



Deliverable E: Project Progress Presentation

Group 3: Accessible Digital Drawing

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Key components of project deliverables to date

Deliverable A

Team Contract

- **Team Leadership:** Informal
 - As a group of 5, we can realistically come to any solution democratically and remain on schedule.
- **Communication:** Through Discord
 - Voice, Video, text chat, file sharing, and notification all in one software.
- **Meetings:** Weekly
 - Notes taken
 - Member progress tracked in MS Project
 - Meeting agenda focused by Eleanor
- **Submissions:** Weekly
 - Callum responsible for weekly submissions on Thursday evenings



Contract Success

- Still Together
- Still Kicking
- Still Going Strong
- Still Supporting Each Other Through any Difficulties

Deliverable A

Client Summary: Madison Ward

Madii is an artist and student. They are non-binary and study Fine Arts at the University of Ottawa with the hopes of becoming a registered Art Therapist.

Their art is surrealist, and they use a variety of media. They describe their art as an “escape” and want to “invoke a reaction” from viewers. Much of their works has themes of struggling with mental health.



www.madiiwardcollective.ca

Deliverable A

Client Summary: Madison Ward

Madison has a fluctuating disability called **Conversion Disorder** or **Functional Neurological Disorder**.

The effects are vast and ever-changing. One day, Madii could be completely fine and the next, unable to move or talk. Anything can trigger these changes, from stress to the colour red.



Deliverable A



What is our Project?

Project Name: Accessible Digital Drawings

Madii has struggled with bringing their art to the digital medium. Photoshop is too confusing, contains too many triggering features, and cannot be used every day.

Madii wants to have access to a digital art platform that is simple, accessible, and inspiring. They never want to feel like their disability is a block in their creative process, no matter the medium.

The project is designed to help Madii complete and sell their art in a digital landscape.

Deliverable B



Client Needs

#	Need Statement	Priority 1 (low) to 5 (high)
1	The software interface has a more comprehensible tool ribbon	4
2	The software has a method for easily repeatable functions	3
3	The software interface has large icons that are easy to find and distinguish from others	4
4	The software interface has minimal options shown	3
5	The system is able to recall and display previously and commonly used commands	2
6	The system is able to quickly copy and paste	2
7	The system can smoothen lines that are drawn shakily	4
8	The software interface allows selection between different line weights and patterns	5

Deliverable B



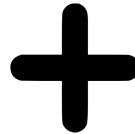
Client Needs

9	The system can be operated using voice commands	4
10	The system can be operated using a keyboard or buttons	5
11	The software interface does not have any red colors	5
12	The system allows the user to choose different colors without using the typical color-picker	4
13	The system inspires the user to create art despite any daily struggles with their disability	5
14	The software interface does not have any flickering or fast popup animations	4
15	The software is compatible with the client's drawing tablet and a normal mouse and keyboard	3

Deliverable B

Problem Statement

Photoshop has a cluttered and unfriendly interface that is especially challenging for our client, Madison, who has a fluctuating disability that occasionally affects their physical and neurological ability. An ideal solution would allow the Madison to continue to use Photoshop or other digital drawing tools, but provide additional functionality that would simplify the interface and allow multiple options for input, including voice, drawing tablet, and/or keyboard input.



Deliverable B



Target Specifications

Metric	Units	Ideal	Acceptable
UX as empathetic with client	Personal ranking	5	4-5
Number of repeatable functions	Positive integer (count)	100	20-100
Icon size	px or cm (on-screen)	50px/ 2.5cm	35-100px/ 1.4-3.0cm
Customizability	Personal ranking	5	3-5
Number of commands recorded	Positive integer (count)	100	50-100
Assistive features	Personal ranking	5	5
Prevalence of red	% on startup	0%	<10%
Presence of fast pop-ups	Yes/No	No	No
Hardware Integrability	Personal Ranking	5	4-5

Deliverable B



Benchmarking

Metric	Photoshop	Yanko keyboard	Procreate	GAVPI	Windows voice control
UX as empathetic with client	2	1	5	2	2
Number of repeatable functions	>1000	29	>100	N/A	N/A
Icon size	25px	1.4cm	>1cm	N/A	N/A
Customizability	2	1	1	5	2
Number of commands recorded	0	0	1	Infinite	20
Assistive features	2	N/A	1-2	5	4
Prevalence of red	>10%	0%	0%	>10%	0%
Presence of fast pop-ups	No	No	Yes	No	No
Hardware Integrability	5	5	3	4	4

