

G6 Internet Explorers



keeping plants alive.

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# Introduction

Born from a growth in high-rise living, balcony gardens are fast becoming the new Aussie backyards — with green oases flourishing in places you would least expect. Data from the Australian Bureau of Statistics showed that apartment living was on the rise. (*As the popularity of apartment living increases, downsizing a garden becomes a new challenge - ABC News (Australian Broadcasting Corporation)*, no date)

Plants contribute to reducing the amount of toxins in the air and provide benefits to mental health and reduced stress (*How a pot plant or five is good for you | Pursuit by The University of Melbourne*, no date).. However, many urbanurban dwellers struggle to keep their potted plants or herb gardens healthy and alive. This is where our product gardenMates steps in to assist.

In the following pages we introduce the members of the team working on this project.

The project details including deliverables and risks, as well as discuss the project management process we have implemented. The members of the G6 Internet Explorers team invite you to discover more about gardenMates.

# Team Profile

## Team Name

The Team name of G6 Internet Explorers was chosen to reflect our group numbers ie six and the fact that we would be using the internet to research our project. G6 also has connotations of an elite group such as the Group of Seven Organisation of Advanced Economies.

## Personal Information

My name is Brian Dean and my RMIT student number is S3831349 and I am a member of the G6 Internet Explorers Team. I was born in Brisbane, though spent much of my working life in Sydney. My wife and I are now living on the northern beaches of Cairns in a little spot called Yorkeys Knob, with our twelve year old ginger rescue cat called "Pumpkin", who shares by birthday day and month. I enjoy reading, mainly sci fi fiction, cooking and a spot of gardening. Currently self employed as a technology consultant to the hospitality and tourism sector, having worked in that industry and software houses for many years. I am enrolled in this Bachelor of I.T. degree to fill in the many holes in my knowledge and for accreditation for all those years of doing.

My name is Daria Sukonnova, my RMIT student number is S3812576 and I am a member of the G6 Internet Explorers Team. I was born in the Russian city named Khabarovsk but then we moved to the Northern capital of Russia - St. Petersburg. I enjoy doing many things such as playing the piano or drawing. My biggest passion is reading books of any genre. My dream is to become an Artificial Intelligence Engineer. I find writing code quite enjoyable. My first program was a primitive game on Unity which was created with a tutorial. Since that time I really like solve code challenges on Python. Hope that in the near future I will develop the necessary skills to achieve my goal.

My name is Jeremy Naupay my RMIT student number is S3831039 and I am a member of the G6 Internet Explorers Team. I have grown up in the Sydney area since the day I was born. I love using my spare time to play around with different operating systems and brushing up on knowledge base. I have worked in I.T for over 2 years now as an IT Support Officer and looking forwards to be an Chief Information Officer in the future. Sometimes i do love to plan our model train sets as a hobby, but i also enjoy just playing video games and working on modding games in general.

My name is Shane Thacker, and my current home is Toowoomba Queensland. My RMIT student number is s3827970 and I am a member of the G6 Internet Explorers Team. Born in Adelaide, I moved to Queensland when I was eighteen, where I got a job in the furniture industry. By twenty, I was going back and forth to Indonesia to train the suppliers on how to sand, prepare, upholster, assemble, glaze and upholster furniture for the Australian company I was working for. At twenty-one, I made the permanent move to Indonesia working for that company then eventually by the time I was twenty-two started my own teak outdoor furniture company. After the 2008 global crisis wiped out my customers, then me off the map, I worked for a European company managing their properties in Indonesia. When those properties were sold off in 2015, I joined an international school and became the school director.

My main interests are barbeque low and slow and fishing, both of which involve knocking back a few cold beers. I have three kids the youngest being six and extremely naughty, most likely because he is too spoilt. Flight simulation is my main “do on own” hobby, but I rarely find time these days.

I am working towards a Bachelor of International Business where I hope to move into a management position of an international company within the next five years.

## Group Processes

How well did your group work together in Assignment 2? Will you be introducing any changes in process for Assignment 3? This is new for this assignment.

## Career Plans

Compare and contrast the career plans, including ideal jobs, for each person in the group. This may have changed due to feedback from Assignments 1 and 2. What common elements are there, if any? What differentiates each position from the others, if anything? How similar or different are your career plans across the group? This is new for this assignment.

