

DEAKIN UNIVERSITY

CAPSTONE TEAM PROJECT (B)

ONTRACK SUBMISSION

Showcase and Handover

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October 2, 2022



Showcase Videos

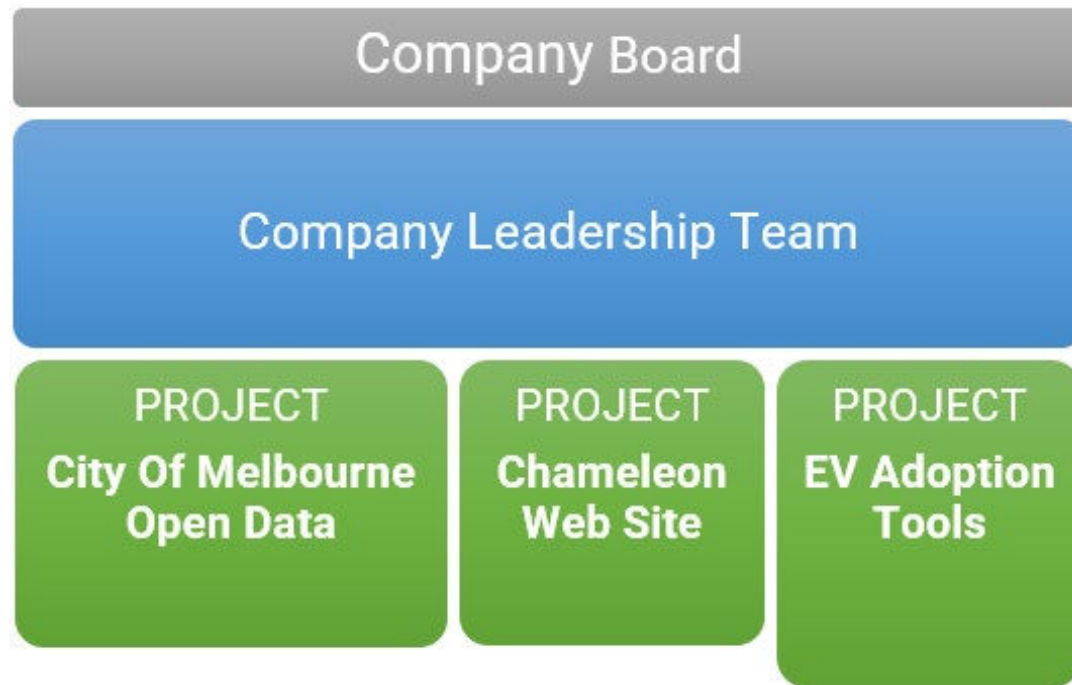
- City of Melbourne: https://video.deakin.edu.au/media/t/1_rr5rh14y
- EV Adoption Tools: https://youtu.be/-zWI_r4x168
- Chameleon Website: https://deakin365.sharepoint.com/sites/Chameleon2-Chameleon-Website/_layouts/15/stream.aspx?id=%2Fsites%2FChameleon2%2DChameleon%2DWebsite%2FShared%20Documents%2FChameleon%2DWebsite%2FAdministration%2FShowcase%2Dvideo%2FT2%2D2022%2FChameleonWebsite%2DShowcase%2Emp4&ga=1



Chameleon Handover Document

Task 10.2P

Company Structure



T2 2022 Objectives

- Continue to develop the Chameleon Website capabilities to be optimised for mobile access and create a staff portal for Chameleon staff to make blog post and manage website user accounts.
- Research, design and develop minimum viable products (MVP) for commercially viable EV (Electric Vehicle) Adoption Tools.
- Enhance the Melbourne Open Data Playground to support City of Melbourne's smart cities goals and aspirations.

Executive Summary

OUR MISSION

"Given the complexity of energy application needs today, IoT (Internet of Things) systems are being designed to address a wide variety of existing problems.

In Chameleon, our mission is to research, create, test, document and deploy IoT-based solutions to enhance life through the application of smart city technologies including: the building of smarter cities, homes, transportation, and energy management systems."

There are 3 divisions within the company, focusing on the 3 key areas of strategic importance:

- City of Melbourne Open Data
- Chameleon Website
- Electric Vehicle (EV) Adoption Tools

Both the open data project and the EV adoption tools leverage data sets that are created using IoT-based sensors and as such, fit into the goals of the company. The Chameleon website articulates the goals of the company and provides a visible presence.

The goals of the City of Melbourne Open Playground are to create a toolset to assist non-technical users in understanding some of the challenges that open data in the City of Melbourne can help to solve, along with useful, step by step examples.

The EV adoption tools division will be focusing on 3 projects. These projects will all related to building out tools to help drive EV adoption and/ or solve challenges associated with building out EV infrastructure.

Seng Loke

Director

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Leadership Team

The company board consists of the following key personnel:

- Seng Loke
- Valeh Moghaddam

Seng Loke is the acting director and key point of contact for the leadership team on a day-to-day basis.

The leadership team consists of the following students:

Student ID	Full Name	Junior/Senior	UG/PG	Project	Project/Team Lead?
217072092	Nykolai Mcherron	Senior	Undergrad	Chameleon Website	Project Lead
219425396	Kinshuk Jain	Junior	Undergrad	Chameleon Website	Assistant Project Lead
220077269	Ayushi Natalie Alujage	Senior	Undergrad	Chameleon Website	Team Lead
218429514	Shakwat Hossain Limon	Senior	Undergrad	Chameleon Website	Team Lead
217285498	Mollie Fernandez	Senior	Undergrad	City of Melbourne	Project Lead
220005641	Bose Alli	Senior	Postgrad	City of Melbourne	Assistant Project Lead
218296596	Michael John Leen	Senior	Undergrad	City of Melbourne	Team Lead
400150369	Bree Margaret McLennan	Senior	Postgrad	City of Melbourne	Team Lead
220532657	Julian Cape	Senior	Postgrad	City of Melbourne	Co-Team Lead
219297735	Caleb Webb	Junior	Postgrad	City of Melbourne	Future Team Lead
216019732	Hannah Smith	Junior	Undergrad	City of Melbourne	Future Team Lead
219179817	Hamish Finnley Glover	Senior	Undergrad	EV Adoption Tools	Evoleon Project Lead
214490138	Leda Scott	Junior	Undergrad	EV Adoption Tools	Evoleon Assistant Project Lead
219213881	Matthew Robert Iredale	Senior	Undergrad	EV Adoption Tools	Best EV Locations Project Lead

Trimester Goals and Objectives

- Continue to develop the Chameleon company website
- Implement additional use cases and rebranding for the City of Melbourne Open Data Project
- Begin to build and create the base for the Evoleon mobile app
- Provide an initial MVP for the EV business case portal
- Create an early MVP for the EV location recommendation engine

Company Structure and Projects Overview

In trimester 2 2022, Chameleon aims to run the following three concurrent projects that, together, support the mission and objectives of the company.

- City of Melbourne Open Data – Promoting smart cities open data adoption
- Chameleon Web Site – A platform for displaying (showcase), and promoting Chameleon's activities
- EV Adoption Tools – A variety of tools to support the adoption of EV adoption by the Australian community.

