



Post-Mortem for QuickPost

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1) Introduction

QuickPost is composed of two components: a device intended to reside inside apartment and community mailboxes, and an external parcel container. For the mailbox device, QuickPost attempts to notify the receiver (through email) that mail has been placed in their mailbox. An additional task is to provide visual feedback by sending images of the mailbox contents. The purpose of sending images is to allow the user to differentiate between junk and meaningful mail. Furthermore, the parcel container aims to provide a secure method of package delivery. With the container, couriers can securely drop packages off even if the recipient is not present. Additional security measures (e.g. alarm, camera, force-sensitive resistors) are implemented in case anyone who is unauthorized attempts to open the container.

Over the past semester, Smart Post Solutions, which consists of Anmolpreet Singh Bhullar, Jae (Jay) Kim, Jinhong Min, Lestley Gabo and Paola Pilaspilas, have strived to develop an idea into a viable proof-of-concept. The following document summarizes high level functions of the QuickPost system as well as any challenges encountered during development. Furthermore, scheduling, financials, as well as individual reflections are provided in detail below.

2) System Overview

As mentioned, the QuickPost system utilizes various hardware components to achieve security and timely feedback for recipients. A block diagram representation of QuickPost is provided below in Figure 1. Green blocks are exclusive to the mailbox device while yellow blocks are exclusive to the parcel container. Red blocks are relevant to both devices.

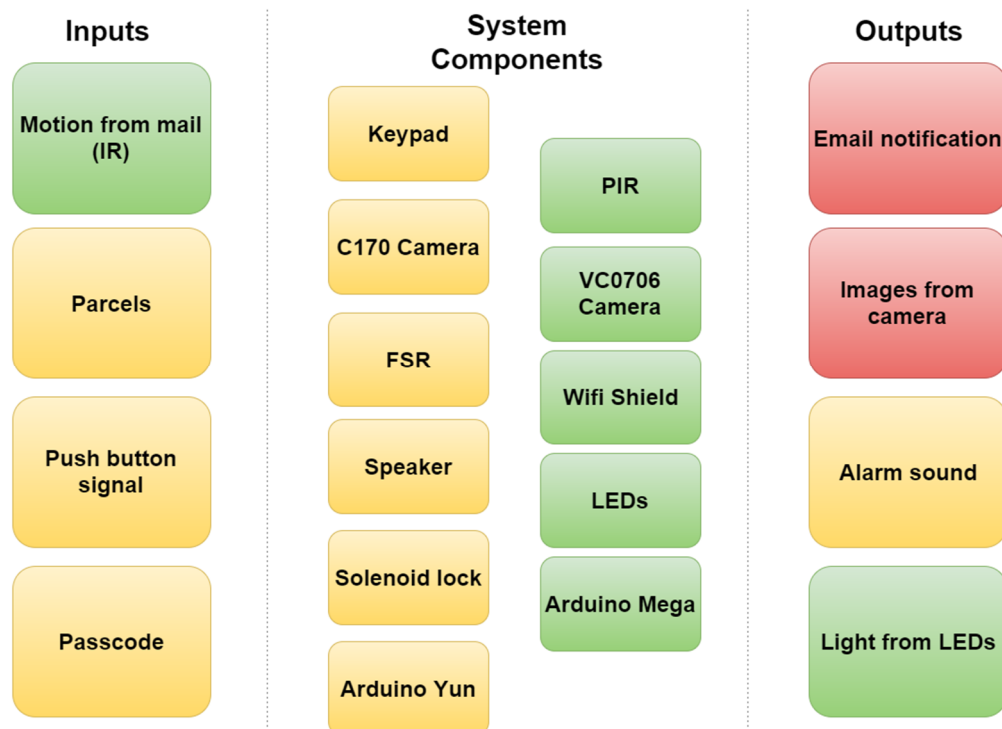


Figure 1: Block diagram of QuickPost system

a) Mailbox Device

The mailbox component of QuickPost will be attached on the inside ceiling of the mailbox. The proof-of-concept device consists of a microcontroller (Arduino) that controls a camera module, PIR sensor, LEDs and a Wifi shield. The software flow for the mailbox device is provided below in Figure 2.

```
void setup()
{
  WifiSetup();
}

void loop()
{
  if (ReadPIR())
  {
    CaptureImage();
    SendEmail();
    StartTakePhotoCmd();
  }
}
```

Figure 2: Software flow for mailbox device

As shown, the device attempts to connect to a network before reading the output from the PIR sensor. A Wifi shield for the Arduino is necessary to connect to the Internet and provide email feedback to the recipient. Once a connection is made, the PIR output is read continuously until motion has been detected. Next, the camera captures a frame and sends JPEG bytes to the Arduino using asynchronous serial communication. After the last JPEG bytes are sent, the Wifi shield is used to connect to an SMTP server to send an email notification to the recipient. Lastly, before looping, a command to allow the camera to resume capturing frames is sent from the Arduino.

An enclosure was made for the mailbox device to keep users safe from accidental contact with electronic components. The 3D printed enclosure can be found below in Figure 3. The design was created using SolidWorks while SFU ENSC facilities were used to perform the printing.



