Deliverable H: Prototype III and Customer Feedback

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November 25, 2021

Introduction

The Ross Video Design Challenge is a project assigned to students by the client Ross Video, in collaboration with the Ottawa Sports and Entertainment Group (OSEG). The goal is to design an innovative interface that controls the various graphical and auditory elements used during sporting events. This system is expected to be produced using Ross Video's very own program, Dashboard, which is built specifically for the purpose of modelling interfaces to be used in live events.

Work efficiency is extremely important for the production team at the TD Place Arena, this project will explore ways to optimize their control system's user interface to make the job smoother.

In the previous deliverables, prototypes 1 and 2 were created, refined, and tested. Prototype 1 focused on determining the feasibility of integral aspects that make up the user interface and that facilitate a smooth flow between each subsystem. Tab switching, button functionality, and file upload were three of the key functions that were analyzed. Prototype 2 evaluated fundamental features crucial to the functionality of each subsystem. Each prototype was tested according to its test plan and the results were recorded to be analyzed once the stopping criteria was encountered. The objectives of each test for each prototype were met, for the most part, and were determined to be feasible for use in the final product. In this deliverable, prototype 3 will be created and tested following its test plan. The main purpose of this prototype is to streamline the layout of all of the functional aspects integrated in the previous prototypes in order to create an efficient and pleasant user experience. Feedback will be taken into account and the aesthetics will be refined as necessary. Based on the testing, the bill of materials, detailed design, and target specifications will be adjusted accordingly. Prototyping allows for the verification of the practicality and usability of design plans to ensure that the best final product possible will be produced.

1. Analytical, Numerical or Experimental Models

1.1. Team Setup Subsystem

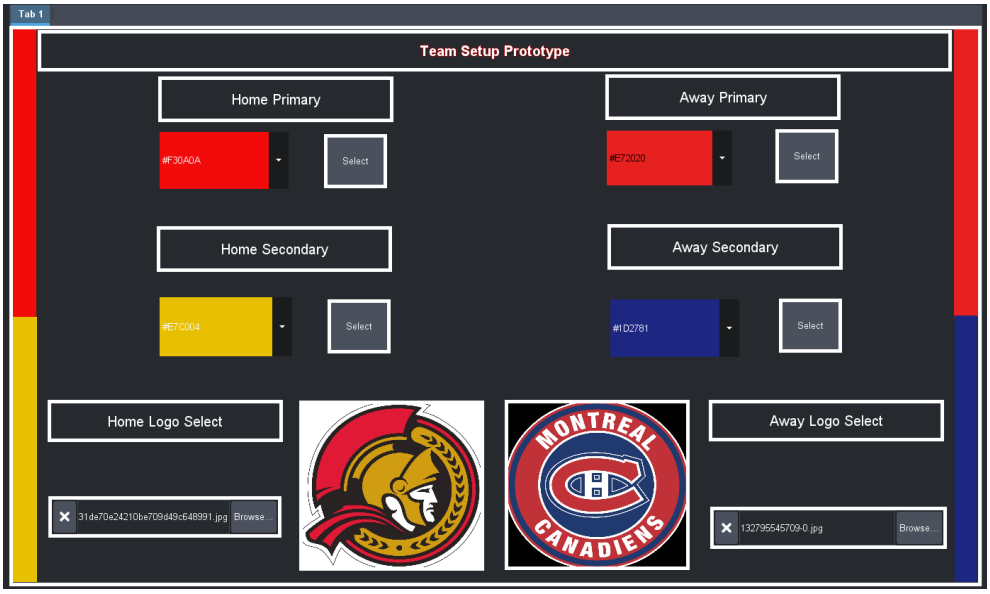
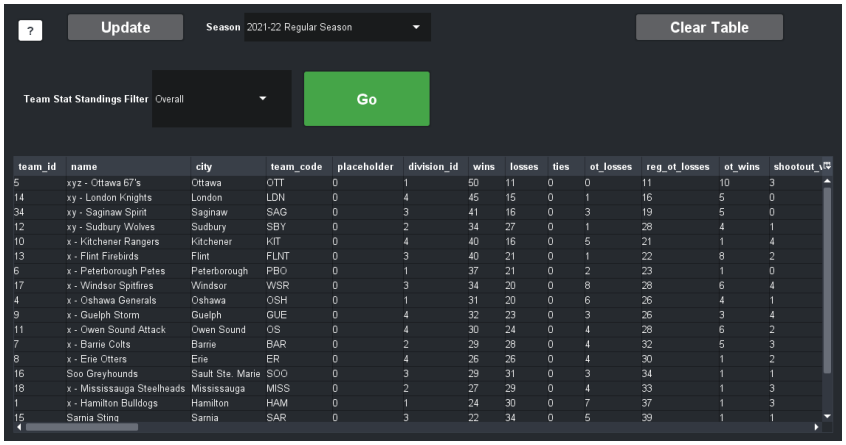