Chameleon is managed by a Company leadership team comprising one Board Director and a student leadership team. This team coordinates whole of company initiatives and ensures projects are delivering on the company mission and objectives. The Company Leadership team reports to the Board of Directors.

Some members of the Student Leadership team are assigned as leaders of each of the projects with the remaining student leaders providing important administrative and executive functions for the company.

Figure 1 illustrates the company structure at a high-level with members of each team listed in subsequent sections of this document and Figure 2 illustrates the typical structure of a project team in its relationship to the Leadership team.

Each project may be comprised of multiple teams providing a diverse set of skills in support of the project's deliverables. Each team will have a designated team leader accountable for that teams' deliverables.

The project leader will be supported by an assistant project leader who can assist with project management, team communications and meeting facilitation. Assistant project leaders and team leaders are also candidates for future leadership roles in the subsequent trimester.

Figure 1: Chameleon Company Structure,

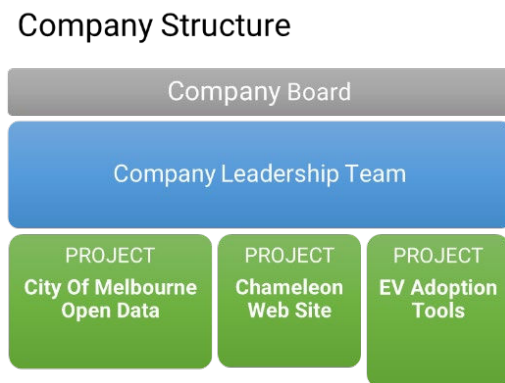
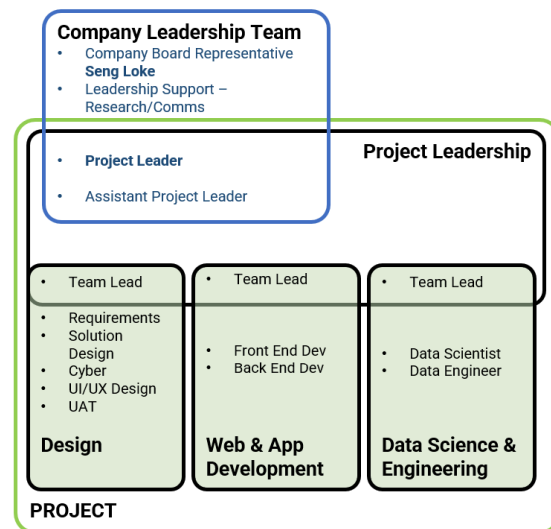


Figure 2: Chameleon Project Team Structure



Project 1: City of Melbourne Open Data

Overview, Goals, and Objectives

The City of Melbourne has been an Australian leader in Open-by-default Data approach since 2014, hosting a large pool of datasets in the open data platform available from their website. The City of Melbourne council (the client) initiated this project with Deakin University to support an innovative, collaborative, and greater use of their Open Data by businesses, researchers, and software developers. Open Data is a component of their smart cities' strategy.

This project delivers an education portal which demonstrates how to leverage Open Data using real world scenarios that may be of interest to industry, government, and researchers. Its long-term goal is to increase the usage of City of Melbourne Open Datasets and drive increased investment across the City of Melbourne council area.

Aims for Trimester 2

This semester the project aim is to become integrated into the Chameleon company by re-focusing its deliverables on Smart Cities Open Data while delivering additional use cases of value to City of Melbourne businesses and residents.

Deliverables

The short term (trimester) deliverables were:

- Create additional data science use cases to the Melbourne Open Data Playground portal and GitHub Repository.
- Ensure the Melbourne Open Data Playground portal can run on mobile devices
- Make Minor cosmetic improvements to the Melbourne Open Data Playground portal
- Implement the remaining use cases designed in 2022 trimester 1 into the live site
- Implement design changes suggested in trimester 1
- Researching & Rebranding the Open Data resources for easier recognition and accessibility
- Migration from flat file data sources to a relational database for improved search functions
- Implement Staging Pipeline & Web-application for more streamlined Development and Integration

Longer term goals included:

- Preparing the Melbourne Open Data Playground portal and GitHub repository for use by the public
- Migrating the Pedestrian data use cases and Jupyter notebooks to support a new data provider
- Migrating the Open Data access API from SOCRATA to a new platform
- Implementation and Integration of updated designs and features

5.1P update

Project Progress Update

The City of Melbourne Project is full steam ahead, with our first client meeting on Friday the 5th of August (end of week 4) which outlined our goals and expected deliverables for the trimester. The client was impressed with the proposed deliverables and updates to the Melbourne open Playground site giving feedback. We have now begun our first three-week sprint at the beginning of week 5.

Web App Development team

At this point in the project the web development team have made great headway getting all their new members upskilled and development environments setup. Moving into sprint 1 the focus is on documenting and creating tutorial videos for implementing use cases onto the Melbourne Open Playground. Secondary focus for sprint 1 is to implement a staging pipeline to assist with development and future changes to the web application.

Design Team

With a rebranding in mind the design team have hit the ground running. The team begun with a research phase, looking into colour pallets and design elements to enhance the functionality and usability of the site. The end of sprint 0 saw the collation all this research into creating documentation which will solidify the direction of a solid idea of the new-look and feel of the site. Sprint 1 will focus on redesigning the new aspects of the site and creating mock-ups. Also, the team will be working with the data science team to implement standardized colour pallets whilst the web development team implement these changes.

Data Science and Engineering team

- As of week 5, the data science team have now commenced technical development work on the use cases which were endorsed by the client. All team members have been allocated use cases to work on and all have clearly stated their engagement and commitment to their assigned tasks. The technical work has been categorised into 3 domains, 'safety and wellbeing', 'environment and sustainability' and 'business and activity'. The team have also commenced work on a 4th domain which focuses on building internal value to the team, project, and the company through the development of documentation and work practices.

10.2P Update

Deliverables achieved this trimester

The City of Melbourne Open Data Project has completed the following deliverables:

Project Team

- Leadership Checklist (Mollie)

Data Science & Engineering Team

Technical Documentation

- Peer Review and Quality Assurance Work Practice (Hannah)
- Parameters for Publishing Python Notebooks Work Practice (Brendan)
- Chameleon Company Colour Palettes and Python Notebooks (Andrew)
- Simple and Practical ways to write use cases, user stories, and define variables (Bose)

Domain 1: Safety and Wellbeing

- Use Case 1 Pedestrian Footpaths and Road Safety (Bree and Jack)
- Use Case 2 Impacts of Highrise Residency (Andrew and Jack)

Domain 2: Environment and Sustainability

- Use Case 1 Environmental Sensor Study (Julian)
- Use Case 2 Ideal Green roof Locations (Hannah & Ryan)
- Use Case 3 Smart Bin & Disposal Optimisation (Bose)

Domain 3: Business & Activity

- Use Case 1 Deep Analysis on factors Affecting Pedestrian Numbers (Barkha and Brendan)
- Use Case 2 Analyse and model high-rise residency against demand for public transport (Andrew and Brendan)
- Use Case 3 Merge new business analysis and pedestrian traffic analysis – Day and Night (Weiren and Barkha)
- Use Case 4 Pedestrian Numbers Predictive Modelling (Brendan and Weiren)

