GNG2101

Design Project Progress Update

The Communication Crew B 1.4

Submitted by:

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Introduction

The purpose of this document is to quantify the beginning stages of planning for the communications array. It will be divided into several parts to more easily organise the information. For all acronyms, please refer to the table above the introduction section. Section 2 will entail sustainability report (2.1) and DFX sections (2.2). The sustainability report outlines the project's triple bottom line, while the DFX lists the 5 highest priorities for design to keep in mind while making the C.A.. Section 3 details a more indepth look at the main missions for the C.A. and the primary methods to accomplish them. The scope of activities mentioned in this document are relatively preliminary. The goal is to lay a solid foundation rather than having our hands full with unnecessary complications that will have to wait until further along in the process.

Table 1. Acronyms

Acronym	Definition
C.A.	Communications Array
CAD	Computer-Aided Design
BOM	Bill Of Materials
DFX	Design for Excellence

Sustainability report

Triple Bottom Line	Positive Impact	Negative Impact
Economic	**Charity:** This product is funded by the university to help a disabled client, who cannot afford an expensive product contracted from a company for their needs. **For Individual Client:** the product will not need to spend money on other business practices such as marketing, and support. **Little expenses:** This product does not waste money on indirect expenses such as marketing and doesn't need to pay business taxes.	**Non-profit:** this product is done on a very small budget and done by students. This product is not intended for long-term business. **Only for one client:** This product will not be mass-produced and sold to help other disabled clients. **No Support:** without any incentive/business to support the project for the long term, the student team when it disbands will not be able to support the client regarding the project in the future.
Environmental	**Negligible waste:** As this product is for one client, at a large scale this product doesn't have to worry about emissions or large amounts of wasted material. **Pre-existing tools:** This product is produced from pre-existing	**Energy source:** This product runs on replaceable batteries, which have toxic chemicals and use metals. It becomes landfill waste when depleted. **Life-span:** This product has a life-span, and when it fails to function, may become

	university machinery, which is sustainable because many students can use it. This means no resources will be spent on new machinery for personal use. (producing machines has a negative environmental impact)	unrepairable (due to no provided support from the students), and thus waste. **Part usage**: See Bill of Materials. This product uses electronics and non-recyclable materials, which are manufactured and imported products that consume fuel for transportation, energy from machinery, limited resources to create, etc.
Social	**UN's "17 Sustainable Development Goals" - Reduced Inequalities:** Our product works towards making communication more accessible. **Educational purposes:** This product teaches engineering design and software/handy skills to students. **Charity:** Student designs are far cheaper than contracting an official company, and this project is funded by the university. The client will save money using our product.	**Limited functionality:** The array of communication is very simple and not sufficient for communication at an able-bodied person's level. It is not a flagship solution to the problem at stake. **Limited scope due to resource limitations**: A student team isn't experienced nor specialized in designing communication devices, so the product/assembly quality will not be as good vs. were it to be made by professional designers.

Design for X

DFS: Design for simplicity

Designing our CA for simplicity means sticking to the bread and butter of our ideas. The client must understand how to use the product so that they want to use it. If we added too complex of designs (such as a side button to hold that would change all button's outputs), we can not guarantee that the client would understand it. We must be constantly vigilant while designing simple prototypes. We can do this by asking others if they understand how to use it without our input.

DFI: Design for installability

Designing for installability is very important for the CA. Our client's caretakers have detailed how it is likely that the CA will only be in the client's wheelchair when they are at the Computer Wise building. This means that our product might be installed and taken apart multiple times per week, and as such we must make set up and take down as easy as possible. The main potential problem with DFI is designing a system to attach the CA to the wheelchair that is both sturdy and modular.

DFR: Design for redesign

Designing for redesign is arguably the most important DFX for the communications array. This project is meant to accompany our clients in their everyday life, our client's needs will constantly grow and develop. As such, we must make sure that our client can communicate their ever-growing needs effectively and without hassle. To achieve this goal there are two main options: 1. Use buttons that can be changed for different outputs conveniently, 2. Attached are spare buttons with different meanings that can be easily installed. The current goal is to have 4-5 different buttons available with changing what they say is possible.

DFS: Design for safety

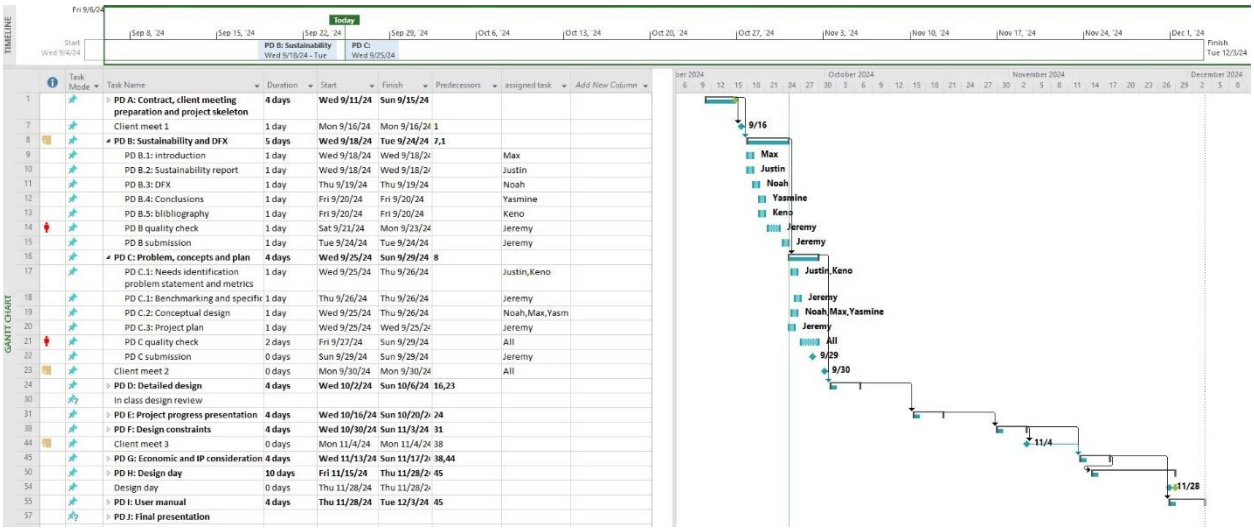
Designing for the CA for safety means ensuring there are no sharp edges or exposed wood if possible to reduce cuts and blisters. We are now aware that the client has Cerebral Palsy which reduces their dexterity, making them likely to hit the buttons with more force than intended.

