8888 University Drive,
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604-446-6738

Post Mortem for Fall Emergency Distress System

Project Team: Cyrus Chi Chung Chan
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Table of Contents:

8888 University Drive,
Burnaby, BC, V5A 1S6
604-446-6738

List of Tables and Figures

8888 University Drive,
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604-446-6738

1 Introduction

As we age, our bodies gradually become weaker and less responsive. This is especially true for senior citizens, as they tend to have difficulty controlling their body movements. At the beginning of the 20th century, it was estimated that there were at least 2.6 million fall related injuries in the US alone; of which 10300 were fatal [1]. In Figure 0.1 the severity of this issue can be seen. It depicts an increase in death rate for individuals over the age of 65 who succumb to their fall injuries. During a meeting with Omar Aziz, a PhD graduate of SFU Engineering Science and a researcher in prevention of injury to the elderly, he stated that the most common causes of falls involve an incorrect shift in body weight. In many cases, falls are unavoidable but we want medical assistance to arrive as soon as possible.
To solve these problems, our company is designing and developing a system called the Fall Emergency Distress System (FEDS), which responds to the falling motion of the user. When the user has a sudden downward acceleration, the system will detect this motion and will emit a buzzer alarm. This informs the user that a distress call will be sent to the service center if it is not deactivated within a certain period of time. The device will also include an emergency button that can be pressed anytime and it will notify the system of the user's need for medical assistance. When a distress call is received on our servers, the service team will locate the user through GPS and send the information to a medical response team.

Over the past 13 weeks, the engineers of 4Life Technology Services has been working hard to produce a proof-of-concept (POC) system. This document provides a summary of the process and results in producing the POC system. Challenges, learning experiences, budget, and schedule will also be addressed in their respective sections.

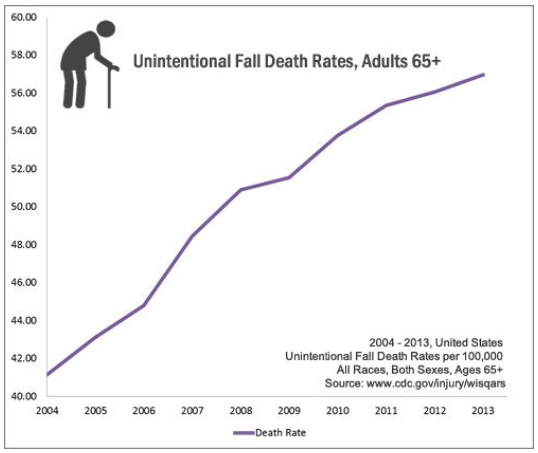

Figure 1: Death rate of unintentional falls for seniors age 65+ [2]

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2 Materials and Costs

The estimated and actual costs for creating the FEDS device and system are shown in tables 1 and 2 respectively. When comparing the two tables, it can be noted that safety equipment, Li-po battery and shock sensors were not purchased and did not factor into the actual cost. The safety equipment and the Li-po battery were substituted by a mattress and an external battery supply to reduce the overall expenditure. In regards to the shock sensor, the accelerometer is able to calculate the force of impact so a shock sensor is not needed.
There was a large difference between the estimated and actual cost of the web domain name and hosting servers. The estimated cost of the domain name and servers were calculated with a daily fee for 3 months. The actual cost is much lower because there was a free one year free service offer so the only fee paid was for the domain name.

Table 1: Estimated Costs		
Item	Quantity	Cost ($)
Raspberry Pi 2 Model B and kits	1	90
3-Axis Accelerometer	1	30
Wires	N/A	40
Wire Connect Board (Order from third party)	1	60
Safety Equipment (padding for testers when they fall)	1	40
Li-po Battery	1	40
Shock Sensor	1	15
Heart Pulse Sensor	1	30
GPS	1	90
Speaker	1	20
Buttons	3	45
Website domain name and Hosting Server	1	100

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Misc. (tapes, LED lights, USB cable and water resistance, etc.)	1	100
Shipping	N/A	50
Total Cost	N/A	750

Table 2: Actual Costs		
Item	**Quantity**	**Cost ($)**
Raspberry Pi 2 Model B (1GB) Complete Starter Kit	1	89.95
Heart rate sensor	1	6.69
GPS	1	55.75
Button	1	6.17
USB to TTL	1	15.53
Breakout RGB LED	2	4.36
Electrical Tape	1	1.06
Header Extended Socket	2	3.19
Solder Wick	1	2.87
Rocker Switch	1	1.60
Printed Circuit Board	1	4.73
USB and microUSB shell	1	2.03
Standoff M3X15MM	1	2.82
Jumper Wire F-F	1	12.98
Header 0.1 40 Pin 20MM	1	3.25
GY-80 (accelerometer, gyroscope barometer)	1	17.66
Buzzer	1	1.32
Protoboard	1	2.52
Raspberry Pi Case	1	4.97
Domain Name	1	1.97

Jumper Wire M-F	1	2.66
Screw M3x20MM	1	1.61
Screw M3x10MM	1	1.51
MG Ferric Chloride	1	10.75
MG Positive PhotoResist DEVE	1	12.45
PC BRD DS POS 150X250MM	1	17.95
clear tape for making PCB	1	2.23
Velcro 3FT	1	7.24
elastics straps	2	6.66
3d printed case	1	47.35
Metric Flat Washers	1	3.32
PC Drill Bits Set 0.033 x3	1	22.5
PCB Etch Resistant Pen 1/32	1	3.42
PC BRD DS POS 100X150MM	1	10.26
Heat Shrink, 7mm	1	1.61
Total		392.94

3 Schedule

Figure 2 below depicts a comparison between the original schedule and the actual schedule. As figure 2 is analyzed, it can be noted that the project was usually behind schedule. This is mainly because the original schedule projected a presentation at the beginning of December; in actuality, the presentation date was near mid December. The project was also behind schedule because the estimated time it takes to debug issues was severely underestimated. Most of the time the tasks went over schedule was because there were bugs to fix which were either difficult to solve or was found at a later date.

