Monsters, Inc. Logbook Entries

Date	TEMPLATE
Attendance	☐ Samhitha Bodangi ☐ Derek Desrosiers ☐ Abigail Figueroa ☐ Kruthi Gundu ☐ Charuvi Singh
Important Decisions	
Action Items/Goals **Include due dates**	☐
Notes	
Comments	

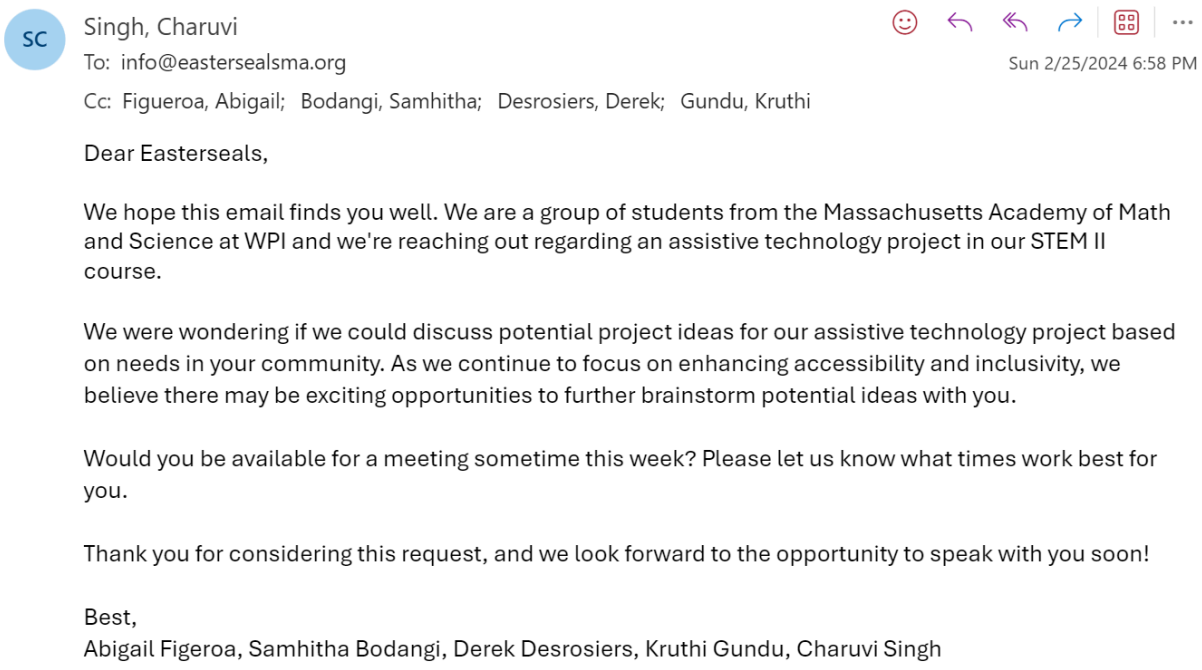
Acronyms of note (all applicable to the prototyping of a design):
PDR - Preliminary Design Review (initial invention proposal)
CDR - Critical Design Review (prototype proposal)
TDR - Technical Design Review (final product proposal)

Date	02/19/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The next meeting will be more brainstorming and finding more specific devices that can be made, keeping in mind the scope and ability of our team.
Action Items/Goals **Include due dates**	☑ ~~Goals: Find specific gaps and problems with current assistive technology devices~~ No due dates as of now, but will update the regular due dates after initial brainstorming
Notes	- Shin splints - Arthritis - Gait - Walking problems - Shaky hands - Eyesight - Drunk driving - Car accidents/drunk driving
Comments	Researched and brainstormed certain conditions to make technology devices. Discussed current problems and issues with each condition.

Date	02/20/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Will email Easter Seals, 7 Hills, and contact the

	nearby veterans home for potential ideas.
Action Items/Goals **Include due dates**	☑ ~~Email organizations: Charuvi will draft and email the organizations before 2/26/2024~~
Notes	• A device that measures vitals and notifies EMS when a stroke is occurring (or some variation of a life-threatening condition) • Device that turns text-to-speech https://www.maxiaids.com/product/rocket-pen-reader?gad_source=1&gclid=CjwKCAiAuNGuBhAkEiwAGId4arhSRAPC58s5RvyuEAtaZp3iY6a08pdgjGBq9ApzPrqYF5J06-KCPBoCkA4QAvD_BwE
Comments	Discussed more problems and found some more specific technology device ideas.

Email to Easterseals, sent 2/25/24



SC

Singh, Charuvi

To: info@eastersealsma.org

Sun 2/25/2024 6:58 PM

Cc: Figueroa, Abigail; Bodangi, Samhitha; Desrosiers, Derek; Gundu, Kruthi

Dear Easterseals,

We hope this email finds you well. We are a group of students from the Massachusetts Academy of Math and Science at WPI and we're reaching out regarding an assistive technology project in our STEM II course.

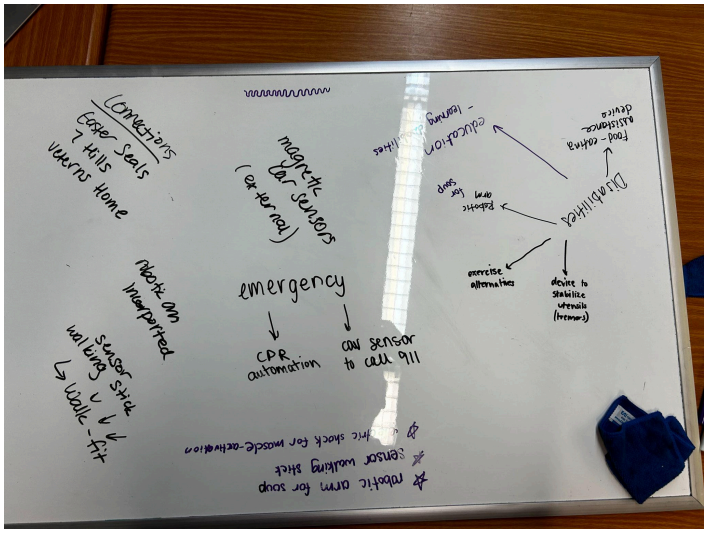
We were wondering if we could discuss potential project ideas for our assistive technology project based on needs in your community. As we continue to focus on enhancing accessibility and inclusivity, we believe there may be exciting opportunities to further brainstorm potential ideas with you.

Would you be available for a meeting sometime this week? Please let us know what times work best for you.

Thank you for considering this request, and we look forward to the opportunity to speak with you soon!

Best,
Abigail Figeroa, Samhitha Bodangi, Derek Desrosiers, Kruthi Gundu, Charuvi Singh

Date	02/21/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Created Trello account and will continue to add group and individual deadlines in the trello board.
Action Items/Goals **Include due dates**	☑ ~~Continue Brainstorming and update idea document with ideas and needs after connecting with Easter Seals~~

Notes	
	
	- Car sensor to call 911
	- Magnetic car sensors
	  - External to add features
	- Sensor walking stick
	  - Walk fit
	- Exercise alternatives
	  - Mechanisms to maintain muscle integrity for those who struggle with motion/are bedridden
	- Device to stabilize utensils
	  - People with tremors
	  - Robotic arm for eating soup or other foods
	  - Adaptive eating utensil

	- Learning disabilities
Comments	Updated Doc: AT idea development

Date	02/23/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Going in-depth and researching chosen ideas. Members split up the brainstormed ideas and will add specific notes and previous devices for each respective idea.
Action Items/Goals **Include due dates**	☑ ~~Abi: Robotic arm for eating soup or other foods~~ ☑ ~~Samhitha: CPR automation device~~ ☑ ~~Kruthi: Mechanisms to maintain muscle integrity for those who struggle with motion~~ ☑ ~~Charuvi: Sensor walking stick~~ ☑ ~~Derek: Brainstorming more ideas and researching assistive tech for learning disabilities~~ **All tasks must be completed before 02/26/2024**

Notes	• Car sensor to call 911
	• Magnetic car sensors
	  ○ External to add features
	• Exercise alternatives
	• Device to stabilize utensils
	  ○ People with tremors
	• Learning disabilities
	• Adaptive eating utensils

Comments	Updated the logbook and started to update the LUCID Chart for the upcoming tasks and deadlines.

