

SignTalk

Objective

SignTalk is designed as an ASL dictionary app that provides a comprehensive resource for learning and understanding American Sign Language (ASL). The app aims to bridge the communication gap between deaf individuals and those who do not know sign language. It achieves this by offering a user-friendly platform to explore ASL vocabulary through text descriptions and corresponding media, such as images and video and it has real-time ASL translation currently available to translate alphabet.

Target Audience

Deaf or Hard of Hearing (HoH)

A person who has difficulty hearing compared to someone with normal hearing defined as having hearing thresholds of 20 dB or better in both ears—is considered to have hearing loss. This loss can range from mild to profound and may affect one or both ears, leading to challenges in hearing conversation or loud noises.

"Hard of hearing" refers to individuals with hearing loss that can range from mild to severe. Those who are hard of hearing typically communicate using spoken language and may benefit from hearing aids, cochlear implants, other assistive devices, and captioning.

Deaf individuals usually experience profound hearing loss, meaning they have very limited or no hearing at all. They often rely on sign language for communication. (World)

American Sign Language (ASL)

American Sign Language (ASL) is a complete natural language with the same linguistic features as spoken languages but different grammar from English. ASL is communicated by motions of the hands and face. Many North Americans who are deaf or hard of hearing use it as their primary language, and some hearing individuals do as well. (National Institute on deafness and other communication Disorders). For the Deaf community, ASL is not only a language but also a bridge to social connection and inclusion, facilitating a sense of belonging. It is often the first language Deaf children learn, and for many, it is the preferred method of communication throughout their lives. Beyond practical communication, ASL enables Deaf individuals to access education, advocate for their needs, and fully participate in society.

Problem statement

The Deaf and Hard of Hearing (HoH) communities face significant communication challenges that impact their daily interactions and quality of life. Communication barriers arise in various situations, including workplaces, social gatherings, and public spaces, where spoken language is the primary mode of interaction. Deaf individuals often rely on sign language to communicate, but only a small portion of the hearing population understands it, creating a gap in accessibility. For those who are hard of hearing, hearing aids and other assistive devices provide some support, but these aids are not always effective in noisy or group settings, and lip-reading can be tiring and limited in accuracy, especially over prolonged conversations.

Challenges faced by Deaf/Hard to hearing individuals

- **Communication:** It can be hard to understand spoken language and environmental sounds. In the workplace, it can be difficult to participate in office conversations, which can lead to feelings of being left out or uninvolved (Deaf Unity).
- **Social isolation:** People with hearing loss may have difficulty communicating with others, which can lead to social isolation and loneliness. (World)
- **Emotional Problem:** Hearing loss can cause distress, embarrassment, self-criticism, anger, frustration, discouragement, guilt, and stress. It can also lead to a drop in self-esteem and confidence. (Council et al.)
- **Tiring of online meetings:** Difficult lip reading and hard to read people's facial expressions and body language (Deaf Unity).

User Personas

User Profiles 1 (Deaf):

- Dhruv
 - Dhruv learned to sign as a young child and is fluent in sign language.
 - He prefers written content to be well-structured, using clear headings and minimal jargon, to ensure it is easy to read and understand.
- Context:
 - Dhruv can lip read, but only effectively when he can see the full face of the person speaking. This is challenging to maintain for long periods, making lip reading unsustainable in extended conversations.
 - Dhruv benefits from tools that allow captions to be moved and customized according to his preference, improving his accessibility to information.
- Scenarios:
 - Dhruv has a friend named Miles, who does not know sign language but is eager to communicate with him. To bridge the gap, Dhruv introduces Miles to the SignTalk app.
 - Miles points the phone's camera at Dhruv while he signs, allowing the app to use its real-time sign language recognition feature to generate text.

- As Dhruv signs, SignTalk translates his signs into text that appears on Miles' screen in real-time, enabling effective communication.
- To respond, Miles can either write out his reply or use the app's audio-to-text feature for faster and smoother communication. This allows both of them to have a seamless conversation without the need for sign language knowledge from Miles.

User Profiles 2 (Hearing (Non-Deaf)):

- Sarah
 - occupation : Customer Service Representative
 - Non-deaf (does not know sign language)
 - Communication with deaf customer using sign talk to bridge the language gap
- Context:
 - Sarah works in a crowded department store. Emily, a deaf customer, walks into the store today asking for help locating a specific item. Sarah is worried about how she will be able to give excellent customer service without being able to communicate with Emily as she has never studied sign language.
- Scenarios
 - Emily goes up to Sarah at the counter to ask for assistance. Emily begins to sign to Sarah, inquiring as to whether a particular product is available.
 - Unsure of how to react, Sarah pulls out her smartphone and launches the SignTalk application.
 - Sarah clicks on the app's Real-time Sign Recognition function. Emily keeps signing as she points the camera on her phone at her.
 - "Where can I find the blue sweater?" appears on Sarah's screen as a result of SignTalk's AI technology translating Emily's sign language into text and audio in real time.
 - With haste, Sarah locates the sweater in her inventory and speaks her response. She speaks into the phone, using the app's option to translate audio to text and sign, saying, "The blue sweater is in aisle three."
 - Emily nods and smiles when the program translates her words to text and signs and shows it to her on the screen.
 - Using the chat-like interface of the program, Emily carries on the conversation by inquiring about possibilities for size and color, which SignTalk interprets into signs for Sarah.

