



## **Post Mortem for LiteSpeed Gate**

### **A pleasant, fast and light shopping experience**

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## Introduction

At ShopLite Solutions we wanted to innovate in a way which would completely alter the current checkout process to greatly reduce the time spent waiting in long line ups. Our LiteSpeed Gate eliminates the need for shoppers to perform the archaic process of unloading and reloading all of the groceries in order for them to be scanned. Thus, greatly increasing the efficiency of the checkout process and saving shoppers time spent waiting.

The LiteSpeed Gate used RFID technology in order to wirelessly scan all of the shopper's merchandise without them needed to unload anything. A list of the shoppers merchandise is then displayed on a user friendly user interface where the user can verify their items and complete their transaction. The LiteSpeed Gate offers a completely unique solution to the age old problem of long checkout lineups. It truly does create a pleasant, fast, and light shopping experience.

## System Overview

The development of the LiteSpeed Gate proceeded according to the design specifications, with a few changes made due to unforeseen challenges that arose. Once a shopping cart or bag of items is pushed onto the weighing surface, the user presses a button on the user interface to begin a scan. The main software process activates the antennas and location control unit, and passive tags are read by the reader using an algorithm to avoid collisions. During this process, the antennas rotate about the horizontal and vertical axes, increasing the volume of reader sensitivity. From our testing, up to 25 items can be read 100% of the time.

Rotation is facilitated by both 5V and 12V stepper motors. 5V motors suffice for rotation about the vertical axis, but 12V motors were required for horizontal axis rotation. This is likely due to the non-uniform mass distribution of the antennas. In addition, rotation about the horizontal and vertical axis are intentionally set at different rates, since this allows a larger volume to be swept. The motors are controlled by drivers through Arduino Uno units, which themselves receive instructions from the main software process. 5V power is supplied by the Arduino Uno unit, while 12V is supplied by an AC/DC adaptor. The



antennas are accessible to allow free rotation and to prevent signal power loss via material obstruction. The remaining hardware is housed in the frame of the gate.

After a scan time of 10 seconds, tag serial numbers are compiled and the software retrieves associated item information from a database. The theoretical weight of the items is compared to the actual weight read by the scale. If these figures are within a particular error tolerance, the software displays the full item list along with total price on a monitor. Then the user can pay and move on to other activities in life. If the weight figures do not match, the user may either choose to rescan, or call for store assistance.

## Challenges

During the development of the LiteSpeed Gate, our team encountered many challenges. One of the biggest challenges was in the implementation of the location controller unit. Originally, the location controller unit was designed to move the antenna from one side of the gate to the other side. Our team believed that by changing the physical position of the antenna the accuracy of the scan would dramatically increase. However, performance testing of the antenna showed that changing the physical position did not help. After consulting with our TA, Maryam, and conducting more experiments, we observed that the accuracy of the scan increased when the antenna was rotated and changes to its angle, rather than its physical position, were made. As a result, we had to redesign the structure part of our gate, as well as our current location controller.

During the implementation of the location controller we decided to use a micro controller to control the motors. Initially, the micro controller could easily control one stepper motor to rotate in a pattern. Problems arose however when the micro controller was trying to control all 4 motors at the same time; some motors did not turn. After debugging and troubleshooting, we discovered that the main problem was due to the power supply. Our micro controller was able to provide 5V, which was sufficient to power 1 - 2 motors. It was not however sufficient to power all 4 stepper motors. To solve the problem, we used an external power supply to power half of the motors.

Another challenge arose during the integration of the location control unit with the whole system. Initially, we had done calculations and testing on the location control unit which showed that the stepper motor had enough torque to rotate the antenna. Problems arose however when the wire was connected to back of the antenna, which dramatically increased the resistance and the weight of the location control unit making it difficult to rotate the antenna with this type of stepper motors. Fortunately, we purchased the same model of motors but 12V, instead of 5V. Using the 12V stepper motors, we were able to successfully implement the location controller unit.

## Future Plans

In the future, ShopLite Solutions hopes to continue to improve the accuracy of the RFID reading unit and reduce the cost building the gate. Metal and liquid are two main sources which can disturb the radio frequency signal. To avoid this problems, future considerations will go into implementing a mechanism which manages the metal and liquid items so that we can maintain a high accuracy from the RFID reading unit.

