

IT Assignment 3 - IT Project Idea

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Team Profile

Team Name: Team Binary (IT World 8)

Group Website: <https://s3-ap-southeast-2.amazonaws.com/projecteir/binary.html>

Personal information

De Xing Teoh

Student Number: s3719485

I am Malaysian born Chinese who migrated to Melbourne, Australia during Year 5. I grew up in a small city called Ipoh where I attended kindergarten and primary school up until Year 5. I am currently doing Information Technology at RMIT. I speak English and Chinese (Cantonese & Mandarin). My hobbies include playing various video games. Playing and watching soccer specifically the Bundesliga where the team Borussia Dortmund I support plays in. Including watching the World Cup and continental competition such as Champions League and Europa League. Besides watching soccer, I also enjoy watching esports such as CSGO Majors, Anime, Kdramas, Reading Manga, listening to music I don't understand such as Kpop, Jpop and other songs from different countries. My interest in IT includes things like programming, web develop. My interest in IT was sparked when I was a child when my father introduced me to gaming through consoles such as the PS1 and handheld consoles like the Gameboy and PSP. My current experience mainly comes from programming I did during high school in year 10, 11 and 12. I mainly have experience with object-oriented languages such as visual basic from VCE. I have basic experience with Java as I have started learning the language during my courses for university.

Ronald Tang

Student Number: s3725095

Born and raised as an ABC (Australian Born Chinese) in West Melbourne, I predominantly speak Cantonese at home. However i can speak English and Japanese fluently as well. I enjoy a large plethora of hobbies; I enjoy watching Japanese animation, and western movies alike. Have a small background in the visual arts, studying Visual Communication in high-school and have a physical and digital folio on a website, called Pixiv where i also draw occasionally at home. Therefore, I enjoy hands on design work, including digital, graphic art, as well as traditional sketching or painting and combining technical skills with painting in scaled model making. Due to my hobbies in games and technology, I grew a large amount of interest in how computer and internet networking worked in tandem with different computer hardware, as well as learning about CPUs, GPUs, motherboards etc. Leading me to build my first computer at around 2010. But not only did my interest in computer systems grow, but my interest in programming as well. I found that one of my early dreams was to create and develop my own game software as i became interesting in how these games were made as they were extremely fun to play.

JingYuan Tan**Student Number: s3613299**

My name is JingYuan Tan, whose student number is S3613299. Most of my friend call me LongTea, some of them call me Ray. These are both my nicknames. My Persona; Email address: 13798966233@163.com ; 6606233@gmail.com.

I am a 20 year-old student from Guangdong, China. This is the first year I study in Rmit. I had already finish the high school education in my country. Compare to other subjects, I am better at Math and English, that's why I choose to study IT here. I am always glad to try something new, and create something, the main ways I have fun in my daily life are gaming and developing games. I enjoy the process of analysing the advantages of other games by gaming, extract them then use them in my designing. I also enjoy the process of collecting the feedbacks from player, observing the reactions of players and thinking of what player want to see in my game.

Bowen Yang**Student number s3665803**

My name is Bowen Yang, and my student number is s3665803. My hometown is Chongqing China. However I was born in Heilongjiang Province which is the most northern province of China. Before I studied at RMIT, I completed a two-year undergraduate course. Then I was not satisfied with my major and college. Therefore, I chose to study in Australia under the support of my family.

Hobby

I am a big fan of the German national football team. I adore Miroslav Klose very much who is the top goalscorer in the history of the FIFA World Cup. A professional player who seems to be always avoiding the temptation of flash. The legend of the world always makes his actions speak louder than words. A real football idol that inspire me forever.

It interest

I'm interested in artificial intelligence and automatic driving, which is the most attractive technologies to me. These two technologies can be bring benefits to the human society. For example, the AI robot may play an essential role in many manufacturing area, because the AI robot more efficient than humans. I had the computer course when I was study in the primary school , it was my first time to contact with the computer, the internet. After that, I was shocked by the science fiction film "Iron man" , which the handsome suits and the technology, especially the Jarvis who is the virtual housekeeper of his computer. Therefore, I'm interested in artificial intelligence and automatic driving.

It experience

To be honest, I don't have much experience with IT, because I studied Accounting before I study in Australia. However, I change my major because of studying IT is a dream for me and I will try my best to study to achieve it.

Lei Guo**Student Number: s3516439**

My name is Lei Guo, student number is 3516439 and email address is:

s3516439@student.rmit.edu.au.

I come from China, my first language is Chinese. I had graduated from Dalian Neusoft University of Information in 2014, my major is Software Technology. I started studying in RMIT in 2017.

My biggest hobby is surfing the internet. I spend at least five hours a day surfing the internet. I usually watch news and videos. Sometimes I play games with my friends. In addition, my favorite sport is fitness. I go to the gym four times a week. My interest in IT is that I can develop some application and websites to make people's lives more convenient and interesting. When I was in primary school, I had no idea what life would be like today. The development of science and technology has completely changed people's lives. I started interested in IT in 2009, at that time, computer games had become very popular in my school, most boys would play and talk about computer games. At the same time, online shopping began to pop, people could have more choices and save money by shopping online. That made me a lot of interested in IT. In 2011, I would go to university, I enrolled in Dalian Neusoft University of Information and started to study Software Technology. However, there were a handful of courses about software or information technology. That's why I study Information Technology again. When I graduated from my last university, I didn't try to get a job, because I was going to apply a university to study.

Haowei Geng**Student number: s3554574**

My name is Haowei Geng, and I am Chinese. I come from a city called Baotou which in the Inner Mongolia. After I finish my grade 11 in highschool, I came to Australia, it was hard for me to adapted new life and second language at the first time. Now I am studying in RMIT which is the reason I came to Melbourne, and my major is Information Technology. In daily time, I spend most of time on playing video games, and I really enjoy that, but playing games is not the only hobby I have. I am also a big fan of DC and Marvel, I did not miss any movies in recent years. About my it experience, just like most of people, my first program is "Hello World". I just started learning programing for about one year, so I do not have too much experience of programing or coding. Honestly, I am still a beginner of learning IT. My interest in it is about making games. I want to make games because I like to play games, and I believe video games would be a major entertainment in the future world. My dream is building a MMOARPG with a team which has same goal as mine, and make it popular just like WOW in decade ago.