Figure 3: Mailbox device enclosure

b) Parcel Container

The parcel container is a standalone box entirely separate from the mailbox. An Arduino Yun controls a push button, solenoid lock, keypad, FSRs, and USB camera/speakers. The container unlocks when the push button is pressed, which allows the courier to place the package inside. As a security measure, the force sensitive resistors are placed on the bottom of the container to measure the amount of pressure of the packages. The intended result is that the courier will only be able to place packages inside the container but is unable to remove packages without setting off the alarm and camera. The security mechanism is created by the combined efforts of the solenoid lock, keypad, FSRs, camera, and speaker. Deactivating the security mechanism requires a password input (using the keypad) which unlocks the container. If the security mechanism is not deactivated when the contents are taken out, the speaker will sound an alarm and an image of the unauthorized person(s) is captured and sent to the receiver. The hardware interface of the container can be found below in Figure 4.

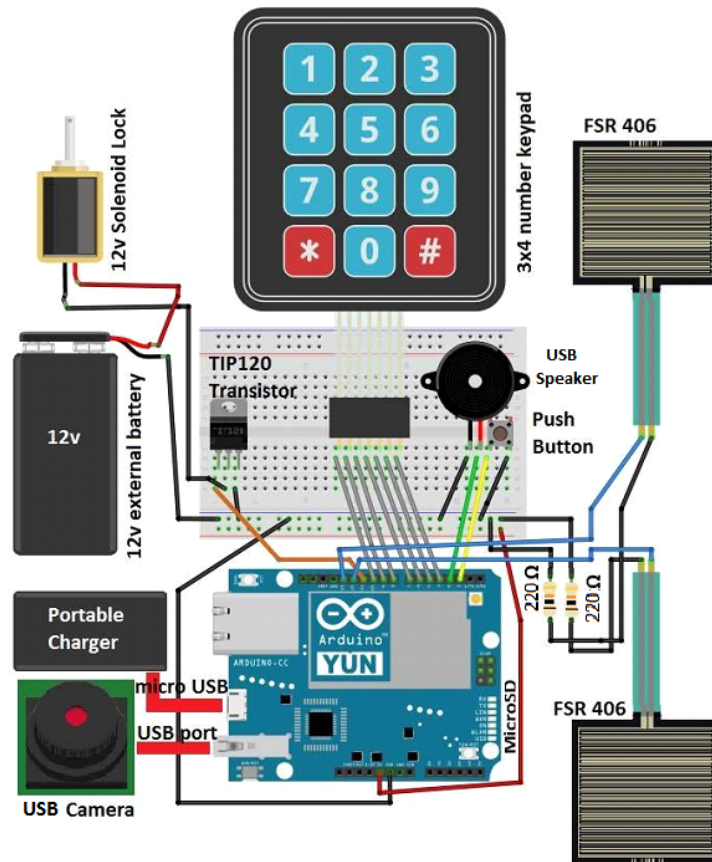


Figure 4: Hardware interface for parcel container

a) Costs

Estimated and actual costs incurred in developing the proof-of-concept is outlined below in Table 1. The first 2 columns represent the estimated costs, while the last 2 columns represent the actual costs. A discrepancy exists between the two lists since the estimated costs were



thought of in the early stages of development. Parts were added/removed as QuickPost's design became progressively mature.

Table 1: Estimated vs. actual costs

Part (Estimated)	Cost (CDN)	Part (Actual)	Cost (CDN)
Arduino UNO R3 (2x)	\$70	VC0706 UART VGA Camera	\$76.84
Sensor Kit (2x)	\$95	OV7670 Camera	\$13.35
Wifi Shield (2x)	\$95	USB External Stereo	\$10.99
Camera Module (2x)	\$30	Arduino Yun	\$131.35
Parcel Box (incl. materials, locking mechanism)	\$100	Force Sensitive Resistor (2x)	\$17.00
		Lock-style Solenoid	\$20.00
		12 volt Battery	\$30.00
		Adafruit HUZZAH CC3000 WiFi Shield	\$53.50
		Round Tactile Button Switch	\$7.80
		9V Battery Holder	\$5.25
		USB Cable A-B	\$5.25
		4x4 Keypad	\$15.00
		USB Camera	\$25.00
		USB Speaker	\$25.00
		USB HUB	\$10.00
		Building Parcel Box	\$50.00
		Physical Mailbox	\$25.00
		PIR (motion) Sensor	\$25.00
		Mailbox Enclosure	\$100.00
		High Power LED, MAX232 IC	\$10.00
Total	\$680	Total:	\$656.33 - \$400.00 (ESSEF grant)
Total with contingency (10%)	\$748	Total Money Spent	\$256.33 or \$51.26 per person

3) Schedule & Development Issues

The development schedule for QuickPost is provided below in Figure 5. Tasks in green were completed by the estimated deadline while tasks in blue were finished with extensions. Since the system was divided into 2 standalone components, most tasks were completed in parallel.

