FRESHIST

July 21, 2019

Dr. Craig Scratchley
School of Engineering Science
Simon Fraser University
Burnaby, BC, V5A 1S6

Re: ENSC405W/440 Project Proposal for FooMinder

Dear Dr. Scratchley,

This attached document outlines the project proposal for the design and implementation of FooMinder, a mobile application and a detector, prepared by my team. Our purpose for this project is to apply image recognition and sensor data analysis to provide a reminder and organizer for groceries. We will be developing a tool to use in families for daily routine.

The aim of this proposal is to provide a high-level overview of our product. This document outlines our product scope and purpose, the potential risks and benefits, the current market and competitions. It also details our cost considerations and a brief introduction to our team and members.

Freshist consists of four passionate and ambitious senior engineering students: Xiaoyan Zhang, Yixin Hu, Wei Liang and Ruihong Gong. As we are coming from different engineering concentrations, our team has extensive hardware and software background to support us achieve our goal. Our team would like to thank you in advance for taking the time to read our project proposal. If you have any questions, feel free to contact our Chief Communication Officer, Yixin Hu, at huyixinh@sfu.ca.

Sincerely,

Xiaoyan Zhang
CEO
Freshist

Enclosed: Project Proposal for FooMinder

Project Proposal

Group 6

FooMinder

Partners:

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Submitted to:

Craig Scratchley, ENSC 405W

Andrew Rawicz, ENSC 440

School of Engineering Science

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Issued Date:

July 21th, 2019

Executive Summary

When refrigerators are not widely used in normal families for storing vegetables and fruits, people often go to the market every day to buy fresh vegetables and fruits, these are usually eaten in a very short time. However, nowadays people's life is more fast-paced, and people have fewer chances to buy fresh fruits and vegetables every day. They tend to buy a lot of vegetables, fruits and meat at once and use the refrigerator as a place to store food for a long time.

As most people may or may not notice that on the one hand, fruits and vegetables stored in the refrigerator for a long time are likely to lose their nutritive value. On the other hand, fruits and vegetables stored in the refrigerator are easy to be forgotten. By the time they realize, most of these fruits and vegetables have gone bad and need to be thrown away. Therefore, our team came up with this project aims to reduce food waste for such reasons. If we can reduce such food waste, we are able to save money on buying groceries and moreover help accomplish the world's sustainable goal.

Our product, FooMinder, is designed to consist of a mobile application and a fridge detector. In this modern world, people rely on technology products, such as smartphones, for their daily needs. Apps installed on smartphones are a simple way to keep users engaged. We propose to use image processing to convert images to texts after users scan their receipts. This technique will allow us to generate the grocery lists and set up a reminder to alert users when certain items are going to be bad soon. To properly store food and analyze data accurately, we have added a dedicated environmental detector to the home refrigerator. We believe this system will be an accurate and effective solution to the problem.

This proposal document, we will present a high-level overview of our product. We will also discuss the potential risks and benefits in our project. A detailed market and competition analysis are included as well. As one of the primary concerns, we will provide the cost analysis, funding and resources. We aim to set the price reasonable and attractive. For the reference of project progress, the project timeline is given at the end.

Our team consists of four enthusiastic students from various engineering background of electrical, computer and systems which brings solid knowledge and expertise in hardware and software. With this asset, we have great confidence that we will accomplish our goal.

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Glossary

Aflatoxin: A family of toxins produced by certain fungi that are found on agricultural crops such as maize (corn), peanuts, cottonseed, and tree nuts.

Alcohol Fermentation: A biological process which converts sugars such as glucose, fructose, and sucrose into cellular energy, producing ethanol and carbon dioxide as by-products.

Arduino Uno: An open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc.

Carcinogen: Any substance, radionuclide, or radiation that promotes carcinogenesis, the formation of cancer

Conductive Polymer: known more precisely as intrinsically conducting polymers (ICPs). They are organic polymers that conduct electricity.

E.coli: Escherichia Coli. A type of bacteria that normally lives in your intestines. It's also found in the gut of some animals.

Ethanol: A chemical compound, a simple alcohol with the chemical formula C_2H_6O. It is a volatile, flammable, colourless liquid with a slight characteristic odour.

Ethylene: A hydrocarbon which has the formula C_2H_4 or $H_2C{=}CH_2$. It is a colourless flammable gas with a faint "sweet and musky" odour when pure.

Foodborne Pathogen: Substances such as parasites or bacteria in food that cause illness or food poisoning, and in severe cases, death.