(Please note: the official presentation date was scheduled for mid-December. However, due to a team member having a seizure a few hours prior to the presentation, the

presentation had to be rescheduled for mid January even though the project was already completed in mid-December)

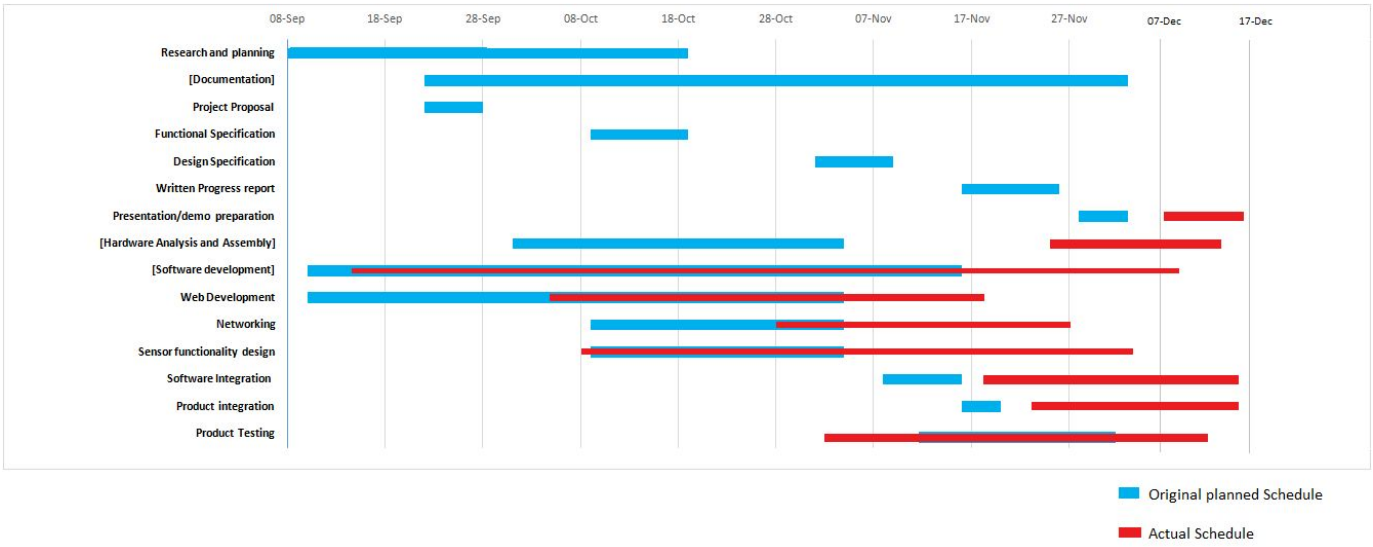

Figure 2:Original planned schedule vs Actual Schedule

4 Problems/Challenges

The most difficult and challenging part of the project was deciding on the features of the system. At the start of the project, all group members had different ideas on how the system should work and what functions should be implemented. This meant that each idea had to be discussed carefully to avoid conflict and in order to gain an overall consensus on the project as a whole. Some ideas such as LED monitors and microphones were initially suggested but later removed because the team agreed that it was not an important feature. After multiple group discussions, the features of the system were finalized and the project was able to proceed.

We already encountered a small challenge right at the start of the project. Many team members had no experience with the Raspberry Pi. This delayed the project as information had to be learned through online tutorials and resources before progressing in the project.

Another major challenge in the project was integration. When each individual sections were completed, they had to be integrated into one system. However, many software and hardware errors started appearing. Some hardware problems included sensitivity issues and placement of the buttons, problems with the LED, and soldering issues. In regards to software, the buzzer code and fall detection code had to be edited and

debugged many times to compensate for changes in the system.

Although it may seem simple to implement changes for the problems above, it took a lot of effort to get everything to work. For instance, the FEDS' buzzer was one component that and had two major problems with it. It took around a month to solve this issue because it would occasionally malfunction, making the issue very difficult to solve.

The first problem was related to how the buzzer was soldered onto the PCB. Buzzer works using vibrations in order to make a high-pitched sound. However, soldering it onto the PCB restricted the buzzer's movements and prevented it from vibrating properly. The property of how the buzzer needs to vibrate in order to make sounds was not discovered until 2-3 weeks later. The solution was to separate the buzzer from the PCB and let it hang loosely within the case while making sure that it did not interfere with the other components.

The second problem arose when the FEDS software application was modified to automatically execute the main program during bootup. During bootup, the operating system would create a process for the main.py program. However, this would cause a problem when the developer connects to the device through SSH (secure shell). Running main.py from the SSH connection would duplicate the process because main.py was already running beforehand from the bootup. This results in having two of the same process writing on the same peripherals of the device (in this case, the buzzer) which causes conflicts. To solve this issue, we disabled the auto-start feature and decided to manually run the code.