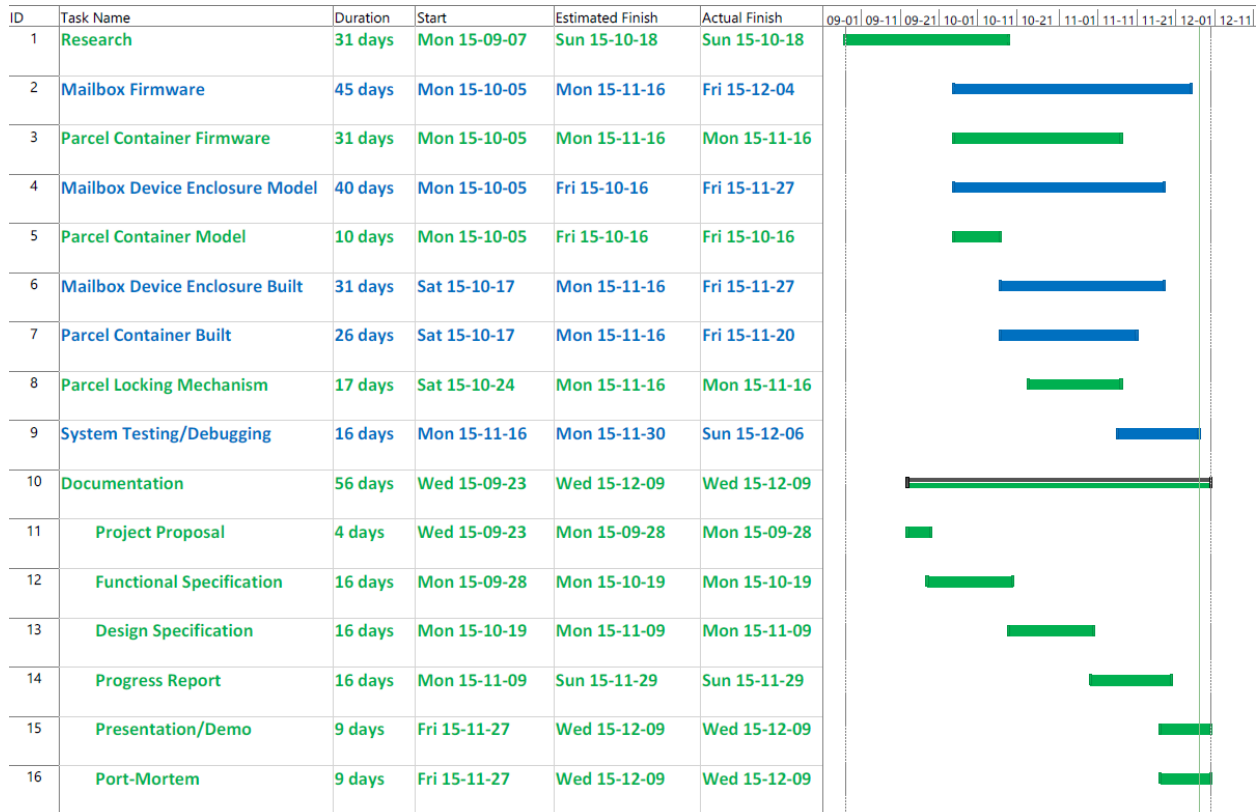


Figure 5: Development Schedule

Implementing the camera for the mailbox device was a major technical challenge, which resulted in the delayed finish of the Mailbox Firmware task. Upon investigation, the original camera was found to introduce various firmware tasks that were not anticipated. Furthermore, interfacing the camera with the Arduino was left as the last firmware task and was started later than we would have liked. As a result, a new camera module (VC0706) (which had a simpler 2 wire serial interface) was bought in late November. Incorporating the VC0706 also brought technical challenges. Despite the manufacturer’s website declaring that the camera operated on 5V CMOS/TTL voltage levels [1, 2], we found out that the camera was actually running on ±8V RS-232 voltage levels. Since the Arduino’s I/O pins operate at 0-5V, signal conversion was needed. A MAX232 chip was used to handle the conversion [3], and once the camera received a recognizable signal, commands (sent to the camera) to capture frames were implemented according to the VC0706 protocol. 2-3 days of development was lost by taking the website’s information for granted rather than referencing the datasheet carefully and observing what ICs are used on the module. Lack of research (for both camera modules) resulted in delays during the system testing phase as well.

Another unexpected challenge occurred when we discovered that the parcel container’s hardware suddenly stopped working. The keypad stopped functioning partially while the push button and FSRs did not respond at all. We were able to conclude that the problem occurred

due to shorts caused by poor insulation of exposed wires. The problem was fixed by resoldering all components and replacing the transistor.

4) Team Organization

The QuickPost team was formed during the first day of ENSC305. Fortunately, team members were composed of various engineering disciplines, and had a variety of skills with a strong background in software/firmware development. Having a strong software background helped greatly in developing and debugging Arduino programs. No major issues occurred during the last 4 months as the team meshed well from the first meeting to the last. The workload distribution chart, which outlines tasks ventured by each member, can be found below in Table 2. 'xx' indicates major responsibilities held by a given member, while 'x' represents secondary responsibilities.

Table 2: Workload Distribution

Task	Aanmol Bhullar	Lestley Gabo	Jay Kim	Paola Pilaspilas	Jin Min
Documentation	X	X	X	XX	X
Administration				XX	
Financials		XX			
Parts Sourcing	X	XX	X		X
Mailbox					
Software			XX	X	
Hardware			XX		X
Integration			XX		X
Testing/Debugging			XX	X	
Enclosure					XX
Parcel Container					
Software	XX	X			
Hardware	X	XX			
Integration	XX	XX			
Testing/Debugging	XX	XX			
Design & Manufacturing	XX	X			

5) Reflections

a) Paola Pilaspilas

In the past 4 months, I have learned what it was like to work on a product from conception to development and integration. Furthermore, a takeaway from the project is that what I have learned so far in my 3 years as a Computer Engineering Student is the bare minimum of what is required for Capstone. I am very thankful for my team to have guided me throughout this journey and introduced me to things that I have never even tried tickling with. Arduino, for instance, is a major leap for me to learn because I have only heard of it but I have never tried using it. I have worked with microcontrollers before but unfortunately, I have never



encountered Arduino in my past projects. However, I had no choice but to learn it and I could proudly say today that I have successfully programmed an Arduino.