GC: Gas Chromatography. A type of chromatography used in analytical chemistry for separating and analyzing compounds that can be vaporized without decomposition.

HPLC: High Performance Liquid Chromatography. A technique in analytical chemistry used to separate, identify, and quantify each component in a mixture.

Mycotoxin: Naturally occurring toxins produced by certain moulds (fungi) and can be found in food. It can cause a variety of adverse health effects and pose a serious health threat to both humans and livestock.

Oxidized: A type of chemical reaction in which the oxidation states of atoms are changed. The chemical species from which the electron is stripped is said to have been oxidized.

Salmonella: A group of bacteria that commonly cause a foodborne illness called salmonellosis.

Sensory Metrology Instrument: The measurement of parameters that, either singly or in combination, correlate with attributes of human response (sight, smell, sound, taste and touch).

Spectrometer: A scientific instrument used to separate and measure spectral components of a physical phenomenon.

1 Introduction

With today's continuing and rapid improvement in mobile devices and machine learning technology, people are able to get a lot done with their phone. The mobile phone has become an essential tool in modern people's life. Mobile phones and mobile applications are playing a great role in improving living standards. Therefore, we want to provide a simple-use, cost-friendly and effective application that can be easily installed on phones which can help users keep track of their groceries and organizing them at the same time.

In the current market, there are products that are designed to detect fruits/vegetable freshness and smart fridges that are able to detect the environment inside the fridge. However, they are either pricey or may damage the fruits/vegetables and will reduce the storing time. In order to provide a tool that will not cause these problems but also can be accessed freely on major mobile devices, we designed FooMinder. FooMinder is designed to be a system that consists of two major parts, a mobile application and a fridge detector.

Users can record their daily receipts from the grocery stores using our application. By scanning the receipts using image processing, the application will extract the grocery list and set up a reminder to alert users when it is close to the expiration date. The reminder is set up based on the data pulled from the web and it is suggested to store the fruits/vegetables in the desired place. The purpose of the fridge detector is to make sure the environment of storage is desirable. It needs to be put inside the fridge and continuously detect the environment of the fridge. With the built-in sensors, the processed data will send through Bluetooth to our mobile application. The fridge status data will be also visualized in the application and suggest the users clean the fridge when necessary. We believe it would be an effective way to get the best nutrition from every single food and thus help reduce food waste and save money for the users.

In the structure of this proposal document, section 2 presents a high-level overview of our prototype. Section 3 discusses the potential risks and benefits involved in the project. It also provides a detailed analysis of markets and competitions. Section 4 lists the cost analysis and potential funding resources. Section 5 provides the project schedule including each task done and milestones.

2 Project Overview

2.1 Background

According to the Food and Agriculture Organization (FAO), roughly one-third of all food produced globally is either lost or wasted. Food is wasted in various ways. For example, foods that are close to, at or beyond the “best-before” date are often discarded from household kitchens by consumers[1]. Less food waste would have positive influences on climate change and sustainability. Reducing food loss and waste is crucial to creating a Zero Hunger world and reaching the world’s Sustainable Development Goals[2].

When we go shopping and bring a lot of groceries back home, we often forget some food item after stowing them into the fridge drawer hidden or under other items. By the time we realize this, some groceries are already smelly and mouldy. And also, an early recording and detection system can help prevent the rotting item from affecting the remaining products. This will imply that food waste is reduced.

Furthermore, we believe there is a big market for our product. The target of Alpha Mos, the current market leader in the French company, is the very expensive and high-performance laboratory equipment market[3]. The relatively inexpensive and portable devices of Scensive Ltd (Bloodhound) and Smiths Detection (Cyranose model), which are often reported in the academic literature, are based on conductive polymer arrays. All existing equipment is intended to be used strictly as a laboratory instrument similar to HPLC/GC and spectrometers[3]. All of these devices need to be individually calibrated for specific applications. The company “eNose” is researching technology to make cheaper detector, but it is specifically targeted at the medical industry and disease detection[4]. Different from them, our choice of targeting families will have strong potentials in the market.

2.2 Scope

The scope of our capstone project includes the design, modelling and testing for the prototype of FooMinder. To accomplish this, we established the main requirements of our design, which includes:

1. Both the mobile application and detector have properties of low latency, efficiency and accuracy.
2. The detector detects the temperature, humidity and chemical concentrations.
3. The detector distinguishes different chemicals.