5 Group Dynamics

From the beginning, the project was divided into two parts: software and hardware. Benjamin, Welson, and Daniel mainly focused on the hardware side of the project, like the accelerometer, GPS, casing design, and proto-board. Cyrus, Yuvin, and Janet focused more on the software side of the project, which included the embedded system, server, and websites. Everyone had a role in the doing the documentation, but Daniel and Welson had major roles for the documents. Their responsibility included editing other group members' written sections. Although everyone had their own strengths and weaknesses, everyone's opinion was considered for every section of the device. Because there were so many opinions to consider, arguments in design decisions often occurred. We used a variety of methods to solve these problems. Most of the time, we talked things out until both parties are satisfied. If that does not work we would vote on which design to go with. The last method (if possible and if the person is willing) was to implement both designs in order to see which one was better.

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6 Workload distribution

6.1 Workload Distribution

Table 3 is a listing of the group's workload distribution for the semester. Please note that although some members seem to have a smaller work load, the table cannot show small details such as effort/contribution to discussions that went into building this project. This table also does not indicate which tasks were easier/harder to implement. As a result, this table is only a general guide, and not a clear indication of how much each person worked over the term. Our group has come to a consensus that every member had roughly an equal share of the workload

Table 3: Workload Distribution

Task	Yuvin Ng	Cyrus Chan	Benjamin Sia	Janet Mardjuki	Welson Yim	Daniel Lei
Operator Interface Design	xx	xx				
EC2 Server and Database Setup	xx	xx				
SW Integration	xx	x		xx		
Networking	xx			xx		
FEDS SW Design	xx	xx	x	xx	x	x
FEDS HW Design		x	xx		xx	x
HW Integration		x	xx			
Casing Design		x	x		xx	
PCB Design		x	xx			
Accelerometer coding	x	x	x	xx	x	xx
GPS coding	x	xx	x	xx		x
Buttons, LED,	xx	xx		x	x	

Buzzer						
Parts Acquisition (as in research in what to get)		x	xx	x	x	xx
Administrative						xx
Documentation	x	x	x	x	xx	xx

xx Primary responsibility
x Secondary responsibility

6.2 Individual Reflections

Yuvin Ng
In this project, I was mostly involved in software design. However, I also provided assistance to other members as needed. As Chief Technology Officer, my position's responsibility in this project was to assist my group members with the communication between the embedded system and web server as I have previous experience in this area. I am really glad that I worked on FEDS, as I am able to apply my knowledge of concepts to this project. Furthermore, I am glad to contribute to making a product that could improve the lives of many people.

I learned to integrate the FEDS software system as a whole, beginning from the device's peripherals signal to the back end of the online database server. This is an important skill that I believe is crucial in order to make a complete product. I also learned the importance of analyzing my groupmates' skills and capability first; this helps to distribute design tasks within the project and it allows us to ensure efficiency in delivering results within a tight deadline.

One of the best learning experience I had was making the PCB board with the guidance from the TA Jamal. I felt that this is the most important skill I have acquired in this course. I also realized that making a PCB board is not as difficult as it seems. I would really like to take this opportunity to thank Jamal for his patience and guidance. Lastly, I would like to thank my groupmates for putting in effort towards completing and making this project successful. At the same time, I learned as much as I could from all members.

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Benjamin Sia

It has been a rough and amazing journey throughout this project and I faced a lot of different challenges and achieving some hard tasks. Being the Chief Operating Officer of this team was a whole new experience. I needed to take up responsibilities such as keeping track of the project's progress and understanding the difficulties that my teammates had in order to discuss further improvement with the team, including our CEO, Cyrus.

One of the most challenging parts that I encountered was time management and compromising among teammates. Each individual had different tasks and responsibilities to be accounted for. For example, we all had other classes throughout the term and there are times where time conflicts resulted in missing members during our group meetings. We decided that the best way to deal with this problem is to continue the group meetings with missing members and to assign tasks accordingly. At the end of the meeting, we inform any absent team members about our discussion and notify them of what their assigned task is.

I personally do not have much experience in doing software, but through this project, I had to break out from my comfort zone to work in this area. All of our components required us to configure it in such a way where it needs to be compatible to the Raspberry Pi. I configured the accelerometer and GPS module. There was no problem dealing with the accelerometer, but GPS was the challenging part. I used UART as well as inputting it as a USB port, but those attempts did not get it working properly. Fortunately, through Cyrus' in-depth research, we managed to solve the configuring GPS problem.

Designing and producing the PCB was a whole new experience that I had in this project. The process was interesting and memorable. I learned to use a new software called Eagle to design schematic pathways for all components to be connected to the Raspberry Pi. TA Jamal was very patient and knowledgable and he guided me during the process of making the PCB. This kind of experience is something I can never get in school.

Janet Mardjuki

Throughout this project, I gained a lot of experience by doing a lot of things, from simple things like coding in Python to more complicated things such as designing applications for embedded systems. As the CPO of FEDS4Life, I was responsible for managing the cycle of development and design of our product. I had some experience in working with

embedded systems. At first, I thought the whole development process should not be that time consuming, but I was totally wrong – it was not that easy. Our group spent about 50% more time than originally planned. This is where we really had to manage and plan our time and meetings well.

