Post-Mortem for an

IMPAIRED DRIVING PREVENTION SYSTEM

Project Team
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Glossary

ACC	Accessory
BAC	Blood Alcohol Content
CPU	Central Processing Unit
CEO	Chief Executive Officer
ESD	Electrostatic Discharge

1. Introduction/Background

"The main reason why people continue to drive drunk today is because they can"- This statement made by Mother Against Drunk Driving (MADD) president Glynn Birch couldn't be more accurate. There is no denying that impaired driving is an unfortunate prevalent occurrence in today's society. It is estimated that 2,541 individuals were killed in motor vehicle accidents in Canada in 2010 of which at least 1,082 were impairment-related [1]. This approximates to 3 unnecessary deaths every day as a result of poor judgement on someone's part. Other consequences of non-critical accidents due to intoxicated driving include infrastructure damage and wasteful use of health resources to treat injuries. In 2010, it was estimated that roughly 578 impairment related accidents occurred every day which caused property damage and injuries [1]. The financial implications of these incidents were analyzed in a report prepared for the federal Ministry of Transportation which stated the cost to be over $20.62 billion [2]. One can agree that this is a tremendous waste of resources and needs to be resolved immediately.

Current measures in place such as Blood Alcohol Monitoring Stops and hefty fines [3] are obviously insufficient in eradicating this despicable behaviour. These techniques are designed such that their effectiveness only prevails after the deed has been done, an example shown in Figure 1. Realizing this, the AlcoShield Team has relentlessly worked together for the last 4 months to engineer an Impaired Driving Prevention system which catches the drunk driver before they even get a chance to turn on their car.

To elaborate further, the project focuses on preventing intoxicated individuals from operating their vehicles by terminating the ignition of the engine if they are suspected to be over the local Blood Alcohol Content (BAC) limit. The system includes a gas sensor to detect alcohol and a method to authenticate the driver through facial detection. This ensures a foolproof system and averts any attempts to tamper or cheat the device.

Figure 1: Consequence of impaired driving

2. Overall System Design

The general system design of the Impaired Driving Prevention system is presented in this section. This includes an overview of the hardware components with details on the high level view of information flow through the system, as well as the underlying software algorithms. For details please consult the Functional Specifications [4]. Additionally, sketches of the possible appearance of the vehicle fitted device as an aftermarket product are illustrated.

2.1 System Overview

The high level system overview of the chosen design approach is visualized in Figure 2. Specifically it focuses on the two scenarios which are targeted in our system:

1. The user is intoxicated and thus is not allowed to operate the vehicle.
2. The user is sober and although no immediate restrictive action is taken further authentication is required.

The entire system consists of a breathalyser, an ignition kill switch, a user interface, an alarm system, and a driver authentication strategy all of which are integrated into the vehicle as an aftermarket device. Figure 2 illustrates the general flow of information through the system. The system initializes upon entering the key into the ignition keyhole and turning it to the Accessory (ACC) position. The camera then begins capturing images to build the comparison database. Following that, once a breath sample is provided to the breathalyser, the camera immediately captures an image of the driver and stores it for analysis. Analysis comprises of detecting the breathalyzer as well as detecting the face of the user. If either one is not detected, the system does not proceed forward as this is a critical step in assuring the effectiveness of the product.

If successful, the system proceeds and determines if any alcohol is detected in the provided breath sample. As in scenario 1, if the Blood Alcohol Content (BAC) is above the legal limit, the ignition kill switch is actuated to prevent operation of the vehicle. In scenario 2, where the BAC is below the legal limit, the driver is permitted to operate the vehicle but a further identity check must be performed to authenticate the driver with the breath sample. Additional images are then captured at random time intervals which are also compared with the stored database to verify a match. In case of a mismatch, an alarm is sounded.

To further ease the utilization of the product, an LCD interface is provided to the user which provides real time information of the system operation.

Figure 2: System overview illustrating the high level operation of the device

2.2 Implementation of the Design

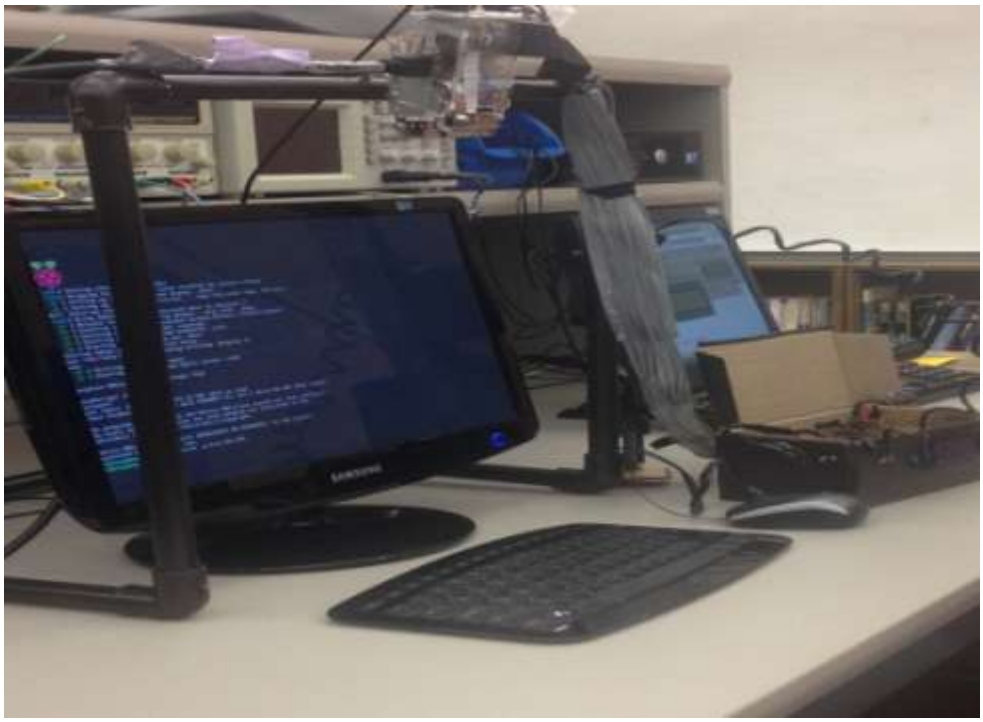

Figure 3 illustrates the vision of the final product integrated into the vehicle.