Of all of the things I have learned from this project, the most valuable skill I have learned is communication and time management. Throughout our implementation and integration process, we felt like we were always behind schedule. However, we were able to persevere as we understood that critical moments near deadlines requires patience, respect and understanding. Working in a team has its challenges and being able to compose yourself, respect one another, derive a plan, and tackle it accordingly is what matters.

b) Jay Kim

The last 4 months have been a challenging but rewarding experience that was not matched by any other ENSC class. Working with a team of 5 brought its own challenges (such as incorporating each other's work), but was enjoyable in the long run due to the personalities of each member. I was slightly skeptical of forming a group with students that I have never met before, but the teamwork and cohesion quickly formed as the term went on. Working on QuickPost has taught me valuable technical and interpersonal skills that will likely stick with me throughout my career.

Initially, starting such a large project felt daunting but I soon learned to approach tasks separately to avoid feeling overwhelmed. Working on tasks one-by-one becomes even more important when working under pressure near a deadline. One interesting aspect of the course is that most deadlines are set by the students rather than the instructor. Therefore, we had to be highly motivated and work with a sense of urgency from day 1. Furthermore, I received a small glimpse of what it takes to bring a product to market. One thing that stood out to me is making sure the issue is fully understood before designing a solution, which is a crucial problem solving method that can be applied to all facets of life. Lastly, the documentation requirements of the course was necessary to flesh out the entire product development process.

As I was mainly responsible for the software used in the mailbox device, I was able to improve my programming skills and learn the possibilities of Arduino programming. Since the code was to be shared within the group, I tried to emphasize readability with proper code documentation and by keeping the sketch as modular as possible. Because I had previous experience developing firmware in C, Arduino code came naturally to me. However, I would still like to work on my optimization techniques as the program started growing too large to fit on an UNO. Keeping the program small allows for portability across various Arduinos. Furthermore, I learned to isolate possible sources of error during debugging. For example, the Arduino kept hanging when trying send emails with image attachments. I was able to figure out that the encoding function was the issue, rather than the email code. Other debugging issues were figured out through reading online documentation on libraries and programming techniques. Another major issue I ran into was trying to interface the camera with the Arduino. The main takeaway from the camera issue is that all available documentation needs to be read before purchasing the part. Specifically, I should reference the datasheet/schematic rather than the information shown on the manufacturer's website. For several days, I was under the



impression that no external hardware would be needed to interface the camera. However, once I found out from the schematic that the camera ran on different voltage levels than the Arduino, the problem was solved afterwards with minor issues. Proper planning and research on parts would have allowed us to avoid wasting time and money.

c) Lestley Gabo

I have learned that things will never work properly without thorough testing. This project course seems like it would be easy, but now that I am here at the end, it has been very hard! The last four months for this course has gone by like this: documentations, buying parts, testing, buying more parts, more documentation, building the actual project, fixing the project, why is it not working project, finally it works project, final documentation. This is a very accurate portrayal of my semester for this course. It has been an experience learning how to program an Arduino and make its modules work.

I remember from ENSC 220 and ENSC 225 when Professor Ash taught us how to properly wire circuits and how to work with chips, voltages, etc. There was one group I saw at that time that got their breadboard circuit rejected because Ash did not like it. That was all he said, because he did not like it. Now I understand fully what he meant. On the first iteration of the parcel box, even though everything was wired up properly, Ash would not have liked it either. The protoboard was very congested and there were even extra wires I left on purpose just in case we would need it (like extra grounds and extra 5 volt connections). Although these extra wirings might not have been the cause for the broken parcel box it definitely helped. After we resoldered everything again and cleaned up the wires, we felt more confident in our work and the parcel box glowed in our eyes because we knew then that it would work properly from then on.

There is also the issue of myself being the person who bought most of the parts for the group. I know we bought these parts as a group, but I felt guilty that some of the parts were not usable by us at all. Firstly, even with expedited shipping, they took too long and delayed us. Secondly, in the end, some parts had to be replaced immediately because it was just not ideal or just not going to work. We did our research for these parts but it was not enough. We were content just to be able to order something and did not look into the fact that what if it would not work. As a group we have learned our lesson for this one the hard way, but as the one who ordered the parts it still makes me feel bad.

Overall it has been a fun journey. If I had to give myself from four months ago any advice on how to make my life easier, it would be "Just do it." I was hesitant about ordering and ordered late in the game so that parts came late. I also did my parts in documents late which must have been bad.

d) Anmolpreet Singh Bhullar

I learnt that everything that initially may seem simple can actually turn out to be really hard. And small little things such as making a certain sensor work properly can consume an entire day or maybe a week. Things don't always work out the way they are planned and a lot of changes

are made to the product along the way. At the end you may get a product which is different in features than initially planned. Slow shipping can be a great setback to the schedule. I learnt a lot about Linux, various sensors, Arduino IDE and microcontroller Arduino in general. I discovered various shortcomings of Arduino and how choosing a proper microcontroller is really important to the product. One should buy a microcontroller based on the needs and should not just pick the most popular one from the shelf and assume that it is capable of doing everything. I learnt a lot about the product documentation and how they are essential part of product development. It was the documentations of the various sensors and microcontroller we used that saved us a lot of time. Products with poor documentation lead to time wastage and we would definitely not be buying that company's product in the future. Reading and making documentations are a crucial part of any product. Another important thing that I learnt this semester is that poor communication can lead to a lot of problems both personal and professional. I also learnt how to deal different kinds of people. Everyone has different pace of learning so one should not lose patience if the other person doesn't get the information you are passing. One should try to explain it using a better approach and maybe use a lot more diagrams.