Research Notes 02/26/2024

Abi - Robotic arm for soup

- Solidworks for 3D modeling
- 3D print the parts
- Arduino is controlled but needs a power adapter for more electric power
- Potential to be controlled by an app
- Could use Bluetooth

Dejan. (2018, September 11). DIY Arduino Robot Arm with Smartphone Control. *How To Mechatronics*.

https://howtomechatronics.com/tutorials/arduino/diy-arduino-robot-arm-with-smartphone-control/

Kruthi - Mechanisms to maintain muscle integrity

- 2 Forms of electrical muscle stimulation (E-stim)
- Can be used for the following purposes
- Muscle re-education
- Relaxation for muscle spasms
- Increased range of motion
- Treating other medical conditions (stroke, serious injury, major surgery)
- Preventing atrophy

Health, C. for D. and R. (2018). Electronic Muscle Stimulators. *FDA*.

https://www.fda.gov/medical-devices/consumer-products/electronic-muscle-stimulator

Samhitha: CPR Automation Device

Problem:

CPR is an emergency lifesaving procedure performed when the heart stops beating. Immediate CPR can double or triple the chances of survival after cardiac arrest.

CPR requires a lot of force, which can be tiring on the person after a few minutes Rescuer fatigue can occur within one minute, coupled with a decay in the quality of chest compressions.

Current solutions include an automatic, CPR machine that is commonly used by emergency paramedics

However, the device is not portable, making it unusable for common individuals

Device requires a long assembly time.
The time required to apply mechanical CPR devices can delay the initiation of CPR during the early phase of cardiac arrest.

Devices are very expensive (~$5000)
https://coastbiomed.com/product/zoll-autopulse-refurbished/

Youtube Demonstration: Automated CPR Machine Put Through Paces

Potential Solutions:

Affordable, portable CPR machine that can automatically perform CPR on a patient under cardiac arrest. Device must require an easy, short assembly time to administer CPR as quickly as possible.

1. Sides of the CPR machine could fold for easy storage
2. Power block could latch off and be made more efficient to decrease size

3. Device can be made of more light-weight materials

References in APA Format:

Pechaksorn, N., & Vattanavanit, V. (2020). CPR Compression Rotation Every One Minute Versus Two Minutes: A Randomized Cross-Over Manikin Study. *Emergency Medicine International*, *2020*, 5479209. https://doi.org/10.1155/2020/5479209

Platenkamp, M., & Otterspoor, L. C. (2014). Complications of mechanical chest compression devices. *Netherlands Heart Journal*, *22*(9), 404–407. https://doi.org/10.1007/s12471-013-0491-y

What is CPR. (n.d.). Cpr.Heart.Org. Retrieved February 26, 2024, from https://cpr.heart.org/en/resources/what-is-cpr

Charuvi: Sensor walking stick/ devices to aid VIPs

Problem:

- Visually impaired people (VIPs) face many issues in their daily lives, making them dependent upon other individuals. Increased dependencies reduce VIPs' confidence in new environments. Therefore, it is important to develop novel devices to improve VIPs' everyday activities.
- Major challenges faced by VIPs include the following:
    - Access to information in public spaces (times, billboards, etc)
- Living in isolation

Potential Solutions:

- Compact and affordable Braille embossing printers enable visually impaired individuals to produce Braille labels, notes, and documents at home or in educational settings.
- Wearable devices like wristbands or belts equipped with GPS and haptic feedback systems provide real-time navigation cues and directional information to help users navigate outdoor environments independently.
    - Through a sensor on the blind person's cane

Derek - Learning disabilities

Learning disabilities are disorders that affect the ability to:

- Understand or use spoken or written language
- Do mathematical calculations
- Coordinate movements
- Direct attention

Learning disabilities occur in very young children, yet they are usually not noticed until the child reaches school age. Learning disabilities can be lifelong conditions. In some people, several overlapping learning disabilities may occur. Other people may have a single, isolated learning problem that has little impact on their lives.

Problem:

Having a learning disorder means that a child has difficulty in one or more areas of learning, even when overall intelligence or motivation is not affected. Children with learning disorders may feel frustrated that they cannot master a subject despite trying hard, and may act out, act helpless, or withdraw.

Currently, the most common treatment for learning disabilities is special education. Specially trained teachers may perform a formal assessment to understand the child's academic and intellectual potential. Once the evaluation is complete, the basic approach is to teach learning skills by building on the child's abilities and strengths while correcting disabilities and weaknesses. Other professionals such as speech and language therapists also may help. Some medications may help the child learn by enhancing attention and concentration. While a lot of these approaches may be effective, in some cases, these solutions are not available or not adhered to. It is of the utmost importance that schools have the technology and tools available to allow all students to learn to the best of their ability.

Potential Solutions:

Adaptive Keyboards and Mice: Devices designed to accommodate various physical disabilities, allowing easier interaction with computers.

Recording pen: a pen that allows students to record lectures. This removes stress to write down all information and allows students to reference information at a later date.

*note - a lot of assistive technologies for learning disabilities require the use of extensive software programming

References in APA Format:

Learning Disabilities. (2024). National Institute of Neurological Disorders and Stroke. https://www.ninds.nih.gov/health-information/disorders/learning-disabilities

CDC. (2022, July 26). Learning Disorders in Children. Centers for Disease Control and Prevention. https://www.cdc.gov/ncbddd/developmentaldisabilities/learning-disorder.html

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Date	02/26/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Decided on timeline for the near future decisions
Action Items/Goals **Include due dates**	Finalize the idea and find potential clients for the chosen idea
Notes	During class, we prepared for our update meeting and met with Dr. C for the majority of our time.
Comments	

Date	02/27/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Final Ideas:

	- Portable CPR machine
	  - Would require big motor
	  - May be hard to have a more novel design than what is currently there
	- Exercise device
	  - Would require human consent for testing strategy
	- Read the normal text and turn to Braille
	  - The idea will be put on hold until we can discuss the idea with someone who has experience with visual impairment and their strategies
	  - Talk to Dr.C about potential contacts
	
	The walk cane sensor idea is already done, but not going forward as a main idea

Action Items/Goals **Include due dates**	☑ ~~Finish deciding idea by this Thursday~~ ☑ ~~Tomorrow, draft of decision matrix to decide~~
Notes	Cost, extent of CS (moderate), mass, testing feasibility, accessibility to target audience Feasibility: - Easy to replicate (straightforward assembly) Interested in robotics Decision matrix should also acknowledge each individual team member's strengths
Comments	Will reach out to walk fit to meet with potential clients

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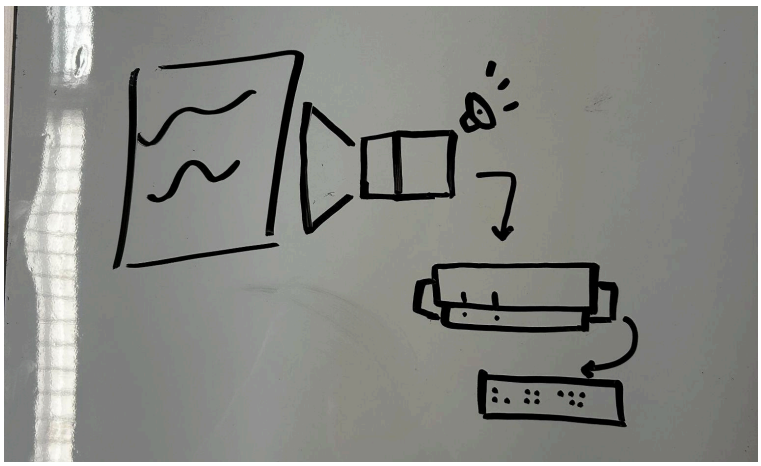
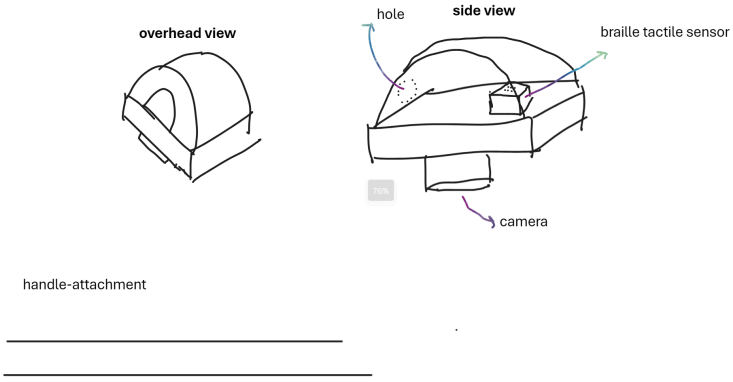
Date	2/28/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The final ideas to analyze in the decision matrix were decided and thoroughly investigated before