Group Processes

Our group worked pretty okay on assignment 2 despite starting a week late with an additional member over the maximum of 5 group members. A large team with a short deadline worked well for us as there was more helping hands to do various tasks, however managing 6 members in the team can be hard, as there is more voices and thus more conflicting ideas. However, this was not really the case in assignment 2, as we worked together as without many problems at all. With experience and feedback between members in Assignment 2, we will work as a team to discuss work allocation early on in the assignment as well as progress milestones so as to not delay the start of the assignment. By doing this we can ensure a more improved time management and efficiency to do the assignment work. Also when there is a disapproval or conflicting ideas, it is good to discuss it out and work a compromise, this was done quite well in assignment 2 but can be extended to all members in the group to participate in discussions.

Career Plans

Ronald's Ideal job:

Senior Front End Developer

The Job listing seeks for a senior front-end developer with at least five years of experience in this field. A front-end developer in this case refers to a developer that supports or allows the design blueprints set out by the UX and UI design team to come to fruition on a web-site or application. They also work in tandem with back-end developers as the front-end developers utilise the functions made available by the back-end developers. The fact that front-end developers indirectly deal with users by enabling designs like animations to work fluidly on a website, attracts to me a lot. Especially due to me enjoying both technological and design work, as I can work together with UX/UI designers and implement designs into the application.

Plan:

In order to obtain the required skills for the job of a front-end developer, I would need a large plethora of skills in varying digital assets. Thus I must learn the different Adobe Marketing Cloud software, such as Adobe Analytics or similar program, as well as a few other web development languages like JavaScript or HTML5. These skills will be learnt through out my university career, and will hopefully be met as I graduate.

As for the experience, before I graduate an internship at a IT company would be ideal to gather first hand experience working alongside IT professional in a professional work environment, gaining the much-needed experience that way. Either through graduate programs, internship opportunities and junior graduate positions.

De Xing's Ideal job:**Java Developer**

The role is for an experienced java developer to join a organisation that provides superannuation services, the company wants to digitise their services. Responsibilities include developing and testing of the software solution, delivery and maintaining the solution. Produce the functional and non-functional requirements for the solution by investigating what the business needs and testing the functional and non-functional requirements.

The experience needed for this position is a relevant tertiary qualification, high proficient in java programming and in other languages like .Net, experience in using Oracle and SQL a language used for accessing databases. Experience working with superannuation or banking platforms are not essential but would be looked well upon. Using API Gateways, can design, program and test and install applications. Able to quickly learn and adapt to new languages quickly and is able to work in a team environment who is able to quickly adapt to rapid and flexible change

Plan:

To obtain the required skills, qualifications and experience for the job is to firstly gain more experience programming in Java. I also will need to practice other programming languages like the .Net framework and Python. This could be achieved by practicing coding on Java daily at home such as writing an own version of an application I really liked. uploading my work onto GitHub. I can also contribute to an open source project to increase my skills as a programmer and/or take up volunteering to help build my resume to showcase that I can work in a team. Also finishing my degree to boost my qualifications. Hopefully be able to also apply for an internship for programming to achieve relevant work experience. Then apply for a graduate junior programmer job and gaining more experience to become a senior programmer.

JingYuan Tan's Ideal job:**Game Developer**

An advertisement I found that might include my ideal job:

http://games.geniteam.com/?gclid=CjwKCAjw7tfVBRB0EiwAiSYGM2209q95z2lcH7HvhZSALiAAmMFXWmjbChfXKCYdA72R3F0h-YjQAhoCzegQAvD_BwE

It is a platform that convert customer's concepts into games. I will join or own a team to analyse the idea from customers, and use the source from them to develop games they want. It sounds interesting and challenging. The content of this job will be various. I can't find the requirements of it because it is not a recruiting ads, but I consider a programmer degree will be needed at least. I am still learning the intro of programming and other skills in ungraduated phase, I don't think I have ability to get this job now.

Plan

In order to obtain the skill I need for this job, the most necessary thing I need to do is finish my school work first, and get some extra skills by self-studying from the books in the library.

Bowen Yan's Ideal job:**Senior Full Stack PHP Engineer - Greenfield AI project**

This job is that using the PHP programming language for developing some artificial intelligence projects. First of all, Big Wave Digital is playing a important role in the Ed-Tech recruitment space. Secondly, working on all new development and tasks no boring stuff is what impressed me, because I don't like the unalterable working environment and the challenge can make me better. In addition, the flexible and sweet CBD work environment can make me relax. Moreover, the salary meets my requirements, which is more than 150k. Furthermore, the most important point for me is that it may provide better career development chances during the growing process of the company.

Plan:

First of all, I will work hard at programming and the basic skills of IT. Secondly, I will find the internship during the holiday in order to accumulation of professional experience and transition knowledge from theory to practice. After I graduate, I may choose to study a master degree which is associated with IT to gain more knowledge to support me get this job.

Lei Guo's Ideal job:**Senior Java Developer**

This job needs to be involved in the development of the project and the java developer need to master a lot of programming knowledge and skills

A description of the skills, qualifications and experience required for the position.

Required skills:

OO programming: Java

Web programming: HTML, CSS, JavaScript, Java EE

UML diagrams

This position needs software engineering degree or equivalent qualifications and experience.

Plan:

I always look at recruitment websites for job postings, like seek. So I am familiar with what a professional software developer needs to have. I will learn important knowledge such as java, language C, and database during my university studies. In addition, I will practice a lot of programming and gain experience. In spare time, I will find some internship opportunities and accumulate more experience. I will finish my studies at RMIT, get a degree, and then join a software development company to achieve my career.

