Project Deliverable C: Design Criteria and Project Specifications

Introduction:

This deliverable will provide a list of design criteria, benchmarking, and determine target specifications which can be used to develop a final solution to satisfy the client's and user's needs.

Table 1.1: List of Needs and Design Criteria

#	Needs	Design criteria
1	Allowing for usage of tools (e.g. 3D printers) to be used in a more organized and faster manner	• Less time wasted when using Makerspace tools (mins) • Decreased time in vacancy of tools (mins)
2	A way to let students know what machines are being used before entering the Maker Space and Brunsfield Center.	• Decreased time in vacancy of tools mins)
3	Tracking system for signed out tools such as SD cards allowing for items to be returned and not lost.	• Decrease in amount of SD cards lost (# of SD cards lost)
4	A way to keep track of materials/tools in stock especially in the Brunsfield Center.	• Decrease in amount of questions pertaining to stock of materials/tools (# of questions) • Decrease in the number of tools misplaced or lost (# of tools lost/misplaced)
5	A better way to help users navigate STEM	• Decrease in lost users (surveying users)
6	A tool or system indicate users to pack up/clean up before the rooms are closed	• Decrease in the time it takes to close (mins)
7	A functional security system for makerspace. Makerspace currently doesn't have cameras set up for security.	• Decrease in theft and damage (# of things lost or damaged)

Table 1.2: Functional Requirements

#	Design Specifications	Relation (=, <, or >)	Value	Units	Verification Method
1	Increase the number of people using the 3D printers	>	5	People/ Day	Analysis
2	Time taken to set up the 3D printers	<	2	Minutes	Test
3	Decrease in the number of SD cards lost	<	10	SD Cards/Month	Analysis
4	Quick setup time	<	2	min	Test

Table 1.3: Non-Functional Requirements

#	Design Specifications	Relation (=, <, or >)	Value	Units	Verification Method
1	Aesthetics	=	Yes	NA	Test
2	Product life	>	3	Years	Test
3	Ease of usage	=	Yes	NA	Test
4	Safety	=	Yes	NA	Test

Table 1.4: Constraints

#	Design Specifications	Relation (=, <, or >)	Value	Units	Verification Method
1	Cost	<	100	Dollars ($)	Budget
2	Size	=<	5 x 3(3/32) x 1(1/8)	Inches	Measure
3	Time to Build	<	2	Months	Trello (Gantt Chart)
4	Time to learn Ross Video	<	2	Months	Ability to incorporate Ross Video successfully into project

Benchmarking:

Design criterion used for benchmarking:

#	Needs	Design criteria
1	Allowing for usage of tools (e.g. 3D printers) to be used in a more organized and faster manner	• Less time wasted when using Makerspace tools (mins) • Decreased time in vacancy of tools (mins)

Table 2.1 - Highlights: Software to Generate G-Code

Specifications for 3D printing slicing software	OctoPrint **[2]**	Cura **[3]**	Slic3r **[1]**
Cost	Free	Free	Free
Adaptable to various printers	Yes	Yes	Yes
Upload gcode files wirelessly to printer	Yes	No	No
Setting up printing specifications (Printer head speed, bed temperature etc.)	Yes	Yes	Yes
Set up a webcam to view in browser	Yes	No	No
Real-Time Progress	Yes	Yes	Yes
Total:	12	10	10

KEY:

YES = 2 Point
NO = 1 Points

Conclusion:

The Initial idea was to have a solution that would fix many of the problems such as tracking the availability of 3D printers, tools, machinery, etc. However, after reflecting on the client meeting and careful consideration of time constraints, we have focused our attention on their primary needs. This will allow us to come up with a solution which would solve their main needs within the given time frame and with our limited knowledge of Ross Video.

Within this report we have listed various needs and designs, as well as functional requirements, non-functional requirements, and design constraints based on the client's needs. Through benchmarking various G-code generating software, we have concluded that OctoPrint is the best for satisfying our user's needs.

References:

[1] 3.0 was released! (0AD). Retrieved from https://slic3r.org/.

[2] Häußge, G. (0AD). OctoPrint.org. Retrieved from https://octoprint.org/.

[3] Ultimaker Cura: Powerful, easy-to-use 3D printing software. (0AD). Retrieved from https://ultimaker.com/software/ultimaker-cura.