4. The data from the detector will be sent to our Android application through Bluetooth.
5. The detector accompanies with an Android application.
6. All data will be stored in the database and visualized in the Android application.
7. The Android application recognizes different layouts of receipts from different stores.
8. The Android application recognizes item abbreviations and converts them into words.

Figure 2.1 below displays a high-level overview of the hardware and software design of FooMinder. The prototype will present the main sections along with several subsections.

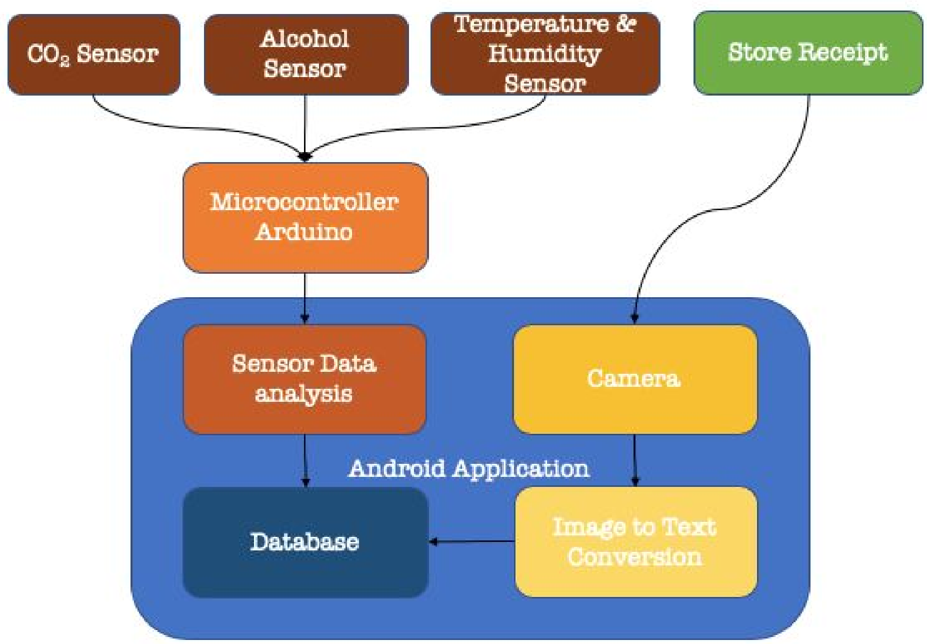


Figure 2.1: FooMinder's System Overview

3 Product Justification

3.1 Risks

3.1.1 Health Risk

FooMinder is a product created for families of relatively big size, making it easier for users to keep track of the groceries they currently have and the items that are about to expire. One of our main goals is to develop a contactless detection mechanism that can extract gas concentrations from fruits and vegetables without damaging them internally. The gas concentrations will be processed into comprehensive values presented to the users that will provide a clear idea of whether the item should be consumed or not.

Without using non-destructive ways to test the quality of a product, health risks can arise from damaging a fruit. As a result, bruising a fruit can make it more susceptible to infections. As the cell walls break down, nutrients leak into the open, inviting colonization by microbes already present on the surface of the fruit or in the air. The microbes will feed on the exposed areas inside the fruit, giving rise to the multiplication of more microbes. Poking into the fruit has a similar effect to an apple left exposed to air, as it slowly becomes oxidized causing an unappealing brown colour. The same implications can be seen in other fruits such as bananas, pears, peaches, etc. The problem is that excessive poking and testing can further reduce the quality of fruits/vegetable over time, which in turn increases the rate at which they expire or rot. It's also possible for damaged fruit to grow some food-borne pathogens, such as salmonella or e.coli, but single-cell fungi such as yeasts and mould are far more common. Yeasts are less concerning as they are a prominent source in alcohol fermentation. However, mould on the other hand release mycotoxins, which can cause different human illnesses[5]. (The most notorious mycotoxin, known as aflatoxin, is a potent carcinogen that grows on milk, cheese, nuts, and grains.) When it comes to consuming damaged fruit/vegetables, usually healthy adults can get away with it without suffering from severe health issues, but this can be different for children and elders. The user is recommended to test the fruits/vegetables by observation instead of damaging the item, or discard the fruit if it has been poked too many times. Thus, our device will avoid using destructive techniques to test the quality of the fruit/vegetable.