## Budgetary and Time Constraints

### Budget

The total expense of the project was \$1278.8, which exceeded the initial estimated budget of \$910. The expenses of this project consist of many essential components including the RFID reader, antennas, cables, motors, arduino boards, tool kits and shipping fees. In addition to these expenses, we also acquired 80 free RFID sample tags from the RFID sellers, and borrowed a free precision weighing scale. These free items are valued at around \$600.

### Schedule

For the project timeline, we were able to meet all of the milestones we set in the project proposal. The project integration and testing was performed on schedule as well. We planned to spend only two weeks to order parts however, and it took us much longer, especially when it came to the motors. During the last stage of the project development, we still hadn't received the motors so we had to purchase extra ones from a local

electronic store. We also planned to have two project implementation cycles in order to use the Agile Development Methodology. Unfortunately, we were only able to finish one.

## Group Dynamics & Personal Reflections

### Group Dynamics

The ShopLite Solutions team consists of six intelligent and creative members from different engineering disciplines. We have three computer engineering students, two biomedical engineering students and one electronics engineering student. Not only have we acquired different knowledge from school but we have also had different co-op experiences in the field of hardware design, embedded system design, biomedical research and software design. This allowed for us to bring in different expertise and different perspectives which contributed to a better and more well-thought product. Even though we all have different backgrounds and expertise, we are all passionate about technology and want to utilize our knowledge to build a product that solved a problem.

### Workload Distribution

Table 1: Workload Distribution

Tasks	Noah	Alex	Brian	Joyce	Kelvin	Tim
Documentation	xxx	xx	xx	xx	xx	xx
Software Development	x	xxx	x	xx	x	xxx
Mechanical Design	xxx	x	xxx	xx	xx	x
Arduino Programing	x	xx	x	xxx	xx	x
Parts Sourcing	xx	xx	xx	xx	xx	xxx
AutoCAD Drawings	x	x	x	x	xxx	x
Testing	xxx	xx	xxx	xxx	xxx	xx
Administrative tasks(budgeting, meeting set up, meeting minutes)	xx	xxx	x	x	x	xxx



## Noah Balzer

As I reflect on all of the lessons I have learned through my experience doing this capstone project, I truly am blown away by how valuable these past four months have been. Although it has been overwhelming and stressful at times, the final outcome was well worth all of the struggle. I have learned invaluable technical and interpersonal lessons which I know I will take with me for the rest of my career.

Some of the main technical learnings during this project involved learning how RFID technology works and how it is implemented. Learning more about wireless communication and RFID technology specifically has really excited me about it and all of the potential applications. Another major technical skill that I grew in during this project was in micro controller development. Although I was not in charge of the micro controller development for this particular project, I helped in troubleshooting various problems and became more familiar with the process of using micro controllers as a tool to interface hardware with software. Finally, throughout this project I grew in my mechanical design and engineering skills through the design of the location control unit which was composed of two stepper motors. I learned various mechanical design lessons as I realized the significance of motor power, friction, and torque requirements when doing mechanical design.

Throughout this capstone project I definitely also grew in interpersonal skills. As the chief executive officer of the project I felt responsible for how well things were going and felt an extra burden to keep everything organized and on track. One of the major lessons I learned being the leader is that being the leader doesn't always mean that your way of doing something is the best way. I grew in understanding how important listening is when you are leading a team, and how easily my own stubbornness can get in the way. I truly couldn't have asked for a more dedicated and hard working team who put up with me as their leader despite my weaknesses. Looking back, one thing I think I would do differently if I was to lead another project like this would be to be more willing to take a break from working and have fun along the way.



In summary, this capstone project has really been an invaluable course in my life. The challenge of learning a new technology and implementing it in an innovative way was not only stressful and overwhelming, but also incredibly satisfying. Furthermore, I'm thankful for my team, and how they have sharpened me as an engineering. To be honest, I can't wait for the next project.

## Alex Yang

I really enjoyed working with this excellent team throughout this semester. We started forming the group, having meetings for brainstorming and discussing ideas several months before the school starts. This team is really good at pushing everyone else to meet the deadline. I feel this is because everyone cares about the project.

I learned a lot of from the experience of working in this team in a start-up like environment. Instead of doing development only, we had to worry about a lot of things, such as the costs, fundings, deadlines, deliverables, etc. This team is very diversified as well. Everyone has different specialties. Fortunately, we put this into consideration while designing the project so it turned out to be an integration of technologies related to different areas. It has mechanical part (gate, scale), hardware part (motor, arduino, RFID), software part (C# project, database). I really like how the project turned out at the end and the fact that the TAs and professors like this.