Figure 1. Team Setup subsystem user interface prototype

This prototype incorporates capabilities for the user to select the primary and secondary colours for both the Home and Away team through the use of a colour picker. The primary and secondary colours can then be confirmed by the 'selection' button by the colour picker and the selected colours will appear along the edges of the panel frame. The logos of each team can also be added through an image selector and will appear in a box next to the selector.

1.2. Standings/Stats Subsystem



team_id	name	city	team_code	placeholder	division_id	wins	losses	ties	ot_losses	reg_ot_losses	ot_wins	shootout_w
5	xyz - Ottawa 67's	Ottawa	OTT	0	1	50	11	0	0	11	10	3
14	xy - London Knights	London	LDN	0	4	45	15	0	1	16	5	0
34	xy - Saginaw Spirit	Saginaw	SAG	0	3	41	16	0	3	19	5	0
12	xy - Sudbury Wolves	Sudbury	SBY	0	2	34	27	0	1	28	4	1
10	x - Kitchener Rangers	Kitchener	KIT	0	4	40	16	0	5	21	1	4
13	x - Flint Firebirds	Flint	FLNT	0	3	40	21	0	1	22	8	2
6	x - Peterborough Petes	Peterborough	PBO	0	1	37	21	0	2	23	1	0
17	x - Windsor Spitfires	Windsor	WSR	0	3	34	20	0	8	28	6	4
4	x - Oshawa Generals	Oshawa	OSH	0	1	31	20	0	6	26	4	1
9	x - Guelph Storm	Guelph	GUE	0	4	32	23	0	3	26	3	4
11	x - Owen Sound Attack	Owen Sound	OS	0	4	30	24	0	4	28	6	2
7	x - Barrie Colts	Barrie	BAR	0	2	29	28	0	4	32	5	3
8	x - Erie Otters	Erie	ER	0	4	26	26	0	4	30	1	2
16	Soo Greyhounds	Sault Ste. Marie	SOO	0	3	29	31	0	3	34	1	1
18	x - Mississauga Steelheads	Mississauga	MISS	0	2	27	29	0	4	33	1	3
1	x - Hamilton Bulldogs	Hamilton	HAM	0	1	24	30	0	7	37	1	3
15	Sarnia Sting	Sarnia	SAR	0	3	22	34	0	5	39	1	1

Figure 2. Standings/Stats user interface prototype

This prototype includes the ability to select the season as well as division to show team standings for. The menu to select a season likely will not be used very often, however, we are

keeping this function because it comes with the ability to access new seasons without having to change any of the coding. Therefore, the benefits of the feature outweigh the fact that the dropdown menu itself isn't very useful.

The data then appears in the form of a table on the user interface, so that the user can see the data that has been accessed. The cells in the table can be edited, so it is possible to change any information manually if necessary (if the source of the data is incorrect for example). During testing, it was noted that the "Clear Data" button is the slowest element on the panel and often takes 2 seconds or more to respond. As such, it is likely that this button will not exist on the final product, since its main purpose was to make the coding for the panel easier (helps developers during the design process, not necessary for users).