## Tools

G6 Internet Explorers Team website:

<https://g6-internet-explorers.github.io/>

G6 Internet Explorers Team Repository:

<https://github.com/G6-Internet-Explorers/RMIT-Assignment-2>

The G6 Internet Explorers Team utilised Microsoft Teams available through our RMIT Office 365 account to manage online chat and communications. We also posted links to relevant videos and websites within the chat so as to provide context rather than uploading these to GitHub. Through this same platform we also trialled the use of OneNote and Microsoft planner, which we ended up not using to a great extent. Our Team meetings were held through zoom teleconferencing software which allowed us to discuss and contribute in real time as if we were in the same office. Zoom also allowed us to record the session, which allowed anyone not able to be present to catch up at a time that suited them. Zoom, while providing screen sharing capability also allowed for keyboard and mouse control to be switched to other team members during a meeting.

I do not believe the audit trail on the Git repository accurately reflects our individual contributions, as decisions to create or update folders and text or upload word and excel documents were often made and actioned during our teleconference Team meetings. As such the audit trail will show the username of the person hosting the teleconference rather than the team member who created the content. Additionally, with the problem of GitHub invitations apparently being blocked within RMIT email systems and subsequent delay in providing group access it is incorrect to attribute the initial flurry of activity to any one individual, as with appropriate access others would have contributed equally.

# Project Description

## Overview

gardenMates is a subscription-based mobile application package that you can purchase, which assists in the development of small to large scale agricultural development. This application package comes with a sensor device that can be added to a pot plant, or larger devices for a vegetable bed, to capture environmental data. This environmental data includes moisture content, soil type, soil requirements, soil characteristics and weather information. The information provided gives the customer live-data and life cycle assistance to ensure plant development is met in the best of conditions. So that the end result is a thriving agricultural environment giving quality produce or enjoyment.

Outcomes

The outcome for this project would be that we have a robust, reliable working application and system to suit the novice at-home gardener and students then be able to expand on that technology to cater for large industrial vertical farms to increase their maximum capacity using a minimal carbon footprint.

### Motivation

Our motivation for pursuing gardenMates as a viable project stems from very real personal experiences of having pot plants, herbs and vegetables advertised as easy to grow, end up dead or ravished by insects or disease. Feedback from friends and relatives shows that this issue is not unique to us. Gardening can be very calming and therapeutic, less so when there are poor outcomes, so keeping plants alive for longer assists mental health. Having access to fresh herbs and vegetables is also important to physical wellbeing. The combination of a remote sensor an IOT device and a mobile phone application is very much on trend in I.T. terms with home gardeners and time poor city dwellers. We believe that our project, providing an innovative, cost effective, easy to use solution to gardening dilemma’s will provide a future employer with a better appreciation of our capabilities, problem solving abilities and exceptional team co-operation skills.

### Landscape

There are a lot of different plant devices, some of them are similar to gardenMates. For example, a device which is capable of measuring soil moisture, temperature, and light and automatically water your plant with the built in water pump. Or another one, self-contained automatic watering pot consisting of a soil sensor as well as the water reservoir built into a cavity in the pot.

There is a competition between automatic and non-automatic plant watering and monitoring systems. The most leading ones are PlantMaid and Parrot Pot. Garden Mates is quite similar to Parrot Pot but the distinguishing feature of it is a sensor device that can be added not only to a pot plant, but also to larger sized gardens making it available for micro agricultural projects.

Interestingly our research uncovered a kickstarter start up based in the U.K. that is almost a mirror of gardenMates. The main difference being their sensor is designed for indoor use only which is a limitation gardenMates intends to overcome. (Subscribe, 2019)

## Detailed Description

### Aims

The primary focus of the gardenMates project is to provide to the masses a technological assistant to assist in maintaining happy healthy balcony and indoor gardens. This will be achieved using a sensor that takes measurement of soil and location conditions. The sensor or sensors pair to a small hub which provides access to the internet and the gardenMates servers. The gardenMates servers are then able to feed a mobile phone application with notifications, tips and the sensor measurements for each sensor location.

### Goal 1

The initial requirement is a suitable sensor device. The sensor must be of rugged manufacture, waterproof and able to stand up to outside conditions as opposed to the competition which only provide indoor use sensors. Four different measurements are required.

* Soil moisture
* Soil ph
* Ambient light
* Ambient temperature

Requires either Bluetooth or ZigBee communication protocols.

### Goal 2

Of equal importance to goal 1 is the mobile phone application. This will allow sensors to be registered and named ie “Basil”, “Roses” etc and provide a visual representation on the application of the sensor measurements and general plant health. The application will have a small database to maintain local information and growing tips.

The application needs to allow for very easy wizard based configuration setups and sensor pairing.