Deliverable C

Concept Generation

	1	2	3
Austin	An external custom keyboard that allows for rebinding of keys and hotkey functions for photoshop	Tool integrated into wacom tablet that allows for easy switching between tools, rapid copy pasting capabilities	New UI that allows for simplifying down the menus in photoshop
Ben	A more accessible UI over Procreate to allow user to work under many circumstances	An ergonomic pen for the wacom tablet , allowing user to hold pen more comfortably	A plug-and-play accessible keyboard that comes with accessible design software
Callum	A voice input program that will select small icons and help navigate challenging menus	A new UI to place over Photoshop, simplifying the UI	A series of easy-to-access quick “help” videos to walk clients through the complexity of photoshop, built in.
Ellie	A toolbar UI that can be used with Photoshop (or other tools) with basic commands that can be activated by mouse, keyboard, or voice	A UI that focuses specifically on aspects of the Photoshop UI that the client felt overwhelmed by - e.g. color picker, brush size	A tool integrated into the Wacom tablet that uses gesture commands for tools such as fast copy/paste, line smoothing
Matt	A voice command system that makes it sufficient to complete simple drawing processes for any possible art concepts.	A simplistic UI that will be designed to make navigation easier while using Photoshop	A modification to the Wacom tablet that stores the most common drawing patterns read by the tablet.

Deliverable C

Decision Matrix

Each idea was evaluated against each of the Target Specification metrics.

Ideas that meet the ideal metric value are shown in yellow.

	Concept	Metric								
		1	2	3	4	5	6	7	8	9
Austin	1	3	100	1.4cm	5	100	3	0%	No	5
	2	4	>10	N/A	4	N/A	2	0%	No	5
	3	5	N/A	50px	3	N/A	4	0%	No	N/A
Ben	1	4	100	50px	2	1	4	0%	No	N/A
	2	3	N/A	N/A	5	>10	3	0%	No	4
	3	5	100	50px	4	100	5	0%	No	5
Callum	1	3	N/A	N/A	3	100	4	0%	No	3
	2	5	N/A	50px	4	N/A	4	0%	No	5
	3	2	N/A	N/A	1	N/A	3	<10%	No	N/A
Ellie	1	5	100	50px	5	100	5	0%	No	5
	2	5	50	50px	4	100	4	0%	No	N/A
	3	4	20	N/A	2	10	4	0%	No	5
Matt	1	5	20	N/A	3	20	4	0%	No	4
	2	4	N/A	50px	4	N/A	4	0%	No	5
	3	5	10	N/A	5	10	4	0%	No	5



Selected concept features

Simplification of Photoshop UI

- Larger icons, hiding unnecessary tools
- Improvements to the brush selection tool and color picker.
- Voice activation

Integration with Wacom tablet

- Allows the client to maintain their current work environment
- Use as a mouse
- Explore functions with buttons and pen

Command and gesture history and repetition

- Functionality to recreate frequently used processes
- Voice activation



Selected concept features

Help system

- Help build the client's confidence with Photoshop's tools alongside the solution

