GNG 1103 – Engineering Design

Deliverable E – Project Plan and Cost Estimate

Team B1-05

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Date Submitted: October 28th, 2020
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Abstract

A detailed report that establishes an effective project plan (made in Microsoft Project) to ensure our completion of prototypes and deliverables. In addition, a thorough estimation of required costs and components is provided.

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1 Introduction

Since our very first meeting with clients Patrick and Kenny on September 25, 2020, we have worked extensively on developing a detailed project schedule and plan of attack. Using Microsoft Project as our foundational line, we have worked to create a strategy that highlights all our key tasks – both as a group and individually, milestones (with any dependencies), and key events. Consequently, the most important factors of our team plan revolve around prototyping and the ongoing testing of our solutions.

Additionally, we have proposed an estimate for all the components and material we will need for the different prototyping and solution tests mentioned above.

2 Project Plan

2.1 Gantt Chart

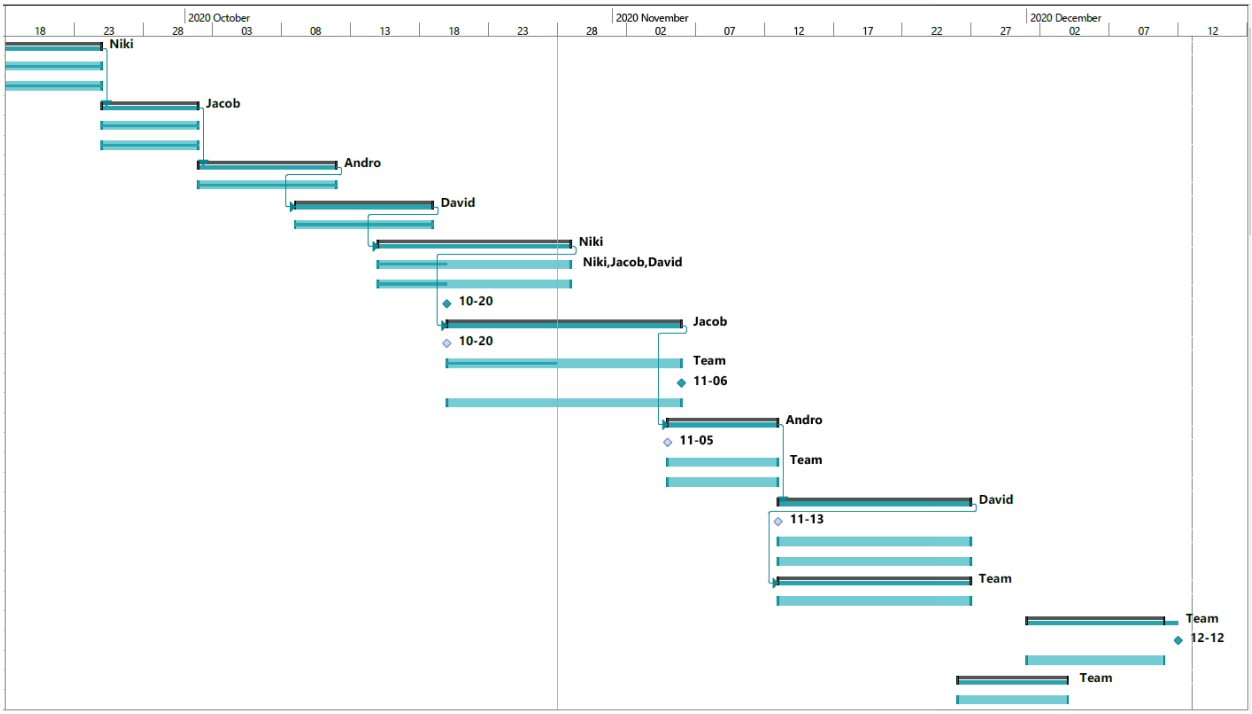

Figure 1: Gantt Chart for Project (Green line indicates up to date of October 28, 2020)

Pictured above is our group's Gantt chart for this project (a copy of the MS Project file and PDF has also been provided in this deliverable). As seen, this chart is an effective tool in allowing us to illustrate all the dates, summarize elements of the tasks at hand, and quickly find any listed milestones. As stated in our team's original contract, we have a leader designated to each deliverable who oversees that any deliverable subtasks are completed on time and with a high level of quality. In addition, little diamond icons are used to display our team's milestones which include prototype due dates, the final design day, and all expected client meetings.