3.1.2 Reliability

By utilizing a non-destructive device to detect gas concentrations in produces, we can avoid situations when a user hurts himself by inserting a detector needle into a fruit or vegetable. Although many physical risks can be avoided with the exception of using a detection needle in our product, having a contactless detector will inherently reduce reliability. For example, a major risk in our product can be the dispersion of the gas concentration when the fridge door is open. In that case, we would recommend the users to only pull detector data when the fridge door is closed for a while, ensuring the concentrations have recovered back to peak values. Another risk would be the ability to distinguish a particular fruit or vegetable that is going bad among all foods in the fridge and be able to tell the user which of the items are soon to expire. This issue will be addressed by observing the gas emission rates for different fruits and vegetables. For example, when apple is left uneaten over time, it emits ethylene, which is a type of ripening agent in the form of gas, and ethanol in the form of liquid. In other words, ethanol is a product of ethylene through a hydration process and its concentration can be detected by an alcohol sensor[6]. Fruits such as apples and pears emit a greater amount of ethylene gas which affects their ripening. On the other hand, cherries or blueberries, produce very little ethylene gas, therefore, have a lesser effect on the ripening process[7]. Figure 3.1 below shows the production rates of ethylene in three different types of apples. Figure 3.2 below depicts the emission rates of ethylene and carbon-dioxide for a variety of fruits at room temperature.

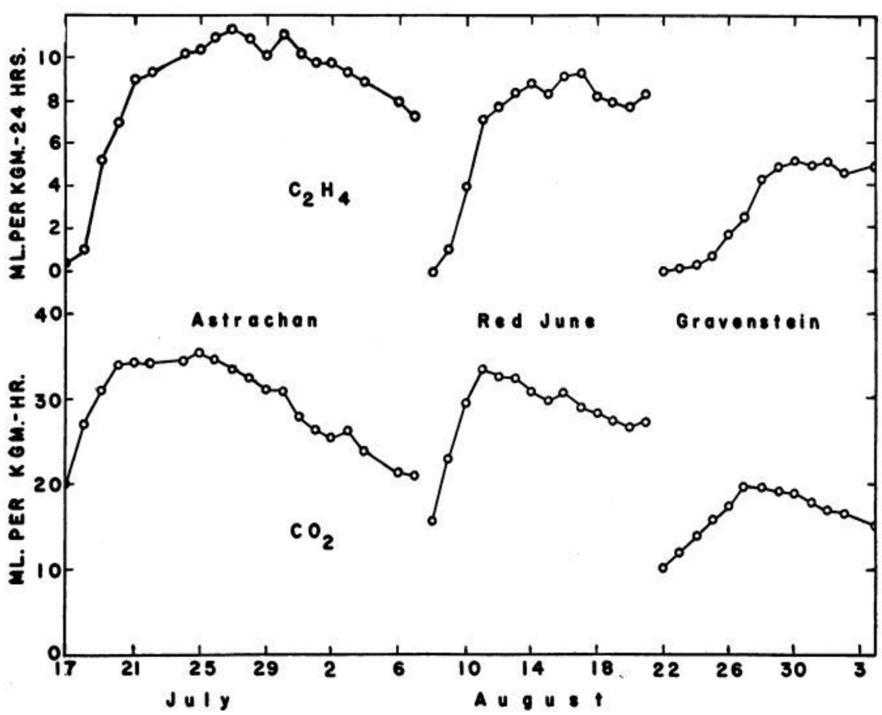


Figure 3.1: Production of Ethylene Over Three Different Types of Apples Over Time [8]

TABLE I

CONCURRENT VALUES FOR ETHYLENE AND CARBON DIOXIDE PRODUCTION

FRUIT	VARIETY	TEMP. °C	C_2H_4 ML/KG · HR × 10^3	CO_2 ML/KG · HR	$\frac{C_2H_4}{CO_2} \times 10^3$
Tropical					
Banana	Gros Michel	20	4	80	0.05
Mango	Haden	20	0	65	0.0
Papaya	......	25	37	44	0.84
Pineapple	......	25	0	42	0.0
Subtropical					
Avocado	Fuerte	20	88	156	0.56
Cherimoya	Booth	20	186	129	1.44
Feijoa	Coolidge	20	50	73	0.69
Lemon	Eureka	25	0	6	0.0
Orange	Valencia	25	0	8	0.0
Orange	W. Navel	20	0	8	0.0
Persimmon	Hachiya	20	2	17	0.12
Sapote	Pike	20	129	43	3.0
Temperate					
Apple	McIntosh	20	112	12	9.3
Pear	Bartlett	20	122	42	2.9
Pear	Bosc	20	29	14	2.1
Peach	Hale	20	36	37	0.97

Figure 3.2: Table of Fruits and Their Corresponding Ethylene / CO_2 Emission Rates [9]

Once we know the emission rate of ethylene and a certain concentration level, we can determine whether a particular type of fruit is spoiling. The user can decide upon whether to consume the item or dispose of it.