1.3. Goalie Matchup Subsystem

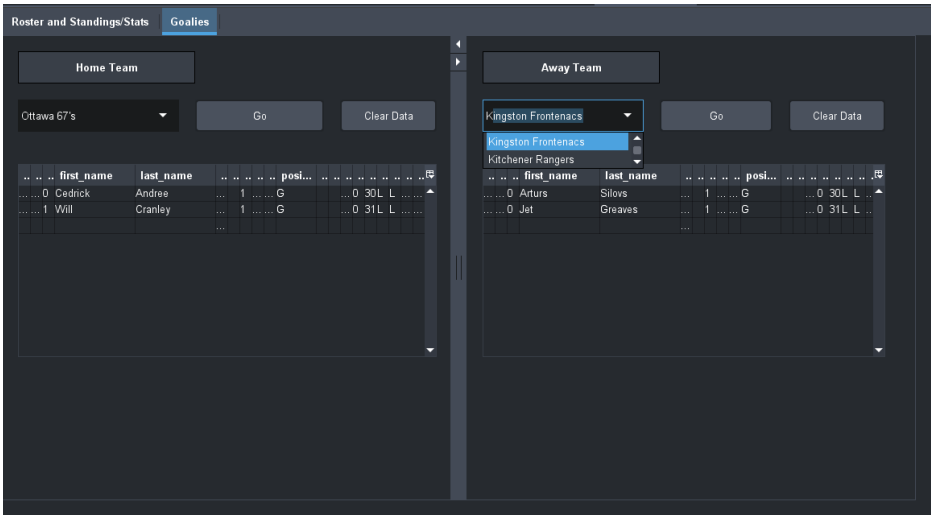


Figure 3. Goalie Matchup user interface prototype (*Tab 2*), includes a tab split to show data for the two Home and Away teams.

The Goalie Matchup subsystem has a tab split in two by a tab divider which can be dragged across the screen, but is split in the middle by default. On either side of the divider, the user can access a dropdown menu to select the home and away teams and show their goalies. The data is shown for the same season as the one selected in the Standings/Stats tab, so the user does not need to reselect the season, only the teams.

Again, the Clear Data button isn't really necessary for the user and may be changed or removed because it works slower than the rest of the system.

1.4. Fan birthday subsystem

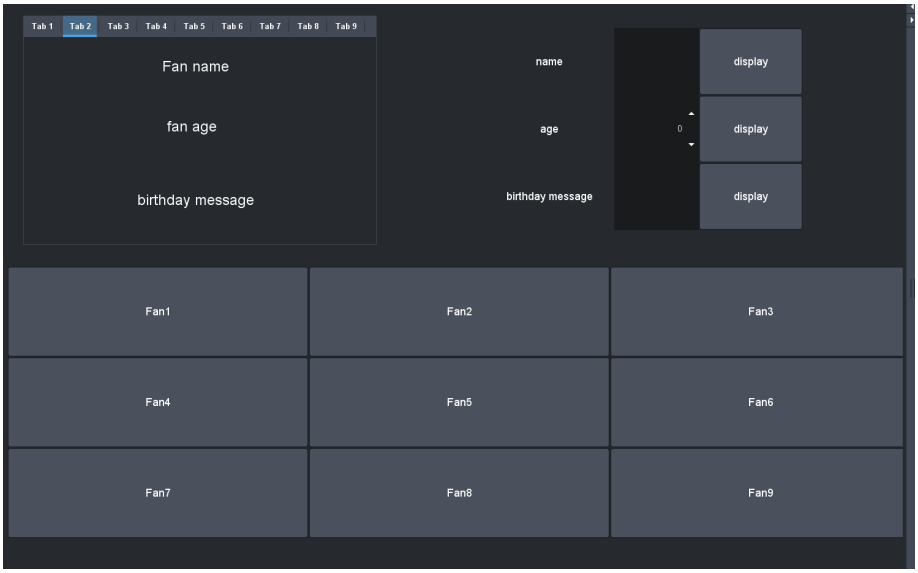


Figure 4. Fan birthday subsystem prototype 3

The fan birthday system contains three inputs on the right top corner. The operator can insert the Fan name, age and his/her birthday message before the start of the game. Then, it will appear on the tabs so the operator can show it on the screen during the game play.