Tactile buttons

- Easier to manipulate than a cursor on the screen
- Large and easy to see

Line smoothing

- Assists client when hands are shaky

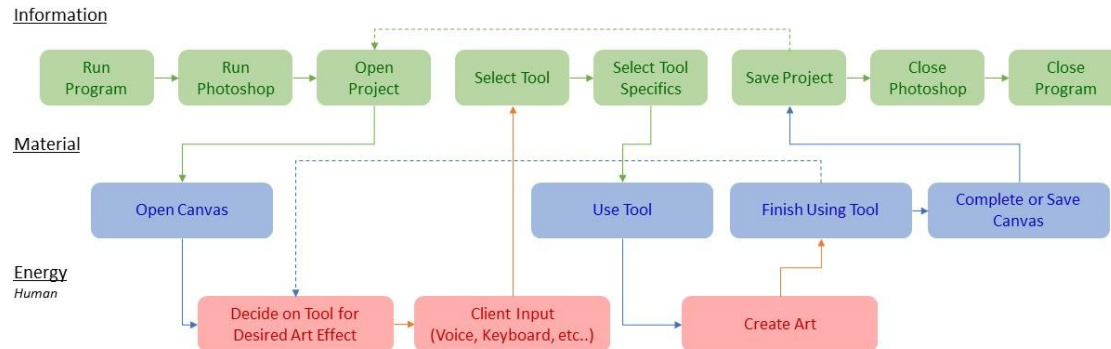
Deliverable C

Functional Decomposition

Core Functional Decomposition



Detailed Functional Decomposition

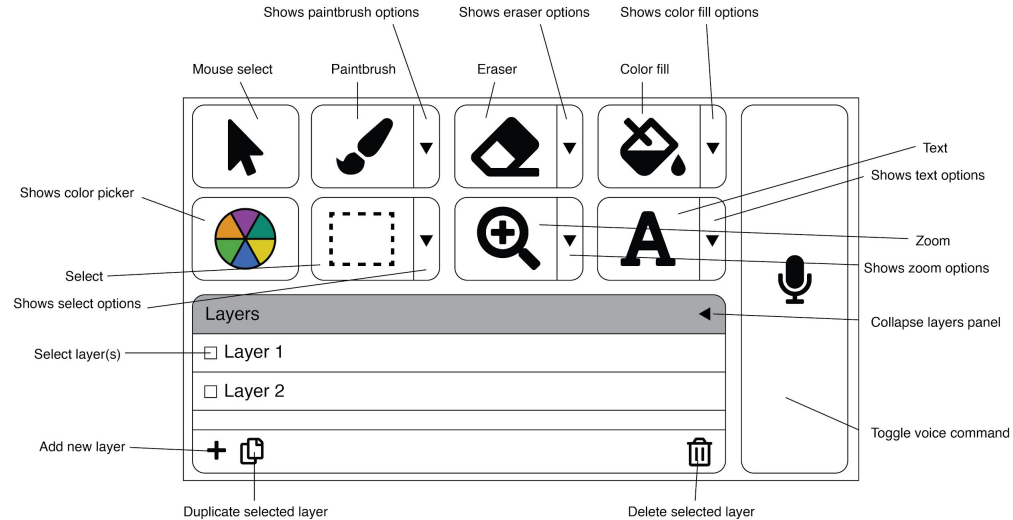


Deliverable C

Final concept

Solution: auxiliary interface that runs as a desktop application concurrently to Photoshop.

- Controlled by voice, mouse, Wacom tablet (as mouse), or keyboard
- Large icons, simple menu navigation, color picking, and brush selection
- Record of command history that can be repeated.





Feasibility: Uncertainties and risks

Experience coding desktop applications

- Only Eleanor has any experience building applications from scratch.
- Eleanor uses MacOS, while the client and teammates use Windows.

Voice commands

- Notoriously difficult to implement and unreliable
- Have to use an open-source library

Keyboard mapping

- Keyboard shortcut mapping is limited by the features that have that already built into Photoshop
- Only Austin has direct experience with custom key-mapping and keyboard design from scratch.

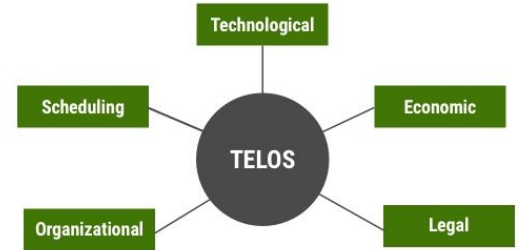
Feasibility: TELOS factors

Technical: Experience and Resources

- Eleanor has experience coding software applications and user interfaces.
- Austin has experience building custom keyboards
- Open-source resources available online (e.g. GitHub repositories)

Economic: Cost Analysis

- All software used in this project is free and open source, decreasing total cost
- A possible economic strategy would be to market towards other disabled artists
- Only cost incurred is the keyboard construction



Feasibility: TELOS factors

Legal: Applicable Laws

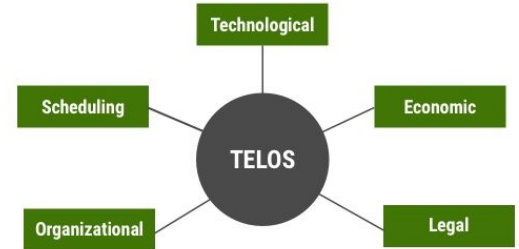
- Section 17 of the Adobe Legal code prohibits reverse engineering or modifying or
 - Does not prohibit the use of a new UI on top of Photoshop
- Open-source is free to use on any product created on a personal scale.

Operational: Organizable Constraints and Other Factors

- Other coursework and commitments
- Limited to remote collaboration within group and with client due to COVID-19

Schedule: Deadlines and Reasonability

- Keeping a detailed Gantt chart created in MS project available for group members keeps everyone on track and ensures reasonability.