Haowei Geng's Ideal job:**Game Developer**

This job requires programing skills to make games run and some of editing pictures and videos to attract games players.

Required Skills:

Unity, Javascript, C++, Photoshop

Compare and Contrast:

Our group has common elements between our career plans in our ideal jobs in that we all require to know a programming language such as Java or C++. The difference in our ideal jobs are the positions with some wanting to be game developers, senior java developer, java developer, senior front end developer, and senior full stack PHP engineer. Everyone in our group has similar career plans in that we will practice on the skills required in our ideal jobs such as programming, obtaining our degree, finding internships to help us gain the required qualifications towards our ideal jobs. Differences in our plans are the type of skills we need to gained but overall we have similar processes to achieve those goals.

Tools

GitHub Repository: <https://github.com/roxalthea/ProjectEir>

Project Website: <https://s3-ap-southeast-2.amazonaws.com/projecteir/binary.html>

Project Description

Overview

Project Topic:

Our group proposes to create a plan for a Robot for Natural Disaster Assistance to assist rescue efforts in the aftermath of a natural disaster. This project is artificial intelligence robot which plan for detecting and rescue in natural disasters. The robot will operate autonomously in the disaster area without manual operation. This robot is used to detect victim's status, location and other conditions, and then send information to rescue worker in order to formulate a rescue plan. The robot carries a radar and life detector that can greatly increase detecting efficiency. Due to the fact that the condition of disaster area is very complex, many rescue operations rely on manpower could be limited, even cause casualties to rescuers, hence AI robot for natural disasters will bring many benefits to human society. As such in Norse mythology, people sought guidance from the Goddess of Healing, Help and Mercy; Eir, thus naming this project: **Project Eir**.

These robots will be mostly in the form of drones where their small size will be an advantage in navigating urban environments. Where these environments would be too dangerous and life threatening to on-the ground disaster response teams to enter, either due to large and unpredictable obstacles caused by the natural disasters destruction. On top of this, the surrounding environment may be contaminated with radiation and/or chemicals that render rescue attempts impossible. These AI controlled drones are able to act on their own to swiftly navigate complex terrain, through its environmental analysis and radar; sending information on distressed individuals as well as environment condition. These drones being

small and compact means that many can be easily transported in masses and be deployed at the affected area which will increase the efficiency of the searches as it will cover more areas faster and assist rescuers in locating survivors. Not only can this robot be used for natural disasters it can also be used to help locate those who are lost and require rescue.

Team's Motivation



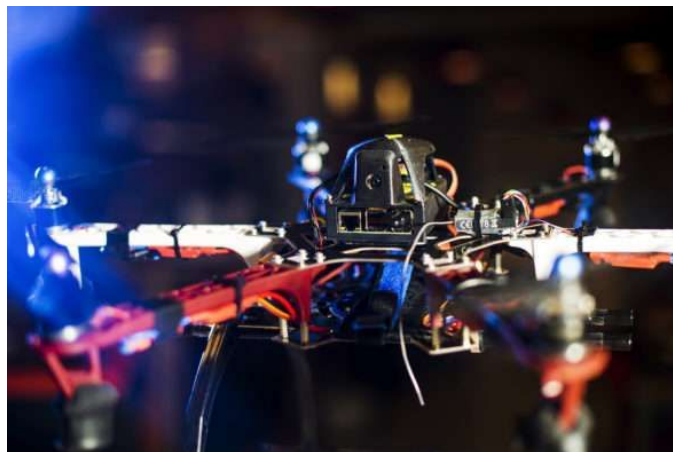
According to the UN report(2015). Since 1995, natural disasters such as floods, storms, and earthquakes have caused more than 606,000 deaths worldwide, and 4.1 billion people have been injured or rendered homeless. However, the reason that some people were injured and caused the death was not the disaster itself. For example, the earthquake. In general, the main shock of the earthquake lasts only ten seconds. Earthquakes pose little direct danger to a person. Because people can't be shaken to death by an earthquake. One of the main reason is buildings can be damaged by the shaking itself which can destroy buildings and hurt people. However, there was no way to stop the disaster. Therefore, the first 72 hours after a disaster are crucial, and response must begin during that time to save lives. However, the secondary disaster caused by the earthquake will complicate the rescue scene that the rescue team can not enter the scene to start rescues, such as debris flow and flood. In addition, if the earthquake happened in some special place, such like the nuclear power plant, it not only will have a huge impact on the rescue work, but it will also cause harm to rescue workers. Hence, the Robot (AI) for natural disasters can solve the problem, which can adapt to various hazardous environments and have AI system that is able to analyze the situation and make decisions extremely quickly.

More often than not, rescue personnel are not able to access and enter areas that pose a significant risk to the lives of the people conducting the rescue. As the environment after a natural disaster is rendered dangerous and immensely unpredictable. To combat this

problem, there needs to be a method to traverse and enter dangerous areas where normally people cannot so that an accurate position of people and/or animals are in distress for the live personnel to act on. Without this solution, there leaves a significant time delay between rescuing a person or animal that's trapped under rubble or is in a position that needs immediate medical attention before their life is lost. This issue is disheartening to the rescue personnel as well as the families and acquaintances of the person whose life was lost, due to the fact that rescue attempts are hindered by the dangerous environment. A robot drone that's able to act as a middle-man sending information about targets and environment analysis enables rescue personnel to act swiftly and safely to rescue a target.

