Deliverable E

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Abstract

This deliverable aims to develop project tasks with a timeline in mind to ensure that the team can complete all four project prototypes from now until the end of the semester, as well as provide an estimate of the project's costs and components. In addition, devise a test plan for the first prototype.

Design Sketch

Provided below, the team has provided a detailed sketch of the ideal user interface for the product. The interface shows sections pertaining to inputted and outputted values, as well as a tool for changing between different types of line processes. The display also shows graphical data according to the V-curve theory and has a feedback/user advice module to help the user modify their line.

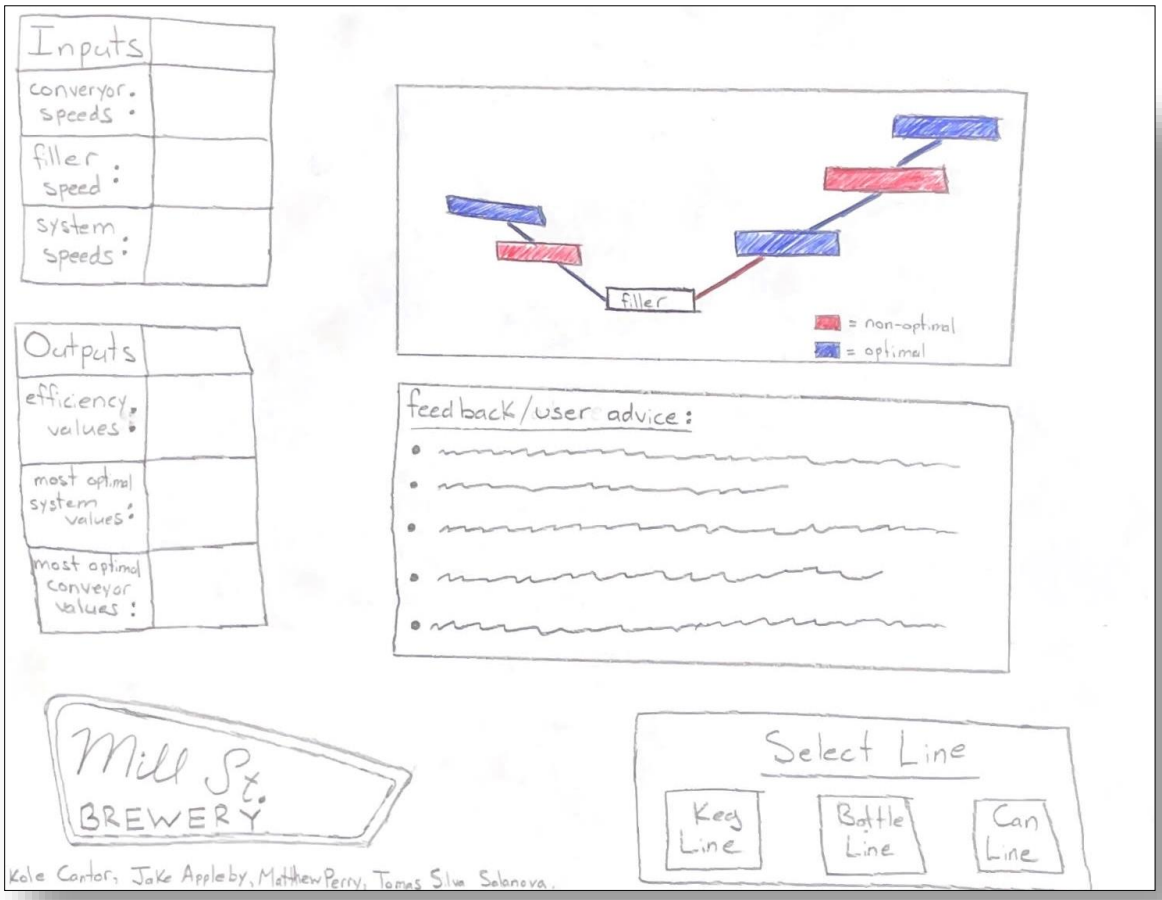

Figure 1: Ideal Mill St Brewery Conveyor Line interface

Cost Estimation

Provided below is a chart pertaining to the teams' budgeting and cost estimations. Since the nature of the project implies low cost, the budget of the product has been focused on counteracting the difficulty of the low presentation quality of a software-based project on design day.