1.5. Three stars

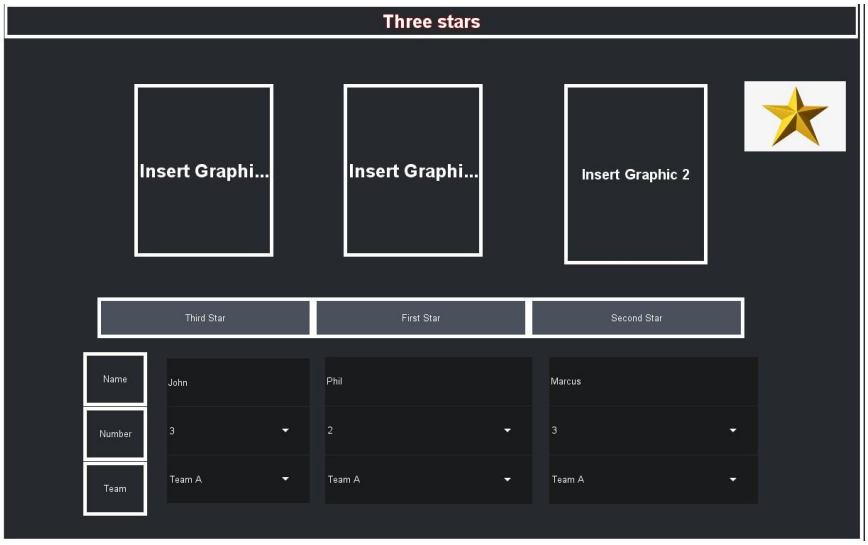


Figure 5. Three stars subsystem user interface prototype

The Three-Star subsystem includes three entries for each player that was picked for the top three players. In addition, the operator can input data through a dropdown menu or input the

player's name, jersey number, and team. The subsystem further allows you to add the player's picture to show what star they got through Xpression.

2. Test Plan

This prototype aims to refine user experience in order to create the most effective user interface possible that allows the user to find, understand, and use controls quickly and easily. Prototype 1 and 2 focused on determining the feasibility of and in integrating many functional aspects of the final design. Prototype 3 will center around the aesthetics and the layout of these aspects to ensure that they optimize efficiency and clarity for the user.

Table 1. Prototype 3 Test Plan

Test ID	***Test Objective (Why)***	***Description of Prototype used and of Basic Test Method (What)***	***Description of Results to be Recorded and how these results will be used (How)***	***Estimated Test duration and planned start date (When)***
1	Find out how easy to use users perceive the system to be at a glance and briefly after using it. This is important because a customer's first impression of a product can greatly impact how much they want to use said product.	Multiple people, ideally who are unfamiliar with the design but who have a general idea of the purpose of the product (people who watch hockey games but don't know programming for example), will be asked to briefly interact with the system. They will be asked to complete a simple task like "upload an image of a goalie that is in the Pictures folder of this computer onto the Dashboard."	Users will be asked to navigate from the Home Screen to the Standings/Stats page (currently the most complicated one), and access the data for the Midwest division. They will then be asked how difficult they felt the system was to use on a scale from 1 to 10 (10 being very difficult). Ideally, a user unfamiliar with Dashboard should respond a number 7 or lower since the task they will be asked to perform will be a very simple one, so their perception of difficulty or simplicity will	Test duration: 20mins. Planning start date: November 13th, 2021

			be based on how the user interface has been designed.	
2	Testing user perceptions of aesthetics	Various people (friends/family/ classmates)will be shown screenshots of different subsystems and asked if they would feel good looking at the control panel every day at work. They will be asked to give a rating from 1-5 (5 being it looks pleasant and easy to use) and then explain how they felt.	If the average rating is lower than 3, the team will make modifications to the user interface based on feedback.	Test duration: 20mins. Planning start date: November, 13th, 2021
3	Final Test system performance.	Each team member will download the prototype 3 Dashboard panel to make sure it works on different devices and operating systems. The time to use each subsystem will be compared to see how much the device affects performance.	If there is a major gap in time taken to complete the task (5 seconds or more), it indicates that the quality of the device used plays a major role in the product's performance. This means a device requirement may need to be specified in the product's user manual.	Test duration: 1hrs. Planning start date: November, 13th, 2021