### Goal 3

One major point of difference between gardenMates and the competition is the ability to monitor the plant/s and notify the user of plant wellbeing while the user is away from home for an extended time. This is made possible by providing cloud-based server technologies that receive information from the sensors even when the mobile phone is not in range. The cloud-based systems will also provide a plant library which will provide tips and tricks on keeping the plant healthy.

### Goal 4

Required for goal 3 to be successful is the ability for the sensors to communicate with the cloud systems irrespective of the proximity of the mobile phone. This requires a small powered hub that can communicate via Bluetooth to one or more sensors and Wi Fi to the home network to relay information to the cloud.

### Goal 5

Apart from having the right soil composition, moisture, with an appropriate temperature and sufficient light, other issues for plant health is disease and insects. It is important to be able to determine what is eating the plant or with what disease it is inflicted with. Both of which may spread to other plants nearby, so early diagnosis is key. gardenMates will have the ability to send a photograph of the afflicted plant to an AI housed within the gardenMates cloud servers and for that AI to determine through machine learning the most likely cause and to offer recommendations for treatment.

### Plans and Progress

The initial project

#### The Sensor

Initial investigation suggested that a 4 in1 sensor marketed as Huahuacaocao Flower Care Smart Monitor by Xiaomi would provide the functionality required. In fact it was the only commercial 4 in 1 sensor found. Initially the fact that this sensor only had Bluetooth communications caused some consternation as a point of difference between gardenMates and the competition is the ability to monitor plants (sensors) regardless of the proximity of the mobile phone app. This was resolved upon the discovery of a hub from the same manufacturer that offers Bluetooth, Wi Fi and ZigBee.

#### The Hub

### Roles

Several roles are required for the GardenMates project. These are as follows:

1. Chief Technology Officer / Product manager (position filled by team member Jeremy) – The role of this person is the know the total scope of the project from start to finish, inside and out. This person will oversee every aspect of the project and ensure that each component has been achieved to expectations. Most likely, the PM will be one of the team members and the individual for this position may change as the project evolves and if it takes different directions.
2. Developer – This position would be best suited to a software engineer. The primary responsibility for this position is to create the code, test the code on various devices and find any bugs.
3. Solution Architect (position filled by team member Brian) – to work closely with the product manager/ Chief Technology Officer, developer and designer to ensure the app functions as expected and to steer the design to have maximum business earning potential.
4. Designer – This person would be working closely with the Developer to ensure the interface of the app is easy to navigate and aesthetically pleasing and conforming with branding. The designer would also need to develop a logo and company colours/branding.
5. Machine Learning Engineer (position filled by team member Daria)– to develop the initial AI database that would be used in our app for diagnostics and advice received from the plant/soil data and user interface data when users are typing questions or uploading a photo of a sick plant.
6. Sales and Marketing and Customer Service – All team members would initially fill this position for our particular project, but down the track, as development goes farther, we would need a tech-savvy team with excellent communication skill to take the position full time looking after customers, reporting bugs to the team, moderating forums, organising advertising and promoting upgrades with offers and subscriptions.
7. Principal Data Insights Analyst (position filled by team member Shane) – to be continually monitoring that the application is functioning in a profitable way. To identify cost saving and other potential earnings. This person would also pinpoint where the project has room for expansion and establish the applications strong and weak elements.

### Scope and Limits

An integral part of the gardenMates project is the sensor and we are pleased to have been able to source a commercially available one that should be sufficient for most balcony gardens.

Paired with the sensor is a hub from the same manufacturer which will provide a link between one or more sensors and the gardenMates servers.

The mobile phone app is in the UI design stage and a mockup is included in this report.

The database chosen to provide server and mobile phone synchronisation is CouchDB, an open source NoSQL database from Apache.

Hosting will be through Amazon AWS.

Options for AI and machine learning are being explored

AWS also offer IoT services.

An Api to connect to open source plant libraries and databases is being researched.

### Tools and Technologies

##### Hosting

Amazon EC2 instance for database

##### Software

Turnkey couchdb server

### Testing

### Timeframe

### Risks

### Group Process and Communication

### Skills and Jobs

Manager

For such a detailed project that spans multiple technologies, cloud computing, software and hardware, the most appropriate

Team Member 1

Team Member 2

Team Member 3

Team Member 4

## Group Reflection

# References

References

*As the popularity of apartment living increases, downsizing a garden becomes a new challenge - ABC News (Australian Broadcasting Corporation)* (no date). Available at: <https://www.abc.net.au/news/2019-03-13/downsizing-garden-becomes-new-challenge-apartment/10874866> (Accessed: 6 February 2020).

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