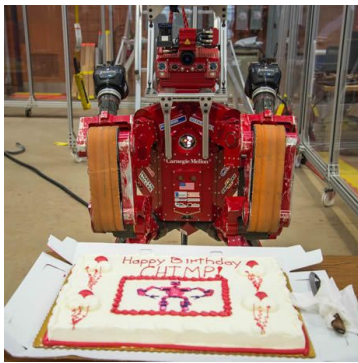
Landscape

Currently there are some robots being designed to help assist in an event of a natural disaster. One of these robots develop is to aid in restricting the damage of a natural disaster rather than after such as using a drone to survey existing buildings to make sure that they are suited to handle a natural disaster which will reduce the initial damage. This drone is currently being developed by Taskin Padir, associate professor of electrical and computer engineering at Northeastern in collaboration with his colleagues and students. This is different to our project idea as our robot will handle the aftermath of a disaster by helping rescuers increase their efficiency in their jobs rather than trying to reduce damage done during the disaster.



Many other robots currently being developed are designed with limbs like a human and to do tasks such as lifting, turning valves, cutting panels, climb and clear debris. These robots are designed to automate the work currently being done by humans during disaster relief or to do the work when the conditions are too harsh for people to navigate due to potential dangers such as radiation or unstable buildings which makes it unsafe for humans to navigate through. Five different robots currently being developed are called CHIMP developed by Tartan rescue team, Momaro developed by NimbRo Rescue, Walkman developed by Istituto Italiano di Tecnologia and University of Pisa, Helios developed by MIT, and Thormang 2

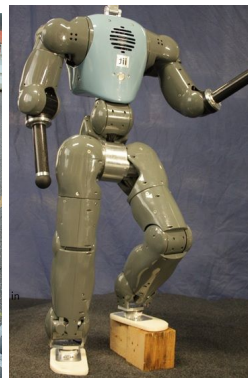
developed by Seoul-based Robotis Ltd. Instead of searching, locating and sending live information back to rescuers about survivors location and status.



CHIMP



Momaro



Walkman



Thormang 2

Detailed Description

Aims and Goals



With Project Eir, our aim is to produce assistant technology to help in natural disaster and rescue efforts to lower the risk of lost of life due to rescue personnel being unable to reach distressed individuals in time. In which the time it takes for rescue personnel to reach and save an individual is dependent on factors such as; vulnerability and threat of the surrounding environment including weather conditions, location of distressed individuals or potential risks that pose a threat to the rescuers themselves. Whereby the ultimate aim is then to provide rescuers a safe and well-thought out plan to tackle these risk factors in order

to reduce the amount of time taken for a rescue. By doing so, it effectively decreases the potential of loss of life. To achieve this ultimate aim, Project Eir would need to complete or follow these goals:

Goal 1:

Be visualised as an AI or semi-AI driven robot, ideally in the form of a small-factor drone. With this form factor, the drone will be about to be dispatched rapidly, and be able to fit in almost all size and forms of environments. Not only this, but the drone will need to be able to be reliably durable in most conditions it is deployed in. Therefore, the drone will need to withstand a large amount of dust or debris, strong wind speeds, rain, hail, as well as being functionable in low visibility conditions.

Goal 2:

Drone needs to be equipped with sensory devices, which highlights one of the secondary goals, which is to provide as much sensory and analytical information about the surrounding conditions and most importantly the relative position of a distressed individual. Thus the drone will most likely be equipped with components such as, bluetooth or WiFi for wireless transfer of its collected data, proximity radar, 360 degree camera, thermal sensors, weather condition detectors as well as high capacity batteries and data storage, for longer deployment duration.

Goal 3:

The drone will need an platform where its users; the rescuers can interact and possibly take control of the drone. The platform may be in a form of a phone application or desktop program that rescuers can quickly deploy, selecting various modes and features as well as being able to view a 360 degree angle from the the camera on the drone. Selecting various modes on the application will alter the view of the camera to display the different sensory features that the drone will hold. The application is able to display data and information in a user friendly way so that it can quickly inform rescuers of new updates so that an effective and efficient plan can be made.

Plans and Progress

The Birth of Project Eir:

Going into this assignment from the previous assignment, the team got together and discussed heavily on how to decide where we should take the assignment project topic to. By this time, the team knew each others sort of habits and IT interests from the previous assignment the team had worked on, thus it was felt easier and more natural to disagree or to further discussions within the team which was one of our team improvement goals entailing our previous assignment. With this in mind we had a productive discussion, on whether the team should gather everyone's project proposals from their individual assignments into a list, then either vote on the best topic or to somehow combine the projects together into a larger project. Quickly the team voiced that their initial proposed project topic or issue was not satisfactory or it was not something they wanted to pursue for this project. Furthermore, when our projects were aligned and compared, it became clear that due to big differences in ideas that a fusion of those ideas could not be possible. In which the group then went on to propose new ideas or issues we could tackle.

The first project proposal, was to somehow tackle the battery capacity problem that is affecting the potential of improving technology, as new and better technology is restricted by its energy usage, and the fact that currently batteries have a storage limit. However, some of the team was not sure if this issue was of a scale that we could tackle, or that if it was something possible within the realm of information technology rather than engineering. With which we agreed, that tackling battery storages was a task too difficult, and that we as a team, should consider ways to be more power efficient rather than improving on the physical capacity of batteries. However with this in mind, the team was still discontent with that project proposal.

Back to the drawing board, we unanimously decided to centre our project in solving a current issue, rather than to centre a project in an non-issue based application. Before this however, we all knew we had an interest in AI and robots, but we had no issue to revolve the robot around, as we decided that revolving a project around an issue or motivation is better for everyone to understand the purpose and aim of the project. Thus, a team member discussed natural disaster assistance AI robots, whereby a robot would be able to assist in post-natural disaster environments to limit the potential of life lost, and to save people. This was a topic and issue we all felt strongly about, therefore it fit perfectly within our group. We wanted our robot to be an assistant or survey robot rather than heavy lifting robots like Momaro, thus the best application of a survey robot is in the form of a drone. With this in mind, and with the interest to save lives, project Eir was born, named after the goddess of healing and help.