Figure 4: Envision of the final product integrated into the vehicle design

2.3 Bill of Materials

Table 1 shows the various components which were required to bring the project to life. The estimated original costs are listed alongside the actual costs which were incurred. As the project progressed, additional components which were not originally conceived were also purchased. In addition, multiple units of the Raspberry Pi Camera were also acquired due to electrostatic discharge damage.

Table 1: Bill of Materials

Original Component List	Estimated Cost	Final Component List	Final Cost
Raspberry Pi 8 GB Microcontroller (ESSEF Parts Library)	$ 44.16	Others (e.g. antistatic strap, tape, door stops, straws, balloons, PVC pine, paint and etc)	$70
Raspberry Pi Camera Module	$ 26.00	Raspberry Pi Camera Module (x2)	$135.00
Mini 4" PTZ Security Dome Camera Sony CCD	$ 186.49	BacTrack Blue Keychain Breathalyzer	$29.99
Relay x 2 - (ESSEF Parts Library)	$ 10.00	Power MOSFET	$2.00
Alcomate Premium AL7000 PRO Breathalyzer	$ 129.99	Gas Sensor	$7.50
BacTrack Blue Keychain Breathalyzer	$ 52.79	Buzzer-Piezo 3-28VDC (x2)	$7.86
BeagleBone (Credit card Sized Portable computer)	$ 89.00	Car Module	$45.00
Blue LED Push Start Ignition Button	$ 19.99	LED (x4)	$4.00
Rent a car	$120	AdaFruit Standard 16X2 Character LCD	$12.99
Electronic Component failure and Contingency	$90	Electronic Components	$32.59
Shipping and handling part	$99.99		
Total Original Cost	**$ 868.42**	**Total Final Cost**	**346.96**

2.4 Schedule

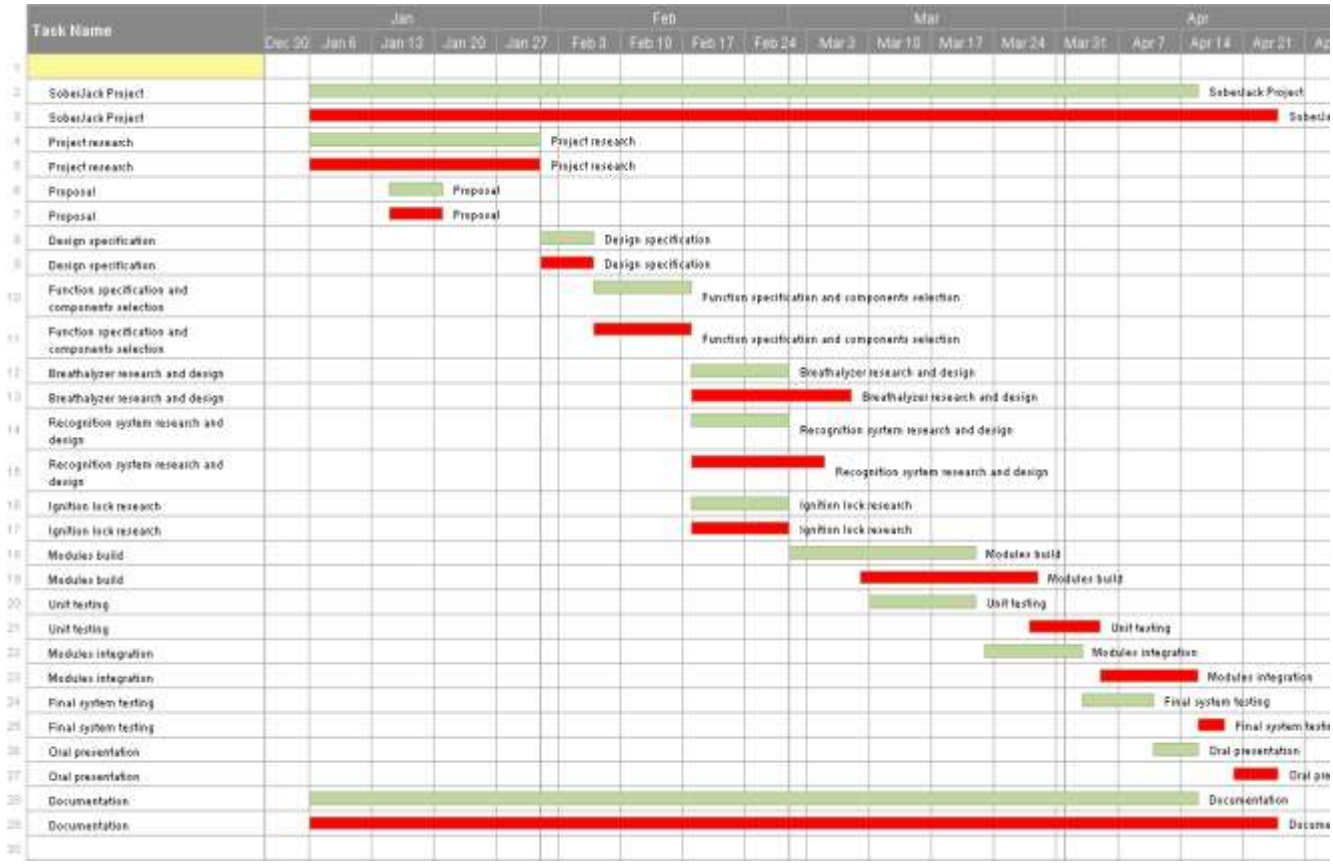

Figure 5: Comparison of the projected schedule to the actual schedule

3. Problems and Challenges

Upon undertaking this project it was realized that implementing a foolproof impaired driving prevention system would be no easy task. Rather it was accepted that the next four months would be very strenuous and challenging. This could not have been any truer. The AlcoShield Team inadvertently made this task more challenging than necessary by choosing to employ a CPU which would require them to learn a new programming language. Python was the necessary language due to the OpenCV source code for integrating the facial detection algorithm into the system. Having been fruitful in our endeavours, all members now agree that it wasn't so bad but during the frustrating periods of learning the syntax, the group atmosphere was quite tense.