We have also went through a lot of different difficulties throughout the semester. For example, we sometimes couldn't agree with each other on ideas, had trouble with setting up meetings and found it hard to manage the time spending on this course versus others. However, whatever happened, we still show respect to each other as we keep in mind that everyone is different. This is a great lesson for me about working with others.

I hope in the future, I still have chance to work with people's in this team!

## Brian Lew

I generally enjoyed working with the other people in my group, even though I typically don't like group projects. It felt like everyone put in quality time and effort into the project. The project itself was interesting, and I learned a lot about the possibilities and constraints with RFID technology.

There were a lot of challenges and setbacks, which I will hopefully learn from in the future. One was the selection and ordering of motors. I determined that we could use the cheapest possible motors for the project by testing if a 5V stepper motor could rotate the antennas, and also the antenna-frame structure. It worked, but in practice, there is extra inertia and resistance coming from cables and joint friction, and also a small load component which arises from the non-uniform mass distribution. So it was a mistake to assume a uniform mass distribution and negligible friction.

I also ordered the motors mentioned earlier at the cheapest price possible through an American website, because it was a great deal. \$3 for a stepper motor and motor driver and free shipping was too much savings for an Asian like myself to resist. A month later, the motors still have not arrived. Upon further research, the suppliers are actually located in China, which probably explains the delay. In addition, no tracking number is provided since the order was monetarily negligible. So it would have been better to pay more, but have it shipped here within a week or two.

Finally, when we decided we couldn't wait for the motors to arrive any longer, I also made the mistake of buying the wrong type (12V instead of 5V). Fortunately, it turned out to be a happy mistake because we actually require the stronger torque the 12V motors provide. The lesson here is that you should always check the fine print before buying something.

To conclude, I feel our project will not be an immediate commercial success due to the challenges of RFID and water/metals, incompatible product packaging, and the cost of passive tags. Though once the cost of tags comes down (and they will if they are ever mass produced), I think it could be widely adopted by most large stores and supermarkets in order to increase efficiency and improve customer service.

## Joyce Zhang

Before taking this course, I heard good things and bad things about it. Some say they made long lasting friendships and carried on the project after graduated while others say it's all about writing documentations and having conflicts with the teammates. For me,



right from the start I knew it was going to be a once-in-a-lifetime experience and we were going to build excellent product. And I was right, I enjoyed all the bits and pieces of it.

I had that good feeling because we had a great team with different expertise and dynamic personalities. We have people that are passionate about high-end technology while some prefer building down to earth problem solving products. Some are big fans of hardware, mechanical work and getting their hands dirty with all kinds of power tools while some are into building apps and excited about the magical improvement that a good user interface can bring to a product. Also not only we have an all-star technical team, we also bear a good business sense in mind that our goal is to build an excellent high tech engineering product that is cool but also can sell. The greatest thing I like about this team is every time we argue over some issues, it was always for the better project outcome but nothing personal. In this open environment everyone, including me, can speak freely about their opinion. Every single time after a heated debate, we came up with some great ideas none of us has never thought about and those were turning points for the project.

I also like the approach we took when we were brainstorming, we started with everyone's passions and went from there. We also accounted for the limited time and limited knowledge we had when we were deciding which project we should go for. After consulting with the prof and interviewing as many people as we could we settled with the LiteSpeed Gate idea.

While there were thousands things I think we did right, there are also several things we could have improved along the way, which is also my personal reflection and the things I could have done better.

When we were designing the product and making decision, we should have always done it with remediation in mind. For example, when we ordered the motors online, we should have planned on what to do when the it is not delivered or by what date we should worry about it. All of us thought that deliveries always ship in time and it is silly to worry about that. But despite the littlest chance it could happen, it never came and because of that we

wasted a long time waiting for it to come therefore delayed our development processes by a lot.

We also should have considered all the details and all the tiniest things that could affect the whole system when we were doing power analysis. It was imprudent for us to say that a 5V stepper motor is able to rotate the antenna without testing or considering the resistance introduced by the cables and frame. Also many of us including myself had the doubt whether the small stepper motor is powerful enough to do the job. But I was not determined enough to speak out to the team and kept the doubt until it was completely resolved.

The last thing I could have done better is to dig deeper into the technical side of things in order to make it as good as it could be. I was responsible for programming the Arduino and the wiring to control and power all the motors on both sides of the gate. If I had better understood how the stepper work and the serial connection between Arduino and PC, I could have implemented more error checking and a better communication protocol between them.