Item name	Description	Cost per unit ($)	Total cost ($)	Link
Poster board	Used for design day	33.38	33.38	White Tri-Fold Presentation Board 36" x 48" Corrugated Tabletop Display Exhibition Board Lightweight and Portable with Smooth Surface Great

				for School Projects and Business presentations - by Emraw : Amazon.ca: Office Products
Microsoft Excel	Used for prototyping	0	0	
Python (Pygame module)	Used for prototyping and final product	0	0	
Touchscreen Display	*Used for design day to display the program and allow users to have an interactive experience*	*219.00*	*219.00*	15.6" Portable USB Type-C Monitor Touchscreen, 1080P FHD, IPS, 10-Point Touch External Screen with Premium Smart Cover Dual Speakers for Xbox,PS4,Switch,Laptop,PC,Phone,Mac,Surface : Amazon.ca: Electronics

Table 1: Cost Estimation of Project Materials

Equipment:

List of equipment used:

- Python programming language with Pygame module
- Microsoft Excel

Project Risks and Contingency Plans:

Significant risks regarding the completion of the project include:

- Breakdown/errors in code when integrating data provided.
    - Test frequently throughout design process to make sure the code is working properly.
- Issues calculating ideal system and conveyer speeds (pertaining to v-curve theory)
    - Test calculations beforehand and repeat calculations to ensure they are correct. Real calculations must be based on the v-curve theory method, thus there can never be an actual system running at a higher speed than an optimal system.
- Sporadic and potentially invalid optimal conveyer speed data
    - Ensure all conveyer data is originating from a reliable and accurate source. Optimal conveyer data must originate from brewing process running same systems and same metrics (I.e., filler speed) OR at the least must be able to be converted to Mill Street Brewery system specifications.
- Accurately accounting for conveyer acceleration/deceleration
    - Considering that conveyers will not operate at a constant velocity, and factors affecting the acceleration/deceleration of the conveyers include specific line, Conveyer lengths, conveyer widths, individual system operating speeds, diverging/converging lanes.
- Compatibility issues pertaining to the integration of the software into the existing brewing line process.
    - Ensuring that the integration of the software system into the brewing line system will be done seamlessly without interfering with any aspect of the current line. Furthermore,

the integration of the software system must be compatible with new equipment added to the lines (I.e., new products).

- Difficulty of user-adoption process
    - Ensuring that the composition of the system allows for users to quickly learn and become comfortable with the system software.

Prototyping Test Plan:

Test ID	Test Objective	Description of Prototype used and of Basic Test Method	Description of Results to be Recorded and how these results will be used	Estimated Test duration and planned start date
1	Create a simple main menu with all the different lines	To test the interface, we will make sure all the menus are working, and seeing if there are any errors in the code	Checking any errors and comparing test results to theoretical results to determine whether it is good enough to be used	Testing already complete
2	Create an interface with no main menu and instead have always one of the lines showing, and being able to change between them	Testing will be very similar for all prototypes. It will involve using the interface and testing all possible scenarios to try and find bugs in the code.	Depending on how the interface performs relative to the other prototypes, the best aspects of it will be recorded (in terms of code).	Test duration: 1 hour Planned start date: February 29th
3	Create a graphical program than can plot system speeds according to V-curve theory	Prototype will be made using excel, test will have user unput filler speed, with a resulting output of all ideal system speeds plotted on a dot chart	Result will be recorded when test successfully outputs desired values. These results will then be recoded for python and used in the final product	Test duration: 1 hour Planned start date: March 4th

4	Create a comprehensive prototype the encompasses all aspects of the final product	Prototype will be made using python and tested for errors in code and calculations	Results will be used to make any final adjustments to the final product	Test duration: 1 hour Planned start date: March 15th

Table 2: Prototyping Test Plan and Objectives

The first prototype involves a main menu from which the user can select the different lines. When a certain line is clicked, the user will be taken to a menu specific for that line, showing the different stations along with their speeds. The user can input speeds, which will change the others according to the v-curve theory. After selecting the different line that they want to view or modify, they can return to the main menu with a button. After trying this code for a while, the use of a main menu seemed to be of little use and required an extensive amount of code to function with the rest of the programme.

For the following prototypes, the team will work with different interface styles and different types of navigation systems. The team will test to see which is the least buggy and the most intuitive and easy to use. After all prototypes have been made, the best features of all will be combined into one program, and from there, it will be improved as much as possible with the time remaining before design day.