *Empower the blind and visually impaired to lead more independent lives via assisted navigation*
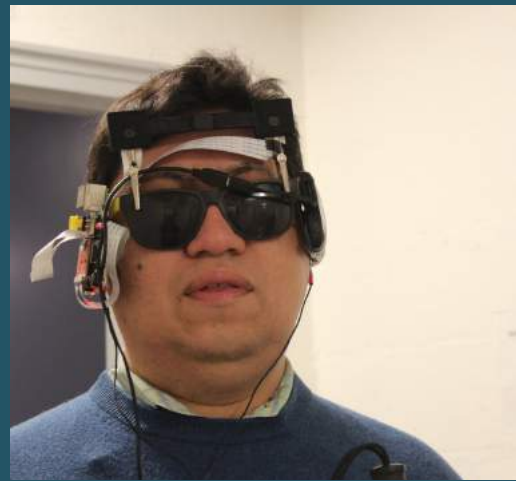
Status: Completed

Members:

Aleksandra Pasek, Melissa Chen, Nathaniel Hartwig, Brendon Welsh, Emerson Boyd

Collaborators:

Brian Mac Donald and Sassy Outwater-Wright

The Need

Blind and vision-impaired people currently have very limited options for navigation assistance technology. However, the few options they have are prohibitively expensive, meaning that the blind and visually impaired still rely on low-tech solutions for navigation and environment sensing, such as seeing-eye dogs and canes, as well as braille/ topographic maps and signage. The visually impaired and blind need a device to assist with navigation to common landmarks such as bathroom/ exit signs, with a strong emphasis on affordability and ease of use. Sign and landmark detection would empower the blind and visually impaired to be more independent, especially when traveling.

The Solution

Our solution is to detect a specific set of signs/ landmarks, output to the user via audio the type of object detected, and approximate distance and heading to the object.The current design accomplishes this with the following setup: a RPi 3 B+ powered by a long lasting 4000mAh battery which has a multiplexer allowing for two Pi cameras, and a button to take pictures. The Pi cameras are enclosed in a 3D printed frame and can be attached to any pair of glasses. When a user presses the button, the Pi cameras take an image and transmit wirelessly via the RPi to a python server. The images are passed through an image recognition model on the server. The server then returns a string containing the detected object type, distance, and heading to the RPi client. This is then sent to the user as speech via headphones.

GAIT TRAINER HARNESS

Overview: *Create a comfortable and adaptable harness for patients involved in gait training*

Status: In progress

Members:

Alex Rivas, Nicolas Tan, Rachael Biega

Collaborator:

Ross Lilley from AccesSport America

The Need

Gait harnesses are used in the physical therapy treatment of patients who have limited walking capabilities. They are designed to bear the weight of patients of all ages and sizes so that the patient can comfortably practice using their legs. However, while gait harnesses are effective in supporting the patient's weight, the harnesses themselves are a major source of patient discomfort, particularly around the groin and underarm region. Therefore, there's a defined need in creating a harness that is comfortable to wear and adaptable to different ages and body sizes.

The Solution

Our solution involves taking the weight off from the groin area by having several contact points elsewhere. By having several connections from the patient to the harness system, their discomfort is minimized and dispersed. The harness consists of a vest and thigh straps which are worn over the patient's clothes. The vest will attach to a frame which is sturdy enough to bear the patient's weight. The thigh straps will also connect to the vest and serve as the extra contact points to reduce the load on the vest. The vest is lined with a highly frictional coating on the interior to assist in bearing the weight of the patient and to prevent the vest from sliding up the patient.

GO BABY GO- NATALIA

Overview: *Adapt a toy car for a child with limited motor control and allow for parent to over-ride car with remote*

Status: Completed

Members:

Kerri Lehmann, Rohan Verma

Client:

Natalia Horruitiner- Sternberger and her son, RG

The Need

The motivation for this project was to adapt a ride-on car so that a child with physical disabilities and cortical impairment could safely enjoy riding it. The car needed to be modified so that the child could be comfortably strapped in and able to control the vehicle. The child could not use the foot pedal and steer with both hands so a joystick was needed to control acceleration, breaking, and steering. Most importantly, the remote control for the car had to be modified so that a parent could override the child's control at any time.