2.2 Tasks & Milestones

Table 1: Task List, Milestones, & Dependencies

Task Name	Duration	Start	Finish	Resource Names
Deliverable A	**10 days**	**Sun 20-09-13**	**Thu 20-09-24**	**Niki**
Team Contract	10 days	Sun 20-09-13	Thu 20-09-24	Team
Project Management Template	10 days	Sun 20-09-13	Thu 20-09-24	Niki
Deliverable B	**5 days**	**Fri 20-09-25**	**Thu 20-10-01**	**Jacob**
Needs Identification	5 days	Fri 20-09-25	Thu 20-10-01	Andro, David
Problem Statement	5 days	Fri 20-09-25	Thu 20-10-01	Niki
Deliverable C	**7 days**	**Fri 20-10-02**	**Sun 20-10-11**	**Andro**
Design Criteria	7 days	Fri 20-10-02	Sun 20-10-11	Team
Deliverable D	**7 days**	**Fri 20-10-09**	**Sun 20-10-18**	**David**
Conceptual Design	7 days	Fri 20-10-09	Sun 20-10-18	Team
CLIENT MEET	0 days	Tue 20-10-20	Tue 20-10-20	
Deliverable E	**10 days**	**Thu 20-10-15**	**Wed 20-10-28**	**Niki**
Project Plan	10 days	Thu 20-10-15	Wed 20-10-28	Niki, Jacob, David
Cost Estimate	10 days	Thu 20-10-15	Wed 20-10-28	Andro
Deliverable F	**13 days**	**Tue 20-10-20**	**Thu 20-11-05**	**Jacob**
PROTOYPE I	0 days			
Prototype I	13 days	Tue 20-10-20	Thu 20-11-05	Team
CLIENT MEET	0 days	Fri 20-11-06	Fri 20-11-06	
Customer Feedback	13 days	Tue 20-10-20	Thu 20-11-05	Team
Deliverable G	**6 days**	**Thu 20-11-05**	**Thu 20-11-12**	**Andro**
PROTOTYPE II	0 days			
Prototype II	6 days	Thu 20-11-05	Thu 20-11-12	Team
Customer Feedback	6 days	Thu 20-11-05	Thu 20-11-12	Team
Deliverable H	**10 days**	**Fri 20-11-13**	**Thu 20-11-26**	**David**
PROTOTYPE III	0 days			
Prototype III	10 days	Fri 20-11-13	Thu 20-11-26	Team
Customer Feedback	10 days	Fri 20-11-13	Thu 20-11-26	Team
Deliverable I	**10 days**	**Fri 20-11-13**	**Thu 20-11-26**	**Team**
Design Day Presentation Material	10 days	Fri 20-11-13	Thu 20-11-26	
Deliverable J	**8 days**	**Tue 20-12-01**	**Thu 20-12-10**	**Team**
DESIGN DAY	0 days	Sat 20-12-12	Sat 20-12-12	
Project Presentations	8 days	Tue 20-12-01	Thu 20-12-10	
Deliverable K	**6 days**	**Thu 20-11-26**	**Thu 20-12-03**	**Team**
User Guide	6 days	Thu 20-11-26	Thu 20-12-03	

The table above is a detailed list of tasks, along with some important milestones and key events. Each deliverable acts as a main task, with elements of the deliverable serving as subtasks. Every key task has a designated leader (as established in our team contract) who oversees the given task is completed on time and with high quality. In addition, an estimated duration of each task has been developed. This column in particular is always getting updated as deliverable dates are constantly changing.

The milestones in yellow signify moments for us to present out progress and work thus far and provide opportunities for constructive feedback. The 2 client meets are particularly vital as they will provide any feedback on presented designs and prototypes allowing us to improve our solutions based solely on the clients' needs. The blue milestones signify important tasks as a team in which we must produce prototypes.

Coloured arrows have been used to distinguish the dependencies withing tasks, particularly with milestones. The red arrows were used at the beginning of the project, in the section we called the "design establishments". Here, deliverable D held the highest importance and therefore needed a lot of information obtained from past deliverables. As such, the conceptual design depended heavily on our previous design criteria task, which depended on the original problem statement. The green arrows indicate the dependency to our prototypes – arguably the most important aspects of our entire project. The first prototype will rely heavily on our original concept design and the initial feedback we received from Patrick on October 20, 2020. As mentioned above, the client meets are extremely important milestones as they will provide the necessary feedback we require to improve our prototypes. Thus, each proceeding prototype depends heavily on any client feedback we receive on previous models.