At the beginning of the development process, I suggested to use C for the whole application, as it is one of the programming languages that everyone was familiar with. In general, programming languages are faster than scripting language. C is the language that is used the most for embedded development. After our group tried working with C for a while, we realized that it is not the best choice for fast prototyping. For one, most of the examples and tutorials are coded in Python. Secondly, Python is a much simpler language (no malloc, no data type, etc). I have done a fair amount of test scripting in Python, but I have never developed a Python based application.

Although translating all code into C is possible, it might take quite a while as we are not that familiar with the overall system and Python. Multithreading is possible in Python, just like C, but is ten times slower in comparison. During this time, I learned to make decisions within a very limited time and with very little information. I learned how to discuss matters in the group and to come out with the best solution. In this aspect, I also learned how to better communicate with my teammates in order to make the best decisions.

Due to my experience, I am used to reading a lot of datasheet, tutorial, and documentation, but I have barely done any formal documentation. Throughout this project, I learned how to actually create proper formal documentation every step of the way. I learned how to collaborate with my teammates, and give critical feedback during revision.

Overall, I really enjoyed my experience working in this project. I learned more than I expected, from online resources, my teammates, and the people around me.

Daniel Lei
Imagine yourself on a plane 5 kilometers in the air. Wearing a jumpsuit, you open the door and the wind instantly hits your face warning you how dangerous it is. Without any experience and feeling a chill down your spine, you jump out of the plane. That is the feeling I had when I took this course. Throughout the course, I have been frantically trying to figure out how to use devices which I have never seen before, knowing very well that if I fail, my grade will be crashing into the ground. However, thanks to this crazy

experience, I would say I have learned a larger variety of skills compared to any other course I have taken in my undergrad. Some of the noteworthy skills I have gained involved leadership, documentation, Linux environment and Python coding, and internet/ssh protocols.

As the Chief Marketing Officer my main task was to ensure the presentability of the company's work – mainly documentations. Even with my co-op experience in creating test cases and writing the documents for the test cases, I was not accustomed to organizing and writing reports of this size. I learned the importance and challenges to have a good overall picture of the project in order to create a proper structure for documents. Originally, when I was distributing the topics for everyone to write, it was too general. The final structure of the document was so discontinuous that the entire documented needed to be reconstructed. From this experience, I learned to be specific to the topic details required. Also, as the person who is in charge of splitting the tasks/editing, all members tended to ask me for questions. As a result, I went in-depth with nearly all the different tasks involved for this project, helping me gain knowledge in various subjects.
Along with writing the documentation, I also had a major role in programming the accelerometer and had a minor role in connecting the GPS. In order to properly program the two sensors, it was necessary to learn how to navigate around the Linux environment within the Raspberry. With this opportunity, I took the chance to familiarize myself with the basic commands and gained intuition on how the operating system works. Moving on to the sensor coding, I initially had a very difficult time. We were coding in Python and the only programming language I knew before was C++. This transition proved more difficult – very different from the rumors I have heard where people said, "If you know C++ then learning Python is easy". It took me around 4 - 5 weeks to get the hang of Python. It just never clicked for me.

Finally, although it does not sound impressive, a useful skill I have learned is how IP addressing works. In order to allow my team members to SSH into the Raspberry Pi at my house, I was required to learn about public/private IDs and port forwarding. This is a skill I feel will be very useful for me in the future.

All in all, my experience with Capstone has been mostly positive. Yes, there were scary moments when I could not figure out things before the deadline, but the sense of accomplishment of solving the problem (that is if I did not pass it onto my group members) is exhilarating. However, if you ask me whether I would jump off another

plane and take a similar course again, I may have to reconsider it. It depends if my heart can take the pressure or not.

Cyrus Chan

Over these past 4 months, I am glad to work with 4life technology team. When the idea first came out, I believed that the device would be very useful. During the research of the idea, I knew that one out of three elderlies had fallen once per year. Additionally, only half of them can get help immediately. Hence, FEDS development was very attractive for me because it was not only a device that can detect falls – it can also save someone life. I am pleased that we were able to finish a functional prototype device after one semester.

As the Chief Executive Officer of 4Life Company, my main job is to strategically plan solutions to the problems, making crucial decisions towards the project and implementing the hardware aspects of the project. Also, I needed to consider the constraints of the device carefully to find out what kind of functions really need to be included in the device. Making the right decision is a challenging part of the project, since the whole project may fail because of a small error. Thus, my job also includes researching each component and studying the theories behind them.

As Yuvin, Janet and I have experience in making a website and hosting a server on Amazon EC2, our group was able to create the web application in a very short time. Hence, we mainly focused on our hardware design at the middle design stage. As I had only used Arduino before, Raspberry Pi was a new device for me. So, this was my opportunity to learn new knowledge. During the project, I also learned to control the GPS, active buzzer and LED in Python with the Linux system. Afterwards, my task went over from the software side to the hardware side.

On the hardware side, I had a pleasant experience in making a PCB board. Since I had never created any PCB before the project, I thought creating PCB would be a long process. By learning from online resources, I have found that Eagle is a simple and easy-to-use software. You can finish a PCB layout in 3 hours if you are good at it. Since it has an auto routing function, it can shorten the time for routing the connection ourselves. Thanks to the help from Jamal, we got the chance to learn and create our own PCB using photoresist method. Ben, Daniel and Welson also taught me a lot about hardware design and 3D design by using SolidWorks.