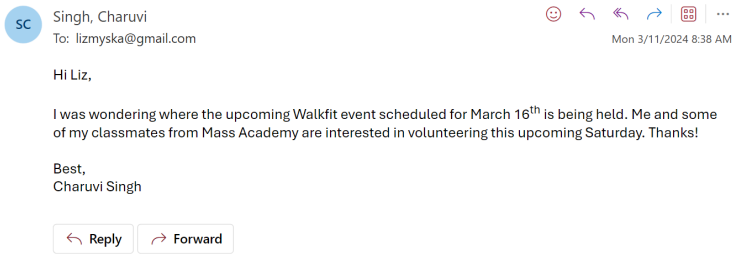
	beginning the decision matrix. The final ideas are the text-to-braille scanner, the sensor walking stick, and the automatic CPR machine.
Action Items/Goals **Include due dates**	☑ ~~Decision matrix by this Friday~~
Notes	**Text to Braille Scanner:** Need: Braille printers cost thousands of dollars, making them inaccessible to many visually impaired individuals. Additionally, current printers are not portable, making it difficult to independently read text outside of the home. Solution: Small, portable device that can scan English text and convert it to braille. 1. Include a speaker that speaks the text 2. Have a printing mechanism that prints braille on pre-inputted paper sheets. 3. Device has a platform with a grid of pins that raise, forming the words in braille to allow the user to use only their finger to read the braille **Sensor walking stick** Need: Solution: 1. Requires app to guide visually impaired individuals to avoid obstacles **CPR automation machine** Need: CPR is a life-saving procedure. However, CPR can quickly tire the rescuer, putting the patient in harm. Current automatic CPR machines have a long assembly time, and are inaccessible to a common person, because of cost and portability. Solution: A portable device that can automatically do CPR on a patient and requires little assembly from the rescuer. 1. Smaller battery to decrease the weight of the device 2. The sides of the CPR device would fold for easy storage and assembly

	 Preliminary drawing of proposed braille device
Comments	Members discussed ideas further and expanded on possible solutions. The next step would be to complete a decision matrix that compares all of the ideas. Then, the ultimate idea will be chosen based on the pre-defined design criteria for the project.

Date	2/29/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The Text to Braille idea was chosen to be the focus of this project
Action Items/Goals **Include due dates**	☑ ~~Project Design Review (PDR) due March 27.~~

Notes	Logbook was updated, the decision matrix was finished, and the idea was chosen. Decision Matrix v2 Preliminary design concepts: ● Inspired by Portable Text-to-Braille Converter  V1 design concept
Comments	Next steps would be to start the PDR document, beginning with thorough background research.

Date	03/11/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	A potential client was contacted
Action Items/Goals **Include due dates**	☑ ~~Make a systems diagram~~ ☑ ~~Connect with at VIP to further cater our product design and criteria towards VIPs~~ ☑ ~~Participate in Walkfit on March 16th to gain ask VIP developed questions~~ ☑ ~~Work on design brief~~

Notes	Questions for design brief: - Start broad so they do not feel obligated to answer a particular way? - Do not mention text to braille - What kind of daily activities require you to read English? What current strategies do you have to help with this? - How does your visual impairment impact your daily activities? - What do you enjoy about reading? - Would you prefer reading braille or hearing audio? How easy is it to obtain braille-translated materials? - What is your fluency in braille? - Use glasses with a camera in it to provide a direct line of sight Email to Liz from Walkfit:  SC Singh, Charuvi To: lizmyska@gmail.com Mon 3/11/2024 8:38 AM Hi Liz, I was wondering where the upcoming Walkfit event scheduled for March 16th is being held. Me and some of my classmates from Mass Academy are interested in volunteering this upcoming Saturday. Thanks! Best, Charuvi Singh Reply Forward
Comments	Recognition of road/traffic signs Walking around a city can be a difficult task for visually impaired - things like the yellow bumps on sidewalks

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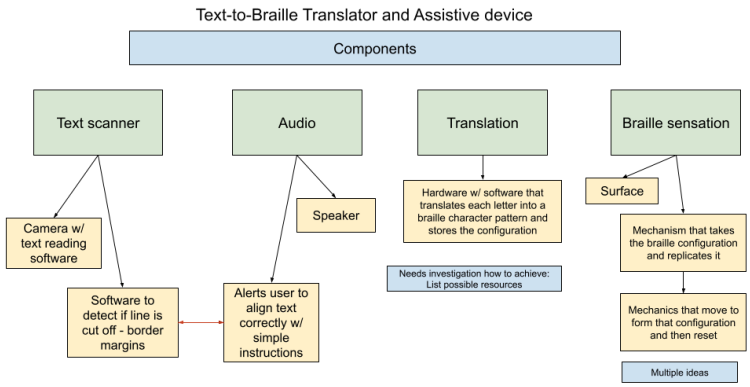
Date	03/12/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Decision was finalized and the most important features were mapped out on the systems diagram. The final features would be to include an audio

	component to the device that would be able to read the text for VIPs who may not be fluent in Braille.
Action Items/Goals **Include due dates**	☑ ~~Design brief~~ ☑ ~~Background~~
Notes	

Date	3/13/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	• Narrowing down components of the device • Audio component will be important for the device to make it more accessible for more VIPs
Action Items/Goals **Include due dates**	☑ ~~Team members worked on market research~~
Notes	After discussing with Megan's group, it became clear that only a small percentage of VIPs use braille. As most VIPs lose their sight in the middle of their life, not many learn braille.
Comments	Megan's group is also doing a text-to-braille device. Could collaborate on questions, background, and/or a device to display braille

Date	3/14/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- We need to determine what size device to make (how many braille tablets)
Action Items/Goals **Include due dates**	☑ ~~Work on design brief, questions for VIP, and background~~
Notes	**PDR DUE MARCH 28 WITH PRESENTATION**
Comments	https://mashable.com/article/team-tactile-braille-display https://brailleworks.com/braille-resources/history-of-braille/ https://www.inclusivecitymaker.com/history-braille-writing/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3036681/ https://www.loc.gov/nls/services-and-resources/informational-publications/about-braille/ Statistics: - 253 million VIP people in the world - 10% of VIP in the US use braille - 6 million people worldwide

An email was sent to Bonnie Whitney, one the graduate students who worked on Tactile at MIT:

Assistive Technology Project Request

Hide message history

From: Gundu, Kruthi <kgundu@wpi.edu>
Sent: Thursday, March 14, 2024 10:20 AM
To: Whitney, Bonnie <bcwhitney@wpi.edu>
Subject: Assistive Technology Project Request

Dear Bonnie,

My name is Kruthi and I am a junior at Mass Academy at WPI. In our STEM class, we spend 2 to 3 months working on Assistive Technology (AT) projects with 3 to 4 other students. My team is creating an AT device to assist visually impaired people (VIPs) in converting text in their environment to braille. We wanted to reach out to ask if we could meet with you to answer a few questions for us, as you were on the team that built Tactile.

Thank you for your time and consideration and we look forward to speaking soon!

Kind regards,
Kruthi

Date	3/15/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- The Braille device will have a rotatable camera that allows for multiple angles of reading. Will wait to make a decision on the final number of braille tablets until after WalkFit.
Action Items/Goals **Include due dates**	☑ ~~Charuvi and Derek - background~~ ☑ ~~Samhitha - prototype creation (OnShape)~~ ☑ ~~Abi and Kruthi - design brief and questions for VIP~~
Notes	Kruthi, Charuvi, Samhitha - WalkFit 3/16/24 9:30-11:30
Comments	https://www.rnib.org.uk/living-with-sight-loss/education-and-learning/braille-tactile-codes/why-is-braille-important/#:~:text=Braille%20is%20a%20unique%20tactile,to%20enjoy%20reading%20for%20life. https://sightscotland.org.uk/articles/information-and-advice/benefits-braille https://www.perkins.org/four-reasons-why-braille-still-matters-in-the-age-of-alexa-and-iphone/ https://www.rickhansen.com/news-stories/blog/importance-braille-world-braille-day

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Date	3/18/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~

Important Decisions	- Discussed information learned by two of our team members from walkfit and took what they learned about a VIP's lifestyle into consideration - After debriefing about the experience at Walkfit, the team decided that one of the biggest issues to focus on is affordability.
Action Items/Goals **Include due dates**	☑ ~~Research background info on visual impairment and braille for the background of the PDR (3/21)~~
Notes	- Worked on writing background sections about history of Braille and its importance
Comments	Kruthi, Charuvi, and Samhitha went to a walk-fit meeting and met with some potential clients for the device. They were blindfolded and went through a series of tasks to understand how VIPs navigate the world without their sight. After meeting with Liz who is not a Braille user, it was evident that audio is an important feature as more VIPs rely on audio. After talking to another client, who is a Braile user, we learned that braille is not very accessible. Additionally, the biggest issue is affordability. There are many devices that help VIPs read and interpret Braille, but they are very expensive and not financially accessible to many VIPs.

Date	3/19/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Continued the background section and expanded our knowledge of braille translation and reading from a human and also CS

	aspect
Action Items/Goals **Include due dates**	☑ ~~Finish Background by the 21st~~ ☑ ~~Meeting with Bonnie from Tactile to talk about her team's text-to-braille device and learn how we can improve upon it~~
Notes	- Researched technologies currently available for Braille display
Comments	• https://www.youtube.com/watch?v=dwaiPnoYf6Y • https://www.youtube.com/watch?v=F9rHAQuiVz0 • https://hackaday.io/project/191181-electromechanical-refreshable-braille-module

The team met with Bonnie Whitney, one of the graduate students who built the Tactile device. We asked about the specific hardware and software they used to build the device. They used the Microsoft OCR API, and is likely the API that we will use in our code.