The stopping criteria for the prototype 3 test plan will be once feedback has been obtained from various unfamiliar users after they have either performed a simple task or viewed screenshots of the system. The test can be stopped once enough feedback has been received such that a unanimous solution can be made for the refinement of the user interface. A prototype of high fidelity is acceptable for carrying out this test plan. This is because in order to test the effectiveness of the user interface, most of it will need to be functional. The final layout of all of the buttons, tables, and tabs will be very similar to that of the final product. Since the general layout of the entire system will be in line with that of the final solution, a prototype of high fidelity will be used.

3. Testing Results and Analysis

3.1. Test 1: User Perceptions of Ease of Use

Table 2. Time to complete a predetermined task, and score out of 10 for ease of use.

Task	Average Score (out of 10)	Time to complete task (s)
Navigate from the Home Screen to the Standings/Stats page (currently the most complicated one), and access the data for the Midwest division.	5	8.78

This test was performed to analyze the ease of use of the interface based on tests performed by an unfamiliar user. The users rated the difficulty on a scale of 1 to 10, 10 being very difficult. The average score was 5 meaning that the entire system is easy enough to understand, even for an individual who has not had a long time to acquaint themselves with the Dashboard interface. The time it took each user to complete the specific task designated above was recorded and the average time came to be 8.78 seconds.

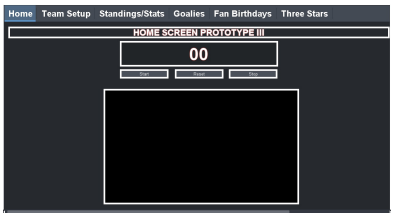
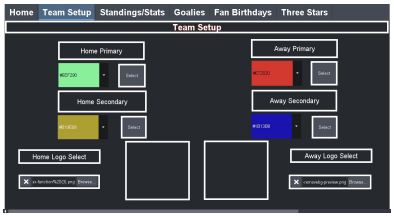
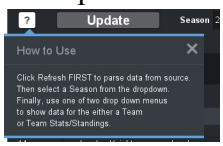
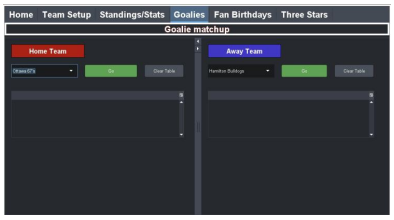
This result displays the overall simplicity of design and ease of use. It did not take an unfamiliar user much time to complete a simple task. As a result, it is not expected to take a familiar user a large amount of time to complete a more difficult task. This test indicates that the design criteria specifying the requirement for a simple layout in order to create a panel that is easy to comprehend and can be used to carry out tasks efficiently has been met. No major changes need to be made to any of the subsystems to improve this characteristic.

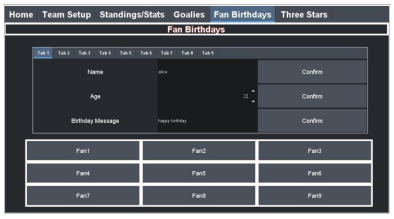
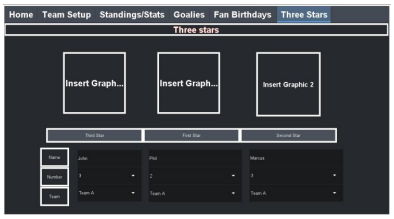
3.2. Test 2: User Perceptions of Visuals

In test 2 testers were asked to look at screenshots of the systems and rate the visual aspect of it out of 5, the list below explains what each number represents:

1 - It looks very complicated and difficult to use/it does not look nice.
2 - it looks a bit confusing to learn/it doesn't look very nice.
3 - I wouldn't mind having to use it every day at work, but it can be improved.
4 - it looks fairly simple to learn to use, and looks decent.
5 - It looks very simple to use, and is nice to look at.