Web Development Team

- GCP Staging pipeline plan (Michael, Sammy, Shlomi)
- Implementation of Ideal Green Wall Location (Sammy)
- Implementing Event Impacts and Disruption on Pedestrian Traffic (Sammy, Caleb, Tianqi)
- Taiko Acceptance Tests (Shlomi)
- Adding Unit Tests to CI/CD Pipeline
- Creation of the Development Environment Installation Video (Sammy)
- Implementing Melbourne Bicycle Network Routes and Road Safety Part 2 (Michael, Marcel, Eric)

Design Team

- New Logo Design (Muhammad)
- Website wireframes (Samuel & Bansi)
- Cyber Security enhancements (Jacob)
- Design Research (Whole Team)
- Site testing (Harrison)

Proposed Deliverables for Trimester 3 2022

- Implementation of Use Cases created in trimester 2
- Application of new-design style and logo developed in trimester 2
- Creation of new use cases

- Refinement of current and ongoing use cases
- Functionality testing of the site

Location of project resources

- [Melbourne Open Data Playground website](#)
- [Melbourne Open Data Playground GitHub Repository](#)
- [City of Melbourne MS Teams Channels Files](#)
- [Melbourne Open Data Playground Code GitHub Repository](#)
- [Chameleon Handover Documentation GitHub Repository](#)
- [City of Melbourne Trello Board](#)
- [City of Melbourne T2 2022 Project Showcase Video](#)

Project Members

Student ID	Full Name	Junior/Senior	UG/PG	Team Group/Role
217285498	Mollie Fernandez	Senior	Undergrad	Project Leader
220005641	Abosede Alli	Senior	Postgrad	Assistant Project Leader
400150369	Bree Margaret McLennan	Senior	Postgrad	Data Science & Engineering Team Leader
220532657	Julian Cape	Senior	Postgrad	Data Science & Engineering Co Leader
216019732	Hannah Smith	Junior	Undergrad	Data Science & Engineering
221377945	Jack Pham	Junior	Postgrad	Data Science & Engineering
215127684	Ryan Daniel Waites	Senior	Undergrad	Data Science & Engineering
220616385	Brendan Patrick Richards	Senior	Postgrad	Data Science & Engineering
220554762	Andrew Tilling	Junior	Postgrad	Data Science & Engineering
220410831	Barkha Javed	Junior	Postgrad	Data Science & Engineering
221308817	Weiren Kong	Senior	Postgrad	Data Science & Engineering
218292859	Samuel Spice	Senior	Undergrad	Design Team Co Leader
220580602	Stephen Brackenridge	Junior	Undergrad	Design Team Co Leader
218271294	Jacob Djaelani	Senior	Undergrad	Design
219595935	Muhammad Hassan Peerzada	Junior	Postgrad	Design
218673691	Imani Maina	Senior	Undergrad	Design
218268634	Harrison Corin Padraic Murphy	Senior	Undergrad	Design
219362178	Bansi Baiju Patel	Senior	Undergrad	Design
218296596	Michael John Leen	Senior	Undergrad	Web & App Development Team Leader
221023977	Muhammad Sohaib Bin Kashif (Sammy)	Senior	Postgrad	Web & App Development Co Leader
219297735	Caleb Webb	Junior	Undergrad	Web & App Development
218341765	Shlomi Moreh	Senior	Postgrad	Web & App Development
221070031	Tianqi Zhou	Senior	Postgrad	Web & App Development
219273805	Yi Yang Yu (Eric)	Senior	Undergrad	Web & App Development
222296654	Marcel Gebara	Junior	Undergrad	Web & App Development

Project 2: Chameleon Website

Overview, Goals, and Objectives

Like any other company, the Chameleon company requires a website to be its digital public facing space. The main goal of the website is to promote Chameleon's projects, products, and the services that it provides. As the project implementation progresses, additional features and functionalities will be added such as blogs, events calendar, and a clients' area.

Aims for Trimester

After the foundations for the website were built in Trimester 1, in this trimester we aim to optimise the website for mobile access, create a blog section and begin laying the foundations for a Chameleon Staff Portal, which will allow members of the Chameleon Company to make and manage blog posts, calendar events, and manage client's user accounts.

Deliverables

This trimester's short-term deliverables include:

- Optimise website for mobile access
- Build a blogging section
- Create the front end for staff portal
- If time allows, begin creating back end for staff portal

The future trimesters long term deliverables include:

- Chameleon Staff Portal features
 - Set up staff accounts
 - Manage client's user accounts
 - Create client area that allows them to view Chameleons project progress, updates, and other services
 - Allow Chameleon staff to edit the website pages text content, making them dynamic
 - Manage blog, client reviews & calendar
- Implement a SEO (Search Engine Optimization) strategy to rank the website higher in the web search engines
- Implement a web tracking mechanism and a web traffic analysis