Video Recording of Meeting:
Recording of 3/19/24 Meeting with Bonnie Whitney.mp4

Meeting Notes: 3/19/24 Meeting with Bonnie Whitney (Tactile)

Date	3/21/2024
Attendance	☐ Samhitha Bodangi ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Begin extensive research of competitors and analyze them. - Discuss what we learned from our meeting with Bonnie and re-evaluate our course of action

Action Items/Goals **Include due dates**	☑ ~~Have Market Research finished by (3/25)~~ ☑ ~~Begin developing our PDR Proposal~~
Notes	- Continued working on background and started market research (identifying competitors) - Created preliminary proof of concept using Onshape - Onshape POD V1 Brailliant
Comments	Links to Market research and PDR proposal doc: Background: PDR-Monsters_Inc-Background PDR: PDR-Monsters_Inc-Proposal

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Date	3/22/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Finalize a date with Liz from WalkFit to discuss further the needs of the VIP community and the application of our device
Action Items/Goals **Include due dates**	☑ ~~Complete market analysis by 3/25~~ ☑ ~~Midway through Proposal on the 25th~~
Notes	-finalized competitors and worked on market analysis - put together finalized version of requirements doc based on our previous decision matrix
Comments	**https://innovation.mit.edu/pathway-post/tactile/#pathway-process** **(https://www.amazon.com/Harry-Potter-Chamber-Secrets-Braille/dp/0939173352** **https://store.humanware.com/hus/brailliant-bi-20x-braille-display.html**

Date	3/25/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Chose a template for our slideshow
Action Items/Goals **Include due dates**	☑ ~~Complete PDR Proposal by 3/28~~ ☑ ~~Complete slides by 3/28~~
Notes	- Expanded on background - Updated Lucid chart for the week - Researched materials that are both cost-effective and fulfill needs of project for the budgeting portion of the PDR
Comments	● https://www.amazon.com/Stroke-Push-Pull-Solenoid-Electromagnet-Electric/dp/B098KVBH4L/ref=pd_bxgy_d_sccl_2/135-6316342-4187742?pd_rd_w=IYtYJ&content-id=amzn1.sym.2b132e63-5dcd-4ba1-be9f-9e044543d59f&pf_rd_p=2b132e63-5dcd-4ba1-be9f-9e044543d59f&pf_rd_r=64NFCENNME2EQF2HC8P6&pd_rd_wg=Tfexk&pd_rd_r=6fbd1558-0306-4ef0-967c-c4813c2b0b9d&pd_rd_i=B098KVBH4L&psc=1#customerReviews ● https://www.digikey.com/en/products/filter/solenoids/180?s=N4IgbCBcoJYCZRAWgIwAYUgDQgA4BdFsR8BPXAU0QEMBnAYxAF8mg ● https://www.amazon.com/s?k=arduino+camera&crid=3GX1EVSDRJ6AB&sprefix=arduino+camera%2Caps%2C74&ref=nb_sb_noss_1

Date	3/26/2024
Attendance	☑ ~~Samhitha Bodangi~~

	☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Begin introductory part of the slideshow, continue adding as we further develop the proposal
Action Items/Goals **Include due dates**	☑ ~~Finish PDR Proposal by 3/28~~ ☑ ~~Finish Slideshow by 3/28~~ ☑ ~~Complete 3 design concepts and their drawings by 3/27~~
Notes	- Further expanded on background and market analysis - Devoted significant class time to coordinating on the 3 design concepts
Comments	• https://www.digikey.com/en/products/filter/solenoids/180?s=N4IgbCBcoJYCZRAWgIwAYUgDQgA4BdFsR8BPXAU0QEMBnAYxAF8mg • https://www.amazon.com/s?k=arduino+camera&crid=3GX1EVSDRJ6AB&sprefix=arduino+camera%2Caps%2C74&ref=nb_sb_noss_1

Date	3/27/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Complete what is left to be finished
Action Items/Goals **Include due dates**	☑ ~~Finish PDR Proposal (Materials and Timeline left)~~ ☑ ~~Finalize the QFT (put everything on a single doc)~~ ☑ ~~Finish the slideshow and coordinate speaking~~

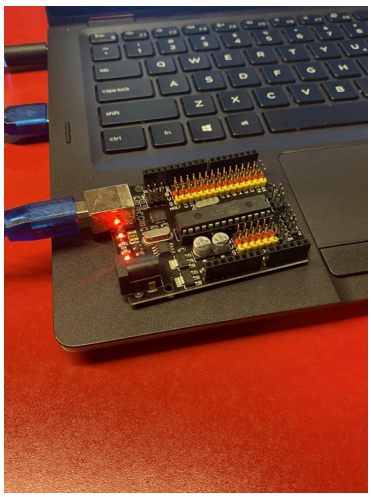
	~~roles~~
Notes	Added some additional requirements to the requirements doc
Comments	Link to Presentation: PDR-Monsters_Inc-Presentation.pptx

Level 1 (Must Have)	Level 2 (Should Have)	Level 3 (Nice to Have)		Key
The device shall be able to record text from a surface	The device shall be able to convert the text into speech	The device will connect to an app that can help the user customize their experience: choose the level of Braille (ex. Grade 1 vs Grade 2), choose the speed of the Braille, choose the voice for the speech, choose the speed of the speech		Functional
The device shall be able to convert the text into braille characters	The device shall be able to present the speech to the user			Physical
The device shall be able to present the braille characters to the users, at least 6 characters at a time	The device shall have buttons to control the device physically			Cost
The device shall be able to help the user properly position the device in front of the text	The device shall be made of durable material			User
The device is portable	The device shall cost less than $150			Documentation
The device shall weight less than 450 grams	The user has the ability to carry the device for the period of use			
The device shall be less than 8 cm tall, 10 cm wide, and 5 cm deep.				
The user has the ability to read braille and/or listen to audio				
The user has the ability to properly position the device with vocal guidance from the device				
The device shall include a user guide detailing how to use the device correctly				

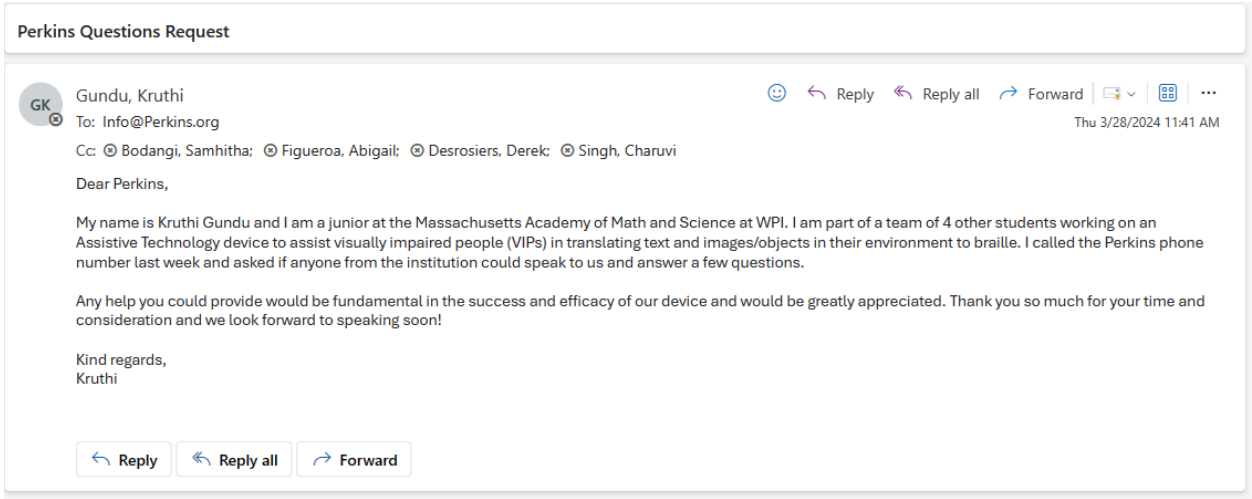
Requirement	Level	Dot.	Tactile	Braille Print Books	Brailliant	TWM651236U (Patent)
The device shall be able to record text from a surface	1	Y	Y	N	N	N
The device shall be able to convert the text into braille characters	1	Y	Y	N	Y	N
The device shall be able to present the braille characters to the users, at least 6 characters at a time	1	Y	Y	Y	Y	Y
The device shall be able to help the user properly position the device in front of the text	1	Y	Y	N	N	Y
The device is portable, and can be operated outside of the home	1	Y	N	N	N	Y
The device shall weight less than 400 grams	1	Y	M	N	N	Y
The device shall be less than 8 cm tall, 15 cm wide, and 8 cm deep.	1	Y	N	N	Y	Y
The user has the ability to read braille and/or listen to audio	1	Y	Y	Y	Y	Y
The user has the ability to properly position the device with guidance from the device	1	Y	Y	N	N	Y
The device shall include a user guide detailing how to use the device correctly	1	Y	M	M	M	Y
The device shall be able to convert the text into speech	2	Y	N	N	N	N
The device shall be able to present the speech to the user	2	Y	N	N	N	N
The device shall have buttons to control the device physically	2	Y	Y	N	Y	N
The device shall be made of durable material	2	Y	Y	N	Y	Y
The device shall cost less than $150	2	Y	Y	N	N	Y
The user has the ability to carry the device for the period of use	2	Y	N	Y	N	Y
The device will connect to an app which can help the user customize their experience: choose the level of Braille (ex. Grade 1 vs Grade 2), choose the speed of the Braille, choose the voice for the speech, choose the speed of the speech	3	Y	N	N	N	N