Everything considered, the capstone project was a very valuable, probably the most valuable experience I had in the 5 year university life that allows me to experience the whole product development cycle from the beginning to the end. I am glad that my course load this course was not that heavy so I was able to put more time and energy to this project. I am truly thankful for all the great work my teammates put in and all the resources and help the school provided.

## **Kelvin Chu**

ENSC 350/440W is one of the most challenge courses in all undergraduate courses because it requires engineering students to use their knowledge, skills and experience that they have obtained from courses, projects and co-op in the past four to five years. ENSC 350/440W is also one of the most fun and interesting course because it let you work with amazing teammates, and meet new friends, learn interpersonal skills and technical knowledge, and let your dream, idea and ambition go as far as you could .

In this project, I was responsible for the mechanical design of LiteSpeed Gate, which was to use Solidworks to draw 3D drawings. Before the course, I rarely used Solidworks for projects in different courses. My knowledge of Solidworks came majorly from ENSC 498. This project has refreshed my 3D drawing skills and showed me that CAD software is powerful assist tool for mechanical design .

One of the most important lesson that I learned from the project is that online shopping can cause a major problem. Our group has ordered motors from the China in early March; the motors still have not arrived yet. Luckily, we are able to purchase the same types of motors, even it is much more expensive. Before ordering components and parts oversea, it will be more efficiently to shop at the local store even if the price to order oversea is lower.

The importance of the testing cycle is another lesson that I learned from the project. Initially, when I design the location controller, my first concept idea is to design and implement a location controller unit such that both antennas would able move up and down; I believed that by changing the position of the antenna, the accuracy of the scan would increase as the antennas would able to scan at different angles, so I started to design the structure of the gate using this design of location controller unit. However, the idea was crushed after the team started conducting testings with the RFID antenna. Result clearly showed that changing the position has no use; as a result, I have to redesign the whole structure of the gate.

Working with my teammates was a great experience; we were able to communicate effectively with each others to overcome big challenges. I have learned a lot from my teammates. I definitely want to work with them again.

## Chupeng Lei

This capstone project, SpeedLite Gate, is one of the most unforgettable experience in my university life. Overall, I not only learned technical skills on both software and hardware, but also the way to properly communicate with others. Respect to the software skills, I studied the different use of C sharp code and the backend design of the RFID reader. Respect to the hardware skills, the hardware design on Arduino board and motors also

interest me even though I didn't physically participate into the work, which was done by my groupmates. Also, I have more chances to practice the communication skill. During the 13 weeks of the project, I always patiently listen to others and appropriately express self-ideas. The harmonious environment allows me to work in a more efficient and productive way. My writing skill also have certain improvement after going through all the project reports. Every time I did the peer review for different parts of the reports, I can learn the better writings from others.

After the group decided to pursuit the SpeedLite shopping gate, I searched for the RFID reader modules online. Our requirements to the modules are mainly related to the reading speed, the reading accuracy, TCP/IP connection and the source code. I went through all different specifications and understand their functionalities so that I know if they meet our requirements. Eventually, I learned how to compare all these modules and find the best fit. After we acquired the reading module, I learned the process of setting up the reader module with the computer through TCP/IP. Our group divided the responsibility in the mid-semester so that each group member can focus on his/her part. My part is to create the reader module APIs for our software backend, to which I need to adapt the the original reader's source code. I looked into the module's source code and understood its overall functionalities. Since the reader module code is for the commercial use and offers a variety of complex features, I performed a real time simulation on the module and analyze the code. Eventually, I created a customized APIs, which can allows our software to automatically set the module environment and transmit the data. The whole practice is challenging but interesting because I learned many different use of high level C sharp code, like delegate, TCP/IP interface, callback handling, etc. Furthermore, during the system integration testing, our group found many issues with motors and wiring. I spent half day to debug the problem and eventually figured them out. The problems are mainly caused by the less power motor and poor connection. This debug process was a good practice for me as an electronic engineering student. Overall, this capstone project is an excellent experience.