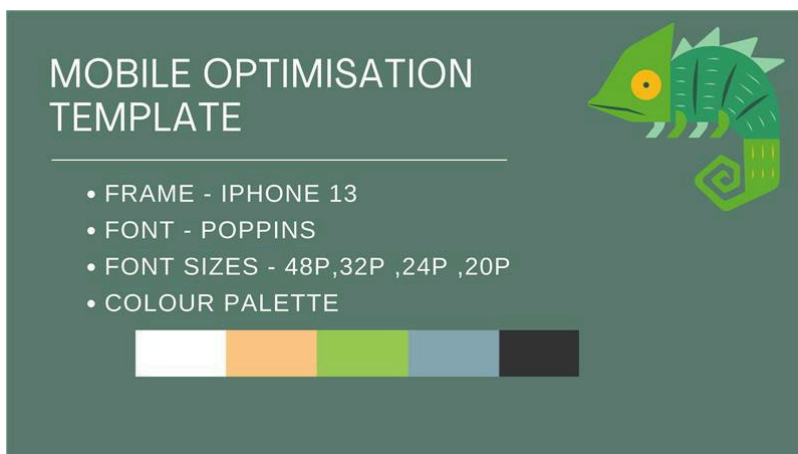
5.1P update

Project Progress Update

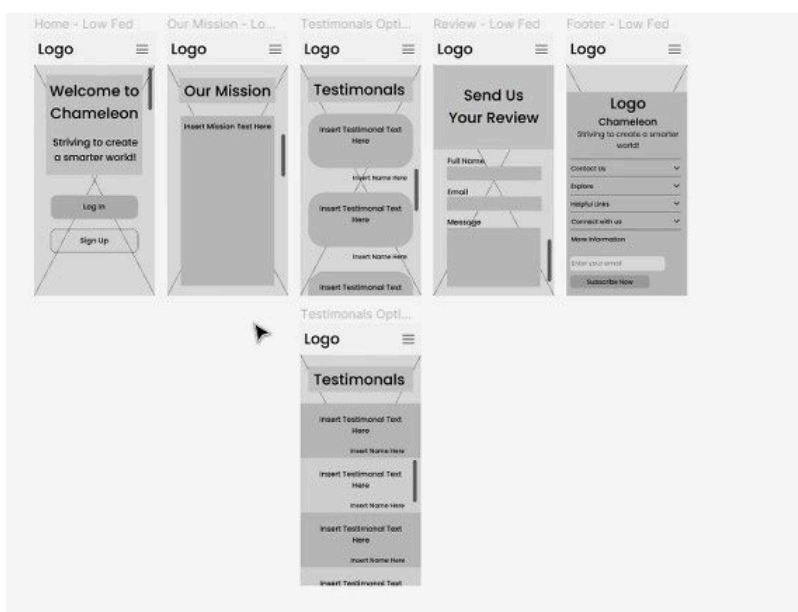
Weeks 1-4 of the project saw the onboarding and briefing of new students, establishment our short- and long-term goals, organisation of weekly meetings, and creating and assigning the tasks required to achieve them. As of week 5, the Chameleon Website project is on schedule to implement mobile optimisation by week 7, a static blog by week 8, and if time allows in the remaining trimesters begin development for the Staff and Client Portal.

Design Team Update

The new additions to the design team have been added to Figma and taught how to use it and mobile optimisation design templates have been created.



All the lo-fi wireframes for mobile optimisation have been implemented in week 5 with just a few designs pending completion by week 6. Work will begin on the blog wireframes in week 6, the Staff and Client Portal wireframes will begin from week 8 onwards.



Web & App Development Team

There were quite a few late additions to the Web & App Development team, the latest being in week 4. Despite this, all the team members have been briefed, granted access to GitHub, and new developers have been buddied with more experienced project members. The responsiveness of the website should be finished by week 6 and all these updates will be included in the SRS document to help future students familiarise themselves with our systems. We have plans to begin development for the Staff & Login Portal from week 8 if time permits.

Forecasted state of project deliverables at the end of the trimester

We have planned to finish the mobile optimisation and blogging section before the end of the trimester in week 8. Aiming to finish these deliverables earlier in the trimester gives us time should we fall behind but if we meet our deadlines, it also gives us the opportunity to begin developing the Client & Staff Portal, which will help the next trimester begin development earlier.

Changes to plans for the project

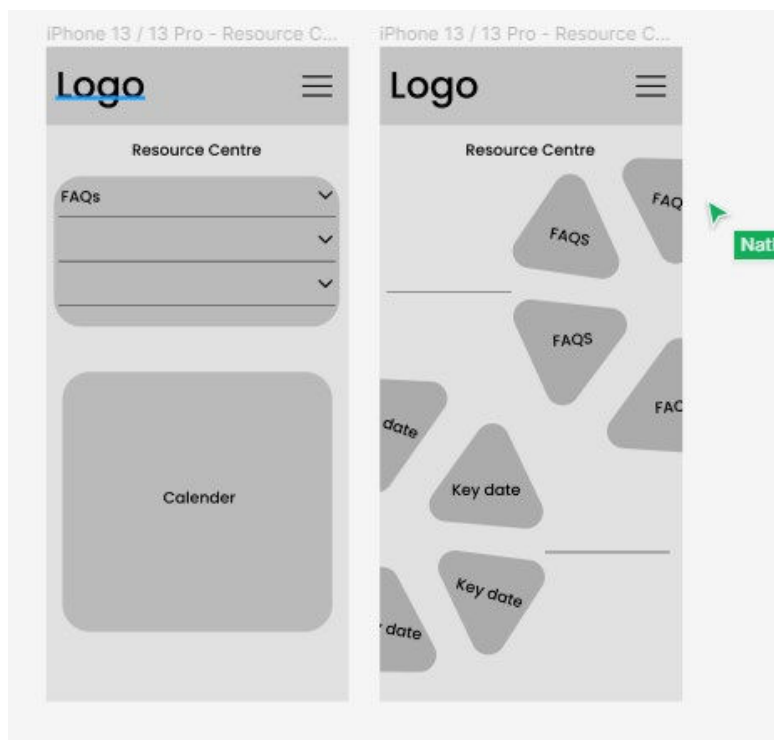
At the start of the trimester, we decided to deprioritise the Client & Staff portal to focus on accessibility and engagement deliverables. So far, we have kept up with our trimester deadlines, so there are no major changes to our plans for this trimester.

The design team did however provide some wireframes that are designed similarly to a mobile app. But, since these drafted designs were proposed in week 5, it was too late to implement them across the website. However, we have considered implementing them into the Staff & Client Portal and potentially the blog section, as these

are more interactive and have yet to begin development, making it more feasible to implement them within this trimester.

Left: original design

Right: updated app style design



10.2P Update

Project migration and restructure

Between weeks 5-8 the project faced major difficulties related to lack of experience with the VueJS framework, poor engagement from a portion of the student team and a complete failure of the CI/CD Pipeline that was tied to an ex-students IBM account, which made it unrecoverable.

This meant we had to shift our priorities from adding further functionality and mobile optimisation to the VueJS framework of the website, and instead deliver a sustainable platform for the project's future. We did this by migrating to a new framework and pipeline by completely rebuilding the website on the ReactJS framework, which was a lot more user-friendly and had far more resources for upskilling available online. In conjunction with this, we began investigating Google Cloud Platform (GCP) for our new pipeline.

Deliverables achieved this trimester and member contributions.

Project Leadership Team

The need for migration highlighted problems in the projects structure for staff onboarding, management, and training. As such, the project has been restructured to cater for an agile and sustainable platform which caters to support a high turnover of staff/students throughout the trimesters, all with varying levels of experience. This has been achieved through creating detailed procedures and practices to increase engagement, accessibility, and consistency.

- Nikolai McHerron
 - Creation of a new Project Tracking workbook template to better track team assignments, trimester goals, tasks, and finally, student attendance and engagement.
 - Diagram, documentation and video guides on how to set up and use the Project Tracker
 - Updating project and leadership procedures to improve consistency and effectiveness of project delivery.
 - Progress Bar component for Our Services page
 - GCP research documentation and setting up our GCP Project
 - Handover document (excluding 10.1 UML Diagram and 10.2.4 Google Cloud Platform).
 - Creating and recording showcase video

- Kinshuk Jain
 - Conducting further research on GCP migration and starting to configure Firebase + Cloud Run APIs for the CI/CD Pipeline
 - Hand over document - GCP section
- Shakwat Hossain Limon
 - Upskilling resources for VueJS and ReactJS
 - Setting up new repository and project structure for ReactJS framework
 - Merging all contributions into the master branch and resolving merge errors
 - Navbar component
 - HeroSection component
- Ayushi Natalie Alujjage
 - Designed project poster for InnoFes
 - Prototyping all the designs before handing them over to the Development Team.
 - Mobile optimisation framework

Web & App Development Team

In weeks 9-11 the Web & App Development team successfully migrated from VueJS to the more accessible ReactJS Framework. This was done by upskilling the team, providing support, clearly assigning tasks, and replicating the structure and expectations of a workplace. The GCP migration is also in the stages of being configured. All the contributions below are components of the new ReactJS migration and are accessible via the [chameleon-website repository](#).