Time is the main enemy obstructing us in this project. Since the design did not meet our constraints sometimes, we needed to spend lots of time to redesign and figure out where the problems arose from. During the second last week of the project, we put our design in the 3D printed case. However, more critical problems regarding our device began surfacing. For example, the buzzer of our device ceased to function and the detection did not detect the fall accurately anymore. And, I sometimes felt helpless facing the unexpected bugs. Luckily, all of our team members had worked overnight to continuously test and fix the bugs. I am very appreciative to all of our members for spending so much time on the project. Finally, we have a working prototype for the demo, and the overall experience of the project is unforgettable.

Welson Yim

Over the past 4 months, I was able to learn a lot from working together within our Capstone group. This ranged from learning simple skills such as basic HTML to catering to design specifications based on other sections in our project. There were also many times where things went wrong and it resulted in conflicting ideas but we managed to pull through to reach our goal.

My position in the group was Chief of Finance, which meant that one of my primary duties was to monitor the amount we spend and to help search for cheaper alternatives. This was generally a new experience for me because we had a budget that we wanted to stick to and I had to keep track of it carefully. Because my team members were not tracking the amount we spent, it would often lead me to nagging my team members to tell me how much each component cost.

Since I was in charge of the spending, I decided to take the role of modeling and printing a case. Modeling the case in Solidworks was a huge chore because of the minor details that kept changing to conform to the team's ideas. In these 4 months, I had to re-build the case at least 5 times because the designs were constantly changing. In Solidworks, the drawings referenced other sections and would fail if changes were made on the referenced sections. I believe using a design tree would help, but I was still new to that function and was not able to fully explore it. Also, the 3-D printed case had pieces that broke off due to structural defects. The button’s support beams were too thin and broke off once during printing and another time during the construction of the fall detector. If I were to ever 3-D print anything in the future, I would need to pay attention to real world dimensions and assume the case would be handled roughly.

As with many of my other team members, I dabbled in the other tasks such as assisting with the testing of components, helping with coding logic and documentation, with documentation being one of my main focuses. I was able to obtain learn a lot by reading the documentation and correcting grammar and style. I had to learn to be concise when I asked my team members to clarify their sections to not waste their time.

This whole experience was a struggle, but it was also fun. When the project you worked on for 4 months is put together and performs how you want it to, you get an ecstatic feeling. The project gives you a feel of how it is to work in real life – everyone specializes in different aspects of the project as well as the time constraints. Overall, this was a very good experience and will definitely help me in the future.

7 Conclusion

FEDS is a wearable device which detects when a user has fallen. Overall, we can proudly say that we have a working product that functions well in everyday “normal” situations. However, that does not mean improvements cannot be made. There can still be further improvements to the fall detection algorithm and operator interface to make the device run “buttery smooth”. This project has been very challenging for the 4Life team where we had to learn many skills from scratch. We hope these skills we learned can be used for our future careers.
As of now, all team members are currently occupied with school and currently will not further continue working on this project together. However, all the work done within this project is free for any 4Life member to use in the future if he or she decides to continue with this idea.

8 References

[1] Injury Prevention, “The cost of fatal and non-fatal falls among older adults”, 2015. [Online]. Available: http://injuryprevention.bmj.com/content/12/5/290.short. [Accessed:17- Oct- 2015].

[2] [Cdc.gov, “Important Facts about Falls | Home and Recreational Safety | CDC Injury Center”, 2015. [Online]. Available: http://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html. [Accessed: 18- Oct- 2015].

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9 Meeting Minutes/Agenda

4Life Technology Services

Agenda

Date: September 13, 2015
Time: 9:00 – 10:30 pm
Location: Skype

Purpose of Meeting: General meeting to talk about the overview of how the fall sensor project will function

Items for Discussion:

- Who is the target audience?
- Ideas with how the device is going to work?
- What hardware or software is required?

8888 University Drive,
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4Life Technology Services

Meeting Minutes

Date: September 13, 2015
Time: 9:00 – 11:00 pm
Location: Skype

Present: Daniel Lei, Welson Yim, Yuvin Ng, Cyrus Chan, Benjamin Sia, Janet Mardjuki
Regrets: None
Purpose of Meeting: General meeting to talk about the overview of how the fall sensor project will function

Minutes:

A. Who is the target audience?

Discussion: Yuvin suggested that we should take Andrew's advice from a previous meeting and make our target audience to be the elderly. Welson mentioned that the device would be acceptable for hospital usage. Daniel further expanded upon the idea to generalize the device usage to any user who are prone to falling (which for the most part is suited for the elderly)

Action: None required. All team members agreed to the generalized audience which Daniel stated

B. How is the device going to function?

Discussion: Daniel suggested on researching how people fall and the symptoms people go through/experience when it happens. Cyrus showed us a few of his researched websites for the team to go through. Out of all the webpages he showed, it was agreed upon that acceleration is a good way to measure a fall. Benjamin asked if a heart pulse change happens when a faint occurs and Daniel asked if body temperature changes occur. Because the group did not have the answers to these questions, we agreed upon doing further research on which symptoms can be detected when someone faints or falls.

Action: Team members will follow up on studying symptoms of a fall. Agreed that we need to measure acceleration for sure.