2.3 Scrum Board

Table 1: Scrum Board of Project (Up to date of October 28, 2020)

	Done	**In Progress**	**To Do**
Deliverables	- Deliverable A - Deliverable B - Deliverable C - Deliverable D	- Deliverable E	- Deliverable F - Deliverable G - Deliverable H - Deliverable I - Deliverable J - Deliverable K
Milestones	- Client Meet		- Client Meet - Design Day
Other Key Tasks	- Team Contract - Design Criteria - Conceptual Design	- Cost Estimate	- Prototype I, II & III - Costumer Feedback - Project Presentations

The scrum board above provides a useful “face” to our project as it allows us to have a visual status of all our tasks. The clear identification of what has been, what is in progress and what is coming up, allows how to have an effective method in envisioning our steps. We separated the tasks into three categories to clarify what type of activity it is we must do as this provides us with an easy method in re-accessing this table to understand our exact point of completion. We have also re-highlighted the important milestones (in the same yellow and blue colours) to allow us to easily identify those prioritized tasks. Going forward, this scrum board will allow us to efficiently keep track of tasks at hand, while allowing us to plan ahead and be prepared for the weight of tasks of coming up.

2.4 Burndown Chart

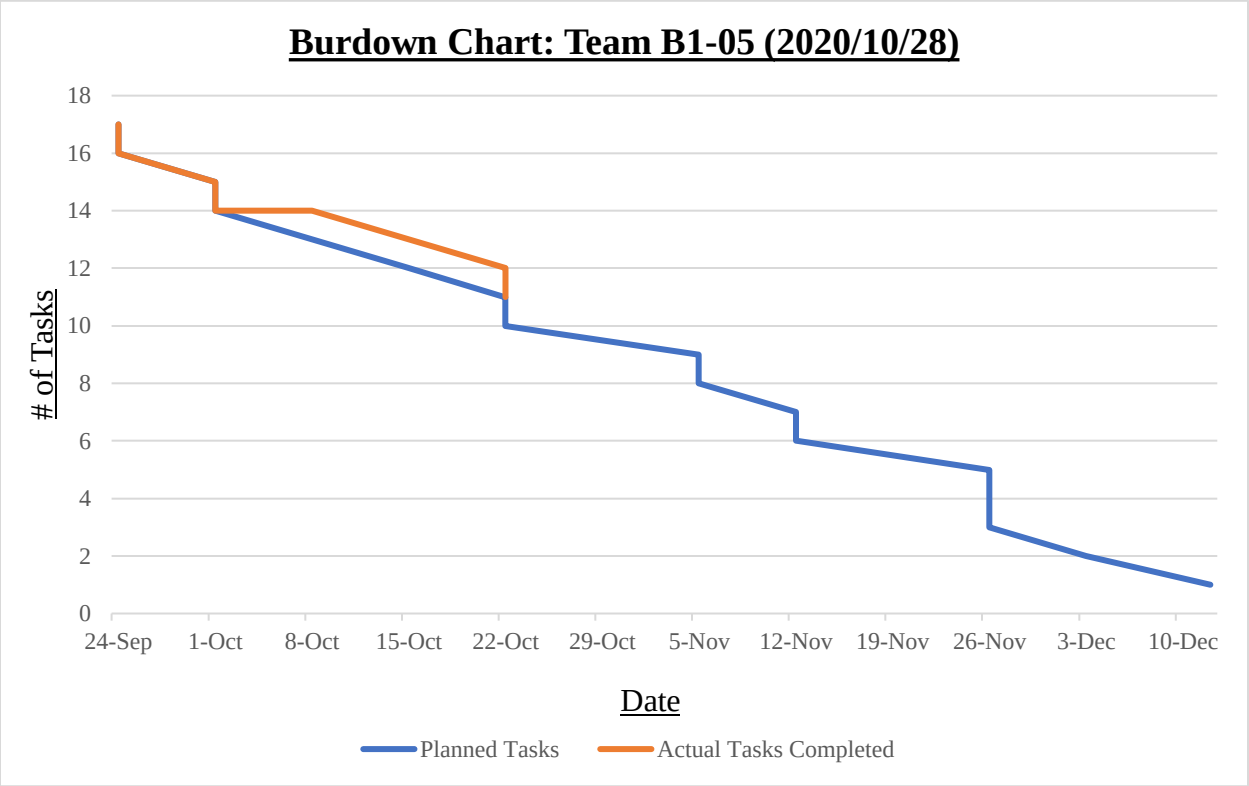

Figure 2: Burndown Chart of Project (Up to date of October 28, 2020)

Similarly to the scrum board, this burndown chart acts as another visual representation of our progress and ability to plan ahead. This graphical interpretation of tasks vs. time is a useful tool in being able to predict when work should be completed. The blue line acts as the original dates for completing deliverables (without extensions or changes), and the orange line is our work thus far. At the beginning, our tasks lined up exactly with the original dates (as the blue line is not visible), however from October 1st onwards, we "fell behind". However, this was due to changes in submission dates, and is not an indication of us not completing tasks on time. Going forward, our challenge (and goal) is to maintain the orange line with the blue, and even drawing out under the given blue line.