DFS: Design for Speed

Designing for speed is very important so the CA does not become a hassle in our client's life. If the CA takes them longer to communicate than they did before, then we would be doing them a disservice. This could become a problem if we went with our previous idea of

a touch screen for the CA, while this would allow for more potential voice cues, given the client's low hands and finger dexterity, it would take them far too long and far too many misclicks to communicate how they intended.

Gantt Chart progress:



	Task Mode	Task Name	Duration	Start	Finish	Predecessors	assigned task	Add New Column
1		**PD A: Contract, client meeting preparation and project skeleton**	**4 days**	**Wed 9/11/24**	**Sun 9/15/24**			
7		Client meet 1	1 day	Mon 9/16/24	Mon 9/16/24	1		
8		**PD B: Sustainability and DFX**	**5 days**	**Wed 9/18/24**	**Tue 9/24/24**	7,1		
9		PD B.1: introduction	1 day	Wed 9/18/24	Wed 9/18/24		Max	
10		PD B.2: Sustainability report	1 day	Wed 9/18/24	Wed 9/18/24		Justin	
11		PD B.3: DFX	1 day	Thu 9/19/24	Thu 9/19/24		Noah	
12		PD B.4: Conclusions	1 day	Fri 9/20/24	Fri 9/20/24		Yasmine	
13		PD B.5: blibliography	1 day	Fri 9/20/24	Fri 9/20/24		Keno	
14		PD B quality check	1 day	Sat 9/21/24	Mon 9/23/24		Jeremy	
15		PD B submission	1 day	Tue 9/24/24	Tue 9/24/24		Jeremy	
16		**PD C: Problem, concepts and plan**	**4 days**	**Wed 9/25/24**	**Sun 9/29/24**	8		
17		PD C.1: Needs identification problem statement and metrics	1 day	Wed 9/25/24	Thu 9/26/24		Justin,Keno	
18		PD C.1: Benchmarking and specific	1 day	Thu 9/26/24	Thu 9/26/24		Jeremy	
19		PD C.2: Conceptual design	1 day	Wed 9/25/24	Thu 9/26/24		Noah,Max,Yasm	
20		PD C.3: Project plan	1 day	Wed 9/25/24	Wed 9/25/24		Jeremy	
21		PD C quality check	2 days	Fri 9/27/24	Sun 9/29/24		All	
22		PD C submission	0 days	Sun 9/29/24	Sun 9/29/24		Jeremy	
23		Client meet 2	0 days	Mon 9/30/24	Mon 9/30/24		All	
24		**PD D: Detailed design**	**4 days**	**Wed 10/2/24**	**Sun 10/6/24**	16,23		
30		In class design review						
31		**PD E: Project progress presentation**	**4 days**	**Wed 10/16/24**	**Sun 10/20/24**	24		
38		**PD F: Design constraints**	**4 days**	**Wed 10/30/24**	**Sun 11/3/24**	31		
44		Client meet 3	0 days	Mon 11/4/24	Mon 11/4/24	38		
45		**PD G: Economic and IP consideration**	**4 days**	**Wed 11/13/24**	**Sun 11/17/24**	38,44		
50		**PD H: Design day**	**10 days**	**Fri 11/15/24**	**Thu 11/28/24**	45		
54		Design day	0 days	Thu 11/28/24	Thu 11/28/24			
55		**PD I: User manual**	**4 days**	**Thu 11/28/24**	**Tue 12/3/24**	45		
57		**PD J: Final presentation**						

Conclusion:

After concluding this document, the team now has a better understanding of what is expected of them and how they plan to accomplish it. The main outstanding problem remains with the technology that will be used, whether to purchase part of the C.A. (most likely the buttons) or design everything from scratch. The answer for that will reveal itself as we get further into the project and understand what the client needs and expects.

Bibliography:

"Assistive Devices for People with Hearing, Voice, Speech, or Language Disorders." *National Institute of Deafness and Other Communication Disorders*, U.S. Department of Health and Human Services, 12 Nov. 2019, www.nidcd.nih.gov/health/assistive-devices-people-hearing-voice-speech-or-language-disorders#:~:text=The%20simplest%20AAC%20device%20is,to%20ask%20for%20a%20drink.