Other unforeseen complications which arose included hardware malfunctions with the

Raspberry Pi Camera. It is suspected that electrostatic damage occurred rendering the device useless [5]. This unfortunately occurred on two instances resulting in multiple purchases and unplanned expenses. At one point an alternate solution of using a webcam was also explored, but the work entailed would have been potentially insurmountable in the given time frame. Therefore a third unit was purchased which has since been meticulously handled.

Figure 6: Fragile Raspberry Pi Camera which halted progress on numerous occasions

Failure of another critical component disheartened the AlcoShield engineers over the term of the project. The BacTrack breathalyser which was intended to capture the BAC of the users began providing inaccurate data. Even upon providing severely drunken breath samples, the system claimed the breath samples to be sober with a BAC of 0.0. Purchasing of another unit was suggested but eventually disregarded as a cheaper alternative was more favourable given the budget circumstances. A simple gas sensor which detected alcohol was sufficient for demonstrating the overall functioning of the product. Challenges in calibrating the sensor voltages to BAC were faced which were eventually dropped due to the highly sensitive nature of the product. A different scheme of simply drunk or sober was then employed without any focus on specific BAC levels.

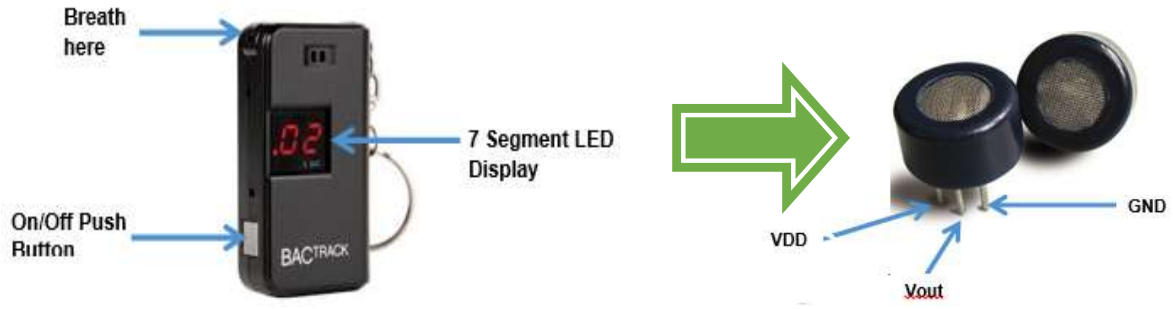

Figure 7: Commercial BacTrack Breathalyzer replaced with an inexpensive gas sensor

Despite the numerous unforeseen events which occurred during the development of the impaired driving prevention system, the final design did not require any significant changes. Rather all problems faced resulted in a better end product along with valuable lessons.

4. Group Dynamics

Each phase of the project required attention from all AlcoShield team members. The tasks were divided equally to ensure one or few members were not overly burdened. In addition to the equalized structure of the team, one member was also appointed CEO to oversee the big picture and ensure all deadlines were being met. Despite one member having been given the CEO designation, this did not in fact grant them any additional authorities. All members were treated on the same level which catered a friendly and open working atmosphere.

As problems arose, meetings were held in a civilized manner to facilitate effective discussions and provide efficient solutions. In the rare case of disagreements, a vote was held to employ the decision of the majority. This was an action which was taken upon multiple failures of the Raspberry Pi Camera. A few team members suggested an alternate camera such as a webcam to replace the Raspberry Pi Camera, but this option was vetoed by the other majority team members. This technique provided an efficient decision and avoided any unnecessary heated arguments. The replacement of the BacTrack breathalyzer with an inexpensive gas sensor was a more simple decision as all members agreed realizing the budget circumstances.

5.Workload Distribution and Reflections

The project of this scope required distribution of work to ensure the final task would be achievable. Each team member was assigned a core task along with the expectation that they would provide further support where required. A degree of flexibility was also incorporated to compensate for the busy schedules of the team members. Nevertheless, all team members contributed effectively to the overall project. Figures 8 to 10 below illustrates the work load distribution pie charts to demonstrate the contribution of each team member. The respective components are divided into technical tasks, support tasks and administrative tasks.

Technical tasks comprised primarily of each main module of the product. This included the Breathalyzer module, the Ignition Kill Switch module, and the main CPU module which entailed programming in Python. The other main technical task required extensive testing of the product. The face detection and comparison algorithm was tested with all team members. Support tasks primarily focused on purchasing components as required and defining the overall

user experience. Administrative tasks entailed packaging of the device, managing the budget, and documentation for the proposal, functional specs, and design specs.