PDR Design Requirements Spreadsheet: PDR-Monsters_Inc-Requirements
AT PDR Tasks Tracking Spreadsheet: AT PDR Tasks

Date	3/28/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~

	☑ ~~Charuvi Singh~~
Important Decisions	- Complete what is left to be finished
Action Items/Goals **Include due dates**	- A proof of concept should be completed before the PDR presentations
Notes	Added some additional requirements to the requirements doc   
Comments	Cam and follower model: How to Make a Cam & Follower

The team emailed the Perkins School for the Blind for a meeting to meet with potential clients. The Perkins School is an NGO that aims to increase education services for children and young adults who are blind and visually impaired with multiple disabilities. Perkins Website: https://www.perkins.org/



Perkins Questions Request

GK Gundu, Kruthi

To: Info@Perkins.org

Cc: Bodangi, Samhitha; Figueroa, Abigail; Desrosiers, Derek; Singh, Charuvi

Reply | Reply all | Forward

Thu 3/28/2024 11:41 AM

Dear Perkins,

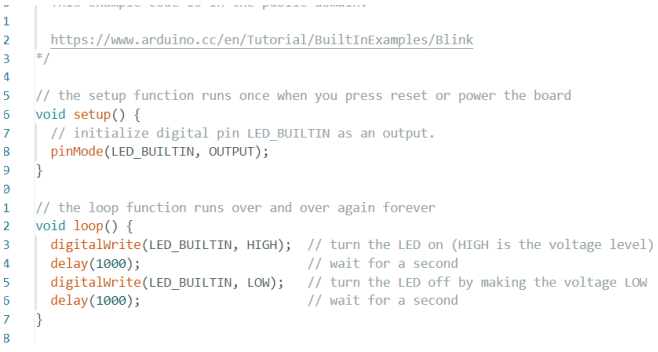
My name is Kruthi Gundu and I am a junior at the Massachusetts Academy of Math and Science at WPI. I am part of a team of 4 other students working on an Assistive Technology device to assist visually impaired people (VIPs) in translating text and images/objects in their environment to braille. I called the Perkins phone number last week and asked if anyone from the institution could speak to us and answer a few questions.

Any help you could provide would be fundamental in the success and efficacy of our device and would be greatly appreciated. Thank you so much for your time and consideration and we look forward to speaking soon!

Kind regards,
Kruthi

Reply | Reply all | Forward

Date	3/29/2024
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Complete what is left to be finished for the prototype
Notes	Added some additional requirements to the requirements doc Arduino Troubleshooting: https://forum.arduino.cc/t/sketches-not-uploading/486759 Cam and follower model we have decided to use for our first POC: How to Make a Cam & Follower

```
  This example code is in the public domain.

  https://www.arduino.cc/en/Tutorial/BuiltInExamples/Blink
*/

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, HIGH);  // turn the LED on (HIGH is the voltage level)
  delay(1000);                      // wait for a second
  digitalWrite(LED_BUILTIN, LOW);   // turn the LED off by making the voltage LOW
  delay(1000);                      // wait for a second
}
```

Date	4/1/24 and 4/2/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	These two days were for round-robin presentations for PDR. The group did not meet outside of class time. Things to consider: - Would an Arduino be able to run the OCR or would it need to be an alternate device? - If the user is blind, how would they be able to know where to point the device? - How would a user know when to move on, or is there an option to go back?

Date	4/3/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~

Important Decisions	Looking further into depth in regards to the design concept we will end up pursuing. So far, the electromechanical design looks most promising.
Action Items/Goals **Include due dates**	☑ ~~Decide and become well-versed in the possible design concept for the braille display by the end of the week - 4/5~~
Notes	- Research led us to a page about how one would build an electromechanical braille display, it's more affordable than typical standards but requires greater engineering knowledge

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Date	4/4/24 (remote day)
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Decide on whether to use a piezoelectric braille display or move forward with the electromechanical concept
Action Items/Goals **Include due dates**	☑ ~~Decide and become well-versed in the possible design concept for the braille display by the end of the week - 4/5~~
Notes	- Continued correspondence with Dr. Estabrooks from InvenTeams. - A cost analysis of materials showed that the piezoelectric method, while more convenient and easier to implement, was greatly more expensive and limited the amount of braille cells we could show
Comments	- Spectra popped into the zoom and asked to share design concepts, which we did.

[EXT] Re: InventTeams Questions Request

GK **Gundu, Kruthi**
Dear Dr. Estabrooks, I have just checked in with our team mentor and it looks like our school is ... Wed 4/3/2024 11:32 AM

LE **Leigh B Estabrooks**
Some people who received this message don't often get email from leighe@mit.edu. Learn why... Thu 4/4/2024 10:05 AM

GK **Gundu, Kruthi**
To: Leigh B Estabrooks <leighe@mit.edu>; inventeams <inventeams@mit.edu> Thu 4/4/2024 10:35 AM
Cc: Bodangi, Samhitha; Singh, Charuvi; Desrosiers, Derek; Figueroa, Abigail

Dear Dr. Estabrooks,

Thank you for being flexible, I will update my team and mentor about the meeting details. We look forward to meeting with you soon!

Kind regards,
Kruthi

Date	4/5/24
Attendance	☐ Samhitha Bodangi (MSEF) ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☐ Kruthi Gundu (MSEF) ☐ Charuvi Singh (MSEF)
Important Decisions	More than half the was at MSEF so no important decisions were made, but progress continued with developing the braille display
Action Items/Goals **Include due dates**	☑ ~~Decide and become well versed in the possible design concept for the braille display by the end of the week - 4/8~~ ☑ ~~Apply for WPI makerspace grant and attend training - 4/12~~
Notes	- Derek started developing the 3D printing files for the braille cells - Abi investigated the possible grant and looked more into the materials needed for the display including PCB boards

Date	4/8/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	No STEM class today - eclipse viewing

Date	4/9/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Prepare questions for meeting with Liz (today after school)~~
Notes	We met with Liz from Walkfit after school and learned a lot about how we can better tailor the device to the VIP community. It was Abi and Derek's first time doing WalkFit, so now all members of the team understand what it is like to navigate outdoors without vision. A lot of VIPs do not venture outside of their home by themselves because they are worried about what could go wrong, so making sure the device is able to help them inside their house is also very important. It could also function to recognize objects in an area and display/read those aloud as well.

Date	4/10/24

Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Our team called the Makerspace at WPI to see if we would be able to use their space and resources. We also inquired about the PCB machine. We first had a meeting with Dr. Estabrooks from Lemelson-MIT InvenTeams Programs to introduce ourselves and obtain some advice for the application. We then had a meeting with Ms. Amy Ruell, a life-long braille user from MABVI who helped gain a better understanding of how to design our device. She gave us a lot of important information. Meeting with MABVI Notes

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Date	4/11/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Makerspace Basic Training to be able to go to the Makerspace~~ ☑ ~~Grant proposal~~
Notes	Booked training at the Makerspace. This is so that we can get the Makerbucks funding as one member must be a full user. Reviewed design and made a new requirement to make sure that testing is done along the way of the creation of the device so that it is simple for users so that they do not waste a lot of money on a device they can't comprehend or has too steep of a learning curve.

Date	4/12/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Grant Proposal~~ ☑ ~~Form for Additive Manufacturing User Training on Friday~~
Notes	Our team went to the Makerspace at WPI to find out more information about the PCB machine as well as other materials they had. We met with an administrator from the Makerspace who highly recommended PCBWay.com for ordering PCBs over the machine here. He also shared some contacts in the RBE department who might be able to help us with the design and assembly of our device.