The Solution

To address the child's needs the team worked on several mechanical and electrical modifications. Because the child could not use the foot pedal and steer with both hands, the team programmed the car to be controlled with a joystick mounted to the car with a bright green 3D printed component. The switch from a steering wheel to a joystick meant that the child's control over the direction of the car was no longer linked to the physical turning of the wheel but rather the electrical signals from the joystick output. At first this electrical change overpowered the parent's ability to control the car remotely. To address this issue, the team worked to successfully program the car and remote so that the parent could always override the child's control.

INTERACTIVE DISABILITY WEBSITE

Overview: *Design a website that provides transitional resources for young adults with disabilities*
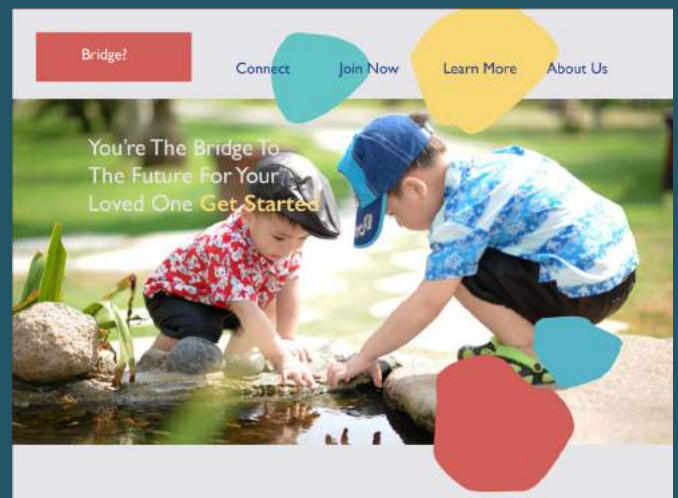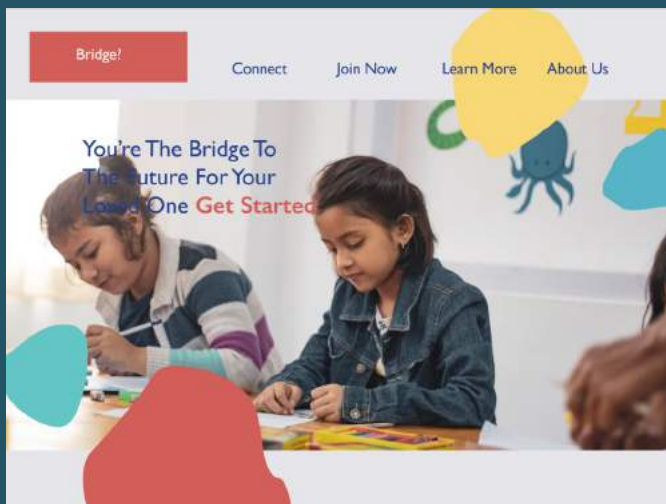
Status: In progress

Members:

Franny Kuth, Rahul Suryadevara, Kaitlyn O'Donnell

Client:

Michael Plansky from You're With Us

The Need

People with disabilities lack a transitional resource that assists them for life after schooling. The time after a person with disabilities turns 22 is referred to as 'a cliff' because federal and state support systems (ie schools) are no longer available after this age. Families and teachers of people with disabilities need a system to help them plan and track goals to ensure that a child is ready for this sudden loss of support. Whether this is going to college, getting a job, or going into permanent care, a guiding resource is needed to help prepare for the child's future. While resources do exist for this, they can be overwhelming to comb through with a lot of irrelevant information.

The Solution

To address this issue, we hope to create a website that serves to be a database of resources for different types of disabilities for a range of needs. This website allows families to set a goal for their child and receive suggested milestones to help prepare for their future. It also allows teachers to access this information, if permitted, to allow clarity and alignment of goals. The core feature of the website is a checklist and timeline feature that provides clear and succinct tasks to build towards the child's future. This feature depends heavily on personalized data chosen during a user survey to gather details about the child and their goals.