C. What hardware or software is required?

Discussion: Yuvin suggested an accelerometer, which everyone else in the team agreed was required. Cyrus, Yuvin and Janet all recommended to use Raspberry Pi as the microcontroller. As Welson, Daniel and Benjamin did not have any experience with microcontrollers it was agreed upon to use a Raspberry Pi.
Yuvin suggested to use JavaScript, Mongol DB as programming languages/tools as he has had experience using them. The team agreed and it was decided.
Cyrus suggested to use Amazon's cloud based server subscription as the database. However, due to lack of knowledge on servers, the team required research on possible servers

Action: Team to follow up on studying different types of databases which can be used.

Meeting was adjourned at 11:00 pm instead of the planned 10:30 because there were too many things to talk about. Will further discuss in another meeting date as some people had to sleep.

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4Life Technology Services

Agenda

Date: September 17, 2015
Time: 9:00 – 11:00 am
Location: School, TASC 1

Purpose of Meeting: General meeting to talk about the software sides of the project

Items for Discussion:

- How the server and software works (Yuvin to give a tutorial)

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4Life Technology Services

Meeting Minutes

Date: September 17, 2015
Time: 9:00 – 11:00 am
Location: School, TASC 1

Present: Daniel Lei, Welson Yim, Yuvin Ng, Cyrus Chan, Benjamin Sia, Janet Mardjuki
Regrets: None
Purpose of Meeting: General meeting to talk about the software sides of the project

Minutes:

A. Discussion of software to use.

Discussion: We met up to discuss on how to approach the project. We talked about what software to use, which database is available and user friendly, and how the database and server are going to link together. Yuvin encouraged all of us to start learning “MEAN” on youtube, and learning HTML in w3school. He believes that it is beneficial for everyone to know what is going on when the software part of the project commences. Benjamin suggested that using MongoDB is a good choice in storing data, because it is using a non-SQL format data, and because he has a bit of experience on it as well. Daniel and Welson described about how the project should look like and what kind of functions to implement such as GPS, wifi shield and etc. Janet suggested making a port on the Raspberry Pi. Cyrus looked into buying the necessary parts.

Action: Started to go through tutorials about Javascript, MongoDB, Express, AngularJS and NodeJs, as well as starting up web server by Cyrus.

Meeting was adjourned at 11:00 am

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4Life Technology Services

Agenda

Date: September 24, 2015
Time: 11:30 am – 12:30 pm
Location: CSIL Meeting Room

Purpose of Meeting: Quick meeting to split up the rolls for the Project Proposal that is due on the 28th

Items for Discussion:

- How to split up the proposal
- Who will be assigned to each section of the proposal

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4Life Technology Services

Meeting Minutes

Date: September 24, 2015
Time: 11:30 am – 12:30 pm
Location: CSIL Meeting Room

Present: Daniel Lei, Welson Yim, Yuvin Ng, Cyrus Chan, Benjamin Sia, Janet Mardjuki
Regrets: None
Purpose of Meeting: Quick meeting to split up the roles for the Project Proposal that is due on the 28th

Minutes:

A. How to Split up the proposal

Discussion: Yuvin was following one of the proposal examples from a previous term and listed out the categories in which our proposal should contain. Daniel suggested to split the roles based off the rubrics instead as that is how the proposal is going to be marked. Yuvin argued that the rubrics is too broad and cannot be split up properly. Eventually, the debate ended with everyone splitting off based on the rubrics. A mental note of the previous proposals were kept to see if incorporating something similar would be acceptable.

Action: None

B. Assigning the roles

Project Overview: Welson
Introduction/background: Janet
Scope/Risk/Benefits: Yuvin
Marketing competition: Ben
Company details: Everyone
Scheduling: Daniel
Conclusion: Everyone
Rhetorical issues, presentation/Organization, Format, Correctness/Style: Daniel and Welson

Actions: Each member needed to finish their section on the 26th to give time for Daniel and Welson to edit everything.

C. Others

We additionally discussed where to buy the Raspberry Pi.

RP Electronics: $59
Lee Electronics: $54
Amazon.ca: $90 (comes with a bundle which may be worth the extra $30-40)

Actions: Need to decide where to buy the raspberry

Meeting was adjourned at 12:30pm

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4Life Technology Services

Agenda

Date: October 9, 2015
Time: 10:00 am – 1:00 pm
Location: Daniel's house

Purpose of Meeting: To classify the technical roles and to distribute workload amongst team members
Requirements: Benjamin is required to bring the Raspberry Pi

Items for Discussion:

- Yuvin and Cyrus will go over what the Raspberry Pi is and will show a working demo
- Officially distributing technical tasks
- Assigning tasks to members

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Meeting Minutes

Date: October 9, 2015
Time: 10:00 am – 1:00pm
Location: Daniel's house

Present: Daniel Lei, Welson Yim, Yuvin Ng, Cyrus Chan, Benjamin Sia
Regrets: Janet Mardjuki (in class)
Purpose of Meeting: To classify the technical roles and to split up the work among team members

Minutes:

A. Yuvin and Cyrus will go over what the Raspberry Pi is and show a demo of it working

Discussion: During the demo, multiple questions from Daniel, Welson and Benjamin were asked. This includes: does the raspberry have Wi-Fi capabilities?; how does the input/output work?; etc.

Action: Yuvin and Cryus showed the raspberry's OS GUI interface and terminal interface. They demonstrated some Linux commands which are used to navigate through the terminal. They showed the different inputs/outputs the raspberry has.