Deliverable D



Low-Fidelity Prototype Overview

Custom Keyboard

- Unsure if the client would be responsive to hardware due to clutter-space
- Need a yes or no on keyboard and keyboard layout design so that we can order parts right away!

User Interface

- Will use keyboard shortcuts to control photoshop underneath
- Simpler, cleaner, but just as powerful
- Contains a new colour picker that avoids the “colour cloud” for colour picking and avoids red

Voice Control

- Uses GAVPI to link voice to keyboard shortcuts.
- A workable prototype has been built already!

Deliverable D

Prototype Keyboard Layouts

- 20 common tools were picked based on Callum's use of Photoshop
- What needs to be decided early is keyboard size so an accurate bill of materials can be made

2x5

Previous Brush	Next Brush	Colour Menu	Move	Select
Brush	Pencil	Bucket	Eraser	Text

4x5

Zoom Out	Zoom In	Text	Lasso	Quick Select
Bucket	Eraser	Gradient	Move	Select
Brush	Pencil	Colour Menu	Up	Open Menu
Previous Brush	Next Brush	Left	Down	Right

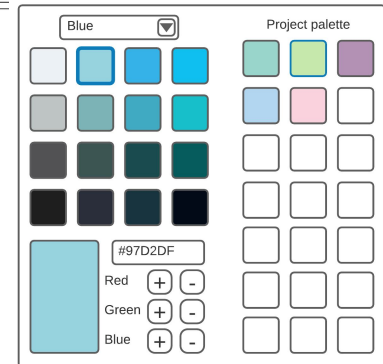
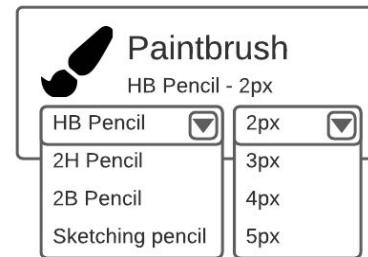
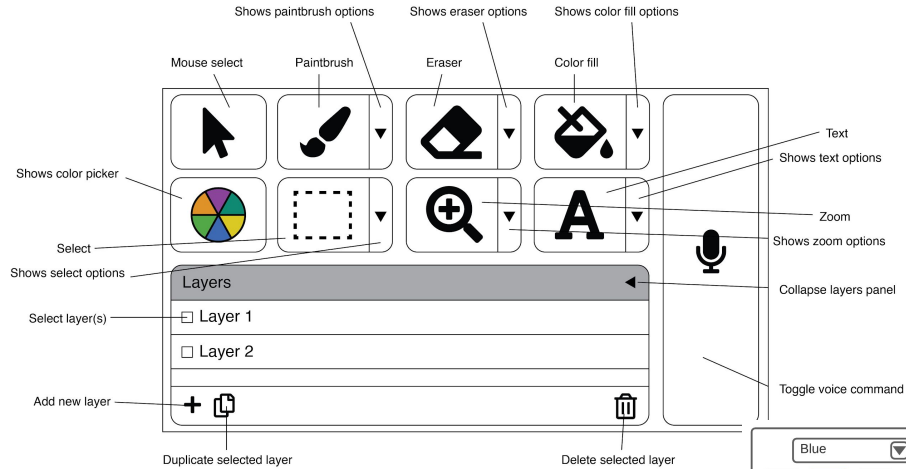
3x5

Previous Brush	Next Brush	Open Menu	Zoom Out	Zoom In
Brush	Pencil	Text	Move	Select
Bucket	Eraser	Colour Menu	Lasso	Quick Select