IPAD MOUNT

Overview: *Create a secure, non removable iPad mount for two students with disabilities*

Status: Complete

Members:

Angelina Bespalova, Grace Sperling, Ray Lin

Client:

The Carter School

The Need

For this project the clients are students at the Carter School nearby. The students tend to remove their iPad from the clamps as a way to get attention. Because of the one of the clients is in a wheelchair, the mount has to be able to be mounted close to her and oriented horizontally. The final design for this mount then has to meet the following specifications: prevent removal by the students, allow removal by teachers and caregivers, allow it to be attached to different surfaces (i.e. tables and wheelchairs).

The Solution

For the final design, we built a case with a suction cup and buckle-lock. The case will cover the iPad, and will be durable and still allow for the student to easily use the iPad. The suction cup was attached to the case with a locking mechanism using buckles on the cup's handles. The buckle-lock itself will be obscured to prevent the students from figuring out how to undo the buckles, and only caretakers and supervisors would be told how to undo the buckles. The buckle-lock component and the suction cup have been 3D printed.

PEDALING MUSIC

Overview: *Adapt a restorator to play music whilst students pedal to incentivize exercise and improve mobility*

Status: Completed

Members:

Allia Langill, Tristan Sweeney, Zach Bauer, Zoe Simonson, Nia Fears, Joey Palmieri

Client:

The Carter School

The Need

The William E. Carter School is a school for students with intensive disabilities. They employ restorators, bike-like exercise devices, to help students develop dexterity and control. The school wants a restorator to be modified so that it provides an incentive to continue pedaling, ideally in the form of music the students enjoy. This would help engage students in restorator exercises and improve their dexterity and mobility.

The Solution

A rotary encoder attached to the restorator's axis will measure the rotation of the pedals. An Arduino reading the encoder signal will make audio control decisions, and use a Bluetooth module to send an HID code (keypress) to the paired device. The device's operating system knows how to interpret an audio control key (pause, play, etc.), and thus should pause or play music without any special software being installed on it. In this way, the firmware can be implemented with minimal work and no customization of the playing device need occur.

PONYTAIL HELPER

Overview: *Design a device that can assist a client with limited range of motion to put her hair in a ponytail*
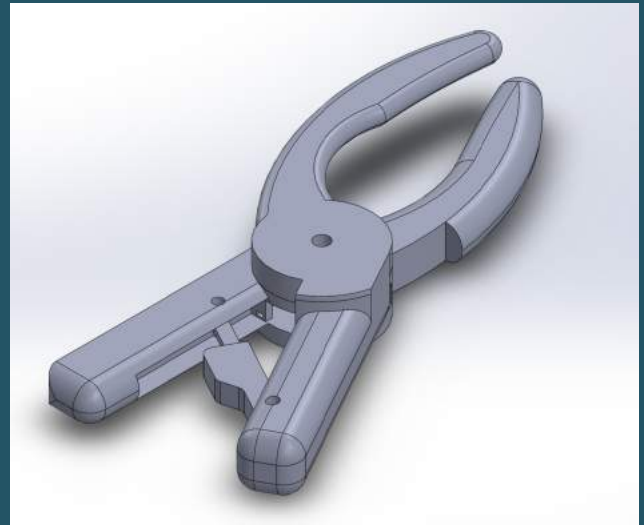
Status: Final prototyping stage

Members:

Chrissanthi Boutalis, Emma Brodigan, Elizabeth Klemm, Nicholas Gregoire

Client:

Lindsay Lee

The Need

The client has muscular dystrophy, which makes it difficult for her to put her hair up or change her hairstyle on her own. The goal of the project is to design a mechanism to allow her to put her hair in a ponytail despite her limited range of motion. The ideal end-product would be functional within her range of motion, and would also be safe and reusable. It would also be easily removed independently. In the past, she has had an aide assisting her at home, but she would like a mobile device that allows her to independently change her hairstyle.