## Appendix - Meeting Minutes

### MEETING AGENDA

Objective: Project idea discussion

Date: [01/13/2015]

Location: EDU General Room

Time: 4:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

### PREPARATION FOR MEETING

Please Read: RFID Related Info, old project ideas

Please Bring: Any ideas you came across, any demo to support your idea

### ACTION ITEMS FROM PREVIOUS MEETING

Item/Responsible/Due Date

1. Further brainstorm/ Everyone/ Jan 13

### AGENDA ITEMS

Item/Presenter/Time Allotted

1. Further discussion of ideas/ Everyone/ 40 min
2. Discuss roles, company name and logo / 20 min

### OTHER NOTES OR INFORMATION

1. Once the project idea is finalized, start thinking about important dates (milestone, documentation deadline) to help Alex put them together in Microsoft Project



## MEETING MINUTES

Date: [01/13/2015]

Role:

Noah Balzer - CEO

Joyce Zhang - VP Marketing

Kelvin Chu - CIO

Brian Lew - CTO

Time Lui - CFO

Alex Yang -VP Strategy & Software Lead

Ideas:

Gardening tag

Smart band

Speed checkout gate

Gesture recognition gloves for drumming





## MEETING AGENDA

Objective: Project idea discussion

Date: [01/20/2015]

Location: EDU General Room

Time: 4:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## ACTION ITEMS FROM PREVIOUS MEETING

Item/Responsible/Due Date

1. RFID Gate idea
2. Gardening tag idea

## AGENDA ITEMS

Item/Presenter/Time Allotted

1. Further discussion of ideas based on professor feedback/ Everyone/ 30 min
2. Finalize project topic/ Everyone/ 10 min
3. Practice for the 15-min interview/ Everyone/ 20 min



## MEETING MINUTES

Date: [01/20/2015]

Stick with the RFID gate idea.

Tonight's interview:

1. Ask ESSS what to do with the funding application now that we changed the idea
2. Form for tonight

Need:

1. RFID Gate x 4 (RFID Receiver/interrogator)
  - at least one R/W receiver, others read only reader (maybe cheaper)mi
  - Gate should be built by ourselves (wood, metal)
  - Price:
2. RFID tags(multiple types), focus on Passive tags
  - Price:
3. Microcontroller for interfacing
4. Scale
5. Wires (more research)
6. Computer and keyboard
7. Trolley (maybe borrow or steal one) and cloth bags

Risk:

1. metal shielding (metal mount RFID tags are expensive)
2. Water will block the tag freq too
3. Freq interference

TODO:

1. Project proposal - due Jan 26
  - finish it by FRIDAY NIGHT
  - Noah: introduction
  - Brian: Scope/ricks/benefits
  - Alex: Project planning



- Joyce: Company Details (If you have log/name ideas, send to Joyce)
- Tim: : market/competition/research rationale
- Everyone: Conclusion/reference
- Kelvin: cost consideration



## MEETING AGENDA

Objective: Project idea discussion

Date: [01/27/2015]

Location: EDU General Room

Time: 4:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## ACTION ITEMS FROM PREVIOUS MEETING

Item/Responsible/Due Date

1. RFID Gate idea
2. Project proposal
3. Parts ordering details

## AGENDA ITEMS

Item/Presenter/Time Allotted

1. Project timeline & feedback/ Everyone/ 5 min
2. Details of parts ordering/ Everyone/ 30 min
3. Plan for next assignment / Everyone/ 20 min



## MEETING AGENDA

Objective: Discuss the project's functional design

Date:[02/03/2015]

Location: EDU Learning Hub

Time: 4:30 PM~8:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## PREPARATION FOR MEETING

Please Read: Functional Design Sample

Please Bring: Markers, eraser, laptop, paper, sticky notes

## ACTION ITEMS FROM PREVIOUS MEETING

(Item/Responsible/Due Date)

1. Read Functional Design Sample / everyone / meeting date
2. Brainstorm high level system overview / everyone / meeting date

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Finalize high level design and table of content/ Everyone/ 30 min
2. Split the task based on table of content/ Everyone/ 30 min
3. Detailed discuss & design of the product workflow/ Everyone/ 3 hrs (quality > quantity)



### Meeting Agenda

Objective: Start implementing the project

Date:[02/20/2015]

Location: EDU Learning Hub

Time: 2:30 PM~4:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

### Preparation for Meeting

Please Read: Everyone's duty

Alex, Tim: software

Brian, Kelvin: motor

Noah: gate; Joyce?