User Profiles 3 (hard of hearing & can lip read)

- Marie
 - **Marie** is deaf and fluent in sign language.
 - She can lip-read but finds it tiring and not always accurate, especially in long conversations.
 - Lip-reading requires her to clearly see the speaker's face, which is not always feasible in group settings or poorly lit environments.
- Context:
 - Marie attends a business meeting with her colleague, David, who is hearing.

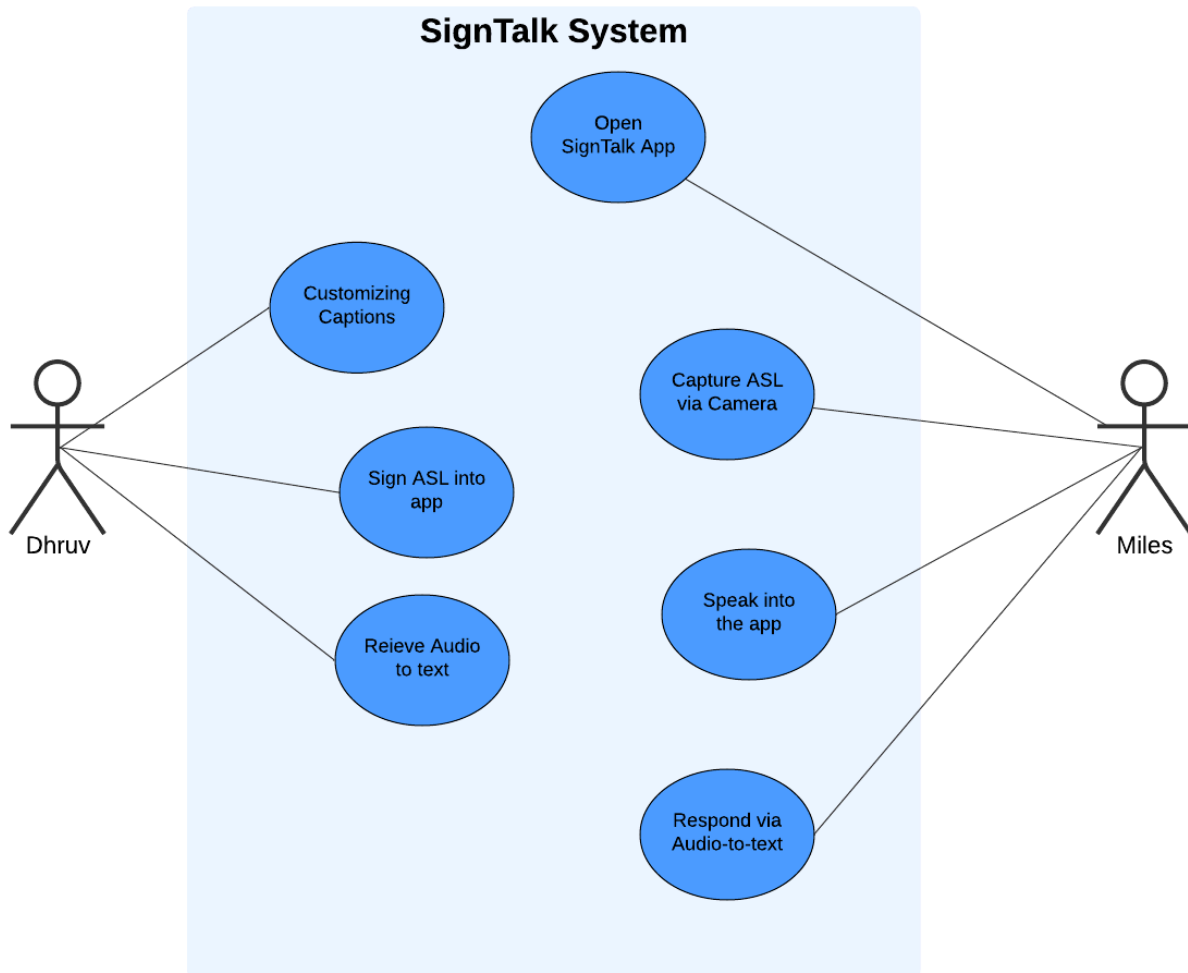
- In the meeting room, the lighting and seating arrangement make it difficult for Marie to consistently see everyone's face, further complicating lip-reading.
- As the conversation becomes more dynamic with people looking at documents or screens, it becomes even harder for Marie to follow by lip-reading alone.
- **Scenario:**
 - At the start of the meeting, Marie lip-reads **David** during brief introductions.
 - As the discussion continues and more people participate, Marie finds it increasingly difficult to rely on lip-reading, especially when the participants' faces are not always visible.
 - Recognizing these challenges, Marie opens the **SignTalk** app on her phone to aid in communication.
 - When it's her turn to contribute to the conversation, Marie signs her input, and **SignTalk** captures her gestures, translating them into real-time audio for David and the other hearing participants.