Table 3. User perceptions of design aesthetics, and feedback/suggestions from users.

Subsystem Images Shown	Average Score (out of 5)	Feedback from Users
	3.57	"Maybe adding some colours could make it more visually appealing"
	3.25	"I think using different fonts than the current one, as well as adding some colour to the buttons to make them easier to identify, could make the design more aesthetically pleasing." "Put more space between the group of buttons, so hone primary and its colour selector should be separated from home secondary and its colour selector."
 Help button: 	4.375	"OH THIS IS FOR SPORTS" "The font for the team names and the button are really small… overall looks easy to use though." "The capitalized FIRST is confusing... I thought it was a button name. I think the help message should say, 'First, click Refresh to parse data from source. Then, select…'" "It should say "dropdown menu" in the second sentence, for clarity."
	4.125	"Not that pretty but I got the point of this in under 5 seconds. Why that shade of red and blue against the grey tho?"

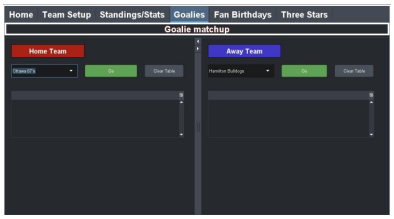
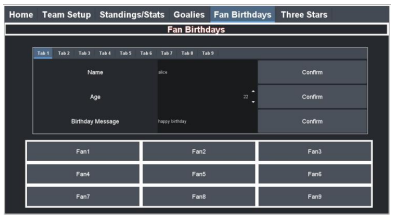
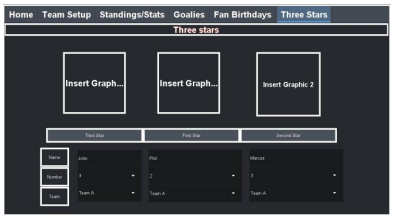
	3.25	“If the tabs are for fans, the names should correlate, i.e. if Tab 1 is for Fan 1, the tab should be renamed "Fan 1". Also the font size for the messages (e.g. "happy birthday") is really small, I think it'd be better to make it bigger.” “Instead of having three separate confirm buttons you should just have one to confirm everything. The fan tab table at the bottom has a thicker border than the one where you put information which I think is distracting.”
	3.375	“Why is the order of your stars messed up? You did 3-1-2 instead of 1-2-3? Anyways, good job overall, I have no clue how you managed to do this so well!”

Test 2 focused on analysing user perceptions of the aesthetics of the overall system. The average rating out of 5 for all of the subsystems combined is 3.66. This demonstrates that the majority of users find the general appearance of the user interface pleasant enough for everyday use. Many users gave feedback saying it was easy to understand but aesthetics could be improved; some of these aspects we cannot change, such as font, where we only have 3 choices of font, but we can modify text size to make text easier to read, as well as make formatting more uniform throughout the system to reduce confusion.

3.3. Test 3: Final Test of System Performance

Table 4. Time to complete task (s) and rating out of 10.

Subsystem and Task	**Time to complete task (s)**				
	Sahibjot	**Zhaoxin**	**Vivian**	**Emma**	**Sagnjeevie**
 Switch to a different tab.	0.12	0.98	0.19	0.94	0.51

 Set a primary color for the home team, and upload a pre-downloaded image.	7.34	7.53	6.54	7.32	6.23
 Access team standings for “Overall” for the “2019 Playoffs” season, starting from a blank table.	5.89	5.87	5.24	6.01	5.95
 Display goalies for the North Bay Battalion away team.	5.73	5.78	5.24	5.97	5.81
 Type a name and age for the 3rd fan.	6.30	6.93	6.76	6.48	6.54
 Type a name, select a number/rank, and select a	8.23	8.64	8.75	7.98	8.33

team (between A and B) for the 1st star player.					