e) Jinhong Min

As a fourth year student majoring in Systems Engineering, I believe that ENSC440/305 were the most challenging courses compared to any other courses that I took before. Through this project, a lot of software and hardware skills are required and since Arduino plays key role on the product, I have to independently learn about what an Arduino is, and how to connect with other components such as camera module, PIR sensor and LEDs. Even though I have heard of Arduinos in various scenarios, I have never used or applied it in my academic years. It was really interesting; at the same time, it was not as easy as I expected. Furthermore, even though I have gained the SolidWorks experience from ENSC 489, this project requires more detailed skills that I have never learned yet.

Throughout this course, the most valuable skills that I have learned is importance of research. During the designing an enclosure by SolidWork, I planned to finish the whole design in three weeks. However, every time I finished the SolidWork design, I often have encountered with critical problems that may ruin our enclosure design such as dimension on components, how much offset needed and so on. In order to avoid the critical issues, I decided to pause everything that I had worked and started research from the beginning again, such as detailed information of every component as well as size of bolts, screws and nuts. Also, Gary Shum gave me incredible feedback on the design so I was able to print out the design without any problems.

In addition, since the project demands enormous amount of documentation such as project proposal, functional specification and design specification, my writing and reading skill have been exponentially improved. Last but not least, I am very thankful to take this course that has provided me the opportunity to improve my technical, interpersonal, communication, and writing skills.



6) Conclusion

The five members of Smart Post Solutions were successful in carrying out the mission to design the QuickPost system. A proof-of-concept was built and demonstrated to bring convenience to mail/package recipients across various places of residence. The project provided a valuable interpersonal and technical learning experience that could not be replicated in any other ENSC class. Specifically, critical thinking and decision making skills required to undertake the project are going to be beneficial throughout our careers. QuickPost will not be abandoned yet as we plan on continuing to develop the system in our spare time. Further developments, such as customized microcontrollers/PCBs, fingerprint scanning, and improved parcel container design, will be considered as the members continue their degrees.

References

- [1] ITEAD STUDIO, "VC0706 UART Camera (Supports JPEG)," [Online]. Available: <https://www.itead.cc/vc0706-uart-camera-supports-jpeg.html>. [Accessed 7 December 2015].
- [2] ITEAD STUDIO, "VC0706 UART Camera (Supports JPEG) ," [Online]. Available: http://wiki.iteadstudio.com/VC0706_UART_Camera_%EF%BC%88Supports_JPEG%EF%BC%89. [Accessed 7 December 2015].
- [3] Texas Instruments, "MAX232x Dual EIA-232 Drivers/Receivers," [Online]. Available: <http://www.ti.com/lit/ds/symlink/max232.pdf>. [Accessed 7 December 2015].



Appendix A: Meeting Minutes

Quick Post

Meeting 1 AGENDA

September 15, 2015

13:30-14:25

SFU Burnaby Library

Purpose of Meeting: To discuss and choose a project idea

Items for Discussion:

- Choose form of communication
- When and where should we meet formally every week?
 - We have now scheduled for 10:30 AM every Friday for the main meeting
- Share project ideas



Quick Post

Meeting 1 MINUTES

September 15, 2015

13:30-14:25

SFU Burnaby Library

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To discuss and choose a project idea

Minutes:

Anmolpreet Singh Bhullar called the meeting to order at 13:30.

A. Approval of the agenda and minutes of the September 15, 2015 meeting

Minutes were approved as amended:

- Collectively as a team, the choice of communication is via facebook and SFU webmail

B. Availability

When and where should we meet formally every week?

Discussion: Paola Pilaspilas is taking 5 classes and she is available on Monday & Wednesday morning and Friday after ENSC 305W class. Anmolpreet Singh Bhullar is working on Thursday.

Action: Collectively as a team, we will have our weekly formal meetings on Friday at 10:30-11:30. We will also meet on Wednesday morning, if needed.

C. Project Ideas

Discussion: Paola Pilaspilas' ideas were blind spot detector while turning left, wearable device turning heat to electricity, wall outlet tripping detector, automated compass card stop recognition and speaking device to change tones of monotone speakers. Jinhongs' ideas were app for warming coffee cup and an app to temperate rooms by controlling when windows should be closed and opened. Lestley Gabo's ideas were a bus notification app in order to know when the bus is coming within 2 previous bus stops and a wearable device



that notifies you if someone is behind you for security purposes. Jay Kim's ideas were remote control garbage bin and fall detection device for seniors and an anti-theft device with face recognition and voice activation for cars. Anmolpreet Singh Bhullar' were mailbox detector, indoor navigation for SFU and wearable device that generates electricity while walking.

Action: The project that was chosen is mailbox detector.

D. Next Meeting Date

The next meeting was arranged for September 18, 2015 at 10:30-11:30 in SFU Burnaby library.

Meeting was adjourned at 14:25.