User Profiles 4 (Hearing (Non-Deaf) & partial blindness):

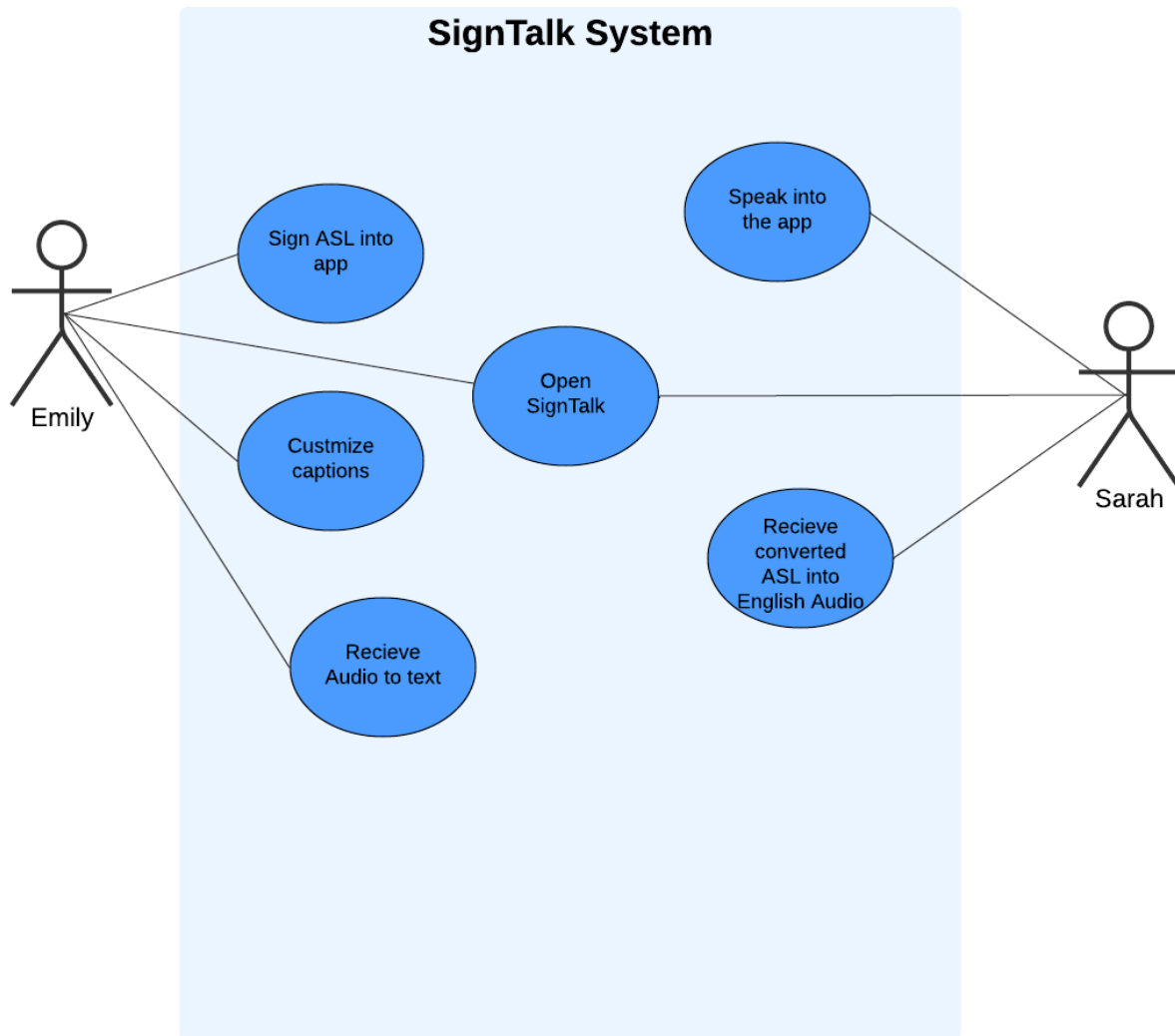
- **Jason:**
 - Jason is hearing (non-deaf) and has partial blindness.
 - He relies on auditory input for communication but struggles with reading small text or following detailed visual cues, especially in busy or poorly lit environments.
 - Works as a manager in a retail store, responsible for overseeing a diverse team.
- **Context:**
 - Sol, a new employee who is deaf and uses sign language, works on Jason's team.
 - In the store, Jason often faces challenges when trying to visually interpret Sol's signs due to his limited vision.
 - The store environment has visual distractions, low lighting, and a fast-paced workflow, making it hard for Jason to follow detailed gestures accurately.
- **Scenario:**
 - During a morning meeting, Sol tries to ask Jason a question by signing, but Jason's partial blindness makes it difficult for him to follow her gestures in the busy setting.
 - Jason opens the SignTalk app, pointing the camera toward Sol as she continues to sign. The app translates her signs into large, clear text and audio output that Jason can easily read and hear.
 - Sol's question, "What time should I take my break today?" appears in both text and audio form on Jason's screen.
 - Jason speaks his reply, "You can take your break at 2 p.m." The app then translates his speech into sign language, which Sol sees on her phone.
 - Both Jason and Sol are able to communicate effectively throughout the day, with Jason using SignTalk to ensure he stays connected despite his visual limitations.