Date	4/16/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Grant Proposal~~ ☑ ~~Form for Additive Manufacturing User Training on Friday~~ ☑ ~~Get F3Z files to 3D print~~
Notes	Made appropriate STL files for 3D printing a model of the braille cell. Worked on making a detailed list of parts that are going to be needed for PCB assembly. Made a list of questions to ask Derek's dad during the meeting tomorrow.

Date	4/17/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Grant Proposal~~ ☑ ~~Form for Additive Manufacturing User Training on Friday~~ ☑ ~~Send STL files to Dr. C for 3D printing~~
Notes	Met with Derek's dad who has a lot of experience with designing and working with PCBs. We obtained help in understanding the files on the Hackaday website and created a plan on what needs to be finished in the coming weeks to successfully order and assemble the PCBs. Notes from meeting: ● Software packages ● C, Python packages ○ Python easier, but performance not as high ● Cricut python, mico python ● Embed image recognition: need high CPU with lot of horsepower ● Image recognition on the ESP-S3 PCB: ● Advanced circuits ● Simiplier designs: Osh park ○ Cheaper ○ Longer shipping time ● PCB way ○ Shipping is expensive but only takes a few days to receive product

Date	4/18/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Reschedule meeting with Kevin from Perkins~~ ☑ ~~Work on grant proposal and continue working on POC~~ ☑ ~~Finalize list of required materials~~
Notes	• Met with Daryl (connected to Liz Myska) to discuss the device as she has been a teacher for over 45 years • Daryl gave us feedback on our device so far, and offered to help us test the device in the near-future • Got 3D printed parts for Braille cell and solenoid winder, but Braille cell was too small to print effectively
Comments	Meeting with Daryl

Date	4/19/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	• Met with Kevin O'Reilly from Perkins school to discuss our device, get feedback, and get potential mentorship. • Went to MakerSpace for training; however, training got canceled due to an conflict the instructor had
Comments	Project Pitch Notes from meeting with Kevin O'Reilly

Date	4/22/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Write rough draft of InvenTeams application~~ ☑ ~~Edited grant proposal~~ ☑ ~~Created CAD for box containing Braille characters for POC~~ ☑ ~~Reprint Braille cell (scale up x3 for visual purposes)~~
Notes	A preliminary code was developed in C using previous github repos to convert .txt into braille. However, it is in Unicode, where each braille character is treated as one letter, and not individual dots. The software will be worked on, and the unicode will be converted to bolleens.
Comments	Software Process and Design

Date	4/23/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☑ ~~Finish editing InvenTeams application (due 4/23/24 11:59pm)~~ ☑ ~~Find somewhere to use an SLA printer~~
Notes	• Met with Dr. C after school to review InvenTeams application • During this meeting, the team discussed

	merging with the other group, Spectra, who is also working a refreshable Braille display • InvenTeams applications was submitted
Comments	• The team is split over whether to merge with the other group. We all support the merge if the other group is willing to shift their project to ours.

[EXT] Perkins School for the Blind Inquiry

GK

Gundu, Kruthi

To: Kevin O'Reilly <kevin.oreilly@perkins.org>

Tue 4/23/2024 11:10 AM

Cc: Bodangi, Samhitha; Desrosiers, Derek; Figueroa, Abigail; Singh, Charuvi

Dear Mr. O'Reilly,
Thank you so much for taking the time to meet with our team on Friday. Here is the brief overview of our device which you requested.
We are a team of 5 high school juniors from Worcester who aim to develop a device which utilizes optical character recognition and object detection machine learning models to convert text and images/objects text from a user's surroundings into tactile Braille format. We also aim to develop the device to help to assist those learning Braille by adding text-to-speech and audio features. This way, text and other information can be simultaneously presented as tactile Braille and audio. By employing a portable device equipped with a camera, we hope this technology will successfully allow users with visual impairments to independently access information in their environment and learn Braille more conveniently. The device's software will extract text characters and images/objects from captured images and translate to speech and Braille physically displayed by the device (using electromagnet braille cells). We are in need of advice and mentorship from anyone with an assistive technology background, as well as individuals willing to help test our device and provide valuable feedback. Thank you for your time and consideration.
Thank you for all your time and help, we really appreciate it!
Kind regards,
Kruthi

Measurements for scaled up Braille character used to create Onshape box design
32.7 mm L → 1.287402 in
23.4 mm W → 0.9212598 in

Date	4/24/24 (Split Day for the team)
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~

Important Decisions	- Abi talked with the members of Spectra and discussed what merging the two teams would look like. A meeting will be held on 4/25 with everyone and Dr. C to further decide on this possibility.
Action Items/Goals **Include due dates**	☑ ~~Submitted InventTeams app~~ ☑ ~~Find access to a SLA printer~~
Notes	- Spectra expressed that they want to focus on a more basic design - Monsters Inc is adamant on continuing with the original text-to-braille design - Abi showed them the Hackaday profile and explained our plans, likewise, Spectra shared a possible concept for the braille display

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Date	04/25/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Meeting held with Spectra to discuss merging groups. Concerns and points of interest brought up. Groups will be merging to share work for coding and getting a proof of concept/basic tech working.
Action Items/Goals **Include due dates**	☑ ~~Finalize parts needed for PCB assembly~~ ☑ ~~Dr C. to order rest of materials~~
Notes	- Spectra expressed that they want to focus on a more basic design, similar to our design - Also willing to use the technology that we are hoping to use, but implement it in a different way - Made a software process document for coding OCR to Braille translation - Made a CAD for the POC

Date	04/29/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☐ Abigail Figueroa ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	-
Action Items/Goals **Include due dates**	☑ ~~Samhitha - convert Braille .txt file to boolean arrays, make an app to test with a camera for OCR~~ ☑ ~~Order parts for PCB boards~~
Notes	- In C, Samhitha made code to convert a text file (.txt) to Braille also in a .txt file - Spreadsheet made for PCB parts and parts were ordered, most arriving 5/3/24 - Board Parts

```c
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
#include <ctype.h>

#define WINDOWS
#ifdef WINDOWS
    #include <windows.h>
#endif

//Letters, numbers, and Punctuation

const char lowercaseLetters[26] = {
    'a','b','c','d','e','f','g','h','i','j',
    'k','l','m','n','o','p','q','r','s','t',
    'u','v','x','y','z','w'
};
const char *lowercaseBraille[26] = {
```

```
    "⠠","⠡","⠢","⠣","⠤","⠥","⠦","⠧","⠨","⠩",
    "⠪","⠫","⠬","⠭","⠮","⠯","⠰","⠱","⠲","⠳",
    "⠴","⠵","⠶","⠷","⠸","⠹"
};
const char numbers[10] = {
    '1', '2', '3', '4', '5', '6', '7', '8', '9', '0'
};
const char punctuationMarks[26] = {
    '.', ',', ';', ':', '-',
    '?', '!', '"', '(', ')', '*',
    '$','%', '=', '+', '#',
    '|', '\'', '/', '\\', '{', '}',
    '[', ']', '@', '&'

};
const char *punctuationMarksBraille[26] = {
    "⠲", "⠂", "⠆", "⠒", "⠤",
    "⠦", "⠖", "⠶", "⠦", "⠴",
    "⠾", "⠿", "⠷", "⠸", "⠡",
    "⠿", "⠲", "⠐⠂", "⠒⠲", "⠒⠿", "⠿⠒",
    "⠈", "⠌", "⠐", "⠨"
};

int main(int argc, char *argv[]) {

    #ifdef WINDOWS
        SetConsoleOutputCP(65001);
    #endif

    //file
    printf("\n\"Text to Braille\"\n");
    printf("Translator of text documents (.txt) to braille
(Unicode)\n\n");

    char sourceDocument[250];
    if (argc == 2) {
        strncpy(sourceDocument, argv[1], 250);
    } else {
        printf("Drag the text file (.txt) into this window or enter its
path:\n");
```

```
        fgets(sourceDocument, 250, stdin);
        sourceDocument[strcspn(sourceDocument, "\n")] = 0;
    }
    printf("Opening '%s'...\n", sourceDocument);

    FILE *source = fopen(sourceDocument, "r");
    if (source == NULL) {
        printf("Could not open the file.\nDoes it exist? Is it being used
by another application?\n");
        #ifdef WINDOWS
            system("pause");
        #endif
        exit(1);
    }

    char destinationDocument[250];
    strcpy(destinationDocument, sourceDocument);
    for (int i=0; i<4; i++) {
        destinationDocument[strlen(destinationDocument)-1] = '\0';
    }
    strcat(destinationDocument, "(braille).txt");
    printf("\nDestination document (in the same directory as the source
document):\n'%s'\n",destinationDocument);

    FILE *destination = fopen(destinationDocument, "w");
    if (destination == NULL) {
        printf("Could not create the destination document.");
        printf("Is there a document with the same name open by another
application?");
        #ifdef WINDOWS
            system("pause");
        #endif
        exit(1);
    }

    //conversion
    int character;
    _Bool isNumeral = 0;

    while ((character = fgetc(source)) != EOF) {
```

```
        if (isalpha(character)) {
            if (isNumeral && islower(character) && character < 107)
                fprintf(destination, "%s", "⠰");

            if (islower(character)) { // Lowercase
                isNumeral = 0;
                for (int i=0; i<26; i++) {
                    if (character == lowercaseLetters[i]) {
                        fprintf(destination, "%s", lowercaseBraille[i]);
                        break;
                    }
                }
            } else if (isupper(character)) { // Uppercase
                isNumeral = 0;
                for (int i=0; i<26; i++) {
                    if (tolower(character) == lowercaseLetters[i]) {
                        fprintf(destination, "%s%s", "⠠",
lowercaseBraille[i]);
                        break;
                    }
                }
            }
        }

          else if (isspace(character)) {
            isNumeral = 0;
            if (character == ' '){
                fprintf(destination, "%s", " ");
                continue;
            }
            else {
                fprintf(destination, "%c", character);
                continue;
            }
        }
        else if (isdigit(character)) {
            isNumeral = 1;
            if (character < 58) {
```

```
                fprintf(destination, "%s%s", ".:",
punctuationMarksBraille[character - 48]);
            } else if (character == 48) {
                fprintf(destination, "%s", ".:.:");
            }
        }

        else if (ispunct(character)) {
            isNumeral = 0;
            for (int i=0; i<26; i++) {
                if (character == punctuationMarks[i]) {
                    fprintf(destination, "%s",
punctuationMarksBraille[i]);
                    break;
                }
            }
        }

        else if (character == 160) {
            fprintf(destination, "%s", " ");
        }

        else {
            fprintf(destination, "%c", character);
        }
    }

    fclose(source);
    fclose(destination);

    printf("\nConversion complete.\n");

    #ifdef WINDOWS
        system("pause");
    #endif
}
```