- Completed
 - About Us, Julian Ryan.
 - AboutUsStats, Mathew Ho.
 - Calendar, Jack (also assisted w/ GCP migration)
 - Footer, Jason Hu
 - Services, Aye Mo Mo Shwe
 - Portfolio, Vineeth (also made the UML diagram for the handover document)
- Has errors but has been pushed
 - OurMission, Zhenyu Ye
 - Testimonial, Chenyu Kong

Design Team

The Design Team students created designs and frameworks for mobile optimisation, new website elements and the log in portal.

- Landing page, Tejal Girish Ranade
- About Us, Nikhil & Pratham
- Portfolio, Uche Ajoku & Samuel Kim
- Our Services & Resources, Nathan Cahill & Muhammed Haris Saeed
- Blog, Nikhil & Pratham
- Hero Image, Tejal Girish Ranade
- Dashboard Design, Nathan Cahill, Nikhil & Tejal Girish Ranade
- Client Feedback, Uche Ajoku, Samuel Kim, Muhammed Haris Saeed & Pratham

Proposed Deliverables for Trimester 3 2022

Web & App Development

- Finish GCP Migration
- Refine mobile optimisation
- Add responsiveness to components
- Begin development on Staff/Client Portal
 - Log in system
 - User management
 - Blog back end

Design Team

- Create promotional materials about Chameleon Company projects for both recruiting junior students in the following trimesters, and to promote relationships with clients
 - Blog posts about projects, updates on their progress, events such as InnoFes
 - Short videos of project descriptions, staff profiles, events, and examples of the code/work
 - Cross post to social media platforms such as Instagram and LinkedIn.
- Design an 'Our staff' framework (either as a page or apart of each project summary), which can include Names, field of study, LinkedIn profiles, etc.

Location of project resources

The resources for T2-2022 following the migration are as follows:

- [The Chameleon Website Project MS Teams channel](#)
- [The Project GitHub Handover repository](#)
- [Chameleon Website GitHub repository](#)
- [Project Tracker \(Team Assignments and Task Management\)](#)
- [Chameleon T2 2022 Website Showcase Video](#)
- [Chameleon Website T2 2022 Handover Document](#)

Project Members

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221337514	Nathan Cahill	Senior	PostGrad	Design
220102998	Nikhil Nikhil	Senior	Undergrad	Design
220490637	Sangjun/Samual Kim	Senior	Undergrad	Design
219204947	Tejal Girish Ranade	Senior	Undergrad	Design
218360746	Muhammed Haris Saeed	Junior	Undergrad	Design
220079655	Pratham	Junior	Undergrad	Design
220462239	Aye Moh Moh Shwe	Junior	Undergrad	Design
220068066	Uche Ajoku	Senior	Postgrad	Design
220381653	Jack Hagen	Senior	Undergrad	Web & App Development
220271708	Mathew Ho	Junior	Undergrad	Web & App Development
220240516	Julian Ryan	Senior	Undergrad	Web & App Development
219222529	Lachlan James Exton	Senior	Undergrad	Web & App Development
220460399	Xinyu Ji	Senior	Undergrad	Web & App Development
217438019	Dasun Tharaka Kodikara Munasinghe	Senior	Undergrad	Web & App Development
218663803	Surpreet Singh	Senior	Undergrad	Web & App Development
220457523	Zhenyu Ye	Senior	Undergrad	Web & App Development
218595157	VINEETH KARUPPIAH	Senior	PostGrad	Web & App Development
218086716	Gideon Kiptugen	Junior	Undergrad	Web & App Development
219220123	Jason Hu	Junior	Undergrad	Web & App Development
218517597	ChenXuan Hao	Junior	Undergrad	Web & App Development
221200347	Jiayi Wei	Junior	Undergrad	Web & App Development

Project 3: EV Adoption Tools

Overview, Goals, and Objectives

The EV Adoption Tools project aims to drive increased adoption of Electric Vehicles (EVs) in Australia.

This will help drive reduced dependence on fossil fuels, lower greenhouse gas emissions and have a positive impact on the environment and global weather events.

EV adoption tools will help EV owners better plan their trips by identifying optimal EV charging stations as waypoints on their journey.

The **Identify Best EV Locations based on Big Data** sub-project will support enterprises looking to establish charging stations in the optimal location based on user demand, traffic, EV owner density and many other data points sourced from government and industry.

Aims for Trimester

The goals for this trimester will be:

- To expand on the mobile app MVP, implementing features designed in the previous trimester (T1 2022)
- To perform initial research and create an early MVP for the EV location recommendation engine

Deliverables

This project has two deliverables running as sub-projects:

- Sub-Project/Deliverable 1: Locate a Socket
- Sub-Project/Deliverable 2: Identify Best EV Locations based on Big Data
- All projects will require research, planning and design activities to be continued on this trimester with finalisation of each carried out in subsequent trimesters.

Project Members

Student ID	Full Name	Junior/Senior	UG/PG	Team Group/Role
219179817	Hamish Glover	Senior	Undergrad	Evoleon Project Lead
214490138	Leda Scott	Junior	Undergrad	Evoleon Assistant Project Lead
220252511	Yuvraj Kapoor	Senior	Undergrad	Evoleon Design Lead
221071029	Jasdeep Singh	Junior	Undergrad	Evoleon Design
218556009	Shafiq Jahangir	Junior	Undergrad	Evoleon Design
220421563	Nihaal Sachdev	Senior	Undergrad	Evoleon Design
218062706	Muhammad Qureshi	Junior	Undergrad	Evoleon Design
220267679	Billie Jack Hancock	Senior	Undergrad	Evoleon Data Science
221459705	Nidhi Tapankumar Patel	Senior	Postgrad	Evoleon Data Science
219605515	Truong Giang Nguyen	Senior	Postgrad	Evoleon Data Science
219051815	Muhammad Ahmed Arif	Senior	Postgrad	Evoleon Application Development Lead
220224202	Abraham Awonusi	Junior	Undergrad	Evoleon Application Development
220462328	Chenyu Kong	Senior	Undergrad	Evoleon Application Development
219302799	Janitha Patabandige	Senior	Postgrad	Evoleon Application Development
218673691	Virg Mania	Senior	Undergrad	Evoleon Application Development
219213881	Matthew Robert Iredale	Senior	Undergrad	Best EV Locations Project Lead
219309149	Leigh Rowell	Senior	Undergrad	Best EV Locations Team Co Lead
221430794	Mei Liu	Senior	Postgrad	Best EV Locations Team Co Lead
219223276	Kale Petruisic	Senior	Undergrad	Best EV Locations Team
220559183	Onawaree Rattanathon	Junior	Postgrad	Best EV Locations Team
219272783	Ezekiel Griffin	Junior	Undergrad	Best EV Locations Team
221302256	Nevil Sukhadiya	Junior	Postgrad	Best EV Locations Team

Sub-Project/Deliverable 1: Locate a Socket

Summary

The goal of this project is to be able to design and implement a mobile app (Android and iOS) to help consumers identify a nearby charging location. While there are existing apps on the market that offer this functionality (i.e., Chargefox), we believe that we can offer an application that differentiates itself from those apps by designing features that add value beyond just finding the charging station.

