GNG 1103 Project Deliverable D: Conceptual Design

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Submitted By:

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Abstract

Team members are required to break down the outlined problem into manageable sections. Next, brainstorm ideas for how to solve the aforementioned problem and rank them based on the provided criterias. Lastly, cross-reference the conceptual designs with preset constraints from the previous Deliverable C. A clear order to effectively fulfill the project is provided through sections as follows: process line data acquisition, information upload, calculations, and user interface. A constraint matrix then determines the relevance of givens with limitations in mind. An updated Wrike task-board outlines project progress.

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1. Introduction

In a design process, engineers/ designers must come up with new ideas to solve the problems set out by clients. At times it can be a process of trial and error. A conceptual design development is required to be consistent in every design process. This includes developing ideas followed with informative sketches. Each idea can then be ranked, compiled, or mixed together to produce ideas that can be presented to the clients for further evaluation, development and/or criticism etc. In this project, the thought process can be broken down into five sections. As the team inputs and outputs data - there should be a clear order that can effectively fulfill the project. This is done through sections as follows: process line data acquisition, information upload, calculations, and user interface. The brainstormed ideas are then placed into a constraint matrix that can aid in the determination of whether they will fit relevant limitations such as cost and access to materials etc.

2. Process Line Data Input/ Acquisition

The focus of this section is to explain how data can be collected from the process line. Below are sketches of the proposed ideas.