Deliverable D

Prototype: User Interface

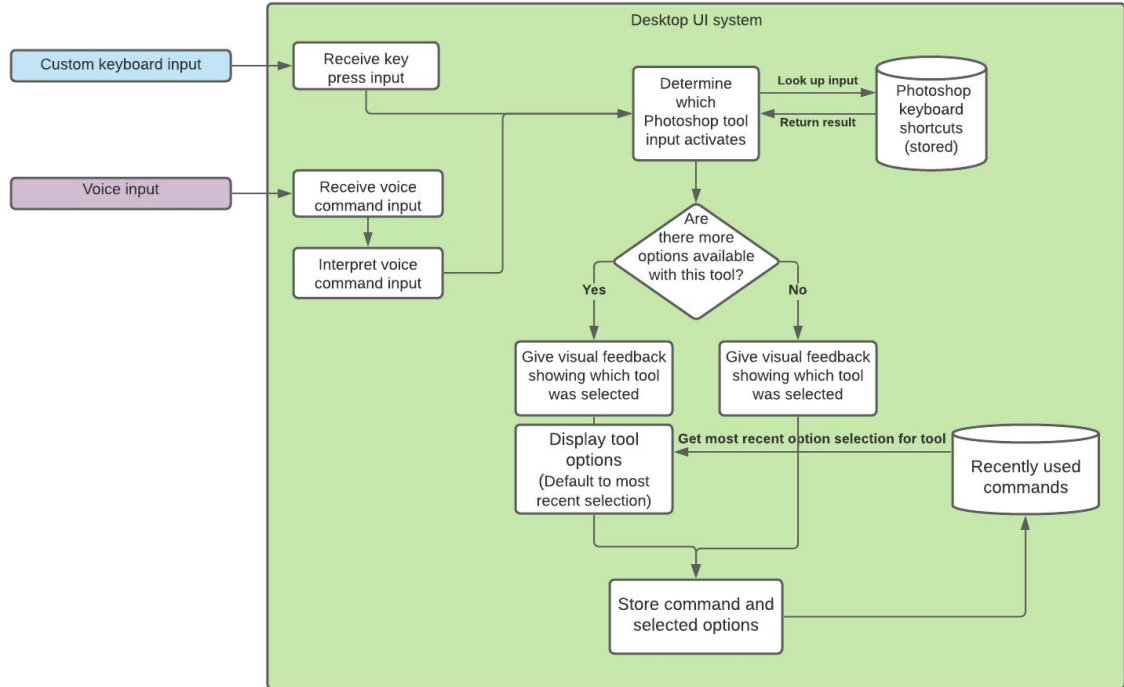
- Avoid a “colour cloud”
 - Client has difficulty differentiating color
- Avoid the colour red
- Make the tool selections larger
- Simplify as much as possible



Deliverable D

Prototype: User Interface

Integration with keyboard and
voice input



Deliverable D

Prototype: Voice Control

A series of coded keyboard combinations that are linked to voice through an open-source free program called GAVPI.



Examples of common Photoshop pathways

Photoshop Feature	Voice Commands	Keyboard Shortcut Pathway
Open New File	"New File"	CTRL+n
Increase Paint Brush Size	"Brush", "Increase Size"	b,]
Duplicate Layer	"Access Layer", "Go Down", "Enter"	Alt, right x4, down, down, enter
Write a common word (like "Cat")	"Text", "Left Click", "Type Capital C", "Type a", "Type t", "Enter"	t, left click, Shift down, c, Shift up, a, t, enter
Zoom to full screen canvas	"Toggle toolbars", "fit to screen"	Alt, CTRL+0

Client feedback (Meeting #2)

Client Meeting 2



Voice Control and User Interface

- Voice control option that can help call upon shortcuts
- Voice control needs a toggle option to prevent it from always listening
- Simplification of photoshop's interface with a new UI (toolbar)

Client feedback

- Interested in the voice activation software
- Would like a smoother interface, better colour picker, and a better brush selector

Client Meeting 2



Custom keyboard

- Tactile keyboard with shortcuts

Client Feedback

- Make sure keyboard isn't heavy (> 10 lbs)
- Normal keyboard key size is okay
- Larger icons on keyboard, but not so large that they can't be distinguished from each other