Test 3 focused on confirming the capabilities of the system, by utilizing other devices to assess the amount of time in seconds it takes to complete the task of each subsystem. The average time for the first system remained below 1 seconds in each test and neglecting reaction time, can be determined to be instantaneous. For the remaining 5 subsystems, the time required to complete each task remained around 5-6 seconds with the only outlier being the final subsystem which still was completed within 10 seconds.

4. Updated Design Information

4.1. Target Specifications

Table 5. Current Design Criteria

Rank	Criteria/Metric	Measurement	Ideal Value	Acceptable Values
1	Uses Dashboard software	yes/no	yes	yes
2	Displays a combination of graphics and text	yes/no	yes	yes
3	Configurable display	yes/no	yes	yes
4	Simple and user friendly. Time needed to modify one element (find buttons + input text)	Seconds	10	< 30
5	Device set-up time	Seconds	30	< 60
6	Cost	$ (CAD)	0	0
7	User perception of aesthetics, average rating out of 10.	Average n/10	10/10	>5/10

There have been no changes made to the target specifications since the previous deliverable. So far, the design criteria has been successfully implemented into prototype 3 and there is no need for any modifications. The testing of previous prototypes has proven all of these metrics to be feasible and the testing of prototype 3 has shown how they can be integrated in a way that maximizes ease of use for the user.

In deliverable F, two main changes were made to the target specifications. The design specifications for an aesthetic appearance once displayed is replaced by appearance of the user interface (does it look cluttered, does it look sleek and well designed, etc). The goal is to get a majoritarily positive response from our users, peers, etc. This criteria is considered at length in prototype 3. In deliverable G, the criteria concerning screen aspect ratio is removed since it is not applicable to the project.

4.2. Bill of materials

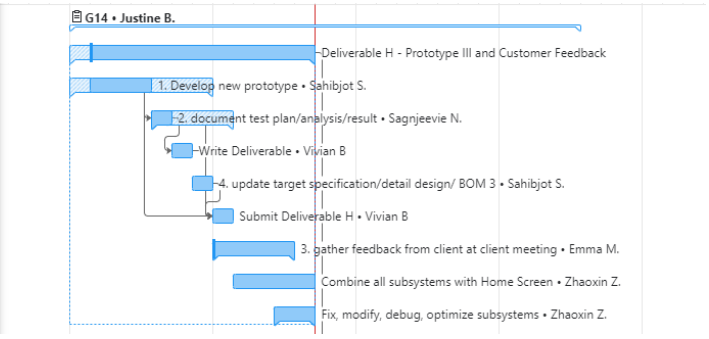
The total cost of the project remains 0 dollars. Refer to Deliverable E: Project Plan & Cost Estimate to see full Bill of Materials.

Conclusion

In Prototype three all the subsystems have been integrated to the main panel. Prototype three is the final version of the dashboard user interface that the team has developed. In this deliverable the prototype has been tested to see if the subsystems are efficient and easy to use for the operator of the user interface. The tests have proven that the entire system is aesthetically pleasing, efficient to use, and easy to understand.

Appendix 1

G14			
Deliverable H - Proto...	15/11/2021	25/11/2021	
1. Develop new p...	15/11/2021	17/11/2021	
2. document test...	18/11/2021	18/11/2021	3FS
Write Deliverable	19/11/2021	19/11/2021	7FS
4. update target ...	20/11/2021	20/11/2021	
Submit Deliverab...	21/11/2021	21/11/2021	3FS, 7FS, 13F...
3. gather feedba...	21/11/2021	24/11/2021	
Combine all subs...	22/11/2021	25/11/2021	
Fix, modify, debu...	24/11/2021	25/11/2021	



Gantt chart for deliverable H