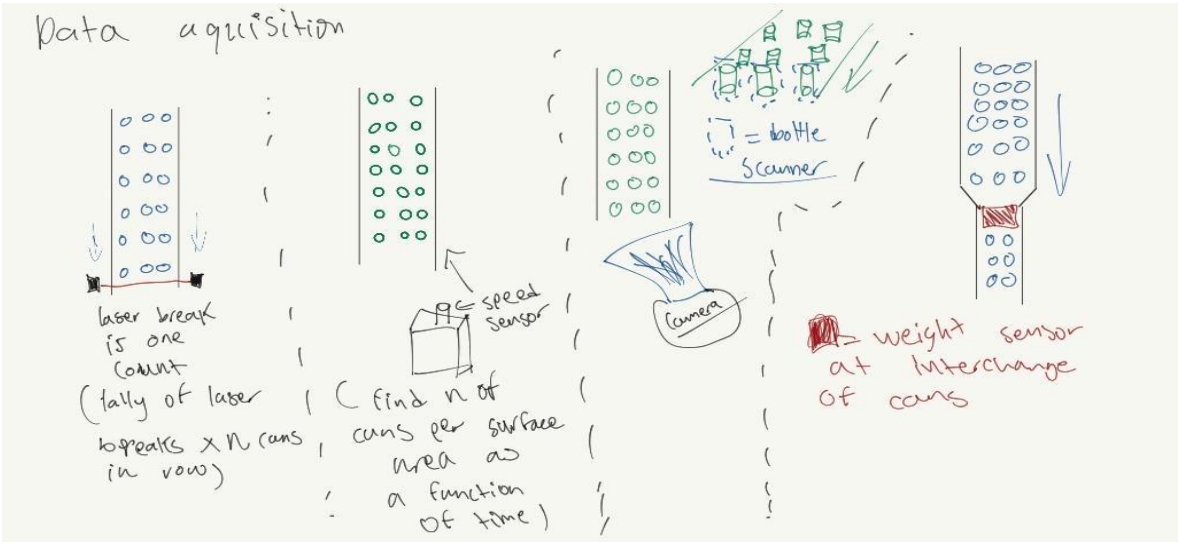

Figure 1. Sketch of Proposed Ideas for Data acquisition

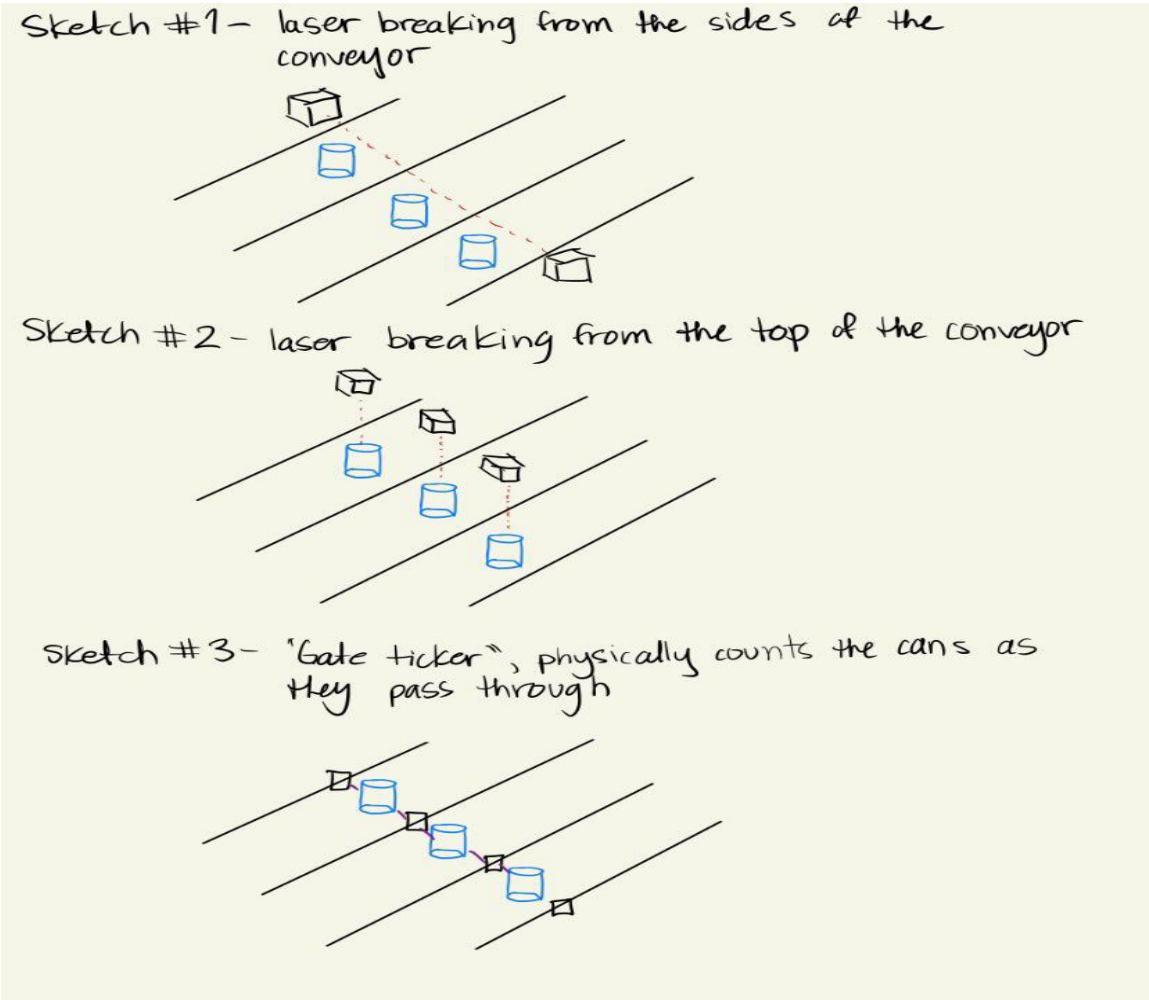

Figure 2. Laser Sketch for Data acquisition

3. Constraint Rating

Best Idea - 3, Medium - 2, Lowest -1

a. Adjustable Sensor Band - goes on either bottlenecks or cans, has a built -in sensor and communicates with adjacent sensors via ultrasonic frequency.

b. Gate ticker - small moveable plastic pieces that physically count numbers of cans as they pass through a gate, one slide or either side of the can. Tracks the movement. 2 + 3 + 2 =7

c. Laser breaking - to track cans 1+2 +2 + 3 + 2 =10
    a. top laser
    b. cross sectional laser

d. Speed sensor - almost like a car speed detector 1 + 1 =2

e. Camera scanning cans- counts cans over a set period of time 3 + 1=4

f. Weight sensor at bottlenecks- counts a can each time the weight sensor goes off 3 + 1 +2 =6

Cons - A weight sensor may interrupt the production line because we need to modify their already made system.