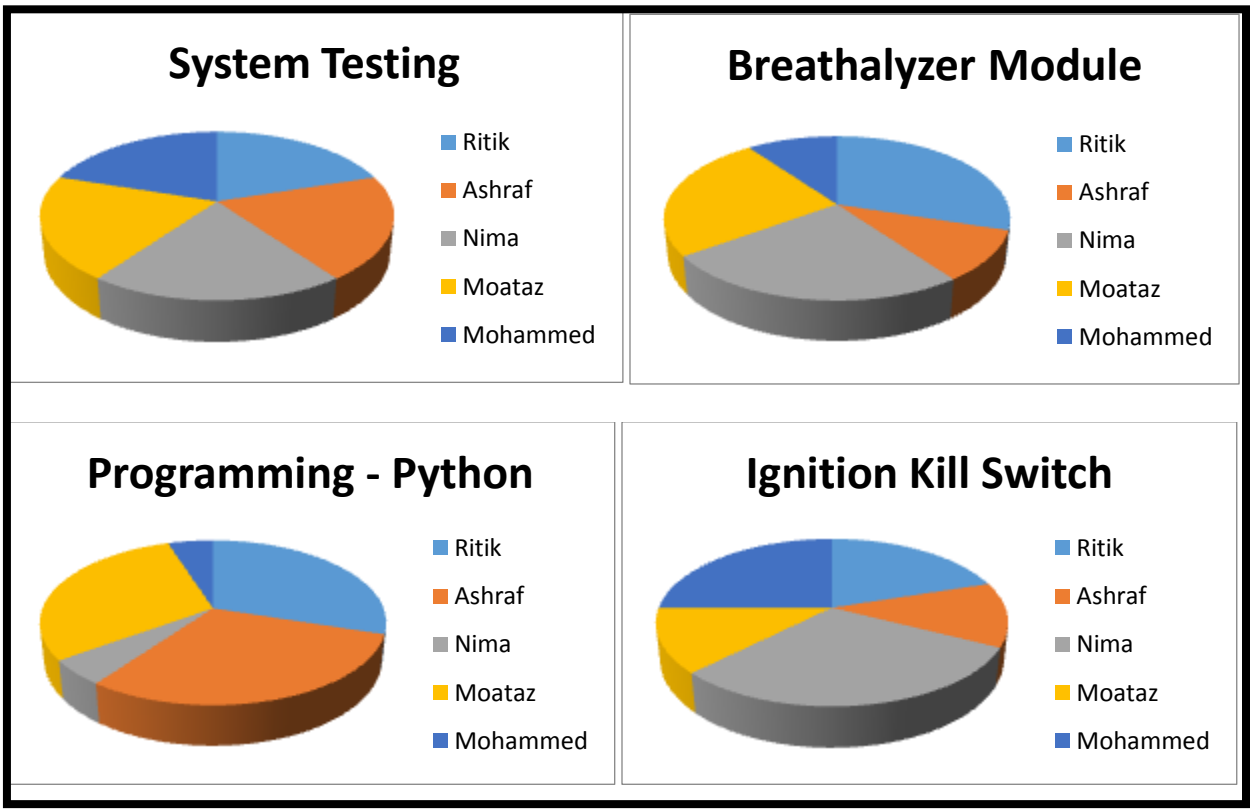

Figure 8: Workload of team members for Technical Tasks

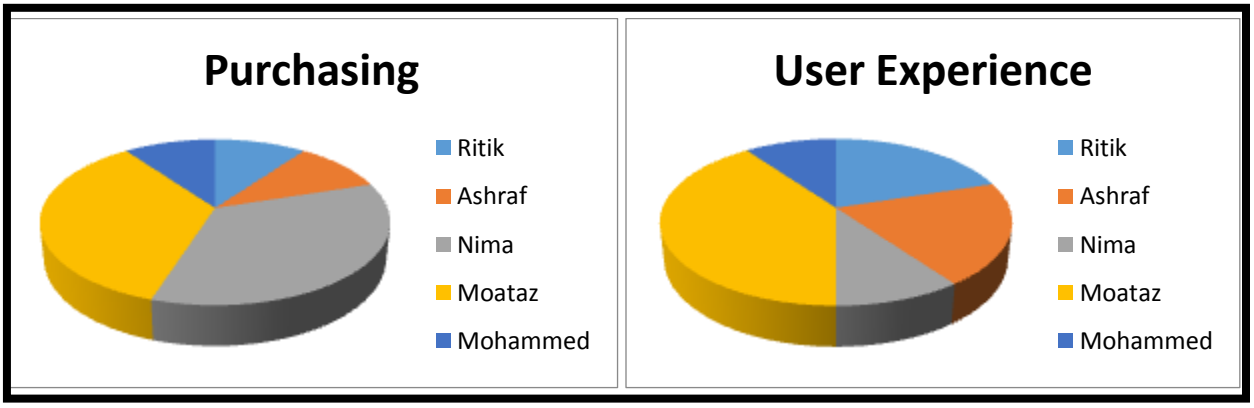

Figure 9: Workload of team members for Support Tasks

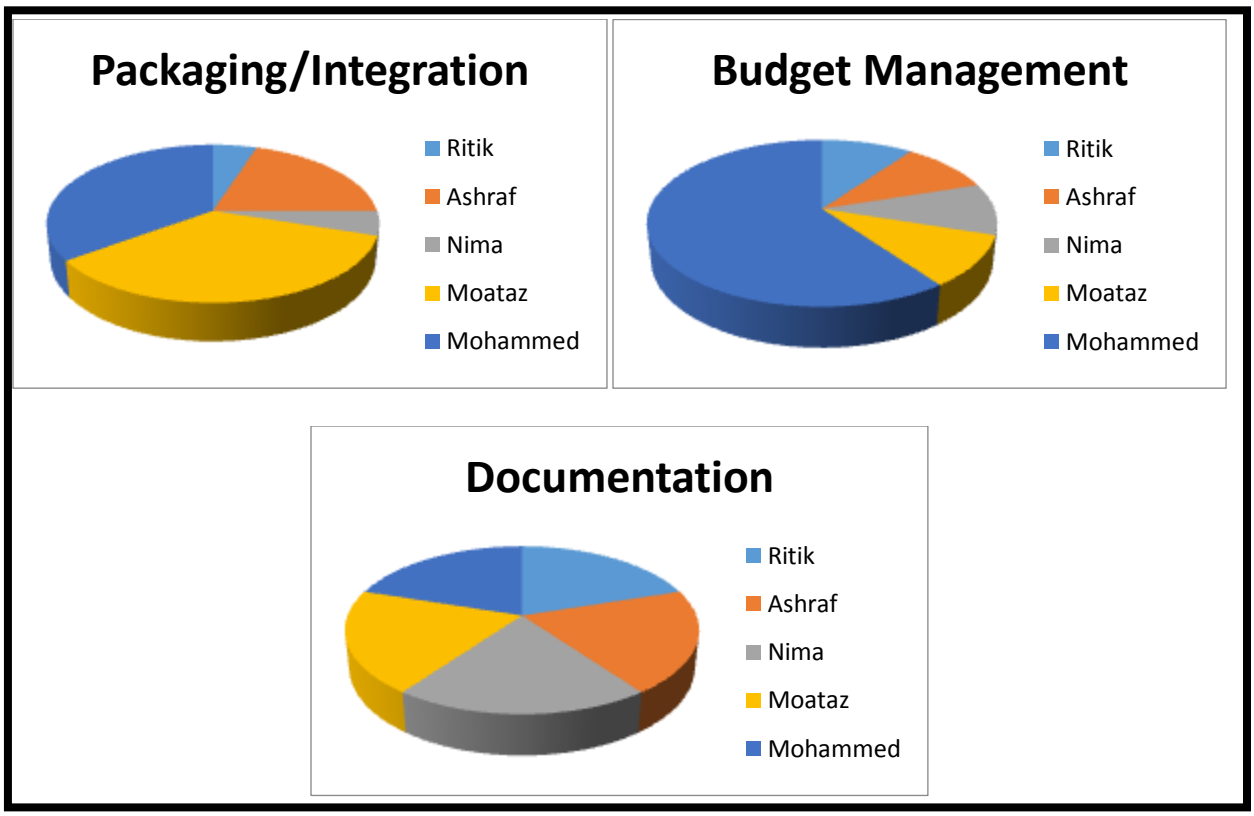

Figure 10: Workload of team members for Administrative Tasks

5.1 Personal Reflections

The five engineers of the AlcoShield Team reflect on their experience in conceiving and implementing, the revolutionary Impaired Driving Prevention System.

5.1.1 Ritik Looned – Designated CEO – Hardware/Software Engineer

Being involved in the project of designing an Impaired Driving Prevention System has been illuminating on both a technical level as well as an interpersonal level. Reflecting on the past four months, I now come to realize how much I have truly gained. Through this project not only have I developed both my software and hardware engineering skills but I have also grown individually as a person. Over the course of the semester, various circumstances have taught me to value the features of a team environment. I have always held an I-can-do-it-all personality but if I had to complete this project on my own without my team members support, I would have failed miserably. Each member provided a unique skill set to the group which was not only very much valued but also deeply appreciated. It provided me with a chance to grow and learn things that would have otherwise been missed.

Appointed as the CEO early on in the semester, I felt I would be burdened with most of the work. This was incorrect as I had underestimated the motivation of my peers. Everyone on the team was enthusiastic about the project and willing to contribute to the best of their abilities. Although there were moments where people were lacking in their tasks, everyone owned up to their responsibility. This includes the time when the design specifications document was due and the team was frantically trying to complete a presentable revision. Time management and organization skills were developed through this experience and lessons were learnt for next time. Communications skills were further enhanced through team meetings where it was vital to be clear when presenting ideas to ensure the message was getting across. All thoughts had to be carefully explained to avoid any misunderstandings. These experiences further made me realize how detailed the engineering discipline is. Being good with numbers or nick-knacks alone doesn't make a proficient engineer, but rather an engineer must be well rounded and be able to actively participate in discussions.