B. Splitting up the technical tasks

Discussion: Yuvin drew a system overview diagram and went over the different sections of the project. All were in agreement with his logic. The tasks were distributed according to each person's strength and weakness. Janet, who originally wanted to do the networking section of the project, was reassigned by Yuvin to do front end development as she seemed to have the most experience with it. The rest of the team (excluding Janet as she was not there) agreed on the decision.
Welson also mentioned that people should be working in pairs (if possible) in case one person gets sick during the project. Everyone agreed.

Action: The following tasks and roles were assigned between the team members:
Sensor to Raspberry Pi input/output: Daniel and Welson
Networking (Linking Raspberry Pi's output to database): Yuvin and Benjamin

ec2 (front end to database connection): Cyrus and Janet

Meeting was adjourned at 1:00 pm

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4Life Technology Services

Agenda

Date: October 12, 2015
Time: 8:00 – 9:00 pm
Location: Skype

Purpose of Meeting: Separate Functional Specification into different modules and assign them to team members

Items for Discussion:

- How to split up the Functional Specifications
- Who will be assigned to each section of the proposal

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4Life Technology Services

Meeting Minutes

Date: October 12, 2015
Time: 8:20 – 10:30 pm
Location: Skype

Present: Daniel Lei, Welson Yim, Yuvin Ng, Cyrus Chan, Benjamin Sia, Janet Mardjuki
Regrets: None
Purpose of Meeting: Separate Functional Specification (due on Oct 19) into different modules and assign them to team members

Minutes:

- **How to split up the Functional Specifications**

Discussion: Yuvin suggested that we look over a previous group's functional specifications. Daniel suggested we look over the rubrics first and try to decide how to split the content up (just like the proposal meeting). Cyrus, Ben, Janet and Yuvin stated that the rubric was too general to properly split up roles. Daniel agreed, but stated his concerns about how the TA will mark the functional specifications based off the rubrics.
Yuvin and Welson suggested to start writing the sections first to see if it matches with the rubrics. If the rubrics are still not fulfilled, then we add our own section. (This process took roughly 1.5-2 hours)

Action: None

- **Who will be assigned to each section of the Functional Specifications**

Letter for Andrew: Janet
Executive Summary: Janet
Table of Contents: Daniel
Glossary: Daniel
Introduction/Background: Janet
System Requirements (with many sub requirements. See google docs for details): Yuvin
Optional Requirements: Cyrus
Engineering Standards: Everyone
Sustainability/Safety: Janet

User Interface: Benjamin
Operator Interface: Cyrus
User documentation: Cyrus
System Test Plan: Benjamin
Conclusion Janet
Content, Technical Correctness, References: Daniel/Welson

Action: Each member needs to finish their section on the 17th in order to give time for Daniel and Welson to edit everything else

Meeting started 20 minutes late due to Daniel finishing up housework. Due to the confusion of the requirements in the rubrics and the possible sections we can split the document into, the meeting lasted one hour longer than expected (ended at 10:30pm).

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4Life Technology Services

Agenda

Date: October 16, 2015
Time: 12:00 – Evening
Location: Benjamin House

Purpose of Meeting: Assign the tasks for the function specifications which Daniel made

Items for Discussion:

- Who will be assigned to each section of the functional spec
- Discuss everyone's strong points and start assigning "speciality" roles for everyone

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Meeting Minutes

Date: October 16, 2015
Time: 12:00 – 04:00 pm
Location: Benjamin House

Present: Daniel Lei, Welson Yim, Yuvin Ng, Benjamin Sia, Cyrus Chan and Janet Mardjuki
Regrets: None
Purpose of Meeting: Split up the tasks for the functional spec

Minutes:

A. Assigning Task for functional specs

Discussion: Daniel assigned the role of who is doing which section of the functional specs.

Action: Daniel and Welson: Editing and formatting of the documents.
Janet Mardjuki: Introduction
Yuvin Ng: System and Sensor Requirements
Cyrus Chan: User Interface, Device Mount/Casing
Benjamin Sia: System Test Plan and Conclusion

B. Discuss strong point of teammates

Discussion: Each of us talked about our strong points and tried to relate it to our project.
Daniel: Hardware, Design and Documenting.
Weslon: Hardware, Design
Yuvin: Software, Server and SQL
Cyrus: Software, Server and SQL
Janet: Software, Server and Embedded Systems
Benjamin: Hardware, Design and software

Action: None.

C. Set up of Raspberry pi

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Discussion: Finally we got a hold of our Raspberry Pi but most of us do not have experience in Operating the Pi, therefore Daniel, Welson and Benjamin started to operate it.

Action: Start up the Pi, getting familiar with bashing and tried some simple example like lighting up the LED through the Raspberry Pi.

Meeting was adjourned at 4:00 pm

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4Life Technology Services

Agenda

Date: October 23, 2015
Time: 12:00 – Evening
Location: Benjamin House

Purpose of Meeting: To set up Accelerometer and MongoDB components.

Items for Discussion:

- Daniel, Ben and Welson need to learn how to use the accelerometer
- Yuvin, Janet and Cyrus will go over MongoDB components and issues

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4Life Technology Services

Meeting Minutes

Date: October 23, 2015
Time: 12:00 – 04:00 pm
Location: Benjamin House

Present: Daniel Lei, Yuvin Ng, Benjamin Sia, Cyrus Chan and Janet Mardjuki
Regrets: Welson
Purpose of Meeting: To set up Accelerometer and MongoDB components.