The Solution

After re-examining the design at the end of the fall semester and over winter break, we have come to the conclusion that it will not fit the needs of the client in an effective way. Therefore, this semester we created a new design in a different direction that will help her put her hair up. Our new design currently consists of the following features: 1.Creating a clamp that could be placed around the hair and holding the shape of the ponytail while the user puts a hair tie on, 2.Clamp would lock to keep the hair shape and would release on demand, 3.Easy to use hair tie (possibly a bead design like the One-Handed Ponytail).

SENSORY TRAY-SKYLA

Overview: *Create a tray with sensory items to securely attach to a wheelchair*

Status: Completed

Members:

Abhinav Muraleedaran, Quinlan McDonnell, Owen Egre, Nicole DiMauro, William Sham

Client:

The Carter School

The Need

This project's goal was to create an easily attachable and detachable sensory tray with the ability to interchange various sensory items. The tray, by nature, had to be secure, as it was attached to a wheelchair. Preferably, this tray had to have the option to be adapted for various wheelchair systems to enable other users to use the tray.

The Solution

Our eventual system (pictured above) was chosen because it was the most discreet way to hold the tray in place, while making space on top of the tray to position all of the objects. Objects on the tray were designed with different textures. Some of the object can make small sounds when the user interacts with them. The objects serve to keep her engaged and active, to keep her from avoiding undesired behaviors. For example, one object on the tray was designed to keep her from pulling on her G-tube (feeding tube). This object mimicked the G-tube feel so that Skyla would enjoy playing with it and could do so without harm.

PYTHON PROGRAMMING CLASS

Overview: *Instruct students on how to code in Python at The South Shore Educational Collaborative*

Status: Completed

Members:

Akira Watanabe, Andrei Lougovtsov, Ean McDonald Wojciechowski, Jaime Gonora

Client:

The South Shore Educational Collaborative

The Need

We work with the SSEC (South Shore Education Collaborative) to provide classes that go over basic programming skills. Computer science students write a fun and interesting curriculum and serve as the teachers for the class. Through the class we hope to encourage students to become more involved in programming and use the skills they learn to expand their interests.

The Solution

It is a 5-7 week programming curriculum that covers the basic skills necessary for students to become acquainted with and comfortable in beginner-level Python. It is focused on interactive activities and deliverables such as games and other small projects. As often as possible, we integrate activities that involve movement so that students can get a break from sitting at computers for an entire hour. By the end of the course, students should have a basic understanding of programming in Python, as well as a final game/product built!

VIDEO RECORDING SYSTEM

Overview: *Create a web application to store video recordings at Northeastern University's SLHC*
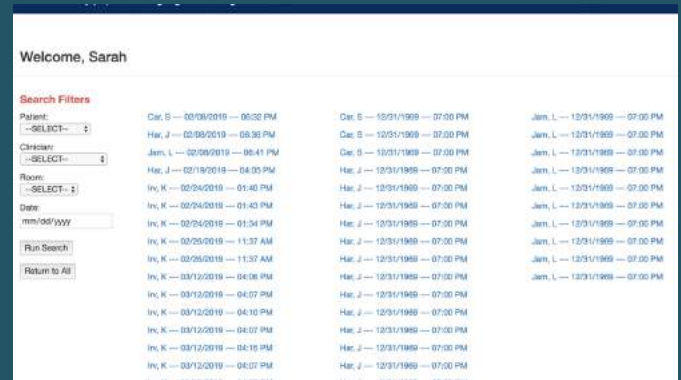
Status: Completed

Members:

Adaeze Adigwe, Asha Chen-Phang, Jordan Massa, Kasia Gibson

Client:

Sarah Young- Hong from the NEU Speech Language and Hearing Center (SLHC)

The Need

The Northeastern University Speech-Language and Hearing Center (SLHC) is a teaching clinic that serves clients with hearing, balance, communication and/or swallowing problems. The clinic heavily relies on video recordings of each session to help the program succeed. Clinical sessions are led by students in the Master of Science in Speech Pathology program, and videos of each session are stored so that supervisors may provide feedback and enhance learning. The problem is that the current method of video storage is outdated and robust. DVD players are breaking, and the hardware is costly to replace. The current solution isn't sustainable going forward.