In terms of the technical skills which were developed, I am excited to say that my Python programming abilities have improved drastically. Through this project I also got a chance to explore the OpenCV library which provides invaluable image processing algorithms. I took ENSC 474, an upper year imaging course last year which required students to implement various image processing techniques in C++ but never did we get in the sophisticated realm of face detection. Granted the course provided me with the background knowledge on the topic, but nowhere near did it encompass what was achieved through the Capstone project. For this task, I acquired the raw images and then further processed them to achieve the desirable results. A challenging phase of the image processing component included breathalyzer detection. To provide consistent accurate results, the raw image was first converted to the Hue-Saturation-Value spectrum and then probed to search for pixels in a narrow range to determine the yellow coloured breathalyzer. Successful detection indicated a job well done. In addition to the newly gained skills, I am also now much more confident in my debugging skills. This is a critical component to any engineering task and this skill is now well polished through the course of the term. Least to say I have thoroughly enjoyed working on this project and look forward to transitioning these skills to my future workplace in the industry.

5.1.2 Ashraf – Software Engineer

The SoberJack project was an excellent opportunity for me to gain new skills and to develop my knowledge about face recognition algorithms, Microcontroller and hardware design. Developing my team work skills was also a major skill that I believe I gained. The idea of having a system that is cannot be easily cheated to prevent DUI is the main motivation behind this project. In addition to that, I wanted to use and expand my knowledge of video coding that I gained from previous co-op terms.

At the beginning of our research, I was a little worried mainly about our face recognition module since a lot of people warned me about the accuracy and the complexity of the project, especially that we only had 4 months to present a proof of concept. During the process of developed, I was pair programming with my friend Moataz as team developers that were responsible for the face recognition module. We both have a fairly good knowledge of video coding algorithms, which I believe helped us in the process. Also, having a little knowledge about python scripting was very helpful and after this experience, I can fairly say that I am very confident in Python scripting. Integration testing was the hardest task in my opinion since there were lots and lots of limitations that we needed to consider while assembling all modules together. I have also helped in hardware design since I assisted all the hardware development stages such as, ADC, ignition system switch, Breathalyser and etc.

I believe that we had good atmosphere overall in our group, because even in tough times, we were all working as a unit to overcome difficulties. The fact I already knew some of our team members made it a lot easier especially while communicating. I consider that SoberJack project was a very good opportunity to gain more technical and entrepreneurial skills that will prepare me for different scenarios that might be met after graduation.