Date	04/30/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Spectra and Monsters, Inc will share the two PCB boards that are going to be created - Either each team will take one for prototyping purposes or we will switch off on who gets both
Action Items/Goals **Include due dates**	☑ ~~Work on CAD and software components~~
Notes	- Met with Spectra and discussed future plans for both of our projects

Date	05/01/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Timeline for assembly was discussed by group and Spectra
Action Items/Goals **Include due dates**	☑ ~~Send Braille cell CAD file to be printed~~ ☑ ~~Get solenoid winder printed and working~~ ☑ ~~Print parts of Braille cell module~~
Notes	- PCB boards and magnets arrived. Need to print out the parts of the Braille cell module - Sent more solenoid winder files to Dr. C for printing

Date	05/02/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	☑ ~~Dimensions for CAD file was finalized~~
Action Items/Goals **Include due dates**	☑ ~~- Print parts of Braille cell module~~
Notes	- Sent STL files to Dr. C for printing out the small Braille cells on an SLA printer - Worked on software for OCR

Date	05/06/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Charuvi will finish the CAD file for the Braille cell by the end of this week. - The team will start building the prototype either May 7 or May 8 this week
Action Items/Goals **Include due dates**	☑ ~~- Finish the Google Form for the AT Brochure by May 9~~ ☑ ~~Finish Poster by May 16~~ ☑ ~~Finish TDR Packet by May 22~~
Notes	- The team moved forward with InventTeams and will meet with their advisor sometime this week to discuss future and summer steps

Date	05/07/24

Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	-
Action Items/Goals **Include due dates**	☑ ~~Get OCR to work by 5/12/24~~ ☑ ~~Print and assemble 1 Braille cell module by 5/12/24~~ ☑ ~~Finalize dimensions for body of Braille cell module~~
Notes	● Watched training video for soldering ● Worked on code

Date	05/08/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	- Discussed the sizing of the Braille cell and possible alternatives based on the resolution of the SLA printer used
Action Items/Goals **Include due dates**	☑ ~~Dr. C has offered to reprint the Braille cell in 2x,5x, and 10x to help us optimize a size for the cell~~ ☑ ~~Charuvi will resize the CAD file for the Braille cell module based on these decisions~~ ☑ ~~Software will be completed by the week of 5/13/24~~
Notes	● Worked on assembling the SLA-printed Braille cell with the magnets, but some of the print

	had excess resin, blocking important holes in the Braille cell. ○ With the current size of the Braille cell and the resolution of the SLA printer in use, the team has decided to re-evaluate the design of the Braille cell. ● Worked on software for OCR ○ Worked on C

Date	05/09/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Poster design
Action Items/Goals **Include due dates**	☑ ~~Poster 5/15/24~~ ☑ ~~Mapping code will be done by 5/13/24 and will be tested~~
Notes	- Looked at previous poster designs and made template for poster on canva - Team worked on software and poster creation

Date	05/10/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Poster design
Action Items/Goals **Include due dates**	☑ ~~Poster~~ ☑ ~~Software for testing during week of 5/13/24~~ ☑ ~~Waiting for resized Braille cells~~

	☑ ~~Sautering will be conducted this weekend~~

Notes	• Worked on software and poster creation
	• Divided plans for the weekend:
	  ○ Software
	  ○ Complete all CAD files for poster
	  ○ Poster
	  ○ Sautering

Date	05/13/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The PCB boards are sautered and the next step includes connecting the PCB board to the software elements The team worked on using Tesseract js to perform OCR on the ESP board. However, the live web server. More troubleshooting is needed in order to display the camera output on the live server in order to view it.
Action Items/Goals **Include due dates**	☑ ~~Complete the CAD files for the poster~~ ☑ ~~Poster due 5/15/24~~ ☑ ~~Finish soldering the PCB boards~~ ☑ ~~Troubleshoot the live server~~
Notes	

Date	05/14/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~

Important Decisions	The live server is working and the next step includes performing OCR on the board. The team worked on the poster and the TDR documents
Action Items/Goals **Include due dates**	☑ ~~Poster due 5/15/24~~ ☑ ~~TDR Packet due 5/22~~
Notes	

Date	05/15/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The team worked on the poster for the upcoming AT fair. The poster will be sent to the WPI ATC for printing. The final poster design is below
Action Items/Goals **Include due dates**	☑ ~~Poster due 5/15/24~~ ☑ ~~TDR Packet due 5/22~~
Notes	

Optical Text-to-Braille Translation Device

Abigail Figueroa, Charuvi Singh, Derek Desrosiers, Kruthi Gundu, Samhitha Bodangi
Advisor: Kevin Crowthers, Ph.D

Problem Statement

Visually impaired people (VIPs) encounter significant challenges in accessing written information. Learning Braille from a young age aids with literacy, enhancing future life implications for VIPs. However, there is a lack of interactive educational devices for younger VIPs.

Engineering Goal

The goal is to design an assistive device for VIPs that uses optical character recognition (OCR) to take pictures of text in the environment. The device translates text from the image into Braille configurations and provides a tactile medium for the VIP to read the translated Braille

Methodology

Initial sketches
Brainstorming, idea development and need investigation

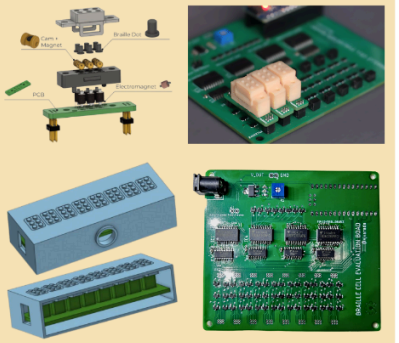
CAD Modeling
Design variations, visualization, design decision making

Electromechanical construction
3D printing Braille cells and tools, solenoid winding, PCB soldering, cam + magnet placement

OCR implementation
Microsoft Tesseract, Margin conditionals, input from camera, character by character translation

Text Conversion + Display
Text to Braille Module Conversion, ESP32-S3 to Arduino Nano, Arduino code to select, set, reset, and turn off pins.

Current Design

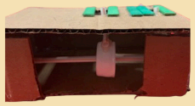


Requirements

Type	Level 1 Requirements	Yes/No
Functionality	The device shall be able to record text from a surface	Y
Functionality	The device shall be able to convert the text into Braille characters	Y
Functionality	The device shall be able to present the Braille characters (at least 6) to the users	Y
Functionality	The device shall be able to help the user position the device in front of text	Y
Physical	The device is portable, and can be operated outside of the home	Y
Physical	The device shall weight less than 450 grams	Y
Physical	The device shall be less than 8 cm tall, 10 cm wide, and 5 cm deep	Y

Design I

Axle-display

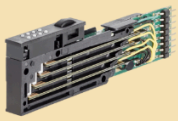


Pros:
- cost-effective
- simplistic design

Cons:
- difficult to control a greater # of moving pieces

Design II

Piezoelectric Braille Cell

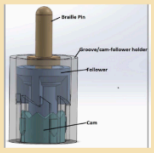


Pros:
- compact
- easy to implement

Cons:
- very costly → limits # of cells

Design III

Cam and Follower Assembly



Pros:
- simplistic design
- solenoid powered

Cons:
- large motor
- costly

One-Dot Test

To determine if the Arduino Nano, Braille cell PCB Board and individuals Braille cell modules are functional and can work together, a "One-Dot Test" will be implemented. This test verifies that the Braille cell is able to receive signals from an Arduino Nano and that one pin can raise up and down. Using code written in the Arduino language, a signal is sent to the Arduino Nano to select the module and pin, and then set, reset, and turn off the pin.