A few examples of what the app may offer in addition to the core function of locating a socket include:

- Providing additional information and filtering of stations based on type (EV vs hydrogen, for example), information on the source of the power (direct solar, grid powered, gas, diesel etc)
- Providing a full journey planner for longer trips that optimizes for reducing charge time, cost, and environmental impact along the route
- Ability to incorporate your usage data with current fuel prices, cost of maintenance etc and provide an indication of real savings for running the vehicle.

Note that Chargefox does also offer the ability to pay for charging via the app, so this may be something to consider in the architecture of the platform.

Aims for Trimester

The goal for this trimester will be:

- Add page switching functionality to app navigation menu
- Implement clickable charging location icons onto the EV charging station map, with details such as charge speed and available/total vehicle capacity to assist the end user's in choosing an appropriate station.
- Arrange charge station data (from a variety of sources) in a consistent format that is readable by the application.
- Design new features, or expand on previous designs, to inform future development

5.1P update

Project Progress Update

Changes to our project's team structure were made in the first few weeks and communicated with all members, then we began breaking down our project deliverables into smaller tasks on our Trello board. Most of the tasks have been assigned to one or more team members.

Our Design team's work is well underway, with App Development following at a slower pace due to development prerequisites (i.e., setting up individual environments and training new developers) and some difficulty contacting all members of the App Dev team. The Data Science branch – working primarily with the App Dev team this trimester – is working towards producing a consistent format to store the EV charging station data that will be used by the Evoleon app and populating it with some data for demonstration and testing.

Forecasted state of project deliverables at the end of the trimester

- App's basic navigation functionality implemented (ability to switch between pages)
- Locations of charging stations overlayed on map (using dummy or demo data)
- Charging station location icons made clickable to reveal more details about the station
- User sign-up and authentication methods implemented
- Multiple app screens redesigned to ensure consistency and improve user experience
- Some data will be represented in a consistent format that is readable by the app, demonstrating this capability that can be expanded with further data in future trimesters

10.2P Update

Deliverables achieved this trimester and member contributions

- Page switching functionality working, with multiple pages available
- Clickable charging station icons implemented
- User sign-up and authentication with email and password implemented; details stored in Firebase DB
- Charge station data format created on our project's new Firebase DB
 - Script created to add new data to the database
- Documentation and explanations of aspects of the project created to assist with onboarding

Proposed Deliverables for Trimester 3 2022

- Implement information display when a charging location icon is clicked (currently, clicking reveals a placeholder)
- App will get its charging station data from our Firebase DB (currently hardcoded)
- Work to reduce resource usage and resolve performance issues when running on Android

Location of project resources

- [Evoleon App play store listing](#) (use evoleonapp@gmail.com to access as admin)
- [Github Repository](#)
- [Github Build Pipelines](#)
- [Evoleon Expo Project](#) (React Native Build Pipeline & submission to play store)
- [Trello Board](#)
- [Figma Board](#)
- [Showcase video](#)

Sub-Project/Deliverable 2: Identify Best EV Locations based on Big Data

Summary

Continuing from T1 2022 the goal of this sub-project remains the same, utilizing community data specifically; political, economic, commercial, and traffic (pedestrian/vehicle) to predict where the most mutually beneficial place to install new charging stations so that:

- Stations are well located in relation to other charging stations to avoid competition.
- People are enticed to stop to charge rather than forced, nearby entertainment (landmarks/restaurants)
- Local economy benefits, new station installation attracts more visitors thus more customers for nearby businesses
- Strategically placed stations to encourage EV users to take different routes and minimise traffic congestion
- Existing or planned infrastructure can accommodate the stations (power and land requirements)

This project primarily involves Data Science, secondarily Web Development:

- Identifying community datasets that can support the previously mentioned dot-points in the decision-making process. This is ensured via data dictionaries to uphold relevance to the project's goal.
- Analysing said datasets to generate visualisations that effectively demonstrate trends and/or outliers, proving or disproving factors that impact predictions on new charging station locations.
- Dataset snapshots, coding and visualisations from analysis will be added to our pre-existing website

Aims for Trimester

- Continue building our data-pool from the foundation constructed in T1 2022 by collating more community datasets
- Detect trends and/or outliers through data analysis, thus ever-increasing the accuracy for predicting new charging station locations
- Mapping detected charging stations from collecting/cleaning/analysing datasets
- Expanding on Google API (Application programming interface) to include more existing stations within Australia and begin to incorporate international locations.
- Implement additional functionality onto the website (specifically for updating the Google API map)

User Manual

Data Analysis (General):

- Refer to upskilling document located in Team's Channel\files\Upskilling\EVCFLO_DA_Upskilling.docx
 - Or through GitHub repository:
- https://github.com/Chameleon-company/EVCFLO/blob/main/Upskilling/EVCFLO_DA_Upskilling.pdf

Web Development (Tools):

- Complete documentation and instruction regarding the front-end website and the backend web server can be found on the GitHub repository here:
- [https://github.com/Chameleon-company/EVCFLO/blob/main/Upskilling/Web%20Dev%20Documentation%20\(T2%202022\).pdf](https://github.com/Chameleon-company/EVCFLO/blob/main/Upskilling/Web%20Dev%20Documentation%20(T2%202022).pdf)

Web Server API:

- **Public URL:**
 - <https://server-e657pcuziq-ts.a.run.app>
- **Current Routes:**
 - [/]
 - Method: GET
 - Returns: 'The server is running...' if the app is running
- **[/api/get_chargers]**
 - Method: GET
 - Returns: All the charger station objects from the database as a Json object
- **[/api/get_bounds]**
 - Method: GET
 - Returns: All the bounding box objects from the database as a Json object
- **[/api/get_suggested]**
 - Method: GET
 - Returns: All the suggested points objects from the database as a Json object
- **[/api/search_chargers/ <lat>/<lng>/<rad>]**
 - Method: GET
 - Returns: Charger station objects from the database within rad km from geo location with latitude and longitude as a Json object
- **[/api/add_station]**
 - Method: POST
 - Returns: 201 if successful, 400 if failed
 - Note: Requires body to contain at least valid values for 'name', 'latitude', and 'longitude' parameters. The complete model for a charger station (parameter names and types) can be found in /models/ChargerStation.py
- **[/api/add_bounding]**
 - Method: POST
 - Returns: 201 if successful, 400 if failed
 - Note: Requires body to contain at least valid values for 'north', 'south', 'east', 'west', 'source', and 'source_date' parameters. The complete model for a bounding box (parameter names and types) can be found in /models/BoundingBox.py
- **[/api/add_suggested]**
 - Method: POST
 - Returns: 201 if successful, 400 if failed
 - Note: Requires body to contain at least valid values for 'latitude', 'longitude', 'total_plugs', and 'suitability_score' parameters. The complete model for a charger station (parameter names and types) can be found in /models/SuggestedStation.py
- **[/api/db_populate]**
 - Method: POST
 - Returns: 201 is successful, 400 if failed
 - Note: This simply adds 5 demo charger station entries to the database and used during development. This should be removed from production