Placing the foundations:

After our project idea was agreed upon, we started setting up our tools such as github repository. In this github repository we created a new project and added in the relevant cards into this project to track our progress. Every resource used into our project plan will be uploaded onto github with the final report also. After setting up our github we created a new google document where each member can work and see each others progress. Where it will end up being our main collaborative workplace, from start to finish when we will then export it as a PDF. For communication, our team decided to use Facebook's messenger platform for communication needs as a group or individually.

From there, In the preparatory phase of the project, our group discussed the scope and limits of the project. First of all, the physical information about the robot, which are the appearance and size of the robot. We watched several videos about relevant robots together, such as CHIMP developed by Tartan rescue team, Momaro developed by NimbRo Rescue, Walkman developed by Istituto Italiano di Tecnologia and University of Pisa, Helios developed by MIT, and Thormang 2 developed by Seoul-based Robotis Ltd. The common feature of these developed robots is that their shapes are all human-like. Moreover, these robots have strong athletic ability and can imitate human actions. The development of humanoid robots like these requires a lot of time, money, and powerful development teams. These conditions are currently an impossible challenge for us. Therefore, we discussed and decided to build the development on a mature platform, Drone. It will reduce our development time and reduce development costs and difficulties.

Furthermore, we will focus on the technical aspects. The functions involved in the AI robot project include Confirm the victim's status and location, Collect environment condition and AI which is the most difficult section of the project and will take a long time to develop. The implementation of artificial intelligence requires the support of large databases and complex algorithms. However, there is a lack of knowledge in our team. Hence, after our discussion we decided to focus our efforts on developing the functions which are Confirm the victim's status and location, Collect environment condition.

After the basic scope of the project was generally set in stone, we then moved onto researching and writing what goals we wanted. In particular what did we want to achieve in the end with this project. From which we asked each member of the group to just discuss what they wanted this drone to achieve, what was our ultimate goal with project Eir. And it came down to our project philosophy, in that we wanted a reliable drone that actually saves lives through assisting rescue personnel. Thus setting that goal was relatively easy as everyone knew what kind of drone it will come out to be. For setting the underlying smaller goals, was slightly more difficult but manageable for our group. Where we discussed firstly, what do we want the drone to be capable of and if that function would benefit our end goal alot. Thus, we brainstormed many features, such as having a 360 degree camera, thermal sensors, weather sensors for example. From these features we then generalised them into three goals: One goal that specifies the look, feel and construction of the drone, the second goal to specify what kind of features and technology would the drone be installed with and finally, what kind of interface as well as specifying how the user of the drone will be fed information collected by the drone.

Forging the project:

After discussing the main ideas in the group meetings, specific ideas are always being shared on our online group chat. Section tasks were quickly allocated to each group member, then we tried to complete them one by one for ensuring the information we write would not be in contradict with others. The section of Tools and Technologies is about the stuffs we ideally need to build and run out project. Before we started this section, we reviewed through the sections of Aims firstly to ensure what we want this project do. For example, we reviewed the section of Aims and then recognize that the robot we planning to create should be automatic. This process produce a new question - "What do we need to make it automatic". We searched for the possible answers, listed them down and then discussed for it. As a result, we understand that the most basic technology we need for this project is Artificial Intelligence. After that, we tried to get more data about Artificial Intelligence by watching scientific videos on youtube and read some theories from several website. The last step is simplifying the information we found, put them in the section and then redo the steps again to look for another stuff we might need for this project.

Every project, especially a project that deals with sensitive situations, like concerning lives of people, ethical and moral questions arise due to this. Thus, as group during group meetings we brainstormed and identified most the risks that we think needs to be addressed. From this we quickly realised that due to the nature of the drone, and the various technology that it is capable of, the drone can be at risk to be modified or forced to do things that are unethical such as being used in a military environment. Currently our idea to minimise the risk the technology must only be used by ethical organisations. Strong regulation and strict rules must be in place to ensure that our technology is not misused by individuals or organisations, in order to achieve this we will most likely have to include a strict screener system to determine whether a certain organisation is trustworthy with the responsibility of handling our technology.

After the risks and the tools and technology we will need to achieve the project, the group moved on to discussing how we could achieve our project, and which roles can help us to achieve the project. From the tools and technologies we constructed what sort of roles we would need and since we have no experience in such projects, it is very difficult for us. We searched a lot of information. According to our project, a project requires project manager to plan and coordinate different employees to work together. In addition, the robots need professional people to design and assemble their bodies. They also need professional people to design and develop their systems, just like human brains. Finally, people need to test robots and systems. Therefore, we determined which roles are important to our project. Which come out to be; Project Manager(s), AI Programmer(s), Deep Learning Engineer(s), Robotics Engineer(s), Software Engineer(s) and UX designers(s).

The Road Ahead:

For the future road ahead concerning Project Eir, the project was given 16 weeks to work on it. During the first six weeks, the group worked well and stayed mostly on track with the

timeframe with minimal corrections, finishing the assignment part of our project. In addition, for the future 10 weeks, the aim is to try to build a test version of Project Eir. In order to do this we discussed that we, first of all, need to hire some technical experts to help could be a good choice to keep on building our project. Due to not having the abilities and knowledge to build a robot or make a control application right now. With the helping of experts, we would design the body of our robot, and purchase some required materials to build robot's body and do several tests of the robot. From which the 4 main jobs that we would need to hire in the future and build our team skill consists of; a Mobile UX designer, Deep Learning Engineer and a Robotics Engineer, from which their experience must be extremely optimal due to the risks and nature of the project. During this phase, we must also test the drone. The test areas would include robot's resistance which makes robot going through different situations of disasters safely, down control system that uses drones to send robots to correct location, AI system which provide automatically working ability, and detection system that uses to detect victims' location and physiological status. These tests would help us to know whether the robot works as we expected, and according to results of these tests, we could adjust our test version robot to achieve the goal of rescuing people in natural disasters.