Client Meeting 2



Ergonomic pen

- An improved pen for the Wacom tablet to reduce hand discomfort

Client feedback

- Would not necessarily be helpful
- Would not be doing art if hand is in pain

Client Meeting 2



Client feedback: Other notes

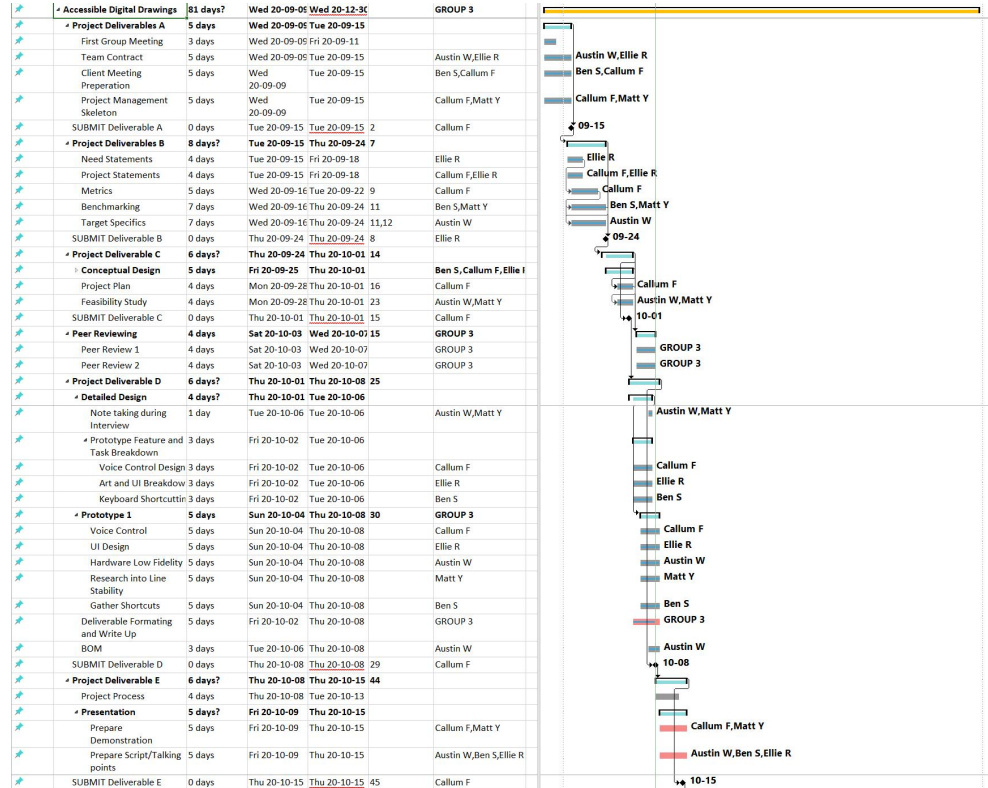
- Would like a smoother interface, better colour picker, and a better brush selector
- Fast pop-ups are usually not too much of an issue
 - The color red is a much worse trigger
 - Preferable to have smooth graphics and animations.
- It would be best if the color picker had a border between each color to tell them apart.
- It would be useful to have some feedback when a key is pressed.
 - The best colors would be off-white or a soft blue/green.

Project plan

Project plan

Project plan (initial)

- Weekly updates to the MS Project
- Breakdown by deliverables, tasks assigned to team members





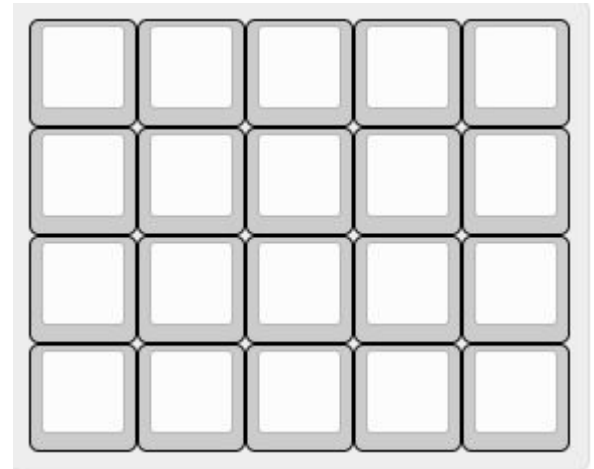
Project plan tracking

- Team has stayed on track!
- After client interview number 2, we have to keep in mind:
 - The keyboard construction time and cost
 - UI design and software construction time
 - Continued consistent communication with the client
- Finalize a team logo and product name

Plan for future prototypes

Custom keyboard

- After discussing with the client, they have requested for a 4*5 matrix size
- Keyboard PCB to be designed from scratch, allowing inexpensive, fully custom keyboard
- Custom open source firmware allows for integration with VIA, allowing on demand remapping
- Low cost and affordable, target cost is sub \$30
- Design will be open source
- Keyboard components will all be through hole, allowing for DIY



Future Prototypes

User Interface

- Use Electron to build desktop application with JavaScript
- Add notification feedback when input received from voice or keyboard
 - Ideally integrate GAVPI code (may research other voice APIs if necessary)
- Add tool options when necessary
 - Color picker redesign
 - Brush selector
- Ability to toggle voice command



Future Prototypes



Voice command

- GAVPI working prototype
 - Can call upon variety of keyboard shortcuts
- Toggle option to begin or stop listening
- Seamless integration with Photoshop and UI
 - Minimise amount of setup and configuration needed by user
- Create a detailed instruction manual that contains
 - An overview of the technicalities of the voice command system
 - A list form of all possible commands
 - A detailed instruction manual if the client wants to add their own commands