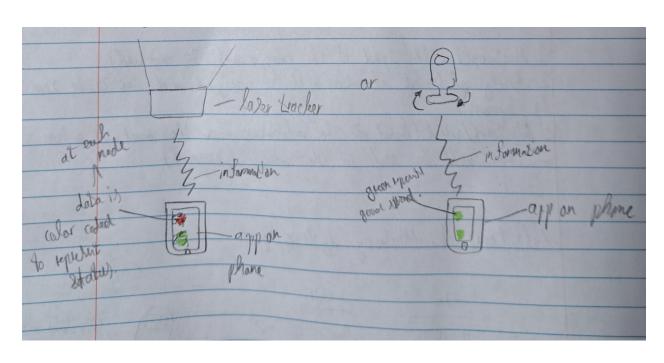
## Project Deliverable D: Conceptual Design GNG 1103 Prof Knox

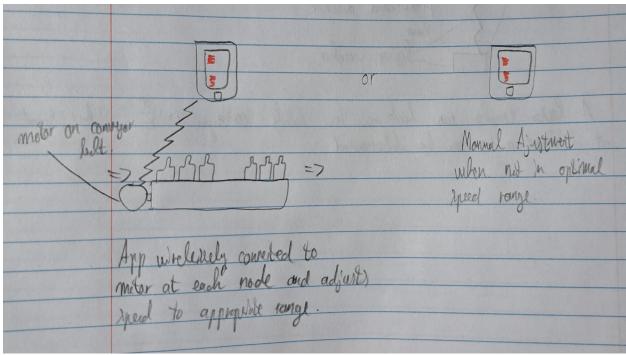
Alex Milgram
Kalan Kok
Eric Wang
Charlie Huang
Peter Zhou

# **Table of Contents**

1. Detailed Drawing	3
2. List of required components and cost	4-5
3. List of Project Risks	6
4. Lecture 11 Prototype Plan	7-11
5. References and Wrike	12

### **Detailed drawing:**





### List of required components and costs:

Name	Description	Quantity	Price	Total
Thunkable	Our project is made of two parts: a machine that determines the speed and an app that controls the speed. Thunkable is a platform that allows people to design and test their apps.	1	\$0	\$0
Python	In order to make the app and machine connected, we need to do some coding in order to allow the app to control the system remotely. Python is a free coding language that can be downloaded from the internet.	1	\$0	\$0
Laptop/PC	In order to run python we need a laptop or PC to do it. Fortunately, everyone in this group already owns one so we do not need to purchase another.	1	\$0	\$0
Phone	Thunkable requires to be installed on a cellphone in order to get the app tested. It would cost around \$1000 for a brand new phone but every member of this group already owns one so there is no need to buy new phones.	1	\$0	\$0

Breadboard	We will be building a circuit on the breadboard, and this would be the prototype for the machine that determines the speed of the conveyor belt. Thus this breadboard is necessary because it can hold a lot of wires at the same time and is easily accessible. Purchased via amazon.	1	\$20	\$20
Wire Kit	When building a circuit, wires are required no matter what. The wire kit has wires in 6 different colours, with a length of 32.8 feet each, which perfectly meets our requirements. Purchased via amazon.	1	\$20	\$20
LED Light	Two LED light bulbs are required in the circuit. One showing the system is working normally, with the colour green. And there will be another red light that only lights up when there is an error occurs. Purchased via amazon.	2	\$15 for 5	\$15
Arduino UNO Rev 3	Arduino UNO Rev 3 is the most basic and commonly used board in the world. It is used to connect the sensors and circuit we build to the conveyor belt. Additionally, we have worked with it before during the lab so everyone in this group is familiar with it. Purchased via amazon.	1	\$45	\$45

The Purchasing links are in the references

#### List of project risks:

Mobile app:

#### • Unable to implement the software system as we expect on a mobile app

During the lab in GNG1103, the only mobile app developer students learn is thunkable. Assuming students do not have any background knowledge on software design, thunkable is the only access to implement a mobile app. The main concern would be to get the value from plc, sending the value to the arduino and to the app

#### • Can't run the program on the app

Logical expression, formatting error can lead the software not able to run the program on the app.

#### Displaying incorrect data and color on the mobile app

The app may display the wrong value for speed when the equation is implemented incorrectly and the color may indicate differently depending on the range in the logic expression.

Arduino Uno:

#### Coding error

Some errors include logical expression, variable declaration, formatting and function prototypes.

#### • Wires and resistor misplugging

Make sure the wires are connecting to the right holes (long end and short end are plugged properly). Resistor is plugged into a hole directly below the cathode lead of the LED and the other lead into a hole below the middle channel of the breadboard.

#### • LED is not lighting properly

Suppose light is shining green when the product line is running efficiently and red when it is not. LED light can execute incorrectly when factors above happen.