Use Diagram

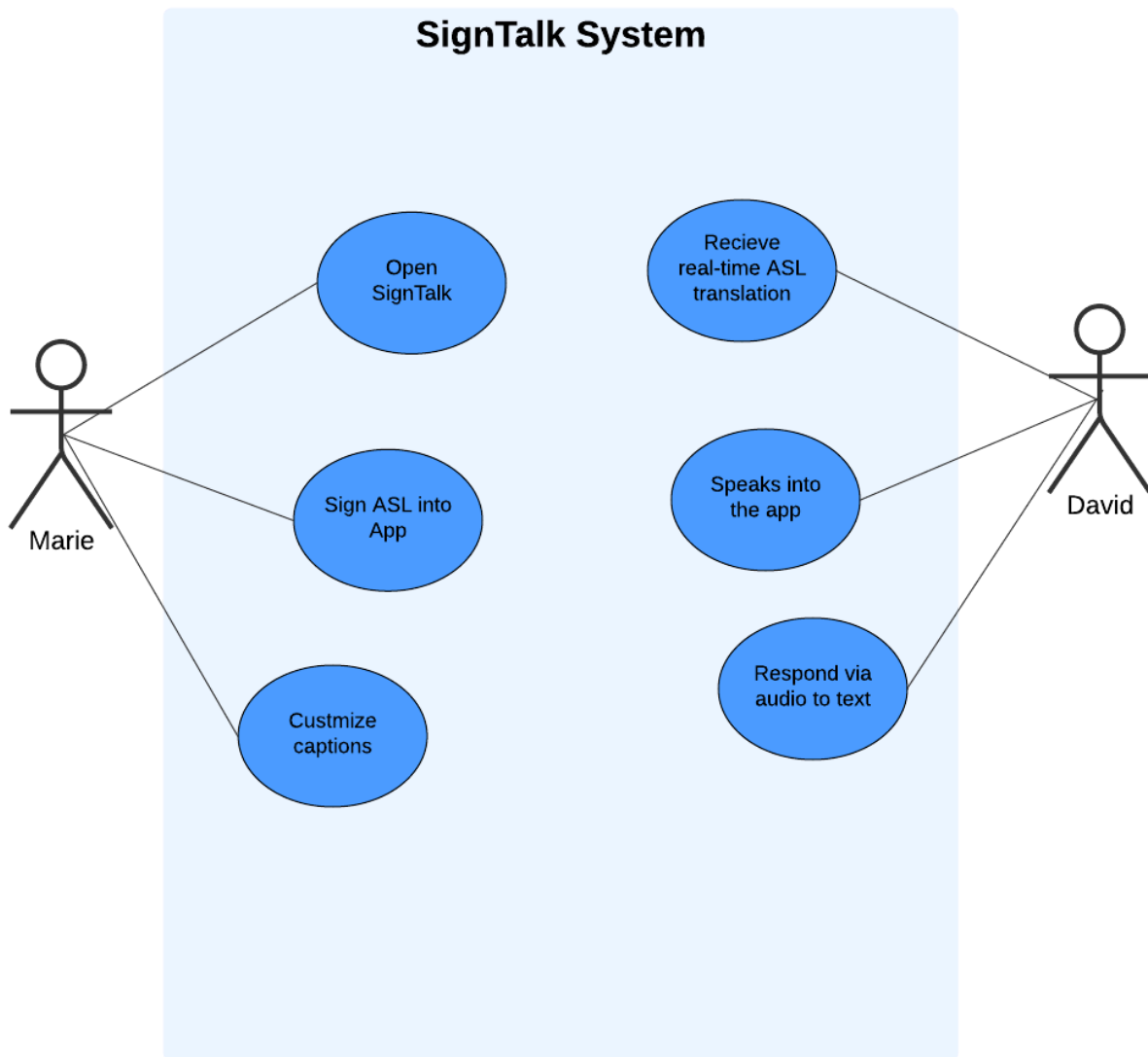
Use Case Diagram for User Profiles 1



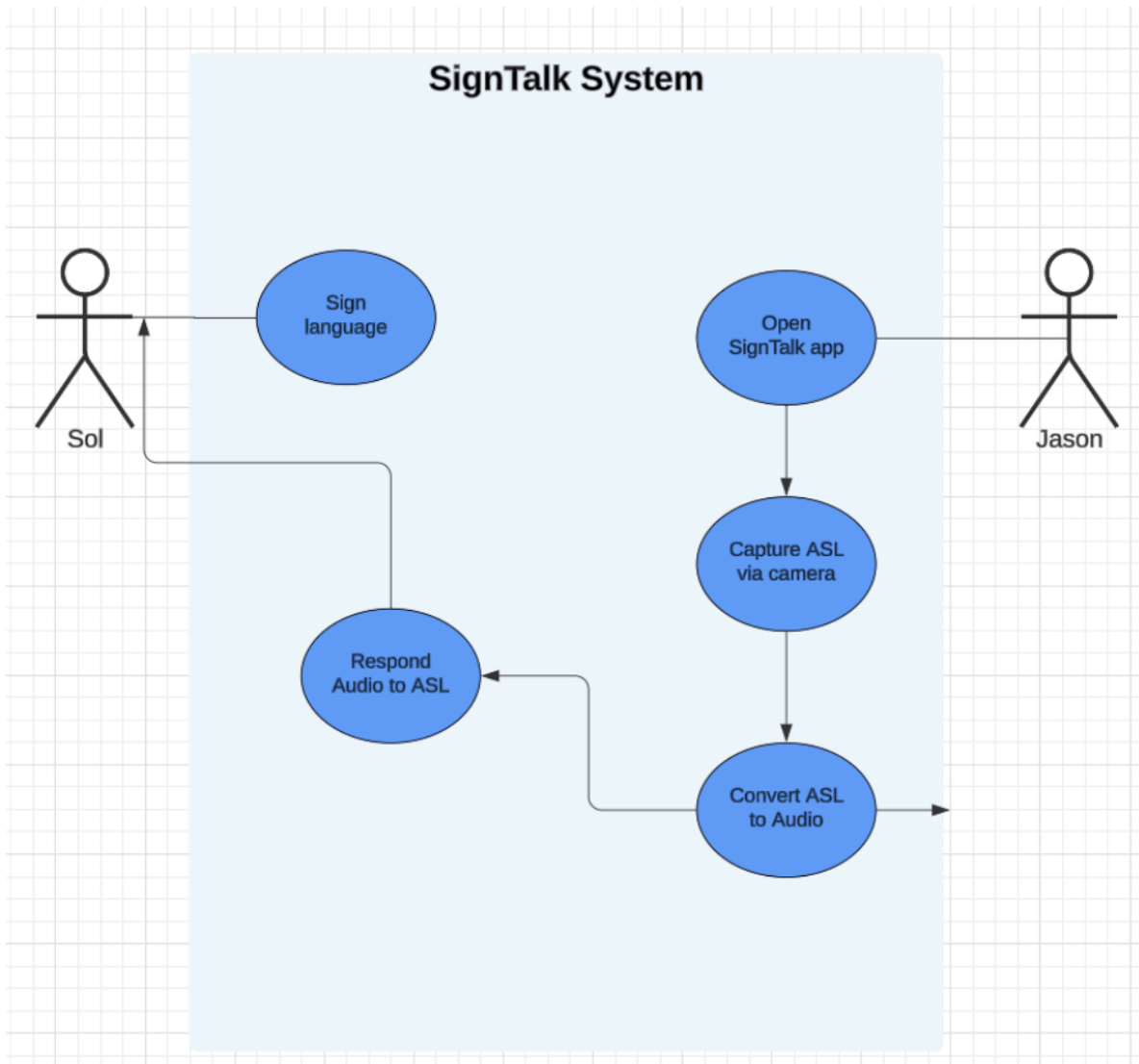
Use Case Diagram for User Profiles 2



Use Case Diagram for User Profiles



Use Case Diagram for User Profiles 4



User Profiles ([Link to Canva](#))



Dhruv

"I want communication to be seamless, with options that suit my needs without relying solely on lip-reading."

About:

Age: 25
Gender: Male
Occupation: Software Engineer
Status: Single

Personality

- Adaptable
- Empathetic
- Resourceful
- Patient
- Independent

Needs

- **Customizable Captions:** Prefers captions that can be moved and personalized for ease of reading.
- **Accessible Communication Tools:** Requires apps that allow real-time translation of sign language into text for non-signers.
- **Clear Content Structure:** Seeks content with clear headings and minimal jargon for better understanding.

Objective:

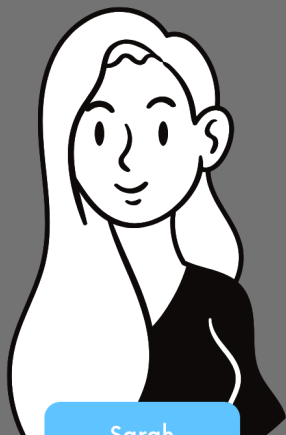
- Dhruv learned sign language as a young child and is fluent in it. He prefers written content to be clear, structured, and easy to read.
- Dhruv can lip-read but finds it unsustainable in extended conversations, so he seeks tools that provide customizable captions to improve his accessibility to information.

Frustrations:

- **Lip-Reading Limitations:** Lip-reading is only effective for short periods and requires seeing the full face, which is not always possible.
- **Limited Communication Options:** Conversations with non-signers are challenging without effective bridging tools.
- **Inconsistent Captioning Support:** Many platforms lack the flexibility for caption customization, hindering his accessibility.

