

Project Title

Compliance plus

1

Brief description

Compliance Plus is a project that will allow students to take a deep dive into creating a tech product. The product is envisaged to bring together all applicable standards, legislation and regulations that SME's must be aware of into a central database which can then be presented in a web application. The end result of the project will be a prototype of the product. The students will be required to work with our Innovation Lead to create a project plan and schedule and then implement.

Project Specialisation

Application development, web development and design

Project Skills

Business Analysis, Project Management, Programming, Web development

Project Environment

TBD

Research

Project Category

Application

Project Title

Developing a Web-based Dataset for Software Bugs and Their Patches

2

Brief description

Cybersecurity is important for today's society because it can prevent private data leakage and financial losses. Among all the solutions for cybersecurity, bug analysis is a critical one to prevent cyber-attacks.

This project intends to build a dataset for different bugs. The dataset will contain information of application names, types of bugs, patches for bugs, and root causes for bugs.

With this dataset, users can easily search for bug information. Furthermore, with bug information, developers can better understand bugs and fix the roots of bugs.

The bug information will be collected from famous platforms, such as Google's Fuzzbench.

The result of the project will be a file (.csv) that contain all bug information, and a web-based system that can query the information.

Project Specialisation

Research; Cybersecurity; Bug analysis; SQL design; Web Development and Design.

Project Skills

Software programming; Security understanding; Web development.

Project Environment

SQL; Linux; HTML

Research

Research on properties of bugs.

Project Category

Cyber Security

Project Title

Bus Replacement Service Customer App

3

Brief description

This project aims to develop a mobile application for customers using bus replacement services as the results of level crossing removal project.

The mobile app allows the LXR program to provide real-time information about the status, routes and locations of bus replacement services for areas impacted by disruption.

Develop a mobile app, which:

- Presents status of bus replacement services
- Show routes and temporary stations

Design a data management framework that records the app data A mobile app for visualising the status, timetable, routes and location of bus replacement services in areas disrupted by level crossing removal project.

A data management system capable of storing and reporting key activities Full documentation and evaluation of the system

Project Specialisation

Software Engineering, Android/iOS programming, Database management

Project Skills

Project Environment

Android/iOS programming

Research

Information about bus replacement services

Project Category

Mobile App

Project Title**Marvin the Worm****4****Brief description**

I have written education booklets that are dispersed through schools in Queensland. I am wanting to make this a fun interactive experience for the students whilst learning about sustainability. An app that can be licensed to schools for education purposes.

Project Specialisation

Mobile application design (Android and IOS)

Project Skills

Software programming- 10 mini games/ activities inside 1 app IOS and Android

Project Environment

Android and IOS

Research

There will likely be a little research, however I am happy to assist with this, I have attached a document with ideas

Project Category**Mobile App**

Project Title**Mobile App design for controlling sensors and motors of an in-vessel composting prototype****5****Brief description**

Food waste is generated every day and are disposed of in landfills. In order to treat this organic waste, an in-vessel composting prototype is being created.

This prototype will be atomised and controlled with certain sensors of moisture content (%), oxygen (%), temperature (oC), and gases (ppm).

Also, the motors will be controlling the rotation (rpm) of the paddles inside the cylinder. In addition, there will be sensors to control when to open and close the lids to transfer the composted material to the second cylinder.

All these sensors and motors need to be programmed and controlled by an App. In that sense, using existing data or obtained from the composting experiment, the development of the App will be tested.

Finally, this composting App should be able to show the performance of the prototype in real time and also can storage the data which can be presented as graphs in the mobile App.

Project Specialisation

Mobile Application Design (Android & IOS);

Project Skills

Software Programming; OIS; Android

Project Environment

Software/ Programming Languages Android; IOS

Research

N/A

Project Category**Mobile App**

Project Title

Project Breeze

6

Brief description

A dating app that matches compatible personality types. We pair couples who have just the right amount of similarities to understand each other and just the right amount of differences to create a spark. And then have a guided conversation to enable meaningful connections.

Project Specialisation

Mobile App development, React Native, Web dev (Admin dashboard), React

Project Skills

Software Programming

Project Environment

iOS, Android, Web, React Native, ReactJS

Research

N/A

Project Category

Mobile App

Project Title

Project Synergy

7

Brief description

Project Synergy is a mobile app whose goal is to make it easier to do fun activities. Be it sports, board games, karaoke or anything that requires a partner or group.