5.1.3 Moataz –Software Engineer

Throughout the past four months, I have gone through a one of a kind experience that I did not earn in any other course. A golden opportunity that offered me not only to capitalize more on my skills, but also to put under test my ability to face and overcome technical and non-technical challenges. Being a member of AlchoShield, I had the opportunity to work in a favorable environment to find and engineer effective solutions to real life problems. During the project development, every member had the option to work on the part that fits his expertise which contributed to an effective execution of tasks and successful fulfillment of milestones. Team dynamics was an important aspect of our progress and it taught me a lot about team work and collaboration.

Starting brain storming, ahead of the effective study term, was of a great benefit and helped me develop more motivation to start my tasks ahead of time. I also learned how to organize my thoughts and plan my tasks efficiently to meet certain deadlines and to follow up with the rest of the team members. Maintaining consistent communication with the rest of the group and being close to each other's progress helped me have a clear view of the overall system development and was a crucial factor in solving technical problems related to my own module. As a software engineer, my tasks did not only involve designing and implementing the program scripts but also setting up a development platform and using available resources efficiently. The fact that our team was on budget was a great motive to exert more effort researching and considering all financial and technical factors before making any decision. Being in charge of

purchasing the necessary parts for the system, made me learn this lesson by practice and witness that resources can never be used efficiently without a thorough research and planning. Working, for the first time, on a platform as powerful and efficient as the Raspberry Pi made me more open to consider alternative developing platforms in the future.

The work flow of the team was not flawless and sometimes we had to differ in major points. However, maintaining a respectful attitude towards each other and favoring the interest of the team over personal technical or non-technical biases made it easy to relate to each other's point of view through the medium of logical thinking. Working with professional team members like the "AlchoShielders" made me value more team work and thanks to their hard work and commitment our product development has been successfully accomplished.

5.1.4 Nima – Hardware Engineer

Throughout this project, I have gained very valuable technical skills and teamwork abilities. This project helped to develop my teamwork abilities effectively and efficiently. It also improved my problem solving skills. In the beginning of the term I thought to myself maybe the project we chose is a bit easy. But as time passed I realized that lots of issues could come up with the simplest problem. I was lucky to have worked as part of this talented team of engineering students. I found the experience both rewarding and challenging.

I was excited to volunteer to work on the hardware aspects of the project since it was my field of experience and I had some experience from my previous co-op position. Initially I worked with third party breathalysers and gained lots of knowledge about the functionality of them and also the gas sensors that we currently using in our product. Other hardware problems I worked on for this product was the ignition key switch and converting data to read/write using our MCU Raspberry Pi. In order to read data, we learnt the how to use with ADC chip which will be very useful in the future projects. Also I took care of the soldering stuff in our project because of the experience I had in that area.

I enjoyed the group-dynamics and the way our group worked with each other. We communicated well with each other and the importance of clear communication became even more important in situations like this and we had to remind ourselves that the focus should be on bringing out the best possible product for our customers given the constraints that we were facing. Lastly, it was very impressive to see that we were able to support each other by being flexible with our roles. Overall, this was a great opportunity and I gained both technical and entrepreneurial skills while being part of a wonderful and talented team.

5.1.5 Mohammad – Project Management Engineer

I would like to take this opportunity to thank all my amazing team members, especially Ritik for his hard work. I have to admit this semester was the hardest semester of my undergraduate study at SFU. Even though I had a very heavy semester, it was enjoyable and manageable with my team members. We created the group in October and started planning since then. If there is only 1 course practical and useful, I would say it is ENSC305/440 due to its technical, administrative and interposal skills gained all at once.

Two of my main responsibilities were budget management and purchasing parts. Unfortunately, we only received $350 of funds, thus it was very frustrating to reduce the expenses from $860 to $350. Having said, I will be applying for Wighton Funds after term. In addition to budget management, I also took lead in packaging and integration using my mechanical workshop and packaging skills. In terms of administration, I made a survey that was distributed before the demo. Besides that, business and market potential research and data collection was done by me. Other distribution was taking care of borrowing and purchasing parts. In terms of technical skills, I also gained vast amount of knowledge and skills. Mainly, I assisted our hardware engineer (Nima) in building the ignition switch module and participated in integrating the gas sensor module. Unfortunately, I was not involved in software part of this project since our 2 senior software engineer did an amazing job in this module. Please refer to work load distribution section for more details.

For this project course, I used all of my undergraduate engineering skills and knowledge. Working on a real life problem from design to implementation gave me a solid and rigid view of a real job. In my opinion, the 2 most important aspect of this successful project was teamwork (part of communication) and time management. Other aspects include documentation (especially functional and design specification), administrative and financial management skills.

I would like to take this opportunity to thank my team members, Steve Whitmore, Andrew Rawicz and all other supportive people who assisted in accomplishing our project goals. I am glad to be part of this course and specifically this project. Having said that, I would suggest that this course should be worth more than 5 (4+1) credit courses, in my opinion, it should be at least 10 credits due its heavy load and time consumption.

6. Conclusion

The product as designed by the team at AlcoShield is intended to keep the streets safer and sober by preventing impaired driving. Prior to operation of the vehicle, the driver must first perform a breathalyser test to ensure their BAC is below the legislated limits. In addition, a driver authentication system is also designed to ensure no violations of the system are possible.

Despite having some limitations, the AlcoShield Team is more than satisfied with the prototype device. All functional requirements [4] which were proposed were met and additional features were also implemented to provide real life simulation in a vehicle. The Test Plan focused on three scenarios – drunk, sober, sober with violation, all of which performed as expected. Further test cases were also designed to test for corner cases. Further work would first entail improving the facial detection algorithm which requires extensive eigenfaces theory knowledge. This is currently a hot topic in the industry which is considered to be a very challenging task.