Current Feelings

Hopeful, Empowered, Seeking Inclusion



Sarah

"I want to ensure every customer feels valued and understood, even if we don't speak the same language"

About:

Age: 30
Gender: Female
Occupation: Customer Service Representative
Status: Single

Personality

- Empathetic
- Patient
- Adaptable
- Friendly
- Dedicated

Needs

- **Accessible Communication Tools:** Requires a way to communicate with deaf customers in real-time without knowing sign language.
- **Easy-to-Use Technology:** Prefers apps that are simple and intuitive to use, even in busy or noisy environments.
- **Effective Customer Service Solutions:** Seeks tools that help her assist all customers equally, regardless of language or hearing ability.

Objective:


- Sarah is a Customer Service Representative in a busy department store. She values excellent customer service and is committed to making every customer feel welcome, even though she has no knowledge of sign language.
- Sarah uses SignTalk to bridge the communication gap with deaf customers, allowing her to provide a better customer experience.

Frustrations:

- **Language Barriers:** Struggles to communicate with deaf customers as she has no knowledge of sign language.
- **Noisy Environment:** Works in a crowded store where it's challenging to rely solely on verbal communication.
- **High Customer Expectations:** Feels pressured to deliver excellent service even in situations where communication is difficult.

Current Feelings

Anxious, Hopeful, Determined



Marie

"I want to fully engage in conversations without the strain and limitations of lip-reading."

About:

Age: 32
Gender: Female
Occupation: Marketing Manager
Status: Married

Personality

- Resilient
- Determined
- Empathetic
- Engaging
- Resourceful

Needs

- **Seamless Meeting Participation:** Requires tools to help her follow and contribute to dynamic, group conversations.
- **Real-time Translation Support:** Needs reliable sign-to-audio translation to ensure her ideas are understood by hearing colleagues.
- **Accessible and Inclusive Tools:** Seeks technology that allows her to communicate without relying solely on lip-reading.

Objective:


- Marie is deaf and fluent in sign language. Although she can lip-read, she finds it exhausting and often inaccurate in extended conversations. Lip-reading requires a clear view of the speaker's face, which is challenging in group settings or poorly lit environments.
- Marie uses SignTalk in meetings to aid her communication and ensure she can participate fully in discussions

Frustrations:

- **Lip-Reading Limitations:** Struggles to keep up with conversations when speakers' faces aren't always visible.
- **Environmental Challenges:** Poor lighting and seating arrangements make lip-reading difficult in group meetings.
- **Feeling Left Out in Dynamic Discussions:** Finds it hard to participate when conversation shifts quickly or involves multiple people.

Current Feelings

Hopeful, Determined, Eager for Inclusivity



Jason

"I want to communicate effectively with my team, regardless of visual or hearing barriers."

About:

Age: 45
Gender: Male
Occupation: Retail Store Manager
Status: Married

Personality

- Responsible
- Inclusive
- Patient
- Supportive
- Detail-Oriented

Needs

- **Accessible Communication Support:** Requires an app that provides clear, large text and audio output for communication with deaf employees.
- **Efficient Real-Time Translation:** Needs reliable, fast translation tools to communicate with team members in a fast-paced environment.
- **Easy-to-Read Interface:** Prefers large, high-contrast text for readability due to his partial blindness.

Objective:

- Jason is a retail store manager with partial blindness. He relies heavily on auditory input for communication, but struggles with reading small text and following detailed visual cues, especially in busy or low-light environments.
- Jason manages a diverse team, including Sol, a deaf employee who uses sign language. He uses the SignTalk app to bridge the communication gap, allowing him to support his team effectively despite his visual limitations.

Frustrations:

- **Visual Challenges in Busy Environments:** Struggles to interpret sign language accurately in the store's low-light and visually distracting setting.
- **Limited Accessibility Options:** Finds it difficult to use tools or apps that don't accommodate his visual needs.
- **Fast-Paced Workflow:** Needs quick, accessible solutions to keep up with his team in a busy retail environment