Within Synergy, you can find new people in your area to connect with or find a team or league to join.

Project Specialisation

Mobile App development, React Native, Web dev (Admin dashboard), React

Project Skills

Software Programming

Project Environment

iOS, Android, Web, React Native, ReactJS

Research

N/A

Project Category

Mobile App

Project Title**Network and Server honeypots****8****Brief description**

Design and create one or two tailored vulnerable network and IIS (web) servers which can be deployed on Hypervisor technology such as Hyper V or Docker which will send traffic and communication logs to a collector for SIEM analysis.

Project Specialisation

Network Design and Security, Web application security, IT Security

Project Skills

IT Security, Cloud Security, Networks, Software Programming

Project Environment

Linux/Windows Programming languages capable of developing the honeypot servers

Research

Research on how honeypots work, what they are used for and the optimal locations

Project Category**Network**

Project Title

Data-driven public transport simulation: passenger trips, flows and service loads

9

Brief description

Planned disruptions frequently occur in the public transport network and cause adverse impacts on passengers and road traffic. Public transport operators can evaluate different “what-if” scenarios in advance through a reliable simulation and get ready to take appropriate actions to reduce the total delay caused by disruptions.

In recent years thanks to the availability of big public transport data obtained from smart cards and onboard vehicle GPS, it provides the opportunity to have detailed information of travellers’ movements and public transport services. Simulating the interplay of travellers with public transport services enhanced by advanced artificial intelligence (AI) models seems essential for better system management under various disruption scenarios.

Project purpose: Visualisation of the public transport services simulation assists operators in a better understanding of the system under different possible scenarios. This project develops a platform that visualises rail services based on General Transit Feed Specification (GTFS). In addition, the patronage of each service can be presented by considering travellers’ demand patterns and public transport services.

Project Specialisation

Web Development & Design

Project Skills

Web-based frontend developer, experience of common frontend technologies (Javascript, HTML, CSS...)

Project Environment

Javascript / HTML Java

Research

- Review the GTFS data for the Melbourne rail network
- Review public transport demand data
- Present the outcome in a map-based platform

Project Category

Research and Data Visualisation

Project Title**Analysis of Road Traffic Accident Data****10****Brief description**

To predict and prevent road traffic accidents, the relationship between accident frequency and features including the built environment, land use, traffic, and demographics needs to be investigated.

The project will involve data mining and/or statistical analysis of a variety of datasets.

Some work has been done by our Swinburne intern in semester 2, 2021, in consultation with the Australian Urban Research Infrastructure Network (AURIN).

Project Specialisation

Research, Data Mining, Machine Learning, Multivariate Statistical Analysis, Geographic Information Systems

Project Skills

Software Programming, Database, Statistical Analysis

Project Environment

Windows, QGIS, RGIS, Python, R Studio, Data Mining Tools

Research

See papers cited below

Project Category

Research and Development

Project Title**Assessment Toolkit for Safe Self-Driving Cars****11****Brief description**

Safety is one of the main challenges for self-driving cars to be accepted on road.

This project aims to develop an assessment toolkit for assuring the safety of self-driving cars.

Students involved have an opportunity learn, develop, and evaluate state-of-the-art self-driving car platforms and technologies, including Apollo, Autoware, SVL, CARLA simulator in this project.

The toolkit will help examine how system behinds self-driving cars perceive, plan, and make decisions for safe driving experiences.

The assessment toolkit should be developed and implemented using Python language in Ubuntu OS.

The product is a set of implementable methods, scenarios, visualization and analysis.

Project Specialisation

Research; Systems Analysis & Design; Software Testing

Project Skills

Systems Analysis; Project Management; Software Programming

Project Environment

Python, Basic Shell

Research

Software Testing, Self-driving Car

Project Category**Research and Development**

Project Title

Code Submission System

12

Brief description

This project is an assignment submission system for program code. It will look at assignment and conduct required analysis.

Research:

Prepare a research report for each the following (with references)

Current state of contracting cheating

Definition and metrics of plagiarism and contract cheating

Describe how you search for these information

Implementation:

Build a web-based prototype

Build an assignment submission web application

Perform the following analysis on the submitted assignment

During submission

Generate at least 5 multiple choice questions with answers from the submitted code

Present these questions to the student for the student to complete the submission

Keep the question, answer and result in a table

After submission

Perform a web search in the submitted solution against posted in the assignment help or code repository website

Generate analysis report such as number code lines, variables, constructs

Update table with the status

Send a notification email containing the questions and answers to convenor

Provide an admin to manage the data in the web application

Final Report: Prepare at least a 1-page report for each of the following Architecture of the implemented system

Sample output with screenshot and explanation

Discussion of the results of the tool

User feedback (if time permits)

Project Specialisation

Database design, web development, basic NLP

Project Skills

The skills that will be needed or required by the students is the knowledge of database (SQL), software development and documentation.