Initially we were going to complete testing by testing the drone in a simulated environment of a natural disaster to test the components of the drone. However the group soon decided that additional testing needed to be done such as testing the drone in a real environment to see if the drone can work in real world environments. Also the group decided that testing also needed to be done on the mobile application that will be used with the drone to make sure that it is functional and easy to use for the rescuers. The group also decided that it was extremely necessary to seek actual organisations that the drone can do testing for increasing more quality feedback. This is because of the large risk that comes with such a function heavy drone, the components, system and reliability must be perfect at all costs, as we are dealing with people's lives. In order to make sure quality testing is made, there must be a quality test section whereby individual components are tested so that early failure rates can be reduced.

Thus in the next coming weeks after extra talented individuals are hired and our teams combined skill has risen, the challenge of the project will arise. The drone must be extremely reliable, while also convincing organisations especially government bodies to consider using our technology will be another big obstacle for this project. Which includes many, many testing and prototypes before Project Eir can take flight and achieve our ultimate goal: to save lives.

Roles

Project manager:

The project manager is responsible for the planning and execution of the project and clearly defines the start and end of the work. The project manager organizes and coordinates the work of different departments to ensure that the project can proceed as planned. The project manager is an expert in the field of project management, ensuring that the project is performed and completed as planned and the possibility of project failure is minimized.

AI Programmer.

AI engineers use algorithms to automate the system. The AI programmer provided the system with a brain that allows the system to run automatically and make its own judgments based on different situations.

Deep Learning Engineer:

Deep learning engineer are deep learning professionals. The benefit of deep learning is to use unsupervised or semi-supervised feature learning and hierarchical feature extraction efficient algorithms instead of manually acquiring features.

Robotics Engineer:

Robot engineers are responsible for creating robots and robotic systems that perform their tasks. They build, assemble and test robots. In addition, they also designed software systems to control the robot system. They design robots and robotic systems that meet their needs based on different usage conditions to ensure that they can complete their work.

Software Engineer:

A software engineer is a person who is engaged in the development of computer software and applies engineering principles to software creation. They apply these engineering principles to every stage of the development process, from requirements analysis to software processes, and create custom systems for individual customers. Software engineers often analyze customer requirements and then design, test, and develop computer software to meet these needs.

Scope and Limits

This project is artificial intelligence robot which plan for detecting and rescue in natural disasters. The robot will operate autonomously in the disaster area without manual operation. This robot is used to detect victim's status, location and other conditions, and then send information to rescue worker in order to formulate a rescue plan. The robot carries a radar and life detector that can greatly increase detecting efficiency. Due to the fact that the condition of disaster area is very complex, many rescue operations rely on manpower could be limited, even cause casualties to rescuers, hence AI robot for natural disasters will bring many benefits to human society.

During the limited time of the project, what we can do is do our best in the time available. The functions involved in the AI robot project include Confirm the victim's status and location, Collect environment condition and AI which is the most difficult section of the project and will take a long time to develop. Therefore, Intelligent robots with victim exploration and analysis capabilities are the primary goals for the project.

The biggest constraint for the project is that artificial intelligence technology is not yet mature and it needs big data to support it. Under some conditions and complex terrain conditions, autonomous analysis and operation of the robot could not be carried out. Therefore, a wireless network was set up in the project to transmit the site data back to the rescue center for manual analysis and formulation of rescue plans. In addition, UAV-based development saves a lot of trouble such as time and development costs.

Tools and Technologies

In the Project Eir, we are aim to create a plan for automatic robots to assist rescuing victims after natural disaster. As a automatic robot, the most important technology it needs should be Artificial Intelligence. It is the core technology to makes the robots do the tasks without human controlling. Before let it rescue people from natural disasters, we have to make sure the robots are able to safely go through those dangerous places first. The natural disasters mainly include fire, flood and earthquake. Hence the technology of producing water-proof, heat-resistant and hard ingredients for the robots is needed.

About the needed tools ,we are planning to let the robots assist rescuing by helping scanning the alive victims. Therefore undoubtedly, a mini-SONAR (sound navigation and ranging) and a life-detector should be installed on each of them. The SONAR is used to scan the structure of the ruins in a wide range for predicting where the alives possibly be, then assign the robots to those places with their life-detector to search victims under the ground. In additional, a radio-telephone and camera should be installed either. Then the operators are able to check the conditions through the monitors and talk to the detected victims through the radio-telephone before the rescue team reach them. Everything above should be able to be done in a simple computer (laptop) with one software designed by this plan, hence it have to be compatible with Window system and Mac system or through our main

drone interface on the mobile platform from which we aim to be the main platform users choose to use. This is because the mobile platform allows the convenience of bringing a small computer, that's easily accessible anywhere. Making it optimal for rescue situations in remote places.

Testing the Prototype

The project will be tested through several times during the development phase. Each different component will be tested in a simulated environment done in both a controlled environment and in a variable environment. After each component is tested individually based on its primary function. Testing each parts individually will allow potential issues to be found out early and ironed out before everything is assembled into the final build. It will then be assembled into a mock-up prototype to test its full functionality. For example, quality and reliability of the drones camera, or the strength and range of the position scanner. Like for the individual components, the assembled mock-up prototype will also be ran through various tests, in order to determine its full functionality as a whole. At this stage we will also, begin to test the project's interface together with the mock-up to again determine if the component's positions, orientations or functionality provide an efficient, as well as effective user experience. Such as, if the proximity scanners' accuracy is being influenced by other components in the drone.

After testing by the development team is done and that the robot meets all of its functional requirements. It will then be tested by real potential users by having trials run by the robots in an actual situation where a lost person needs to be rescued, obviously not relying on the robot only as it is still being tested and will be stopped if it is not effective to the operation. Having real world testing will greatly benefit our project as there will be multiple variables in a real environment that can't really be tested in a controlled or simulated properly such as drones operating in a environment that changes randomly such as rain, fog, visibility and wind speeds. This will allow proper testing done on the sensors and other technologies used on the drone in changing conditions and how accurate the signals are that are sent from the drone back to the interactable interface.