Despite the short comings of the prototype version, all team members are thoroughly satisfied with their achievements. The opportunity to realize the drunken driving situation in today's society and propose and develop an initial product has been both a challenging and fruitful endeavour on its own. The experience and skills developed through this project have been advantageous to all members and a common consensus to halt the project has been made. The team members would also like to take this moment to thank the professors and TAs for realizing the course and providing an educational experience to us.

References

[1] "The Magnitude of the Alcohol/Drug-Related Crash Problem in Canada: Overview" [Online] Available: http://madd.ca/madd2/en/impaired_driving/impaired_driving_statistics.html

[2] "The Magnitude of the Alcohol/Drug-Related Crash Problem in Canada: Overview" [Online] Available: http://madd.ca/madd2/en/impaired_driving/impaired_driving_statistics.html

[3] Stephen G.A. Pitel and Robert Solomon, " Estimating The Number And Cost of Impairment – Related Traffic Crashes in Canada: 1999 TO 2010", Western University, April 2013

[4] AlcoShield., “Functional Specification for an Impaired Driving Prevention System”, Simon Fraser University, Burnaby, BC, Canada, February 2014.

[5] “Raspberry Pi Camera Board”. [Online]
Available: https://www.modmypi.com/raspberry-pi-camera-board

Appendix

Project Meeting Minutes

Date of meeting: Jan 9th
Minutes prepared by: Nima Soroudi

Location: Tim Hortons, WMC
Time: 430-630

Attendance:

- Ritik Looned
- Mohammad Naghshineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:
each member presented 2 idea for the project and discussed it with the other group members as below

Ritik: -Reminder for cellphone loss using the RF receiver/transmitter and notifying the person using a vibrator/buzz on their body
Mohammad: - 2 idea from Carlo and Bozena.
Nima: -2 ideas that required blood analysis
Motaz: -stabilizer for cellphones
Ashraf:

The feasibility for each project and also the option of doing the project with professor discussed between the group members.

Action Items:
- meet with Carlo and Bozena in order to discuss their projects details on Friday Jan 10th
- meet with Andrew and present 3 of our ideas to see his inputs and suggestions on Friday Jan 10th

Project Meeting Minutes

Date of meeting: Jan 10th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1030-1230

Attendance:

- Ritik Looned
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- RF Receiver/Transmitter discussed further.
- Group looked for the bio-compatible tape that could be attached to human body without any disturbance. Ritik found few options.
- Design specification discussed in the group and made an action item list for each group members.
- Met with Steve and discussed the project with him and got his point of view regarding the project.
- Steve suggested to run the idea by Andrew in order to find out if anything similar has been done in the previous years and if we can make it better.

Action Items:

- Book an appointment with Andrew in order to discuss the project with him
- each group member need to research about one aspect of the design specification as below

Ritik: Reciver/Transmitter side of the design.
use RF? Bluetooth? How we going to implement it? Define range? Notification method?
Nima: Power issue
what power we need? What kind of power source? Watch battery? Heart pulsation?
Motaz: Software interface
Ashraf: bio-compatible material
Mohammad: Marketing potential/ Targeting users

Project Meeting Minutes

Date of meeting: Jan 14th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1130-130

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Motaz brought up the new idea that we use a LCD on the car and the module on the car checks if the user has the valuable stuff that are tagged with him in the car.
- RF Receiver/Transmitter discussed further.
- Presented the idea to Lucky and he proposed some ideas based on the stores security systems
- Problem came is that how does the system distinguish between diff and kinds of tagged stuff and alert the user
- Met with Andrew and presented the ideas to Andrew
- Andrew suggested the idea of alcohol check before driving
- Discussed the possibility and complexity of the project
- using the mechanical lock on the ignition or electrical switch discussed

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Action Items:

- each group member reviews the possible way of implementing this idea

Project Meeting Minutes

Date of meeting: Jan 15th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1830-

Attendance:

- Ritik Looned
- Motaz Billeh
- Ashraf Jerbi
- Mohammad Naghshineh
- Nima Soroudi

Items Discussed:

- Each person explained the their research, and presented to the group
- The idea of cheating discussed, which is the flaw in the system.
- Face recognition idea that checked the face randomly would give a sign on top of the car they are drunk.
- Camera is not implemented on the Breathalyzer safety feature. And that's what we are adding to the current products.
- How to start/stop the car at the beginning. Use the relay?
- Motaz and Ashraf could possibly implement the facial recognition. How about at night?
- Group looking through parts list and choose what we need.
- What is the target for the product? Average consumers!
- Other features could be added for parental control - child wants to go out and drink
- Night vision app camera in the cell phones? Hard to process the comparison after
- Camera shouldn't be detachable
- Design specification discussed in the group and made an action item list for each group members.
- Met with Steve and discussed the project with him and got his point of view

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Action Items:

- Order the parts required from ESSS
- Nasir to apply for the Engineering department Funding
- ESSS fundng due January 23th
- Group to do further research for the target
- Motaz look for inferred camera (night vision) and the price
- Motaz and ashraf See what kind of camera and software we need? Regular? Infarred?

Project Meeting Minutes

Date of meeting: Jan 30th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1630-1830

Attendance:

- Ritik Looned
- Motaz Billeh
- Ashraf Jerbi
- Mohammad Naghshineh
- Nima Soroudi

Items Discussed:

- Ritik wrote a Matlab code to distinguish between to face pictures importing from laptop camera or smartphone
- Testing on the same code applied to define the accuracy
- The idea of using external light on a breathalyzer discussed in order to have a better ambient
- The idea of edge detection discussed
-

Action Items:

- Mohammad to take care of funding applications and deposits for the parts
- Nima to figure of the schematic for a breathalyzer
- Ritik/Ashraf/Motaz to research and work more on the idea of face detection

Project Meeting Minutes

Date of meeting: Feb 9th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- discussing the terms for project specification document which is due on feb 17
- the functional specification has to discuss how the device works.
- What we need to do and why we doing it.
- The problems for the functional specificaions are Camera, breathalyzer and ignition system
- 5 componenets for specification: camera, breathylyzer, relay , notification systems and MCU