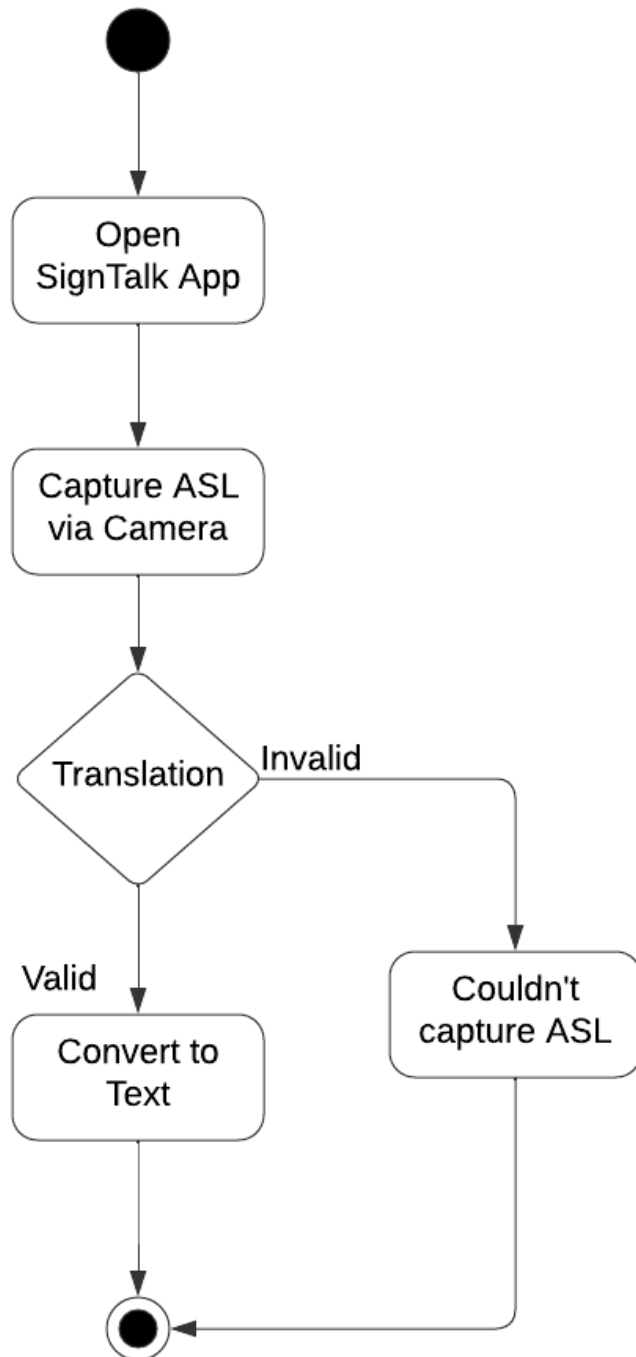
Current Feelings

Determined, Supportive, Concerned about Accessibility

Technology and User testing

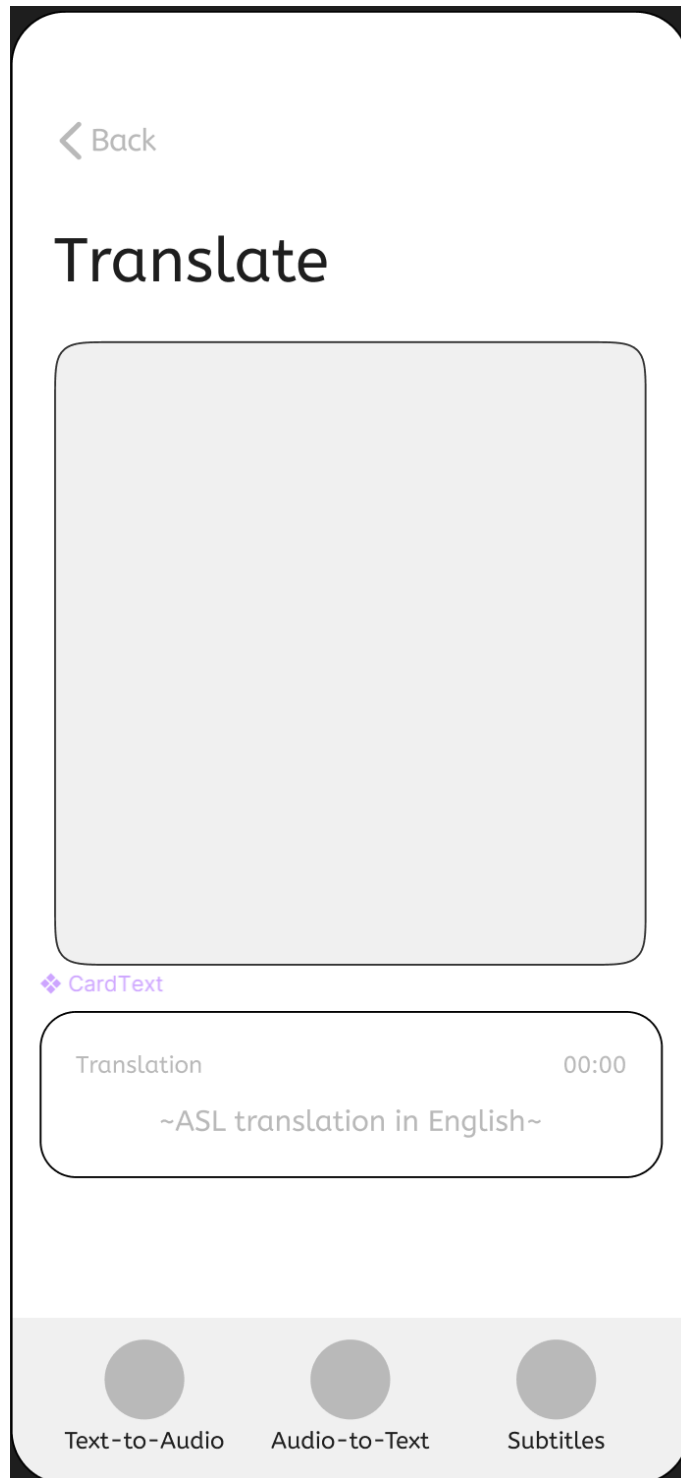
We are still discussing about the Technology, we are going to use, but we are going to use pytorch, tensorflow, Swift, AL and ML

