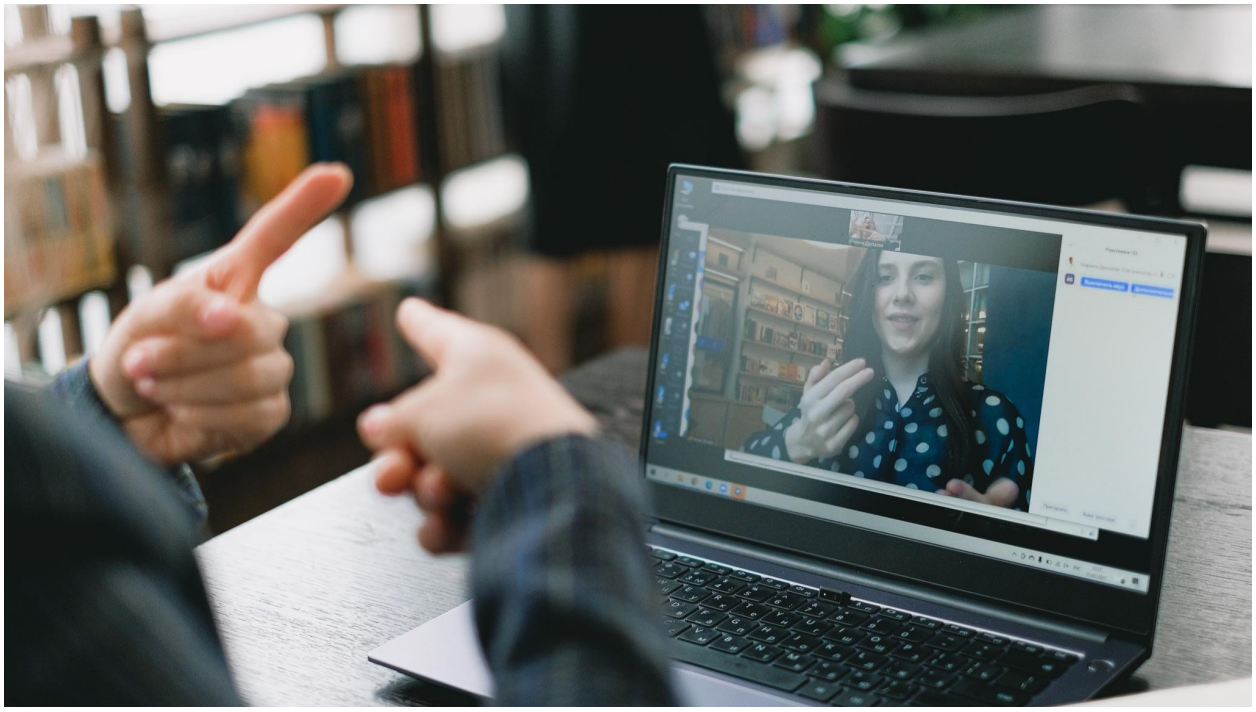


Project Plan HCI & IV 2022

< Learning Platform for Sign Language >

Team 31: Nayoung Jung & Yvo Hu

Theme D New Interaction

1. Research question and motivation

How can leap motion be used to enhance the learning experience for sign language?

People can learn new languages through various methods, such as taking a course, conversing with native speakers and using applications. However, there are not enough ways to learn sign language. We hope that this application will be able to become an easy-to-use and engaging mediator between users with auditory impairment and general users to overcome the communication boundary.

2. Description of interface design

There will be a set of onboarding screens explaining the goal of the product and the layout of the interface, and this can be skipped for experienced users.

The project will focus on teaching American Sign Language to English users.

The project requires relevant visual guidance for users. Considering this matter, the platform will not be text-heavy nor heavily dependent on visuals. Phrases to motivate users and explanations about the teaching materials will be included.

Since this project is built upon a concept of newness and creativity, the primary colours of the interface will be a pastel tone of blue-purple (#7D83FF) and a light turquoise (#2EC4B6). In relation to this colour scheme, there will be an illustration focusing on hand gestures. In this platform, we will not include the entire image of the body or facial expressions although those are part of sign language due to the limited amount of time for this project. The icons of the interface will cover a wide range of entities- from categories of the learning materials and system controls (next, close, setting, etc). Also, to make the interface more aesthetically pleasing, there will be a good use of curved edges for assets or buttons. Also, the colour contrast between the foreground and the background will enable the user to properly distinguish between features.