3.2 Benefits

3.2.1 Remotely Monitor Fruit/Vegetable Status

Often times when people buy a lot of groceries, it may be quite difficult to remember what they have bought after a couple of days. When food is left untouched in the fridge, it may take a while before one come to a surprise that they still haven't cooked their potatoes yet, or their half-eaten avocado has been left in a plastic wrap for a week. FooMinder provides users with notifications through a smartphone app, allowing them to get up-to-date information about their fruits and vegetables. The android application is built upon the idea of reminders, analogous to how a busy person would schedule his monthly goals in the calendar app so he can keep track of completed and undone tasks. The underlying concept is the same, only FooMinder operates on fruits and vegetables kept in a family's fridge. The user is able to remotely monitor the status of their food without scrambling in their fridge to find out what's left, hoping that they can still consume them before the expiry date.

3.2.2 Battery Powered

Instead of powering our device with a USB connection to a host machine, we can isolate it by powering it with a 6v battery. The typical current consumption of the Arduino Uno microcontroller is about 40mA, if given 4.5V as the input voltage to run the board then it can sustain up to 167 hours without a recharge, or less than 7 days[10]. Given that we will be running our device with a 6v battery, it can last more than 7 days under normal operations. This will be convenient for the users as they don't have to replace batteries frequently.

3.2.3 Small and Compact Size

Our detector is small in size and can be easily installed in a family fridge without taking too much space. The dimensions of our detector are 100mm by 45mm by 60mm in length, width, and height respectively, and can be attached to the internal walls of a fridge with small suction cups. We specifically chose these dimensions for the detector so that it can be placed in any orientation within each dividing section of shelves to make it convenient for the user to install and remove the device. If the user has habits of separating his meats and fruits/vegetables, our detector is also able to fit into tiny fridge compartments as well.

3.3 Market Analysis

According to the United Nations Food and Agriculture Association (FAO), the amount of food wastage is estimated at 1.6 billion tons worldwide, with a global cost of $750 billion annually[11]. Each day 35 to 40 percent of the food that is grown or raised is wasted. Among all food categories, fruits and vegetables rank second in wastage[12]. The below Figure 3.3 shows the global food loss and waste in kilograms per person.

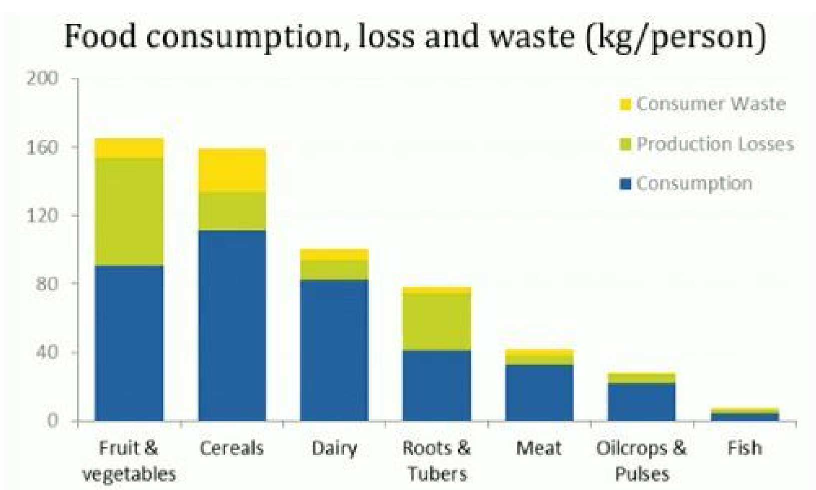


Figure 3.3: Food Consumption, Loss, Waste per Person in Kilograms [13]

By the year 2050, it is estimated that food production will be increased by approximately 60 percent. Nevertheless, there will also be an imminent increase in food waste. An analysis by the article “Global food losses and food waste”[14], mentioned that food waste in developing countries is minimal due to poverty and limited household income. Therefore, it is unacceptable to throw away food. A contributing factor is that consumers generally buy a small number of food products at a time, often just enough food for the day. On the other hand, in industrialized countries, people tend to waste more food simply because they can afford to do so. A lot of grocery stores offer large packages, “getting one for free” bargains, or cheaper cost over a certain weight for fruits and vegetables. This incentivizes grocery shoppers to buy more than they can consume, leading to wastage of uneaten and spoiled foods. Our solution is to target markets that are established on the principle of conserving fruit and vegetables so families can be conscious of food waste, and take preventive actions to consume their food before their expiration dates. Although not everyone is responsible for food waste, we believe that everyone should play a role in promoting awareness to reduce world hunger and make the world more sustainable. We can start off by using smart technologies to help people be mindful of their fruits/vegetables so they can maintain a high level of food conservation.