Quick Post

Meeting 2 AGENDA

September 18, 2015

10:33-11:24

SFU Burnaby Library

Purpose of Meeting: To discuss and choose a project idea

Items for Discussion:

- Share more ideas because Andrew rejected mailbox notification idea
- Propose a new idea today to Andrew again



Quick Post

Meeting 2 MINUTES

September 18, 2015

10:33-11:24

SFU Burnaby Library

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To discuss and choose a project idea

Minutes:

Anmolpreet Singh Bhullar called the meeting to order at 10:33.

A. Approval of the agenda and minutes of the September 18, 2015 meeting

Minutes were approved as amended.

B. Share Innovative Ideas

Discussion: Ideas that came up were:

Lesley: Automated clothes folder, automatic camera device that moves when taking picture

Jin: A device that detects proper form in exercising

- Automatic lock system

Anmol: Added parcel box. A container to solve parcel delivery problems

Action: Keep thinking about ideas but propose an additional feature (parcel) to our system.

C. Propose to Andrew

Discussion: A parcel device that has security features for the user to prevent thieves and save the user in travel time to have their own parcel delivery box at their own home.

Action: Go to Andrew's office today and propose our new improved idea.

Meeting was adjourned at 11:24.



Quick Post

Meeting 3 AGENDA

October, 2 2015

10:02-10:44

Global Student Society Room

Purpose of Meeting: To discuss Functional Specification document

Items for Discussion:

- Distribute the parts individually for functional specification document
- Construction date of the project
- Who, how and when are we ordering the parts?
- When is our official meetings going to be held?



Quick Post

Meeting 3 MINUTES

October, 2 2015

10:02-10:44

Global Student Society Room

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To discuss Functional Specification document

Minutes:

Paola Pilaspilas called the meeting to order at 10:02.

A. Approval of the agenda and minutes of the October 2, 2015 meeting

Minutes were approved as amended as a team.

B. Distribution of Parts for Functional Specification Document

When can we expect to get this document done?

Discussion: Parts were divided accordingly following the strict guidelines of the rubric:

- Anmol: Introduction and Process Details with collaboration with Lesley
- Jay: Conclusion, Technical Correctness, Proofreading
- Lestley: Sustainability/Safety and Process Details with collaboration with Anmol
- Jin: Sketches and Diagrams of the product
- Paola: Executive Summary, Engineering Standards

Action: Collectively as a team, we have decided to finish all of our parts by October 16th so that Jay will have enough time to go through the document and do any finishing touches.

C. Initial Phase of Project Construction

Discussion: Anmolpreet informed us that he will take care of the construction of the mailbox and the parcel box but he will need supplies (wood, hinges, cardboard box, etc.) as soon as possible.

Action: Paola will look into what can be acquired for free to lessen the costs. Anmolpreet has estimated for the boxes to be done by October 16th.



D. Ordering Project Parts

Who, how and when are we ordering the parts?

Discussion: Jay has a microcontroller that the team can use for one of the boxes. However, we need 2 in total. Parts that must be ordered as soon as possible are micro controller, sensors, lock system.

Action: Paola will contact the library to inquire if parts can be borrowed from them. By next week, the team will order the remaining parts in Amazon that cannot be borrowed from the library by next meeting on Oct. 7th.

E. Official Meeting Date and Time

Official meeting date and times have changed to Wednesdays, 11AM at SFU Burnaby Library.

Meeting was adjourned at 10:44.



Quick Post

Meeting 4 AGENDA

October 7, 2015

10:05-10:34

SFU Burnaby Library - 2nd floor

Purpose of Meeting: To discuss what to borrow from ESSEF and equipment needed to complete the project.

Items for Discussion:

- Items to borrow from ESSEF.
- Items to buy from other sources.



Quick Post

Meeting 4 MINUTES

October 7, 2015

10:05-10:34

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Jinhong Min, Paola Pilaspilas

Absent: Lestley Gabo

Purpose of Meeting: To discuss what to borrow from ESSEF and equipment needed to complete the project.

Minutes:

Jay Kim called the meeting to order at 10:02.

A. Approval of the agenda and minutes of the October 7, 2015 meeting

Minutes were approved as amended as a team.

B. Borrow ESSEF Parts

What can we borrow at ESSEF?

Discussion: Compared parts excel sheet and the parts we need for the project and the available. parts that we can borrow are:

- WiFi Shield x1
- 720p Camera x1
- LCD Keypad Shield x1
- Arduino Uno x1
- Battery 3.7V x1

Action: Paola to email ESSEF and request for the above parts by today.

C. Ordering Parts

Discussion: Parts that needs to be bought because ESSEF doesn't have them:

- Solenoid Lock x1
- RF Receiver + Fob key
- Load Sensor



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- Buttons
- PIR Sensor
- WiFi Shield
- Camera

Action: Lestley will buy these items through amazon by today.

Meeting was adjourned at 10:34.



Quick Post

Meeting 5 AGENDA

October 14, 2015

10:02-10:44

SFU Burnaby Library - 2nd floor

Purpose of Meeting: To discuss parts that have been bought and discuss progress on the functional document

Items for Discussion:

- Parts bought
- Functional document



Quick Post

Meeting 5 MINUTES

October 14, 2015

10:02-10:44

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To discuss parts that have been bought and discuss progress on the functional document

Minutes:

Paola Pilaspilas called the meeting to order at 10:02.