2.5 Uncertainties & Risks

Table 2: Risks & Uncertainties Evaluation

Risk	**Severity**	**Likelihood**	**Contingency plans**
Lack of experience in programming	3	5	Research, watch tutorials and reach out to the TA's
May be difficult to cooperate and especially build prototypes through zoom	2	3	Explore other ways to communicate, and maybe delegate tasks individually
Unity, as well as other necessary coding programs may crash	5	2	Debug and research any possible troubleshooting options
Internet connection may be poor/crash	5	4	Reach out to service providers, use a data plan, troubleshoot networking issues.
VR headset may be affected by shipping delays or empty stock	3	4	Order the headset early in advance
Some necessary elements from the Unity Asset Store may exceed our limit of 100$	2	5	Use the Unity Asset Store as an alternative option only if programming an element is too difficult/time-consuming
Severity: *scale is 1-5, where 1 is not severe and 5 is a very severe* ***Likelihood:*** *scale is 1-5, where 1 is low likelihood and 5 is very high likelihood*			

The table above acts as a guide in analyzing our uncertainties and any potential risks that may arise. The severity and likelihood of each risk have also been evaluated in order for us to understand which risks we have to keep a keen eye out for. Nevertheless, if a risk does arise, we have produced possible contingency plans in order to lessen the challenge of a risk and potentially eliminate it. Therefore, this table will be useful going forward as it will act as a guide in problem solving any issues we may come to face.

3 Cost Estimation

For this project, we do not have a definite cost as we are creating an app. In fact, one of the fundamental needs of our customer lies in being cost-free. Nonetheless, the question arises in if our group will have to spend any money to develop this free app. Upon deliberation, we have concluded that there will not be a cost for us in completing this project. The primary software we will be using is Unity – which is a free tool.

However, we wanted to still consider any economics that could arise if we had to approach this project from a business perspective, rather than as students. Thus, we have looked into the cost of program tutorials and formations that we may need to research in order to build our own app on a larger, marketing scale.

Unity reflect: $690.00

Unity reflect is an additional installment a company may choose to invest in that has higher quality experiences of real-time 3D realities.

Udemy formation for Unity AR: $200.00

This is an augmented reality course (by Udemy) that an employee may take in order to develop their understanding or problems and development of AR technology.

Udemy formation for C#: $200.00

Similar to above mentioned program, this is course (by Udemy) provides the learning aspects of C# scripting language, which is the coding language for Unity.

Apart from this analysis, we are also provided with a $100 budget by the university. We may use this money for transportation to go to the STEM building to meet in person if needed. Although to our understanding we will receive all the needed dimensions of the building from our clients, and due to the Covid-19 pandemic, we doubt this will be a cost for this project. Additionally, we may choose to use this money to obtain some offers on formations for C# or to buy some high-quality effects from the unity store to enhance the users' experience. In which case, the provided budget would be used for this purpose. However overall, we do not believe we will be taking a large cost into producing this project and will do our best to ensure the final solution – and all its processes – is free of charge.

4 Conclusion

It is with great conviction that we believe we were able to successfully interpret and provide all the necessary facets of this deliverable. Through continuous updating and discussions, we believe we have provided an effective plan for our project. Using Microsoft Project, we have been able to construct and effective tasks list with distinguished milestones and key events. A visual Gantt chart has also been produced which allows for an efficient visualization of task managing. With further analyses including a scrum board, burndown chart, and table of risks and uncertainties, we have also set the foundation to keep constant track of tasks, whilst being prepared for all future tasks. Overall, we have been a consistent team with our abilities to delegate, prioritize and converse about tasks and these tolls provide us with a confirmation in our plans going forward to ensure we have a successful end project.

Additionally, we have investigated the possible economics of our project as a business model. Due to the particular circumstances we are in, we are limited in our abilities to further venture costs for our project. However, we have provided a hypothetical analysis as a tool to develop our economic skills and prepare for future projects in which a cost estimation and detailed analysis is more required. Therefore, with the development of all our project plan tools and assessment of economics, we believe we have built a great schedule foundation and background knowledge to go forward effectively in our project.