The Solution

We developed a web application to store video recordings of each SLHC session, with a customized user interface that allows staff to search, organize, and comment on prior sessions. The video is transmitted to our site via a new Axis IP Camera, and footage can be played back at any time. Users have different levels of access; for instance, the Director of the SLHC can see all videos, whereas Master's students may only view sessions with their own clients. The web application is tailored to the needs of the SLHC, and importantly it is sustainable and affordable. Our solution is the most accessible way for the center to upgrade its system and strengthen the results of the Speech Pathology program.

VOCAL SWITCH

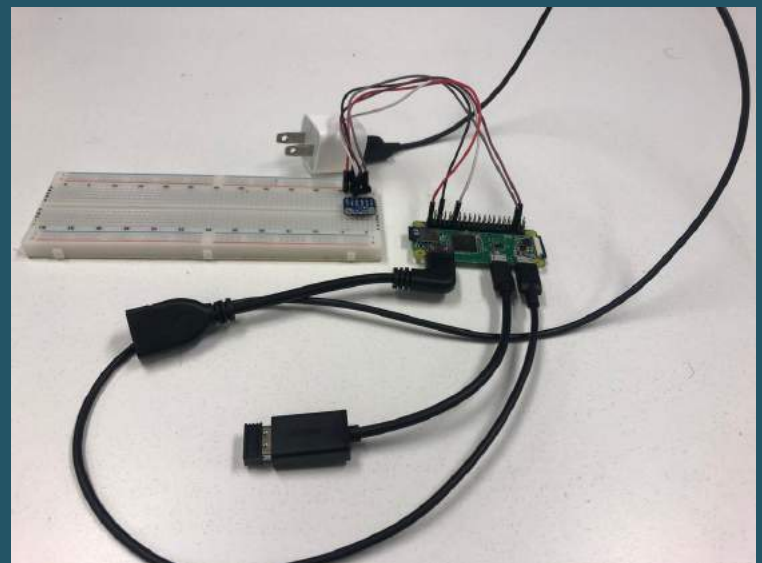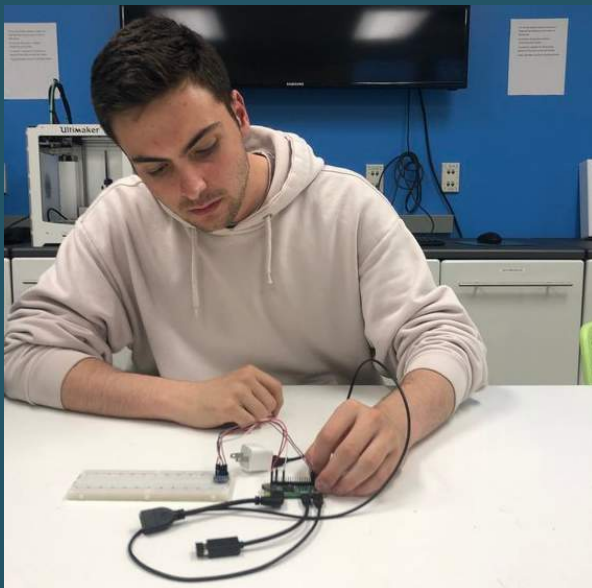**Overview:** *Create a device that can integrate within an existing virtual learning system*

Status: In progress

Members:

Lake Jacobs-Skolik, Mark Higger, Leona Lau, Tycho Dickerson

Client:

The Carter School

The Need

Students with cerebral palsy at the Carter School have trouble integrating with their computer software. We need to create a device that can, without using fine motor skills, integrate with the existing hardware and software used for virtual learning at the school. We are developing an audio-controlled switch—as opposed to a mechanical switch—to help these students interact with virtual learning software.