First Level Activity Diagram



Wireframes

Main Translation

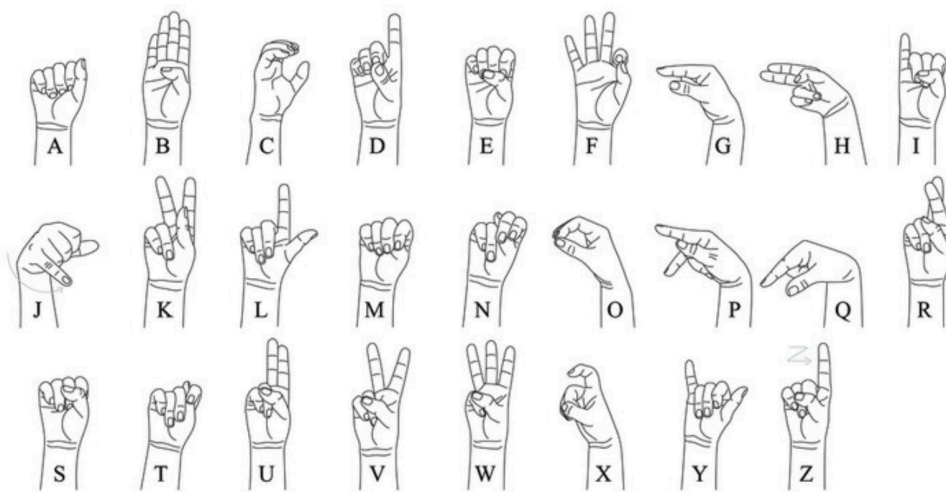


Saving A Conversation



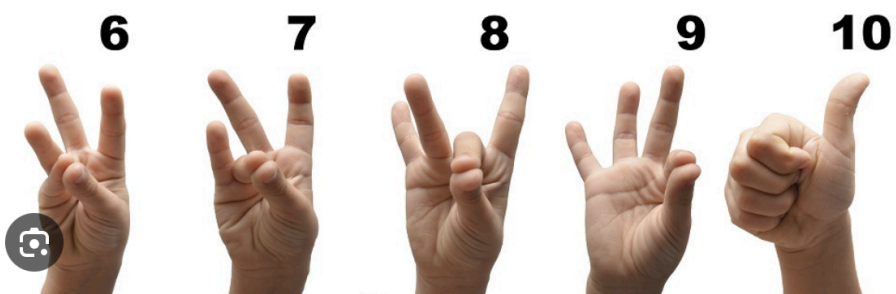
First Level Testing Static ASL

Alphabet



Ignore Z, J for now

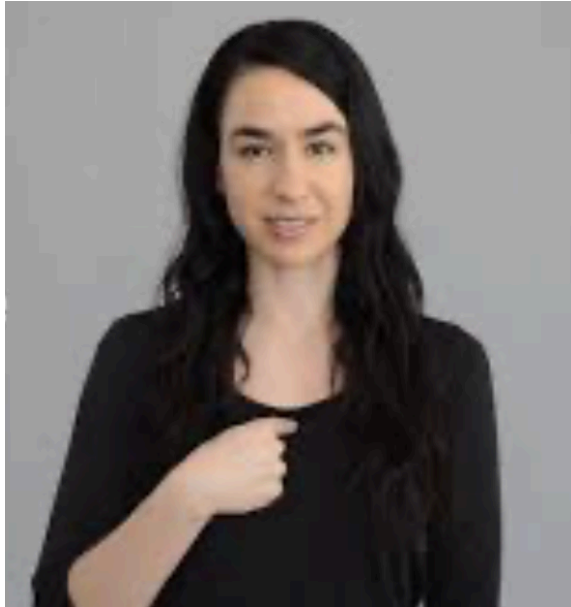
Number



I love you



Me



You



Conclusion

SignTalk represents a significant step forward in promoting inclusivity and reducing communication barriers for the Deaf and Hard of Hearing (HoH) communities. By providing a real-time translation tool for American Sign Language (ASL), SignTalk enables smoother, more natural interactions between Deaf or HoH individuals and those who do not know ASL. This fosters greater understanding, empowers Deaf individuals to participate fully in diverse settings, and helps bridge the longstanding gap in

accessibility. SignTalk not only enhances communication but also contributes to a more inclusive and empathetic society where language differences do not limit connection and collaboration.

Looking ahead, future enhancements to SignTalk will focus on expanding its ASL database, enabling support for more complex and nuanced signs to improve translation accuracy. Advances in machine learning and computer vision will also be leveraged to continually refine recognition capabilities, adapting to individual signing styles and regional ASL variations. Additionally, integrating interactive educational features will help users learn ASL, further bridging the gap between the Deaf and hearing communities. Through these improvements, SignTalk aims to set a new standard in inclusive technology, empowering individuals and enriching communication for all.

Reference

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