A. Approval of the agenda and minutes of the October 14, 2015 meeting

Minutes were approved as amended as a team.

B. Parts Bought

What have we bought online?

Discussion: Lesley have bought these online and we are waiting for shipment.

- Solenoid Lock x2
- RF Receiver + Fob key
- Load Sensor
- Buttons
- PIR Sensor x2
- WiFi Shield x2
- Camera x2

Action: Lestley to keep track of financials and post it in google doc for everyone to see.

C. Functional Document

Discussion: Functional document is due on the 19th. It has already been created in google doc, people will need to participate and take parts.

Action: Finish functional document by October 16th so we have time for Jay to look it over.

Meeting was adjourned at 10:44.



Quick Post

Meeting 6 AGENDA

October 30, 2015

11:50-12:40

SFU Burnaby Library - 2nd floor

Purpose of Meeting: To distribute software and hardware parts for the project and what components has been bought

Items for Discussion:

- Distribute parts for the project
- Items that have been bought and borrowed from ESSEF



Quick Post

Meeting 6 MINUTES

October 30, 2015

11:50-12:40

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To distribute software and hardware parts for the project and what equipment has been bought

Minutes:

Jay Kim called the meeting to order at 12:00.

A. Approval of the agenda and minutes of the October 30, 2015 meeting

Minutes were approved as amended as a team.

B. Distribution of Parts for the Project

Who will do what?

Discussion:

- Lesley/Anmol: Will take care of the whole parcel box including software and hardware
- Jin/Paola/Jay: Will take care of the whole mailbox including software and hardware. Parts are subdivided like these:
 - Paola: Camera interfacing with arduino which includes picture with motion, SD card and attachment of email
 - Jay: Connection to WiFi, Email and PIR
 - Jin: LED and Enclosure design using SolidWorks for both parcel box and mailbox

Action: All parts will be done within 2 weeks, finishing design document will take priority which is due on November 9th

C. Bought Components

Discussion: Which parts have been bought and are borrowed from ESSEF

- ESSEF
- News: \$400 funding received from ESSEF deposited to Lesley's account



- Arduino Uno was the only component that we were able to borrow
- Bought through other sources:
 - OV7670 VGA (Camera Module): <http://www.ebay.ca/itm/181832406314>
 - Lock-style Solenoid: <http://www.adafruit.com/products/1512>
 - UNIK CC3000 WiFi Shield:
http://www.amazon.ca/gp/product/B00Q8QITRG?psc=1&redirect=true&ref_=od_aui_detailpages00
 - PIR (motion) sensor: <http://www.adafruit.com/products/189>
 - Button: <http://www.adafruit.com/products/1009>
 - Tactile button: <http://www.adafruit.com/products/367>
 - 9V battery holder: <http://www.adafruit.com/products/67>
 - Usb cable: <http://www.adafruit.com/products/62>
 - Keypad:
http://www.amazon.com/gp/product/B00NAY2XUS?psc=1&redirect=true&ref_=od_aui_detailpages00
 - Buzzer 3-24V: <http://leeselectronic.com/product/4134.html>
 - Buzzer 3V: <http://leeselectronic.com/product/4167.html>
 - Force sensitive resistor: <http://leeselectronic.com/product/11045.html>
 - Load sensor: <http://leeselectronic.com/product/15247.html>

Action: Start software development immediately after design specification document

Meeting was adjourned at 12:40.



Quick Post

Meeting 7 AGENDA

November 13, 2015

10:30-12:30

SFU Burnaby Library - 2nd floor

Purpose of Meeting: To follow-up on the project's status

Items for Discussion:

- Encasement - Best place to 3D print
- Software progress of mailbox
- Software progress of parcel box



Quick Post

Meeting 7 MINUTES

November 13, 2015

10:30-12:30

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min

Absent: Paola Pilaspilas

Purpose of Meeting: To follow-up on the project's status

Minutes:

Jinhong Min called the meeting to order at 10:30.

A. Approval of the agenda and minutes of the November 13, 2015 meeting

Minutes were approved as amended as a team.

B. Encasement - Mailbox

Where to do the 3D Printing?

Discussion:

- SFU Surrey
- BCIT
- Private company - try to avoid this because it will take 2-3 weeks

Action: Jin to research the above and find out the prices

C. Software Progress - Mailbox

Discussion: Jay is working working on the PIR and email attachment code and Paola is working on the camera module code and being able to interface it with the arduino

Action: Continue working on the software development, once done, test your code

D. Software Progress - Parcel Box

Discussion: Individual parts of the parcel box is currently being coded and tested. Lesley and Anmol will add an additional feature: voice feedback that instructs courier how to use the system

Action: Continue working on the software development, once done, test your code

Meeting was adjourned at 12:30.



Quick Post

Meeting 8 AGENDA

November 20, 2015

10:44-12:05

SFU Burnaby Library - 2nd floor

Purpose of Meeting: Check in to see the status of the project and distribute parts for progress report

Items for Discussion:

- Camera Module of the Mailbox
- Encasement of the Mailbox
- Distribute parts for progress report



Quick Post

Meeting 8 MINUTES

November 20, 2015

10:44-12:05

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To follow-up on the project's status

Minutes:

Anmolpreet Singh Bhullar called the meeting to order at 10:44.

A. Approval of the agenda and minutes of the November 20, 2015 meeting

Minutes were approved as amended as a team.