3.4 Competitions

Our biggest competition will likely be companies that produce sensory metrology instruments targeting the produce industry. A specific market competitor, for example, will be Alpha Mos[15], a French company that develops and manufactures analytical instruments for chemical and sensory analysis. Their well-known product, the “Heracles Neo” is an electronic nose used to analyze the aroma and chemical molecules that compose a smell. An electronic nose in layman’s terms is a device that can detect smell more effectively than that of a human nose, typically consisting of an array of electronic sensors for chemical detection and a neural network to recognize chemical patterns. The recognition system can detect odour pertaining to specific molecules that release the smell and then translate the sensory inputs into digital values. However, the downside of owning an electronic nose leads to great expenses in addition to its big size. There are limitations to their potential in terms of sensitivity to odour and the ability to provide accurate chemical detection. The spectrum of e-nose varies in accuracy, smaller devices are generally less accurate and larger devices usually contain more sensors but with better chemical detection. Our detector consists of three basic sensors: CO_2, alcohol, and temperature and humidity, used in conjunction to detect chemical concentrations at a specific temperature. Our goal is to process these concentrations and compare them with the gas emissions from various fruits/vegetables and determine which of them are spoiling. However, we want our detector to also have a small and compact size so it can be installed into a fridge to extract sensor data. Although the accuracy of spoiled fruit/vegetable detection is limited to the complexity and size of the detector, we will be considering feedback from users to improve our detection accuracy.

4 Finances

4.1 Cost Analysis

Table 4.1 below contains all the components and costs required to build the FooMinder product. For the hardware components, we will mainly use a microcontroller Arduino Uno integrating with three detection modules, temperature and humidity module, alcohol module and CO_2 module. All of the measured data can be transmitted to a mobile device through the Bluetooth module.

Equipment List	Quantity	Estimated Cost
LCD 16x2 Display Module	2	$1.98
KCD1-101 Rocker Switch	2	$0.32
Battery Holder Case	5	$0.56
Breadboard Wire Jumper	65	$0.90
DHT-22 Temperature and Humidity Module	1	$5.23
MQ-3 Alcohol Module	2	$1.50
MH-Z14 CO2 Module	1	$37.65
HC-05 Bluetooth Module	1	$5.25
Arduino Uno Microcontroller	1	$27.05
Total		$80.44

Table 4.1: Project Budget

4.2 Funding and Resources

Our project is mainly supported and funded by the Engineering Science Student Endowment Funding (ESSEF), the Wighton Development Fund and IEEE Student Project Funding. For the Wighton Development Fund, the money will be released for students' projects satisfying

Wighton's requirement of practicality. Additionally, IEEE student branches provide a way to get money and guidance for projects so that engineering students can develop their research, development, project management. In case of insufficient funding, our team members are willing and agreed to share the extra expenses which exceed the received funding amount.

5 Project Scheduling

In order to ensure that our project is successfully completed step by step in a planned way. We have planned and worked out the following schedule. We can see that throughout the whole design process, we need to spend plenty of time to do research and discussion, and then implement our project design. During this period, we will have several group discussions and two significant progress meetings with professors and TA, who can bring us some suggestions and help. In addition, in each design stage, we will have corresponding tests to test the functionality and purpose of the design. As mentioned in the chart below, currently our main functional tests include two parts, the software and hardware part. For the hardware section, all sensors can work properly and transmit data to mobile devices through the Bluetooth module. On the software side, we need to test whether we can extract the information we need from the receipt which is in the format of image, then convert it into text format. Besides, we also have a milestone chart to show our progress. Throughout the term, we are supposed to write papers of requirements specification, design specification, and a proposal document. Also, the most important section of this term is the proof-concept presentation and demonstration. We will be following these time schedules to make sure that our project could be accomplished professionally and on time.