(batch counter idea but not considered due to more necessary clarification needed from client.)

green = 3 points yellow = 2 points red = 1 point

Constraints (multiplies values by 1 to 4 based on overall importance)	**Cost 2x multiplier**	**Interference w/ Pre-Existing System 4x multiplier**	**Parts are easily sourced 4x multiplier**	**Interface several different types of machines 3x multiplier**	**Total points (higher numbers are better)**
Laser scanner	**3**	**3**	**2**	**2**	**32**
Gate ticker	**2**	**1**	**3**	**1**	**23**
Weight sensor	**2**	**1**	**2**	**3**	**25**

4. Information Bridge

Route of Information: Sensor - ethernet cable - wifi modem - cloud

5. Calculation

a. Excel calculations(Visual basic or sheets)

- more research required to figure out which formula to use.

b. Calculator program for each line

- more research required

green = 3 points yellow = 2 points red = 1 point

Constraints (multiplies values by 1 to 4 based on overall importance)	**Cost** 2x multiplier	**Interference w/ Pre-Existing System** 4x multiplier	**Parts are easily sourced** 3x multiplier	**Interface several different types of machines** 4x multiplier	**Total (higher is better)**
Excel Calculations	**3**	**3**	**3**	**2**	**35**
Calculator program for each line	**2**	**3**	**2**	**3**	**34**

6. User Interface

a. App

- accessible on phone

b. Website

- Accessible on phone and computers

c. Monitors at areas so workers can see it too

- Accessible only within the factory

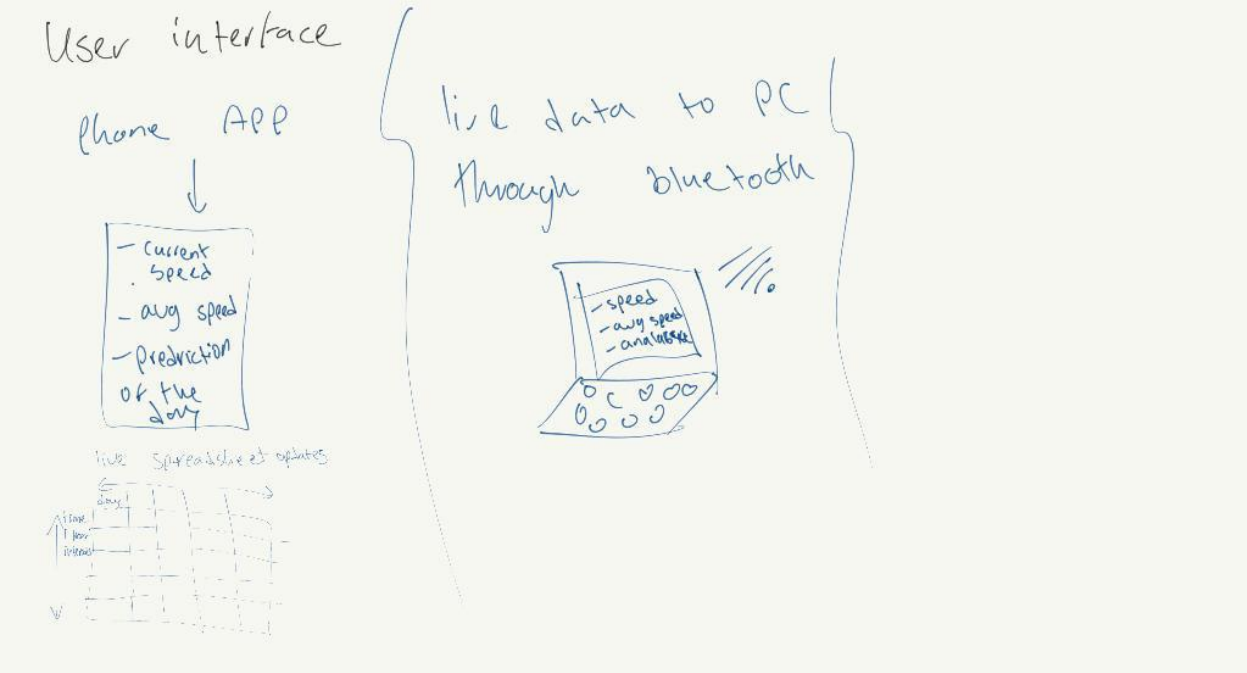

Figure 3. User Interface Sketch

green = 3 points yellow = 2 points red = 1 point

Constraints (multiplies values by 1 to 4 based on overall importance)	**Cost** 2x	**Interference w/ Pre-Existing System** 4x	**Parts easily sourced** 3x	**Interface several different types of machines** 2x	**Data easily viewable** 3x	**Total (higher is better)**
App	**3**	**3**	**3**	**3**	**2**	**39**
Website	**2**	**3**	**3**	**3**	**3**	**40**
Accessible monitors in factory	**1**	**2**	**3**	**3**	**3**	**34**