The Solution

Previous prototypes were able to use the vibrations of a vocal cord as inputs with limited success. However, because this prototype must be tested in real time with various users, the method that was being used for the vibrations was far too complicated. We have begun to implement a microphone to capture the audio. For this iteration, when the audio remains at a constant tone for a specified length of time, the switch will be activated by a Don Johnston switch controller.

X-MAX GAME CONTROLLER

Overview: *Develop an alternative Xbox experience for a client with cerebral palsy*

Status: Final prototyping stage

Members:

Ben Peterson, Todd Roberts, Derek Tran, Vivian Xing, Sebastian Ardila

Client:

Max Planksy

The Need

The client has cerebral palsy which inhibits his motor skills to the point where it is impossible for him to play video games, specifically Xbox, using traditional control systems. Our controller aims to enable him to play XBox with minimal external assistance.

The Solution

Our current solution is an array of mechanical switches suspended around Max's head which allow him to control 4 of the 10 buttons on a traditional Xbox controller. The switches are covered with large foam pads to enable comfortable head operation. The most recent update includes an inline companion controller so that an occupational therapist or friend can play the game with Max and aid him as he learns to use the device. We have currently also been working on myoelectric controls and updating it into the prototype.

YOU'RE WITH US! MENTORSHIP

Overview: *Increase social inclusion for individuals with disabilities via integration into project teams*
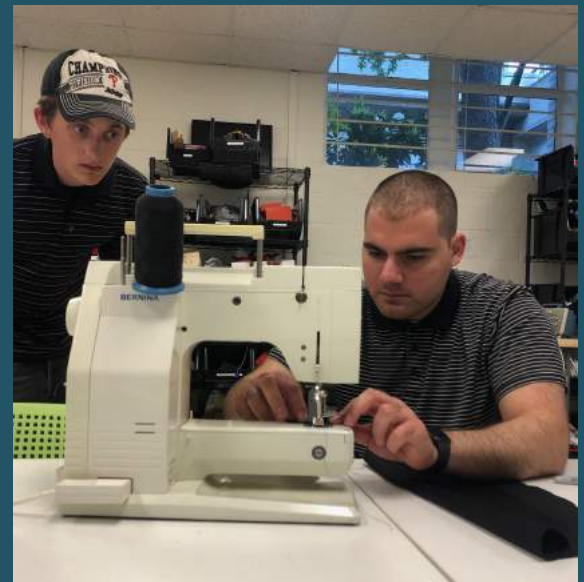
Status: Active

Member:

Brendan McManus

Collaborator:

You're With Us!

Overview

There is a huge need for social inclusion among individuals with disabilities. To ensure we actively engage with the populations we serve, we've partnered with You're With Us. You're With Us! is a non-profit 501(c)(3) organization and a Department of Developmental Services (DDS) service provider that creates inclusion opportunities for young adults with disabilities. The program identifies and trains college clubs, groups, and teams to welcome individuals with disabilities into their groups as they are. You're With Us! believes that a meaningful life includes a home, a job, family, friends and social opportunities with their peers - able and otherwise.

We've recently welcomed Brendan McManus, a member of You're with Us, into the Enabling Engineering family. Brendan has joined 2 project teams, Ponytail Helper (pictured above left) and Pedaling Music (above right). Brendan has a special interest in mechanical engineering and has supported both teams in assembling prototypes, determining dimensions, and brainstorming prototype improvements.

2019 SHOWCASE

Enabling Engineering held its Annual Showcase on Thursday, April 18th. Over 20 project teams proudly displayed their work to clients, collaborators, and fellow students. Enabling Engineering grad tassels were given to our graduating members.

THANK YOU

Enabling Engineering wants to thank all of those that have made it possible for us to continue to scale our impact. We want to express gratitude to our collaborators for offering professional and technical expertise, our clients for providing essential feedback, and our donors for ensuring we have the resources needed to operate.

Enabling Engineering particularly thanks our major donors, without whom our work would not be possible:

Lanes Family
Richard J. Scranton Fund
Timothy Moore