The design will feature an interactive menu for selecting the desired category that the user would like to learn. This category is then subdivided into subcategories or levels (this may be sorted by difficulty).

The main structure of the interface would be the same- the sign language to learn, the input of the user and supportive graphic elements. Overall, by having different themes to learn, users will be able to learn new sign language. According to the toolkit 'Design with Intent'[1], users tend to complete the given format ('partial completion' from Interaction Lens) and keep making progress by collecting assets on the interface ('collections' from Ludic Lens).In addition to this, we may implement a feature that gradually unlocks more themes and levels as the user progresses in the application. Based on this information, we decided that the interface will display an overview of different themes leading users to feel more challenged and incentivising them to keep taking the courses.

[1] Lockton, D. (2010). *Design with intent: 101 patterns for influencing behaviour through design*. Dan Lockton.

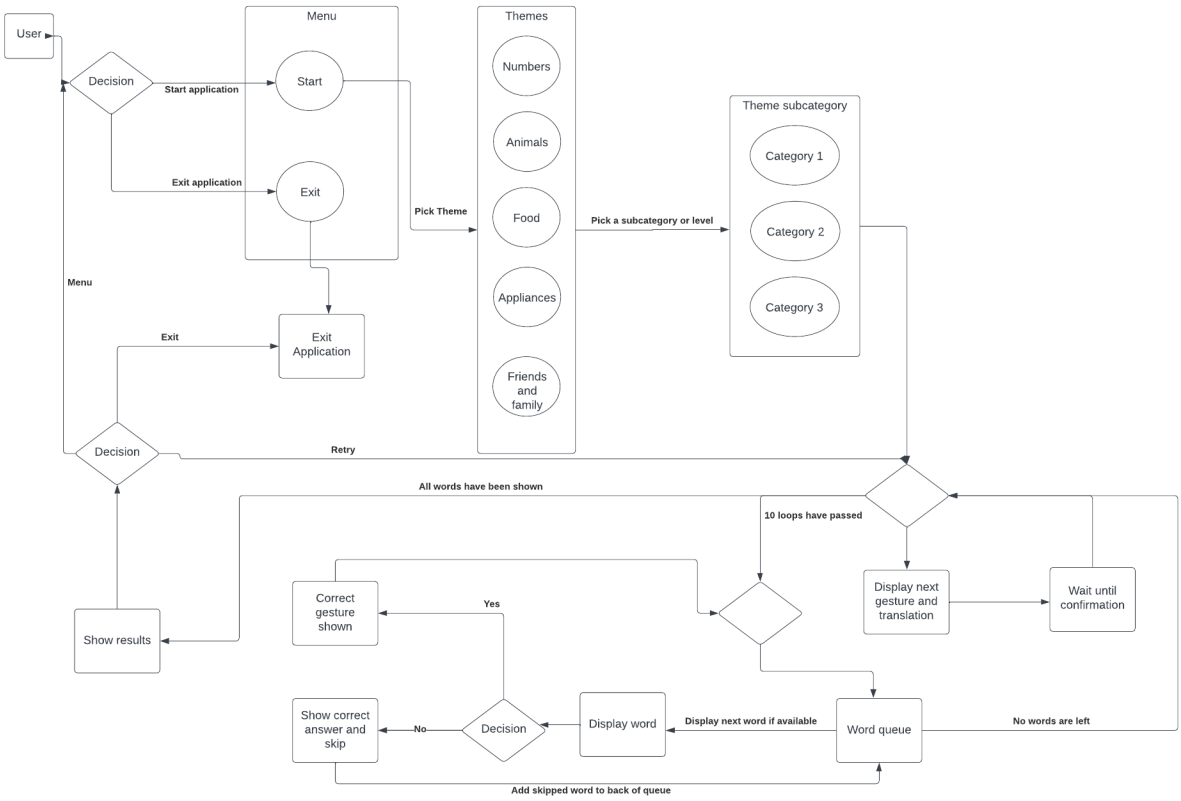
3. Low-profile functional design

The general structure of the interface is based on a selection of sign language learning materials in a series of interactive classes. During the lesson, the interface will display sign languages that users need to learn and the user's gestural input is recorded from the leap motion device. After the system analyses the user input, the interface will show whether it is correct or not and move on to the next chapter. Within this interactive and immersive learning experience, the users will be able to immediately get feedback on their gestures without the need for a teacher.

Users can use either their mouse or a hand gesture to interact with the interface. In other words, if a user wants to choose a level, then they would be able to by simply clicking it with a mouse, or performing a specific hand gesture like moving to that specific section with a whole hand or finger, and applying some sort of finalising gesture like closing the hand.