B. Camera Module of Mailbox

Challenges and Problems?

Discussion: Different frequencies and power for the camera and the arduino un. Need to do low level programming which will require time.

Action: Collectively, as a team, we've decided to buy another camera that will save image as JPEG and which has compatible voltages as the arduino

C. Encasement of the Mailbox

Discussion: Jin is almost done with the SolidWorks design of the encasement, will need to acquire last minute measurements

Action: Will be done by next weekend, November 28th

D. Progress Report

Discussion: Due on the 29th.

Action: Do the challenges and remediation part of the Mailbox - Jay, Jin, Paola

Do the challenges and remediation part of the Mailbox - Anmol & Lesley

Do them by Friday, Nov 27th

Meeting was adjourned at 12:05.



Quick Post

Meeting 9 AGENDA

December 4 2015

11:39-12:25

SFU Burnaby Library - 2nd floor

Purpose of Meeting: Check in to see the status of the project and distribute parts for post mortem and demo presentation slides

Items for Discussion:

- Camera Module of the Mailbox
- Update on the costs
- Distribute parts for post mortem and demo presentation slides



Quick Post

Meeting 9 MINUTES

December 4, 2015

11:39-12:25

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: Check in to see the status of the project and distribute parts for post mortem and demo presentation slides

Minutes:

Jay Kim called the meeting to order at 11:39.

A. Approval of the agenda and minutes of the December 4, 2015 meeting

Minutes were approved as amended as a team.

B. Camera Module of Mailbox

Challenges and Problems?

Discussion: New camera is not responding, Jamal (TA) tried to help but could not find the problem

Action: Collectively, as a team, we've decided to abort the addition of the camera module to mailbox. Jay will try one last time to make it work today.

C. Update on Costs

Discussion: We've spent a total of \$656.33 for the project.

Action: Subtracting the funding of \$400, we are obliged to pay Lesley \$51.26 each.

D. Post Mortem & Demo Presentation

Discussion: Both documents are due on the 9th.

Action: Do by Dec. 6th, Paola will create the backbone of the documents and will distribute the parts on google doc. Group meetup presentation practice on December 7th at 11:30 .

Meeting was adjourned at 12:25.



Quick Post

Meeting 10 AGENDA

December 7, 2015

2:35-3:05

SFU Burnaby Library - 2nd floor

Purpose of Meeting: Integrate and test QuickPost & make an informative video

Items for Discussion:

- Flash LED for the mailbox
- Update on the parcel box
- Informative video for the system
- Testing and powerpoint slides for the Demo date



Quick Post

Meeting 10 MINUTES

December 7, 2015

2:35-3:05

SFU Burnaby Library - 2nd floor

Present: Anmolpreet Singh Bhullar, Jay Kim, Jinhong Min, Paola Pilaspilas

Absent: Lestley Gabo

Purpose of Meeting: Integrate and test QuickPost & make an informative video

Minutes:

Jinhong Min called the meeting to order at 2:35.

A. Approval of the agenda and minutes of the December 7, 2015 meeting

Minutes were approved as amended as a team.

B. Flash LEDs of the Mailbox

Challenges and Problems?

Discussion: Jin bought these today in order for the flash LEDs to be compatible with mailbox's hardware for \$10.53:

- IrL510 Mosfet
- Im317 regulator
- 3.6 ohm half wattage resistors
- half wattage 20 ohm resistor
- voltage holder

Action: If time permits, Jay will integrate these in the mailbox system

C. Update on Parcel Box

Discussion: Camera code left to do for the parcel box.

Action: Anmol will look into this and finish by tonight.

D. Informative Video & Testing & Powerpoint

Discussion: We have decided to postpone this until tomorrow.

Action: Post mortem to be done by tonight and demo slides will be taken care of tomorrow at 9AM, SFU Surrey.

Meeting was adjourned at 3:05.



Quick Post

Meeting 11 AGENDA

**December 8, 2015
10:15-14:22
SFU Surrey - 5th floor**

Purpose of Meeting: To finish demonstration slides, post mortem and practice demo presentation.

Items for Discussion:

- Powerpoint presentation
- Post Mortem
- Informative video for the presentation



Quick Post

Meeting 11 MINUTES

December 8, 2015

10:15-14:22

SFU Surrey - 5th floor

Present: Aanmolpreet Singh Bhullar, Jay Kim, Lestley Gabo, Jinhong Min, Paola Pilaspilas

Absent: N/A

Purpose of Meeting: To finish demonstration slides, post mortem and practice demo presentation.

Minutes:

Paola Pilaspilas called the meeting to order at 10:15.

A. Approval of the agenda and minutes of the December 8, 2015 meeting

Minutes were approved as amended as a team.

B. Powerpoint Presentation

Discussion: Parts were divided evenly:

Paola - Introduction, System Overview, Motivation, Proposed Solution, Summary, Future Plans

Aanmolpreet - Parcel box: Design, Hardware, Security System

Lesley - Parcel box: Flow chart for hardware parts, Things We've Learned

Jay - Mail box: Email Flow, Hardware, Software Flow

Jin - Mail box: Enclosure, Schedule, Costs

Action: Practice individual parts.

C. Post Mortem

Discussion: Document is not yet done. Jin has sent his parts to Jay. Lesley and Aanmolpreet has edited it on google doc. Paola has finished her parts.

Action: Jay will finish up the editing and check for grammatical errors.

Meeting was adjourned at 14:22.