Minutes:

A. Setup Accelerometer

Discussion: Benjamin, Cyrus, Janet and Daniel are working on the Accelerometer to make sure that it hooks up to the Raspberry Pi.

Action: Went through a tutorial on Google and tried to set-up the GPIO on Raspberry Pi and to connect it to the accelerometer. Ensured that it reads the accelerometer at address 0x53. Once all the configuration was done, we found an open source Python script and implemented it for experimental purposes.

B. Run MongoDB

Discussion: None.

Action: Yuvin ran the node JS application, operator application and set up MongoDB. Based on the successful operation on the server side, data is able to be inserted and retrieved successfully.

Meeting was adjourned at 4:00pm

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4Life Technology Services

Agenda

Date: November 08, 2015
Time: 5:00 pm – night
Location: Cyrus House

Purpose of Meeting: Doing of individual design

Items for Discussion:

- Each pair brings together what they have been working on so far and discuss it among their partners
- Update everyone on their current progress
- Continue working on the project together

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Meeting Minutes

Date: November 08, 2015
Time: 5:00 pm – 10:00 pm
Location: Cyrus House

Present: Daniel Lei, Yuvin Ng, Benjamin Sia, Cyrus Chan, Welson Yim and Janet Mardjuki
Regrets: None
Purpose of Meeting: Doing of individual design.

Minutes:

A. Continue working on Accelerometer

Discussion: None

Action: Janet, Cyrus and Benjamin tested the accelerometer. They were trying to figure out how the accelerometer source code – which was found online – works. Aside from testing out accelerometer, the gyroscope of briefly tested too.

B. Setting up of Raspberry Pi

Discussion: Daniel and Welson discussed about how the I2C communication protocol worked and how to use that protocol between the Raspberry and other peripherals.

Action: Created the I2C connection between the Raspberry Pi and accelerometer so that they can communicate with each other

C. Trying out of new data input

Discussion: None

Action: Yuvin researched on how to connect to MongoDB from an external environment.

Meeting was adjourned at 10:00 pm

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4Life Technology Services

Agenda

Date: November 13, 2015
Time: 1:00 pm – 04:00 pm
Location: Cyrus House

Purpose of Meeting: Work on accelerometer and do falling tests

Items for Discussion:

- Discuss what can be done to improve the accelerometer code
- Test the accelerometer algorithm

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Meeting Minutes

Date: November 13, 2015
Time: 2:00 pm – 05:30 pm
Location: Cyrus House

Present: Daniel Lei, Yuvin Ng, Benjamin Sia and Cyrus Chan
Regrets: Welson Yim, Janet Mardjuki
Purpose of Meeting: To work on the accelerometer

Minutes:

A. Finding more source code for accelerometer

Discussion: Talked about finding a different source code for the accelerometer. The reason why we are looking for a different source code is because the x, y and z axis only senses the position of the accelerometer, instead of measuring the pitch of acceleration. Only sensing the position of the accelerometer is insufficient for measuring falling data.

Action: Found another source code where it is able to use individual axis to calculate the rate of acceleration by using Sqrt(x^2+y^2+z^2). Set the threshold point to 1.8g.

B. Testing the accelerometer

Discussion: None.

Action: Simulated falls by falling on a mattress with accelerometer. Tested out what is the average magnitude of acceleration from a fall.

Meeting was adjourned at 5:30 pm

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Agenda

Date: November 24, 2015
Time: 2:00 pm – 04:00 pm
Location: Cyrus House

Purpose of Meeting: Doing of individual design

Items for Discussion:

- Continue working on the project together

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Meeting Minutes

Date: November 24, 2015
Time: 2:00 pm – 04:30 pm
Location: Cyrus House

Present: Daniel Lei, Yuvin Ng, Benjamin Sia, Cyrus Chan, Welson Yim and Janet Mardjuki
Regrets: None
Purpose of Meeting: Doing of individual task

Minutes:

A. Figuring out of geolocation

Discussion: None.

Action: Yuvin worked on getting the Wi-Fi geolocation of the device. This was mainly used when the device is indoors as the GPS does not work well indoors

B. Improvising of the code for accelerometer

Discussion: Cyrus, Daniel and Welson discussed about how to distinguish when a person falls verses when a person abruptly sits down

Action: Research more about the fall detection algorithm.

C. Embedded system

Discussion: None.

Action: Janet worked on the embedded system of the device, ie. setting all the conditions on what will happen when a fall detect is detected.

D. Soldering

Discussion: None.
Action: Benjamin soldered some of the sensors to the electric circuit board.

Meeting was adjourned at 4:30 pm

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4Life Technology Services

Agenda

Date: December 04, 2015
Time: 02:00 pm – 06:00 pm
Location: SFU Machine Workshop

Purpose of Meeting: Create the PCB with Jamal

Items for Discussion:

- N/A

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Meeting Minutes

Date: December 04, 2015
Time: 02:00 pm – 06:00 pm
Location: SFU Machine Workshop

Present: Daniel Lei, Yuvin Ng, Benjamin Sia, Cyrus Chan, and Janet Mardjuki
Regrets: Welson Yim
Purpose of Meeting: Making of PCB with Jamal

Minutes:

A. Creating of PCB

Discussion: N/A

Action: Created the PCB board with Jamal guiding us through it

Meeting was adjourned at 6:00 pm