Product Development Life Cycle

Refer to upskilling document and its sections 'Sprints' and 'Resources' located in:

- Team's Channel\files\Upskilling\EVCFLO_DA_Upskilling.docx
 - Or through GitHub repository
- https://github.com/Chameleon-company/EVCFLO/blob/main/Upskilling/EVCFLO_DA_Upskilling.pdf

New Tasks

Data Analysts & Web Developers:

- New tasks are created for the team after an initial planning meeting
 - Usually done at the start of the trimester
 - General overview of requirements is discussed and determined

- From this, the larger scope is broken down into small parts which can be achieved within a single sprint
 - For example:
 - Implementing a specific function
 - Designing a particular data model
 - Etc
- These small tasks are allocated to sprints and are reviewed each week assessing the following:
 - That they are still relevant to the overall progression of the project
 - Make sure that they are the highest priority
 - Depending on how the rest of the team and project are progressing
 - The tasks are updated/added/removed as required each week

Definition of Done

Data Analysis:

- There are 4 phases in completing a DA task; collecting/cleaning/analysing/mapping
- Each phase must have minimum outcomes for the overall task to be marked as done
 - Collection Phase
 - A new dataset that is not a duplicate of pre-existing datasets
 - Must have locational or usage data or both
 - Cleaning Phase
 - All irrelevant values must be removed such as
 - 0 values
 - Null values
 - Incorrectly recorded rows
 - Incorrectly formatted columns
 - Analysing Phase
 - Distribution graphs for each relevant variable/s
 - Each graph is cross-checked against a function
 - Lognormal or Weibull CDF
 - Trends or outliers detected with logical reasoning to why
 - Mapping Phase
 - All found charging stations located are visually mapped
 - Clustered map showing density of charging stations
 - External dataset used for recommending new location mapped
 - Final map overlaying both datasets and displaying recommendations
- After the 4 phases criteria are met, the dataset dictionary is updated to indicate to all members the dataset/s in question have been completed

Web Development:

- The coding structure and layout has already been setup so that new features can be implemented
 - The project can scale without it becoming messy
 - It has been done following best practice guidelines and should be kept to this standard
 - It is recommended that this be reviewed periodically to ensure that it still follows best practices
- As tasks are created requirements need to be clarified to give a specific definition of what is required
 - The feature is worked on 'offline' on the developers' local machine until
 - The feature is working and implemented in a way that is
 - Well laid out
 - Commented
 - Congruent with the existing code base structure
 - Once completed on the local machine, the updated code can be pushed to the team Git repository for peer review and cleaning if required
 - Finally, once it has passed review it can be pushed to the production environment on Google Cloud Platform
 - Once it is moved to production, tested, and working the task can be marked as done.

Task Review

Data Analysis:

- Each task that has been marked as done in the dataset dictionary are peer reviewed by data analysts and relevant leadership prior to being officialised
- Once officialised the region said dataset is covering can be considered finished and next region/s are to be worked on
- Any new procedures implemented after regions have been completed, will have to be revisited and reassessed

Web Development:

- Tasks carried out by the web dev team are peer reviewed by web-dev members and relevant leadership prior to being marked as complete
- Once they have been moved into production, they are available for the rest of the company to use and consume
- At this point if any bug fixes or updates are required these are communicated back to the web dev team through either our MS Teams channel or during weekly stand-ups

Testing

Data Analysis:

- The criteria for each of the 4 phases acts as DA task testing
 - Collection Phase
 - Dataset meets minimum requirements for either location or usage data, or both
 - Cleaning Phase
 - No incorrect/irrelevant values/entries remain
 - Analysing Phase
 - All trends/outliers have been accounted for
 - Cross-checks have been passed
 - Mapping Phase
 - All charge stations have been plotted
 - No bugs seen in map generation

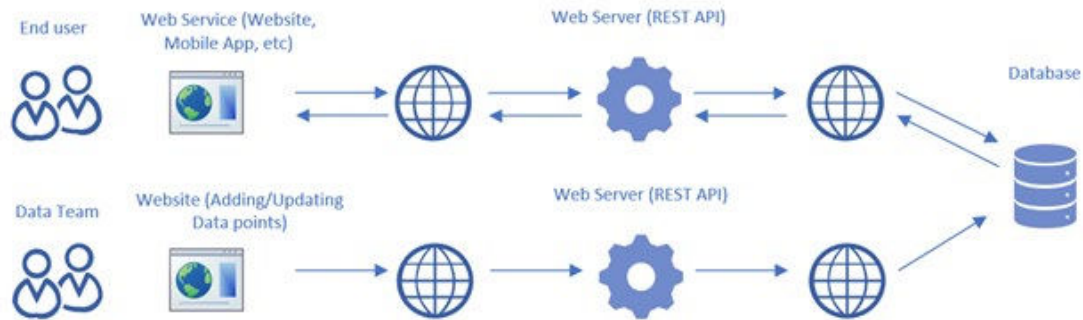
Web Development:

- Features are tested as they are being developed to ensure that they are meeting the requirements that have been determined beforehand
- In this way features should be thoroughly tested and successfully doing what they should prior to being moved to production
- Once the features are live, they can be tested by the rest of the company and any bug fixes or updates can be fed back to the web dev team through the MS Teams channel

Branching Strategy

- The GitHub repository is used in this project primarily for the storage of datasets and the source code for the web development components
- Each component is stored in its own folder to keep them organized
- Any tasks that have passed completion and testing are uploaded to the GitHub at the end of each sprint
- Due to the small size of the web development team and minimal commits from team members there is no branching strategy in place
 - other than to keep it simple and make commitments to the main branch
- Data analysis projects are stored in the repository in their own folders to keep them organized and prevent interference between projects, this also negates the need for branching

UML Diagram



Tech Stack

Data Analysis:

- **Dataset Storage:**
 - Datasets are stored in .csv/.xls/.xlsx to allow reading/writing in excel and to keep consistency in collecting and cleaning
- **IDE:**
 - Any IDE using Python 3 language is acceptable
 - Recommend using Jupyter Notebook as it is the most effective at displaying maps
 - Also, best for converting to .html file for uploading to the website

Web Development:

- **Front end:**
 - Currently built using HTML/CSS/JS for simplicity to get a basic working version available to test and demonstrate the web server functionality.
 - In future this will be updated to use the ReactJS framework to replicate the branding and structure used by the web application team
- **Web Server:**
 - Written in Python using the Flask framework
 - Python was chosen due to the simplicity of this language and ease to learn
 - It is also heavily used in data analysis and predictive modelling
 - Chosen for the ability to perform these functions on the web server later (if required)
- **IDE:**
 - Any editor can be used based on personal preference
 - Our recommendation however is VS Code as it is cross platform and cross language
 - can be customized using plugins as required

Source Code

Source code for all components including DA tasks, Web-Dev tasks (front-end/back-end/tools) for updating the database can be found on the team GitHub repository here: <https://github.com/Chameleon-company/EVCFLO>