Action Items:

- Nima to work with ARDUINO microcontroller and figure out a way to acquire signals from the breathlyzer

Project Meeting Minutes

Date of meeting: Feb 15th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Discussted the flow chart for the Impaired driving prevention
- Duties specified for each person to do the research about how to implement the parts
- Camera=Moataz and Ashraf
- Breathalyzer=Nima
- Relay/Switch=Nima
- MCU= Ritik and Ashraf
- Alarm=Ashraf
- System Overview=Mohammad
- Specific details for the device discussted

Action Items:

- Duties specified for each person to do the research about how to implement the parts
- Camera=Moataz and Ashraf
- Breathalyzer=Nima
- Relay/Switch=Nima
- MCU= Ritik and Ashraf
- Alarm=Ashraf

Project Meeting Minutes

Date of meeting: Feb 20th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Nagshineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Functional Specification Report planning
- Each person presented their research about how each component of the device
- Deadline for the Functional specification report and task for each person
-

Action Items:

- Each member write up their part for functional specification as below
- Camera=Moataz and Ashraf
- Breathalyzer=Nima
- Relay/Switch=Nima
- MCU= Ritik and Ashraf
- Alarm=Ashraf
- System Overview=Mohammad
- Members send their part to mohammad by feb 21 noon
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Project Meeting Minutes

Date of meeting: March 1st
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Nagshineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Design Specification Due March 10
- Rubrics for the design specification discussed
- Issued with functional specification such as
- What kind of Camera to use and if it is a good choice?
- Possibility to implement the device on the actual ?
-

Action Items:

- Each member to research and work on their parts for the design specification
- Mohammad to figure out the implementation on the actual car

Project Meeting Minutes

Date of meeting: March 8th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Design specification is due on march 10
- Each member presented their research for the parts and componenets
- Group decided to hand in the design specification 3 days late
- Got the functional specification results back and went over the problems and parts that caused losing marks

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Action Items:

- to make note of the changes we need to make for functionality of the device
- each member contact Ashraf and Moataz and send them their parts for design specification by March10th
- Ashraf and Moataz to put the parts on Design Specification together
-

Project Meeting Minutes

Date of meeting: March 15th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Changed the ignition switch approach from relay to mosfet.
- Building our own breathlazyer instead of the 3rd party breathalyzer because of the issues with reading voltages

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Action Items:

- Nima to research about possible relays we can use or comeup with a design for using Mosfet as a switch if its easier
- Nima and ritik to research about possibility of building our own breathalyzer

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Project Meeting Minutes

Date of meeting: March 22nd
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Changed the relay to switch ignition system.
  -Use the Mosfet to model the interlock using the power supply
- MQ-3 gas sensor purchased and tested the functionality of the Gas Sensor and corresponding voltages
-
-

Action Items:

- Research about car ignition system and power distribution of the car
- Make test cases for the gas sensor and Mosfet switch Also and plan how to integrate it (power it up) using the raspberry pie

Project Meeting Minutes

Date of meeting: March 29th Location: ASB, Lab1
Minutes prepared by: Nima Soroudi Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- LCD module?
  -What kind to buy?
  -Compatible with the Raspberry Pi
- Power output from Raspberry pie
  - How much are we drawing from the raspberry Pi
- GPIO pins from Raspberry pie to Mosfet, LCD and Gas sensor assigned
-

Project Meeting Minutes

Date of meeting: April 5th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- The Raspberry Pi camera damaged
- - Discussed the ideas about why the camera got damaged
- - Implemented a ESD free station and handling for the camera to prevent damaging
- Test Cases for face Detection
  -
- Alarms and notification systems for the device
  - Buzzer, LEDs, User Interfaces
- User interface
  -

Action Items:

- Nima to go to RP electronic and purchase the new camera
- Ritik and Moataz to come up with a final list for different test cases
- Ashraf and Moataz to work on LCD module for interface

Project Meeting Minutes

Date of meeting: April 12th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Alcohol level testing and calibrating the MQ-3 Gas Sensor
  -Using the alcohol and measuring the output voltage of the Gas sensor using DMM
  -Providing air with alcohol and observing changes in the voltage level
- Implementing the MQ-3 gas sensor
- -Soldering wires to the gas sensor and
  -Reading the value with Raspberry Pi through the ADC

Action Items:

- Nima and Ritik to perform more testing on the gas sensor
- Moataz to Build a case for the Gas Sensor

Project Meeting Minutes

Date of meeting: April 16th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Ritik and Ashraf working to the LCD module and user interface
  -Outputting the results and commands on the interface
- Accuracy of face recognition
  - Testing performed on different members to achieve the accuracy
- Mohammad Working on the Presentations
  - Starting with the presentation and making a survey for the demo day
- Nima sorting the Minutes and Agendas for the Demo Day

Action Items:

- Nima To purchase the Extension for Raspberry pie interface
- Group to work on the post mortem representation

Project Meeting Minutes

Date of meeting: April 20th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Mohammad and Ritik Worked on the Buzzer
  - intergrated it to the original code
- Nima and Ritik Worked on the Audio integration to the code for simulationg the Car ON/OFF
- Ritik Worked on the Post mortem report
- Ashraf and Moataz work on the packaging and Car simulation

Action Items:

- Each person write their part on the post mortem
- Mohammad work on the Demo and have the lay out ready

Project Meeting Minutes

Date of meeting: April 23th
Minutes prepared by: Nima Soroudi

Location: ASB, Lab1
Time: 1230

Attendance:

- Ritik Looned
- Mohammad Naghineh
- Motaz Billeh
- Ashraf Jerbi
- Nima Soroudi

Items Discussed:

- Last day to make the final changes and modification
- Solve the bugs and implementing the car environment
-

Action Items:

- Everyone one getting ready for demo and their parts in presentation
- Debugging and troubleshooting extension hand made cable – loose connection
- Filming and commercializing the product
- Continue on packaing