Text Recognition and Conversion Test

To determine if the camera and written code are functional, a "Text Recognition and Conversion Test" will be implemented. This test will begin with running the camera and taking a picture. Then, the OCR methods will run on the ESP32-S3 Board, extracting the text from the image that was just taken. Finally, this text will be converted to boolean formats of the Braille cell modules to present.

Conclusion

- Assistive device is more affordable and portable than existing devices on the market
- Easily adaptable to include more Braille characters
- Simplicity of device allows for easy and adaptable Braille education

Future Works

- Wi-Fi and Bluetooth features to connect with smartphones and headphones
- Buttons or settings to change the Grade of Braille and adjust the speed of reading for greater personalization
- Audio feature to read Braille while listening to the audio

Date	05/16/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The team worked on building their prototype and the TDR documents
Action Items/Goals **Include due dates**	☑ ~~TDR Packet due 5/22~~
Notes	

Date	05/17/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	The team worked on the TDR documents for most of the class time. A data cable was acquired for the ESP32 board to program the OCR for the camera Code Sources and References: Software Process and Design Configuring the Environment for the ESP32 with the Arduino IDE https://www.youtube.com/watch?v=CD8VJl27n94 Arduino IDE download (Legacy download) https://www.arduino.cc/en/software Board Manager Download for ESP32 Board https://www.electronicssimplified.in/feed/programming-environment-for-esp32/

	Package Download URL https://dl.espressif.com/dl/package_esp32_index.json
Action Items/Goals **Include due dates**	☑ ~~Finish the TDR packet~~ ☑ ~~Finish OCR code for ESP32 Board~~
Notes	Team worked on software and documents for the TDR

Date	05/20/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Tasks were delegated between team members in order to finish the TDR documents AT TDR Tasks Instead of the ESP32 board, the Raspberry Pi will be used for the time being to perform OCR as it is simpler to implement. The Raspberry Pi can run Python, allowing us to use endless libraries and functions to make the code simpler. The code is below for implementing OCR in the Raspberry PI. The code snippet below is the Braille conversion code.
Action Items/Goals **Include due dates**	☑ ~~Finish the TDR packet~~ ☑ ~~Conduct Design Study tests~~ ☑ ~~Finish OCR code for Rasberry Pi~~
Notes	• Team worked on software and documents for the TDR

OCR Code:

```
import cv2
```

```
import pytesseract



print("Initializing the camera")

camera = cv2.VideoCapture(0)

camera.set(cv2.CAP_PROP_FRAME_WIDTH, 640)

camera.set(cv2.CAP_PROP_FRAME_HEIGHT, 480)



while True:

       print("Reading camera")

       result, frame = camera.read()  # read frames from the video

       if result is False:

              break  # terminate the loop if the frame is not read
successfully

       gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

       print("Running tesseract on the image")

       text = pytesseract.image_to_string(gray)

       print(text)
```

Conversion Code:

```
lowercase_letters = "abcdefghijklmnopqrstuvwxyz"
lowercase_braille = ["⠁", "⠃", "⠉", "⠙", "⠑", "⠋", "⠛", "⠓", "⠊", "⠚",
                     "⠅", "⠇", "⠍", "⠝", "⠕", "⠏", "⠟", "⠗", "⠎", "⠞",
                     "⠥", "⠧", "⠺", "⠭", "⠽", "⠵"]
```

```
numbers = "1234567890"
numbers_braille = ["⠼⠁", "⠼⠃", "⠼⠉", "⠼⠙", "⠼⠑", "⠼⠋", "⠼⠛", "⠼⠓", "⠼⠊",
"⠼⠚"]

punctuation_marks = ".,;:-?!\"()*$%+=#|'/\\{}[]@&"
punctuation_braille = ["⠲", "⠂", "⠆", "⠒", "⠤", "⠢", "⠖", "⠶", "⠦", "⠴",
"⠾",
                       "⠮⠴", "⠮⠶", "⠿", "⠷", "⠼⠂", "⠮", "⠄", "⠄⠂", "⠂⠄",
                       "⠂⠮", "⠮⠂", "⠮⠮", "⠼⠿", "⠂⠂", "⠄⠿"]


def text_to_braille(text):
    braille_array = []
    is_numeral = False

    for char in text:
        if char.isalpha():
            if is_numeral and char.islower():
                braille_array.append("⠰")
            is_numeral = False
            if char.islower():

braille_array.append(lowercase_braille[lowercase_letters.index(char)])
            else:
                braille_array.append("⠠" +
lowercase_braille[lowercase_letters.index(char.lower())])
        elif char.isdigit():
            is_numeral = True
            braille_array.append(numbers_braille[numbers.index(char)])
        elif char in punctuation_marks:
            is_numeral = False

braille_array.append(punctuation_braille[punctuation_marks.index(char)])
        elif char.isspace():
            is_numeral = False
            braille_array.append("⠀" if char == ' ' else char)
        else:
            braille_array.append(char)

    return braille_array
```

Date	05/21/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Important Decisions	Because the braille cells were scaled up by x10, they do not fit the smaller PCB boards perfectly. Therefore, the final hardware design studies would include an LED test, and magnetic field test. The LED test shows evidence of the current being controlled and directed to a specific Braille pin. In the future the LED current can be modified to raise the Braille pins up and down. The magnetic field test was conducted and successful (a magnetic field was shown on magnet paper when the electromagnet had current flowing around it).
Action Items/Goals **Include due dates**	☑ ~~Finish the TDR packet~~ ☑ ~~Conduct OCR test~~ ☑ ~~Conduct LED Test~~ ☑ ~~Conduct Magnetic Field test~~
Notes	• Team worked on software and documents for the TDR

For work done over the summer (the logs below), view our Tasks spreadsheet for a more in-depth version of what work was done when: https://docs.google.com/spreadsheets/d/1Mh0hSVoibJRxzRk01cTgkPb5n7k7P8TDfFo0Yv1AMQY/edit?usp=sharing

Date	5/31/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Met with Dr. C to discuss InvenTeams application work over the summer

Date	6/14/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Met again with Dr. C to discuss work done and what needs to be done before the application deadline, target deadlines for mid-summer

Date	6/26/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Lemelson-MIT InvenTeams application webinar

Date	6/30/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	InvenTeams brainstorming session with Dr. C - discussing ideas to include in application and outline of all writeups

Date	7/10/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Lemelson-MIT InvenTeams application webinar

Date	7/22/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Brief meeting with Dr. C to discuss work done and what needs to be finalized in the next few weeks

Date	7/24/24
Attendance	☑ ~~Samhitha Bodangi~~

	☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Lemelson-MIT InvenTeams application webinar

Date	7/31/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Met with Liz Myska, a prominent VIP community leader, to discuss our project. She told us we could present at an event in only a few days to get a lot of traction and views for our project, but we have lots of work to do now!

Date	8/1/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Emergency meeting with Dr. C to discuss opportunity from Liz and to ask for help with 3D printing some parts

Date	8/4/24
Attendance	☑ ~~Samhitha Bodangi~~ ☐ Derek Desrosiers ☑ ~~Abigail Figueroa~~

	☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Presentation at Polar Park to greater Worcester VIP Community

Date	8/7/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Lemelson-MIT InvenTeams application webinar

Date	8/21/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Notes	Lemelson-MIT InvenTeams application webinar

Date	8/27/24
Attendance	☐ Samhitha Bodangi ☐ Derek Desrosiers ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☐ Charuvi Singh
Notes	Met with Representative Kane to discuss project and gain her support, working towards increasing

	community engagement

Date	8/29/24
Attendance	☑ ~~Samhitha Bodangi~~ ☑ ~~Derek Desrosiers~~ ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☑ ~~Charuvi Singh~~
Action Items/Goals **Include due dates**	☐ Finish ALL application materials by this date!!
Notes	Met with Dr. C to go over final application materials and get feedback

Date	8/30/24
Attendance	☐ Samhitha Bodangi ☐ Derek Desrosiers ☑ ~~Abigail Figueroa~~ ☑ ~~Kruthi Gundu~~ ☐ Charuvi Singh
Notes	Meeting with State Senator Moore to pitch project and gain community support