Please Bring: laptop, paper, RFID stuff

### Action Items From Previous Meeting

(Item/Responsible/Due Date)

1. Finalize high level design and table of content/ Everyone/ 30 min
2. Split the task based on table of content/ Everyone/ 30 min
3. Detailed discuss & design of the product workflow/ Everyone/ 3 hrs (quality > quantity)

### Agenda Items

(Item/Responsible/Due Date)

4. Discuss software admin interface, client interface / everyone / meeting date
5. Design of the database table design / everyone / meeting date
6. Motor updates / everyone / meeting date



## MEETING MINUTES

Date: [02/20/2015]

Location: Lab1

Attendees: everyone

mockup:

when to update item list

database remote or local

database structure: RFID#, Item Name, item price, weight, scanned

motors:

might not be able to borrow from ESSS, will look into buying it

next meeting:

start building things on Tuesday at Joyce's

bring: cart, wood, wifi hotspot, tools, antenna,

TODO:

Alex: bring power cord

Tim: bring ethernet cable

Joyce: get a cart

Noah: get wood and tools

Kelvin and Brian: look into belt and motors



## MEETING AGENDA

Objective: Discuss the project's design document

Date:[03/03/2015]

Location: EDU Learning Hub

Time: 4:30 PM~5:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## PREPARATION FOR MEETING

Please Read: Noah's email, Design Specification Rubric

Please Bring: laptop, paper, pen

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Discuss the Design Specification/ Everyone/ 30 min
2. Split the task/ Everyone/ 10 min
3. Discuss professor's email/ Everyone/ 20 min





## MEETING AGENDA

Objective: Discuss the project's design document

Date:[03/10/2015]

Location: EDU Learning Hub

Time: 4:30 PM~5:30 PM

Meeting Type: Normal

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## PREPARATION FOR MEETING

Please Read: Maryam's, Design Specification Rubric

Please Bring: laptop, paper, pen

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Update everyone's status on design document & project progress
2. Let everyone know if they need help from other members



## MEETING AGENDA

Objective: Software UI and RFID reader integration

Date:[03/21/2015]

Location: Alex's house

Time: whole day

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Tim

Optional: Joyce

## PREPARATION FOR MEETING

Please Read: RFID dll library code

Please Bring: laptop, RFID devices

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Work on UI integration with RFID devices
2. Work on software project background worker
3. Work on software database connection



## MEETING AGENDA

Objective: Project update

Date:[03/27/2015]

Location: Joyce's house

Time: 2:30 PM~4:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Joyce, Brian, Noah

Optional: Tim

## PREPARATION FOR MEETING

Please Bring: laptop, adruino, motors, RFID devices

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Update each other with the current progress
2. Let everyone know if they need help from others
3. Start planning the integration and testing



## MEETING AGENDA

Objective: Motor integration

Date:[04/06/2015]

Location: Lab1

Time: 12:30 AM~6:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Joyce

## PREPARATION FOR MEETING

Please Read: Step motor reference manual, adruino reference manual

Please Bring: laptop, adruino, motors, RFID devices

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Start working on motor integration
2. Implement the logic to remember step motor's stop position and recover from the position on startup



## MEETING AGENDA

Objective: Motor integration (2)

Date:[04/08/2015]

Location: Lab1

Time: 2:30 PM~3:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Joyce

## PREPARATION FOR MEETING

Please Bring: laptop, adruino, motors, RFID devices

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Keep working on software integration with motor control
2. Fix motor control bugs in adruino code



## MEETING AGENDA

Objective: Filming for promotion video

Date:[04/09/2015]

Location: Joyce's house

Time: 3:00 PM~5:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## PREPARATION FOR MEETING

Please Read: The promotion scripts you wrote for your part

Please Bring: Camera, laptop, dress up nicely

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Filming for everyone's part for promotion video
2. Start integrating the project



## MEETING AGENDA

Objective: Motor, antenna integrating

Date:[04/13/2015]

Location: Joyce's house

Time: 1:30 PM~5:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## PREPARATION FOR MEETING

Please Bring: laptop, all the tags, more grocery items, 12V step motors

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Start wiring up 4 motors, 2 antennas
2. Modify the code to control all the devices
3. Stress testing



## MEETING AGENDA

Objective: Final preparation for demo

Date:[04/15/2015]

Location: Joyce's house

Time: 1:30 PM~5:30 PM

Facilitator: Alex

Timekeeper: Everyone

Note Taker: Alex

Attendees: Alex, Kelvin, Tim, Noah, Joyce, Brian

## PREPARATION FOR MEETING

Please Bring: more grocery items

## AGENDA ITEMS

(Item/Responsible/Due Date)

1. Split the task for making demo presentation slides
2. Final testing on the system
3. Bug fixing
4. Disintegrate the gate and bring home