5.1 Gantt Chart

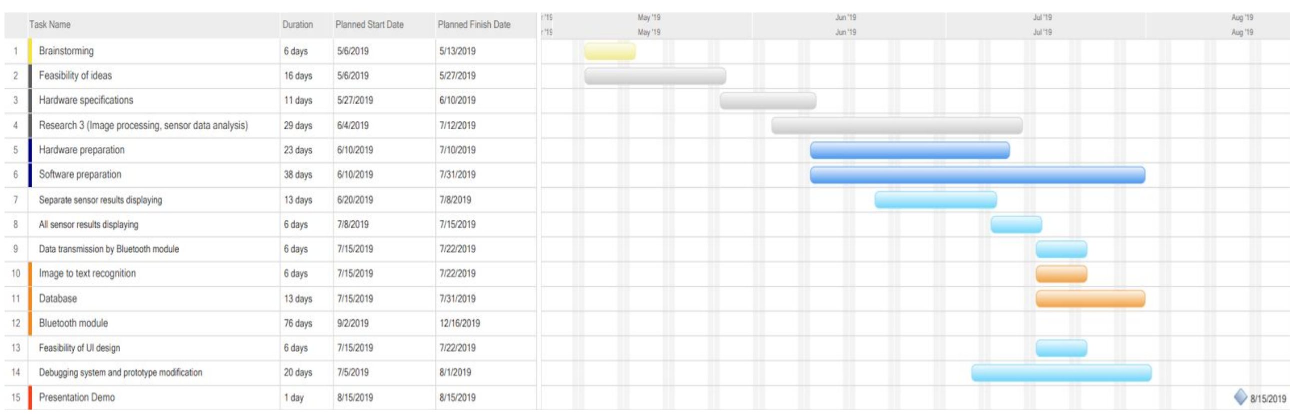

	Task Name	Duration	Planned Start Date	Planned Finish Date
1	Brainstorming	6 days	5/6/2019	5/13/2019
2	Feasibility of ideas	16 days	5/6/2019	5/27/2019
3	Hardware specifications	11 days	5/27/2019	6/10/2019
4	Research 3 (Image processing, sensor data analysis)	29 days	6/4/2019	7/12/2019
5	Hardware preparation	23 days	6/10/2019	7/10/2019
6	Software preparation	38 days	6/10/2019	7/31/2019
7	Separate sensor results displaying	13 days	6/20/2019	7/8/2019
8	All sensor results displaying	6 days	7/8/2019	7/15/2019
9	Data transmission by Bluetooth module	6 days	7/15/2019	7/22/2019
10	Image to text recognition	6 days	7/15/2019	7/22/2019
11	Database	13 days	7/15/2019	7/31/2019
12	Bluetooth module	76 days	9/2/2019	12/16/2019
13	Feasibility of UI design	6 days	7/15/2019	7/22/2019
14	Debugging system and prototype modification	20 days	7/5/2019	8/1/2019
15	Presentation Demo	1 day	8/15/2019	8/15/2019