Login Credentials

<p>MongoDB:</p> <p>User: chameleon@deakin.edu.au</p> <p>Pass: ECFLO1234</p> <p>Access URI: 'mongodb+srv://evchargerforecasting:EVCFLO1234@cluster0.md7fh7i.mongodb.net/?retryWrites=true&w=majority'</p>
<p>Google Cloud Platform:</p> <p>Access GCP by creating and logging into a Google account using your Deakin email address. You will need to contact one of the GCP admin and request access to the platform to use it.</p>

Organization: Deakin.edu.au
Project Name: sit-22t1-ev-adoption-t-a4efab5
Project number: 809892333301
Project ID: sit-22t1-ev-adoption-t-a4efab5
Project Owner: Nghia Dang (ngh_adm@deakin.edu.au)

5.1P update

Project Progress Update

Web Development Team:

- Setup and introduction of the existing GitHub Repositories, website, and Google API has been conducted and achieved with any new members that have joined in T2 2022 given access permission.
- Using google maps and coordinate script searching methodology, the team has been finding existing EV charging locations around Australia with the primary focus localised to Melbourne.
- These locations are then recorded into a database and implemented into the Google API via plotting for user's to visibly see and plan trips accordingly.
- Alternative approach of plotting EV charging stations has been suggested and currently investigated...
- The theory is EVCS locations from pre-existing databases will be read into a program where the coordinates are distinguished and plotted onto the Google API automatically.

Data Analysts Team:

- Process of finding, cleaning, and analysing raw datasets regarding the usage of EV charging stations has been introduced to new members and refreshed for continuing members from T1 2022.
- New methods of documentation have been provided with a dataset dictionary to record datasets the team has currently found and still need to in the future.
- Summary of the file directories and its structure for current and future team members to easily discern where pre-existing work can be found and new work to be added.
- Divide and conquer approach established for data scientists, each member has been delegated a region to work on to cover a wider footprint across the globe.

Forecasted state of project deliverables at the end of the trimester

- Australia's existing EV charging station locations will be fully integrated into the Google API for EV Adoption Tools mobile app team to implement and provide for its users
- Database for locations and usage of EV charging stations continuing to expand, this will provide accurate information for the project's end-goal of an AI (Artificial Intelligence) prediction system for advising new locations to install EV charging stations
- Discovery of new external factors that are proven/disproven to impact the usage of EVs, further information found to prove/disprove known factors.

Changes to plans for the project

- Divide and conquer approach is now the standard procedure for delegating dataset collection/cleaning/analysis (using regions as the divider of tasks)
- **Potential** new method of plotting existing locations via dataset scanning (as opposed to map scanning)

10.2P Update

Deliverables achieved this trimester and member contributions

- Web scraping completed for Australia in populated areas to obtain dataset of existing EV charging stations
- Database models done for existing charging stations, recommended charging stations, and areas searched (bounding boxes)
- API updated to include accessibility to new models
- API updated to include search function for existing charger stations
- Database moved to Chameleon company MongoDB account and datasets recreated, including updating the web server to use this database
- Mouseover feature added to front end map to display additional data about points.
- Upskilling documentation for web dev processes
- Front end design wireframes
- Datasets for EVCS locations in UK region collected/cleaned and initial analysis

- Gulf and Asiatic regions datasets collected/cleaned/analysed/mapped
- Interactive Maps Demonstration of our theoretical end-product
- Visualisation Dashboard created for demonstrating data visualisations in a professional manner
- Documentation for upskilling (DA + Web-Dev) has been provided for future trimesters

Proposed Deliverables for Trimester 3 2022

- Rebuilding the front end using the ReactJS framework following the existing design and branding implemented by the Chameleon web app team and wireframes
- Enrichment of the existing Australia charger station dataset to include additional charger socket and pricing data
- Implementation of predictive modelling for recommended charger station locations and population of the database with these points
- Implement security features to API to restrict access to approved accounts
- UK Region analysis, regarding geo-spatial characteristics such as traffic flow, places of interest etc.
- UK Region mapping and predictive modelling for future EVCS
- Gulf and Asiatic regions traffic analysis, using machine learning for predictive modelling for future EVCS
- Payback period research regarding the commercialisation of EVCS, what impacts the profitability
- Continue research on external factors that impact EV/EVCS usage such as; traffic-flow, population density, energy consumptions, etc.

Open Issues

- Datasets lack quality data when attempting to analyse/map and utilize for predictive modelling
- Quality datasets are often blocked by a pay wall for an exurbanite amount of money (insufficient funds)
- Research gap GIS studies on public charging behaviours, traffic flow and charging possibilities

Lessons Learned

- How data analytical methods can be applied to the development of the project
- Project roadmap was insufficiently implemented, upskilling documents now contain project structure
- Dataset collection methods are unclear, proving to be a critical phase for project DA tasks
- DAs are unfamiliar with web-data scraping and Google API (required web-dev upskilling)
- Too much focus was placed on collecting datasets rather than analysing pre-existing datasets
- Working collaboratively on tasks proved more effective and efficient
- Weekly meetings at the same time and day made it easy for members to consistently attend meetings
- Always provide visualisations to demonstrate what work is achieving to the clientele
- Consistent communication with company directors/clients (minimum once per sprint) to ensure project's direction adheres to objectives/goals

Other Relevant Information

- Please go through all the previous tasks completed and files uploaded to Teams/GitHub then determine what existing or new topics you prefer to work on for the whole trimester to avoid duplicate works.
- **Honourable Mentions:**
 - Matthew Iredale
 - Project Leader
 - Organised and hosted meetings
 - Created dataset dictionary
 - Restructured filesystem for effectiveness/efficiency
 - Creating and updating Trello Board (task delegation)
 - Creation of upskilling documentation for future Data Analysts
 - Attending InnoFes convention, poster, and pitch creation
 - Leigh Rowell
 - Web Development Team Lead
 - Implemented Google API features
 - Creation of upskilling documentation for future Web Devs
 - Handover document completion (Web-Development)
 - Ezekiel Griffin
 - Implemented Google API features

- Volunteered to assist in Web-dev despite lack of knowledge/skills
- Designed front-end for future implementation on website
- Creation of upskilling documentation for future Web Devs
- Handover document completion (Web-Development)
- Merry Liu
 - Data Analyst Team Lead
 - Created legend for file-structure in Team's channel
 - Creator of all Meeting Minutes documentation
 - Extensive research and development for end-product demo
 - Data visualisation dashboard (Tableau)
 - Introduced new procedure in DA tasks (mapping)
- Onwaree Rattanathon
 - UK Region dataset collection/cleaning
 - Extensive research and development for end-product demo
 - Data visualisation dashboard (Tableau)
 - Introduced new procedure in DA tasks (mapping)
- Kale Petrusic
 - China and Hong Kong dataset collecting/cleaning/analysis/mapping work
 - Attending InnoFes convention, poster, and pitch creation
- Nevil Sukhadiya
 - Gulf and Asiatic region dataset collecting/cleaning/analysis/mapping work
 - Suggested idea for dividing DA workload based on regions

Location of project resources

[Test Site](#)

[Trello Board](#)

[Teams Channel](#)

[Github Repository](#)

[Showcase video](#)