7. Data Storage

8. Live data as well as the hypothetical benchmark based on bottleneck
9. Track online data
10. Log old data
11. Check and flag for abnormalities

green = 3 points yellow = 2 points red = 1 point

Constraints (multiplies values by 1 to 4 based on overall importance)	**Cost** 2x	**Interference w/ Pre-Existing System** 4x	**Parts easily sourced** 2x	**Interface several different types of machines** 4x	**Total (higher is better)**
Live data and benchmarks	**2**	**2**	**3**	**3**	**30**
Track online data (cloud)	**3**	**3**	**3**	**2**	**32**
Log old data	**2**	**3**	**3**	**2**	**30**

8. Wrike

Below are screenshots of an updated Wrike task board that includes changes made in estimated task duration, completed tasks/ responsibilities, additional dependencies, and tasks assignees etc. An external link cannot be provided since full usage of Wrike is limited for those without a paid membership. Additional and/or updated dependencies cannot be added. The team intends to communicate with the project manager to remedy the aforementioned sudden issues.

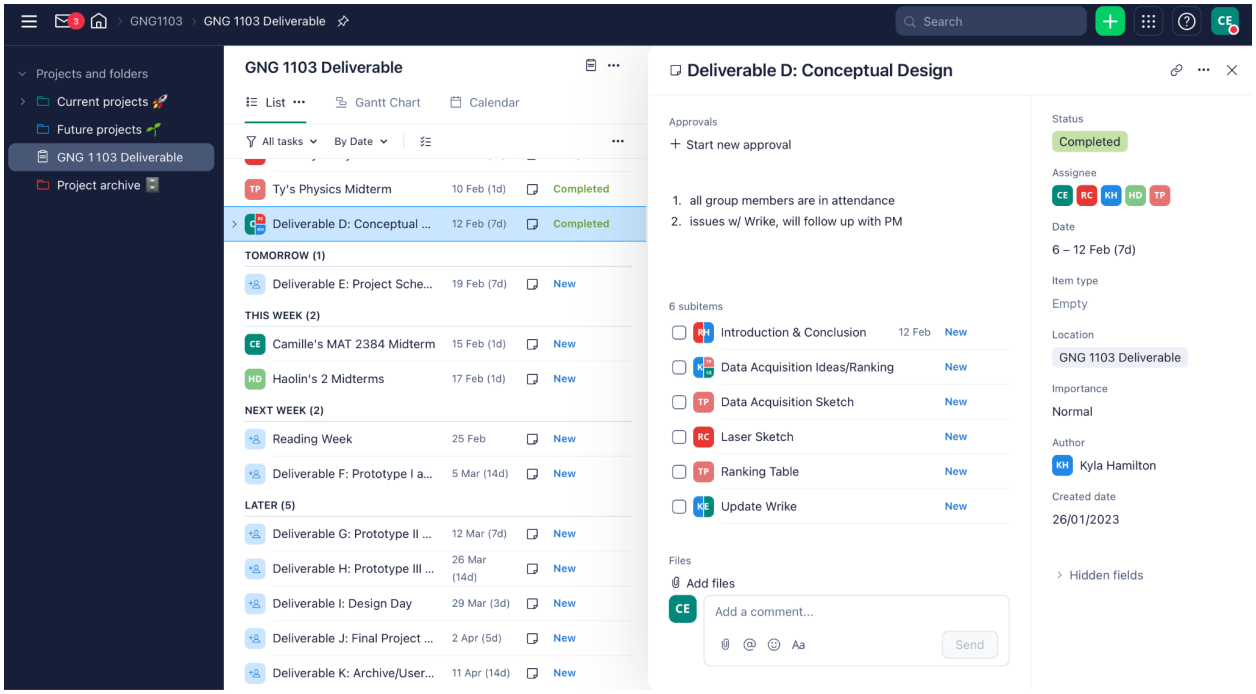

Figure 4. Wrike Task Board Screenshot

9. Conclusion

With the usage of the design criteria along with client needs from the previous deliverables, the team has compared the top ideas to the criterion in a selection matrix with the constraints. After the comparison of ideas in the selection matrix, the best ideas from each section are deemed as the following: tracking the product with a laser scanner, using excel for calculations, using a website as the user interface, and storing all of the data on a cloud service. The best way to wire the raw data onto the cloud in order to perform calculations has yet to be determined. When combining the proposed ideas from each section, it should theoretically provide the best idea for a final product.