A concept diagram has been provided down below.
The prototype diagram shows different interactions that a user may have with the application. It starts the moment the application is opened. The user will then be shown a start menu in which options like start or exit are shown. If the user decides to start the application, then they will be shown a prompt with a list of available themes that the user may be interested in, this may then be subdivided into subcategories. Once a specific theme and subcategory are chosen, the user will then immediately start playing. A potential feature that is currently omitted in this diagram may be the option to choose a specific game mode, but the current prototype has been defined as the following: The user will be shown a streak of 10 (number may vary) gestures and their corresponding translations one after the other. After this sequence, the user will be shown a random example out of the previously shown words. The user can try to complement the word with the corresponding gesture, or the user can skip the gesture altogether (in which case it will be shown again later). After each iteration, the next word in the list will be shown until there are no words left in the list.

The user may be shown a subsequent 10 gestures and their translations (depending on whether there are still unseen words left) or will be redirected to the results page. In which case you can view your results. A few metrics may include the number of errors that you've made, how long it took you on average to complete each gesture or the total time that you've spent on the application. The user will also immediately be able to choose the next course of action (retry, menu, exit).



4. User group aimed at

People with auditory impairment, caretakers and people who are interested in learning sign languages.

Among all the possible user groups, we narrowed the age of our target group to people in their 10s-40s. These people are capable of understanding the concept of sign language and the chosen device for this project. Furthermore, the participant recruitment process for the usability testing phase limits the number of options that we can have and has to be taken into account when figuring out which user group we're aiming at to ensure a smooth recruitment and testing process.

5. Innovations aimed at

There currently exist several gesture recognition applications for the leap motion but we have not found any that offer any interactive educational capabilities. We, therefore, try to address this issue by making an application which enables the user to interactively learn sign language in real-time.

Whilst looking into other existing solutions with regard to a learning platform for sign language, we noticed that most interfaces do not have sufficient engagement factors to motivate users during the educational processes to stimulate them to keep learning. Most interactions only include the use of a video about the gesture, and the option to skip the video when the user feels confident in their performance. Based on this, we thought of including elements of gamification into our interface like providing instant feedback to enhance the learning experience of users and increase overall satisfaction.

6. Usability specification

To test the usability of our proposed solution, we can compare a couple of metrics from our own solution against video-based learning. A few of the metrics that we could be interested in are learnability, efficiency, flexibility, and satisfaction. This basically boils down to whether we can implement an effective, quick-to-learn, easy-to-use and remember, and overall fun and engaging interface to help with learning sign language.

The usability of the project will be assessed during the two times of user testing sessions.

Usability specification table

Task	Issue	Measured	Current	Worst	Planned	Best
Installation	Benchmark #1	Time until successful installation		30 min	10 min	5 min
Initial performance	Launch game	Time until the launch of a valid game			30s	30s
Learnability	Error rate	Average amount of errors per word		5	1	0
Throughput	Completion of a gesture	Average amount of time spent per gesture		10s	5s	2s
Initial impression	Questionnaire	Average score [1-5]		1	4	5
Long-term satisfaction	Questionnaire	Average score [1-5]		1	4	5

7. Detailed timetable

- Phase 0: Preparation
- Phase 1: Sprint 1

- Phase 2: Sprint 2
- Phase 3: Wrapping up

***** The weekly activity starts every Thursday.

Phase	Date	Activities	(Expected) Outcomes
0	Oct 17 - Oct 20	Edit Project Plan (if required)	Revised Project plan
1	Oct 20 - Oct 26	User analysis / Task analysis / Usability specification	
	Oct 27 - Nov 2	The concept interface design / Lo-fi	
	Nov 3 - Nov 9	Wireframes	Design Document
	Nov 10 - Nov 16	Develop the first prototype (MVP)	
	Nov 17 - Nov 23	Conduct user testing	User Evaluation 01
2	Nov 24 - Nov 30	Analyse the results / Plan or conduct additional research for the revised version	
	Dec 1 - Dec 7	Re-develop the prototype	
	Dec 8 - Dec 14	Conduct user testing & Analyse the results	User Evaluation 02
3	Dec 15 - Dec 21		Concept Paper
	Dec 22, 2022 - Jan 4, 2023	Finish & submit the final paper	Final Paper
	Until Jan 5, 2023	Finish & submit the final prototype	Final Prototype