## **Lecture 11 Prototype 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	Description: Make sure all necessary Software is working how it should be.  Why: This allows us to ensure that we will not have any problems related to the software. (this step also ensures all add-ons we are going to need are installed to the ide).	Description: Ensure that the software is working Arduino IDE, Online Compiler/coder  Type of test: Focused, Physical  Materials required: Arduino IDE, Computer, Arduino, and breadboard  Cost to set this up: 0\$	Record if all the technology is working and ensure that all the add-ons for the ide are installed and are working properly	Estimated date and time duration: February 28 <sup>th</sup> should take about 15 min this task should be completed first

2	Description: Ensure that the LEDs are working.  Why: This allows us to ensure that we will not have any problems related to the components.	Description: Use a basic Arduino code and Arduino to ensure the LEDs are working you can use a simple led code/Arduino setup to accomplish this.  Type of test: Focused and physical	Record if the LEDs are lighting up and that there are no damages to the pins.	Estimated date and time duration: Feb 28th should take 5 min this task should be completed second
		Materials required: Arduino IDE, Computer, Arduino, Lights, breadboard and wires  Cost to set this up: 90\$		

3	Description: Set boundaries for the code  Why: we need to do this because we want to be able to calculate the speeds that all the conveyors are going and need to be going.	Description: Using the Arduino IDE set the restrictions of the code. This will take lots of time to set up and is important that it is working well. The restrictions will include lots of calculations and if/else statements.  Type of test: Focused and comprehensive	We will check the outputs of the code to determine if it is running properly.	Estimated date and time duration: March 1st should take about 1 hour + delays for code restructuring (this code is fundamental to our product)  This task should be finished third
		Materials required: Arduino IDE, Computer, Arduino, and breadboard  Cost to set this up: 0\$		

4	Description: Set up LEDs on the Arduino + breadboard  Why: we need to make sure that all the wiring and led placement is set up so that we can start creating the code to control the LEDs	Description: Hook up the necessary parts to the Arduino in a way that will relate to the code.  Type of test: Focused and Physical  Cost to set this up: 90\$ assuming you haven't done the last steps	We will run a test code to ensure that everything is hooked up properly before trying to use the LED code in the next test.	Estimated date and time duration: March 1st Should take 15 min to run/set up the breadboard this task should be finished fourth
		Materials required: Arduino IDE, Computer, Arduino, Lights, breadboard and wires		

5	Description: Incorporate LED commands into the code  Why: we need to incorporate a way for the lights to change color to signal the user that their line is efficient/inefficient	Description: Incorporate a part of the code that will control the lights depending on the speed data we give the code this will require lots of manipulation of the previous coding task and continuous checking	Ensure the Lights are lighting up respectively the code it giving a proper output and that the code can run indefinitely	Estimated date and time duration: March 2 <sup>nd</sup> should take about 1 hour if worked on efficiently this task should be finished last
		Type of test: Focused and Comprehensive		
		Cost to set this up: 0\$		
		Materials required: Arduino IDE, Computer, Arduino, Lights, breadboard and wires		

#### References and Wrike

#### Wrike SnapShot:

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=vdthil848FzzsrCFcVif8TptAr YiQS7S%7CIE2DSNZVHA2DELSTGIYA

#### References:

- "Arduino Uno Rev3 [A000066] : Amazon.ca: Electronics." *Arduino UNO REV3 [A000066] :*Amazon.ca: Electronics,
  - https://www.amazon.ca/ARDUINO-A000066-Uno-DIP-1-5/dp/B008GRTSV6/ref=sr\_1\_1?
    crid=21FKNZSHY0V4&keywords=arduino&qid=1676849080&sprefix=arduino%2Caps%
    2C98&sr=8-1.
- "CBAZY™ Hook up Wire Kit (Stranded Wire Kit) 30 Gauge Flexible Silicone Rubber Electric

  Wire 6 Colors 32.8 Feet Each 30 AWG." *Amazon.ca: Tools & Home Improvement*,

  <a href="https://www.amazon.ca/CBAZY-Stranded-Flexible-Silicone-Electric/dp/B073RDGTPB/ref">https://www.amazon.ca/CBAZY-Stranded-Flexible-Silicone-Electric/dp/B073RDGTPB/ref</a>

  =sr\_1\_5?crid=1CQFPON09STAT&keywords=wire&qid=1676861779&sprefix=wire%2Ca

  ps%2C103&sr=8-5.
- "Elegoo 3pcs Breadboard 830 Point Solderless Prototype PCB Board Kit for Arduino Proto Shield Distribution Connecting Blocks." *Amazon.ca: Electronics*,

  <a href="https://www.amazon.ca/Breadboard-Solderless-Prototype-Distribution-Connecting/dp/B0\_1EV6LJ7G/ref=sr\_1\_9?crid=3K5GI1OAWNN0P&keywords=bread%2Bboard&qid=16768\_61800&sprefix=bread%2Bboard%2Caps%2C103&sr=8-9.</a>
- "ZZHXSM 200pcs 5mm Light Emitting Diode Assortment Led Circuit Kit 5 Colors Led Diodes for Industrial Field, Student Experiment, School Science Project, LED Bulbs Amazon Canada.", LED Bulbs Amazon Canada,

  <a href="https://www.amazon.ca/ZZHXSM-Emitting-Assortment-Industrial-Experiment/dp/B08V18">https://www.amazon.ca/ZZHXSM-Emitting-Assortment-Industrial-Experiment/dp/B08V18</a>

  TD4W/ref=sr\_1\_3?crid=1WYKUVDE3XXO6&keywords=led%2Blight%2Bfor%2Bcircuits

&gid=1676857493&sprefix=led%2Blight%2Bfor%