As the drone includes an interactable interface to function as both a remote controller, if needed, and as an information and data collection hub, it will need optimal user testing so that users are able to access information quickly and effectively. In order to do this, the right user group will be needed to be found in order to conduct effective usability analysis. Which, due to our project revolving around rescue operations, the best user group will be those that deal with rescue or survey operations. This includes: State Emergency Services (SES), police, fire-brigade, rescue organisations like The Australian National Search and Rescue Council, Australian Maritime Safety Authority or even national defence organisations, where we will conduct a live demo presentation of our drone in action.

Project Timeframe

	De Xing	Ronald Tang	Bowen yang	Lei Guo	JingYuan Tan	Haowei Geng
Week 9	Discuss and share project ideas of each group members together, combine these ideas to our group project.					
Week 10	Determine the project and named project. Put personal information of each group members in assignment. Separate assignment to individual parts and work-together part of the project.					
Week 11	Research and start working on individual area: Overview, Testing, and Risks	Research and start working on individual area: Overview, Testing, and Aims	Research and start working on individual area: Scope and Limits	Research and start working on individual area: Roles	Research and start working on individual area: Tools and Technologies	Research and start working on individual area: Timeframe
Week 12	Continue working on individual area of assignment(Overview, Aims and Risks done). Start working on work-together parts(Plans and Progress, Group Processes and Communications). Prepare the presentation: done wireframes, speech craft, and powerpoint.					
Week 13	Presentation. Testing part done.	Presentation. Testing part done.	Presentation. Scope and Limits part done.	Presentation. Roles part done.	Presentation. Tools and Technologies part done.	Presentation. Keep editing and changing the Timeframe part as the process of assignment.
Week 14	Done Plans and Progress, Group Processes and Communications, Group Reflection, and Timeframe . Modify whole assignment.					
Week 15	Hire technical experts for helping develop test version of Project Eir. Purchase required materials and machines for building and testing the robot.					
Week 16	Design the body of robots.					

Week 17	Develop test version of robot.
Week 18	Test resistance of high pressure, high temperature, corrosion, and service life of the robot.
Week 19	Develop control system which could use drones to send robots to correct location.
Week 20	Test control system of Project Eir and make it suitable of both mobile and computer.
Week 21	Develop AI and detection system.
Week 22	Test AI and detection system would detect correct location of 'victims' and make appropriate decision to rescue 'victims'.
Week 23	Develop test version robot of Project Eir by combining robot body, control system, AI, and detection system.
Week 24	Test the test version robot would work correctly to achieve rescue job in different situations of natural disasters. If successful then proceed to soft launch.

Risks Involved

A risk related to the development of the robot is that the team does not have prior experience with building robots of any kind. We also do not have any prior experience in developing mobile applications for Android and iOS which can mean that certain functional requirements might not be completed. Our programming skills are limited and is not sufficient enough right now to program an automated drone that sends information to be usable in a mobile application. A another bigger risk that is associated with this project if the robot does get built is that it could be used unethically. Since the drone detects and sends signals of people in need to rescuers it can be used in unethically ways such as if the drone gets to the wrong hands it can be used for stalking which is a big risk. It can also be used for war where armies can use it to track down people which is a big risk as it can be tracking civilians instead and result in unwanted casualties if civilians are mis-identified resulting it if the technology to be used incorrectly to become a huge risk.

Skills and Jobs

Mobile UX Designer

To develop the design the interface for the mobile application that the rescuers will use to send and retrieve information to and from the drone.

Skills/Qualifications:

Demonstrable UX and UI design skills with a strong portfolio

Proficiency in visual design and wireframing tools

Proficiency in Axure or comparable application for rapid prototyping

Excellent visual design skills with sensitivity to user-centered design interaction

Ability to solve problems creatively and effectively

Up-to-date with the latest UI trends, techniques, and technologies

Excellent verbal and written communications skills with designers and engineers

Ability to report activities in a clear organized fashion

Software Engineer

To develop the mobile application that meets the needs of the functional requirements

Skills/Qualifications:

Bachelor's Degree in Computer Science or related field.

Computer Science fundamentals, as illustrated through algorithm design, problem solving, and complexity analysis.

2+ years of Android mobile development experience and Material Design.

In-depth knowledge of the Android SDK, as well as tooling such as the Gradle build system, and Android Studio debugging & profiling.

Fluent in Java

Proficient with writing unit/functional tests and familiar with automation frameworks (e.g.

Junit, Robolectric, Espresso, Mockito/PowerMock, etc.).

Experience in Reactive Programming (RxJava/RxAndroid), NoSQL Databases (Couchbase), MMVM + Android Data Binding, Retrofit2, Google Analytics, Firebase, and Android Wear OS is a plus.

Excellent verbal and written communications skills with designers and engineers

Ability to report activities in a clear organized fashion

Deep Learning Engineer

To develop AI that will be able to detect humans in different environmental conditions

Skills/Qualifications:

PhD in Computer Science, Computer Engineering equivalent

Experience in Deep Learning Development

Proficiency in Python and C++, CUDA a plus

Knowledge of multi deep-learning frameworks, such as Caffe, Tensor-Flow, Theano,

Torch/PyTorch

Vision, perception, control, planning algorithm development

Track record of excellence in the machine learning/perception/control, including patents, publications to international conferences or journals

Excellent verbal and written communications skills with designers and engineers

Ability to report activities in a clear organized fashion

Robotics Engineer

This role is to develop and deliver a functional real-life prototype drone, that also includes the implementation of the various components and features in the functional requirements

Skills:

Excellent communication, analytical and problem-solving skills.

Able to work in a fast-paced, small, focused team.

Knowledge in electrical and mechanical engineering

Ability to report activities in a clear organized fashion, using GitHub as an example.

Proficiency in programming languages such as MatLab, Java, C++ and various engineering platforms.