Figure 5.1: Gantt Chart

5.2 Milestones Chart

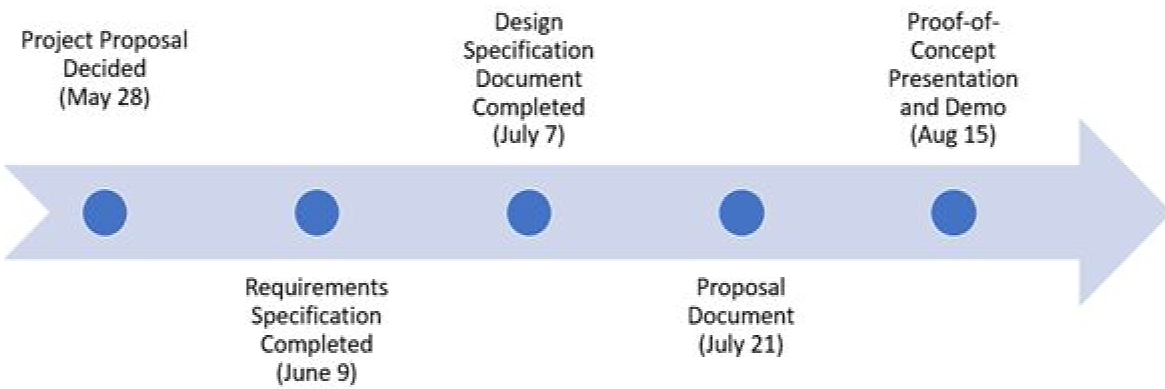


Figure 5.2: Milestones Chart

6 Company Overview

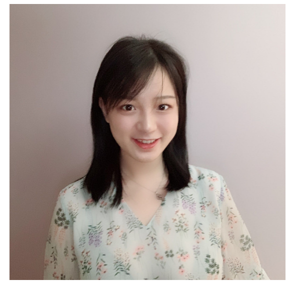
FRESHIST

Figure 6.1: Company Logo

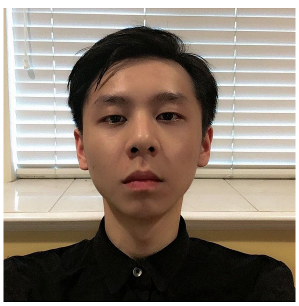
Formed on May 7th, 2019, Freshist aims to provide a reliable, user-friendly and cost-friendly solution, FooMinder, to help individuals and households organizing their groceries. Our company name, Freshist, is formed by “Fresh” and “List” which indicates our goal of providing the list of fresh fruits/vegetables. Our product name, FooMinder, is formed by “Food” and “Reminder”. We believe that by providing the whole list of groceries and set up the reminder of certain food near expiration date will help users keep track of their grocery, thus reducing food waste and saving money for the users. The logo is designed in the colour green to provide the concept of our company as safe, healthy and environmental. As a team of engineers that discover problems and find solutions in real life, we are willing to give our effort to meet the world’s sustainable goal.

6.1 Meet the Team

Gloria is a fourth-year Systems Engineering student with interests in electrical circuit design. She has completed industrial internships at Uchoice manufacturing. Through various lab experiences and a 4-month coop in SFU FAS lab, she has gained valuable knowledge about troubleshooting and teamwork. Gloria will apply her knowledge of hardware design and circuit debugging to support building the key components of our product.



Xiaoyan Zhang (Gloria)
xza144@sfu.ca
Chief Executive Officer



Ruihong Gong (Harry)
harryg@sfu.ca
Chief Technology Officer

Harry is a fourth-year Computer Engineering student with interests in working on IoT embedded modules. He has previously completed his internship at Sierra Wireless where he wrote python scripts to automate firmware updates as well as developed applications on an IoT framework. He is a well-rounded software engineer having experience in development, unit-testing, and automation and is willing to bring forth his knowledge in the design of this project.

Victor is a fourth-year Electronics Engineering student. He has completed three co-op terms in Icove Technology as a manager assistant. He has been trained and getting experience in debugging and building circuits, and he can use specific hardware description software to integrate separate and small systems into a big central-controlled system. Thus, his experience can help with hardware prototyping and testing.

Wei Liang (Victor)
wla111@sfu.ca
Chief Product Officer

Yixin Hu (Laura)
huyixinh@sfu.ca
Chief Communication Officer

Laura is a fourth-year Systems Engineering Student with interests in software development and machine learning. She has completed both industrial and academic internships during three co-op terms, where she improved her testing and debugging skills. Additionally, she worked as an undergraduate research assistant in SFU's MENRVA Lab, where she gained experiences on android application development and database management experiences.

7 Conclusion

The ever-increasing population growth has posed many problems to our society through the exhaustion of natural resources in the development of industrialized countries, faster food production, as well as the exponential increase in food wastes. Technologies such as smart fridges have entered the home appliance market and have been increasing in popularity over the past couple of years. Smart fridges have the benefits of convenience with many functionalities such as ways to improve cooking, freshness tracking, and the ability to connect to the internet. However, this package of goods come with great expenses, just like our competitors that manufacture sensory analysis instruments.

Our goal is to design a small, portable and compact detector that can be installed in a fridge and connect wirelessly to an android application for setting up reminders. The proposal discussed the feasibility of our device in terms of the potential risks that can arise from our product and further emphasized on some of its benefits over current market competitors like the "Heracle Neo" e-nose. In addition, the proposal also reviewed the cost analysis of the final product and how we planned our project schedule to accomplish our goals.

The members of Freshist are eager to propose, realize, and bring into practical use the idea of a grocery reminder in the produce industry. We believe that if we can start off by helping a single family to better conserve food, that change can eventually lead to a big achievement in raising world-wide food awareness. We would like to give special thanks to Dr. Craig Scratchley, our TA, Mohammad, and Andrew Rawicz for providing constructive feedback on our Capstone project. As a team of four ambitious engineers, we want to be the starting seeds to end world hunger.

References

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