Experience in developing robotics, especially drones is a plus.

Has a Masters Degree or higher in Mechanical Engineering/Robotics/Electrical Engineering.

Group Processes and Communications

Group Communication was done weekly when we had a tutorial class on a tuesday where we are able to meet up in person to discuss what progress has been made and what needs to be done in the future. We also discuss our progress on a group chat in facebook messenger which allows us to communicate what needs to be done before our next meet up in class. We accept all group members to communicate with us if called upon. During times where there is satisfaction within the group about the content or structure about the assignment, the problem is discussed through the group chat either on Google Chat or through Facebook's messenger app. From which, we communicate what we think should be fixed or changed and the person who is responsible, provides their explanation and a work around is created. Through this, not only will we be able to work individually well, but it allows us to be able to check each other's work so that a strong report can be made in the end.

In our group, when there is a need for all group members input to complete a task, the whole group is called for their input; whether they agree or disagree with the proposed changes or work. An example of this would be deciding on the project idea, where everyone was given a chance to provide what they thought about it, what could be added onto the project idea to enhance it further. This is also applied throughout the Project Eir wireframe design phase,

whereby, two members worked on the applications user interface then periodically presenting that they have done to the rest of the group. This way the group can stay informed about the projects artefacts and add their input towards the design phase.

Group Reflection

De Xing Teoh:

With more experience from the last assignment and how to work with a large group of six members, we were able to communicate better on what work that everyone will do which made it easier to complete the assignment as everyone had a clear idea on what to do which allowed us to have equal workload. We could have improved on our organisation and complete some of the work earlier and not felt as rushed towards the deadline for the final report but overall everyone in the group communicated well and knew that all the work will be done on time. Our Github log of activity does not really reflect on our group assignment as most of our work was done on a google docs form where each member put in their sections of work in. We also used the project from Github to log our progress to see what other members have done and which sections needs to have more attention which we didn't do on the previous assignment which helped a lot in tracking our progress. Meeting up once a week also helped us communicate on the overall progress of the assignment.

Ronald Tang:

As with the last assignment, our group had a large group of 6 members, but from past experience we knew how to deal with and manage a large member roster. The solution was implemented also in this assignment whereby, each member is assigned a section of the assignment to work on. However in work that required team coordination, such as in the GitHub repository or sections that have more than one member working on the same tasks, we ended up working very well. Outside of the collaboration and individual tasks that we would perform through Google Docs or our GitHub repository, discussion of work quality and allocation, deadlines, proposed projects worked well and without much delay despite a slow start in productivity we rapidly caught up and did our fair share of work. However, the nature of this assignment being extremely more collaborative, there were some issues in making sure everyone was in line and understood the whole structure of the project. This was the case for the project plan.

Haowei Geng:

This is the second time that we worked together as a large group of six. With the experience of last assignment, we could communicate and collaborate a lot better than what we did during assignment 2. As what we did before, each member in group has individual section to work on and all group members would do the larger section of this assignment together. Therefore, everyone would have equal workload of assignment 3 and we complete it well. One thing I was surprising is that some of other groups used same background theme as our

presentation powerpoint. Some thing we could improve is that doing more communicate to track the process of each section in this assignment, which could help everyone to better understand the ideas from other group members. In addition, due to the lack of estimation and limit of time, we lost our conclusion part of presentation, what I learned from that is we need to practice more to prevent running out of time in future cooperation. During the working time after classes, we used Messenger to communicate and Google DOC to put everyone's work together. Therefore, the Github log of activity does not truly reflects each group member's workload on this assignment.

Bowen Yang:

For the last IT assignment of this semester, with the experience of the last cooperation, the obstacles to this task will be easily solved, especially the problem that six people can't easily assign tasks. In addition, everyone can do their job very well with high quality. Moreover, we are able to better communicate the work that everyone will do to make it easier to complete the task. Each member has a clear idea and can accept the opinions of others. In addition, there is one thing needs to be improved is that everyone should complete some work as soon as possible and then discuss it, because everyone's tasks are very connected, otherwise it will affect the consistency of the overall report. We use some tools like Google Docs and Github to help us accomplish our tasks. Because we are a large group with 6 members, it is very easy to have a situation where opinions are not uniform. However, each member of our team was willing to listen to others' opinions, everyone can respect the opinions of others and we were particularly successful in discussing issues. It can help us to finish the assignment efficiently. Therefore, Listening and respecting the opinions of others is important for the teamwork.

Lei Guo:

This is the third assignment, like the second assignment, there are six people in our group and most of our work is done on the google doc. At the beginning we allocated group tasks and personal tasks. We all found a lot of information about our project. We shared the information we found and discussed the project. Then we started working. Because of assignment 2, we know how to coordinate Work, so our project has a very good progress, everything goes according to plan. We discuss the project in practical classes every week, including the problems encountered and solutions. This project was not very easy for us, but with the joint efforts of our group, we completed this project. We are aware of the importance of the group work, because any one person can't keep up with the progress of the work, it may make the progress of the group slow. Fortunately, our group has a very good communication. When we meet problems, we communicate and we can solve problems quickly. This makes our project progress very quickly. In addition, good communication made us happy to complete the project.

JingYuan Tan:

We did tried work as a 5-member group for the first assignment and a 6-member group for the second assignment, and they were both completed successfully. With the experience of cooperation from last two assignments, we finished the final assignment orderly and more efficiently. The tasks of doing each section were completely allocated to each group

member in the first 10 minutes after we started working on this assignment, and everyone in our group appreciate it. During the process of working, everyone was glad to share their ideas directly during the group meeting, and also trying not to interrupt each other when they were being focus. We kept communicating on facebook and putting information we might need to use there. This behavior greatly reduce the barrier from keeping working in process in anytime because it helped us to keep information in minds. We also feel free to share our own work-out as a reference with group members to help getting ideas when one of us got struck or be confused about his work.