Project Environment

Backend – MySQL Frontend – Relevant technology

Research

Students will have the opportunity to research on the issue of contract cheating.

Project Category

Research and Development

Project Title

Deep Learning-based Machine Translation Application

13

Brief description

Machine translation software such as Google Translate automates the process of translating text from one language to another without human editing.

This project aims to develop a desktop application that can automate and then validate the translation capability of the state-of-the-art machine translation software.

Students will have opportunity to build and validate a real-world useful product.

The main tasks in this project are:

Build a desktop application taking advance of deep learning-based engines (e.g., Google Translate API, or open-source SEQ2SEQ) to help translate our documents from one language to another.

Validate the translation capability of the engines and the developed application using state-of-the-art software testing techniques.

Project Specialisation

Research; Systems Analysis & Design; Natural Language Processing; Software Testing

Project Skills

Systems Analysis; Project Management; Software Programming

Project Environment

Ruby, C++/C#, Python or Java.

Research

Basic understanding of software engineering and software testing

Project Category

Research and Development

Project Title

Dynamic Parking Bays for Disabled Motorists

14

Brief description

Searching for a parking space has become a common experience in cities, which leads to wasting time and costs, fuel and causing problems such as pollution, congestion and leads to dissatisfaction for the community.

Parking for disabled motorists have extra issues to consider. Allocation of parking spaces for disabled motorists are limited and cannot be pre-booked.

The project aims at finding a way of providing dynamic parking bays that can be allocated to disabled motorists when demand calls. All ideas will be considered.

Some of the issues to consider are obtaining users' profile and dynamically prioritize and allocate parking spots based on the demands from different groups of people with a disability in order to provide a fair community to empower them (different type of cars, disability, ...). Machine-learning methods for on-line decision making by considering the demand from different groups of people and their requirements combining with environmental facilities to choose the best parking options for each group.

The software to book parking spaces is not the key focus for this project. It's the design and functionality of dynamic parking spaces that can seamlessly convert from normal spaces to Disabled Motorist spaces on demand. There may the use of physical barriers, electronic messaging, etc.

Could use

- Bluetooth mobile application that can authenticate the identity of the users in the gateway and in each parking spot.
- In addition, it can be used to get use's profile in case of non-reservation from the entrance gate.
- Generating report of the parking spaces, such as occupancy patterns and demands from different type of people (disabled. Ordinary), facilities and type of parking spaces in different regions and tariff rates

Project Specialisation

Research, Mobile Application, Design(Android & IOS) Application Development, Systems Analysis & Design, Web Development & Design, Cloud computing, Electronics, Mechatronics

Project Skills

Software programming (IOS, Android) Data base,

Project Environment

Needs research phases to define the required technology,

Research

Every parking spaces on-street and off-street The data can be used by government, organizations and authorities to better manage cities and plan for constructions, required facilities and infrastructures for better managing cities and high quality supports and safe environments for all people Facilitates steps towards Smart cities Prepares backbone for self-driving vehicles.

Some funding may be available.

Project Category

Research and Development

Project Title**Interactive Cloud Interfacing for Autonomous Warehouse Roof Inspection with Unmanned Aerial Vehicles****15****Brief description**

With the emergence of cloud computing, the potential for robotics application has escalated especially with unmanned aerial vehicles (UAVs).

One of the many exciting examples is the integration of UAVs and cloud platform to conduct autonomous warehouse roof inspection to replace human labor with inherent safety risks.

In this project, an interactive cloud interfacing is to be deployed on a commercial-grade UAVs to perform data acquisition, processing and transmission for warehouse roof inspection.

The UAV will act as an interactive platform that connects the onboard camera and sensors to a cloud service for real-time operation.

Dashboard and human machine interface (HMI) are to be developed to provide data visualization on top of the cloud database. The UAVs will be retrofitted with onboard computing units to allow onboard computing and cloud integration.

Project Specialisation

Database design, hardware interfacing and application development

Project Skills

Software programming

Project Environment

C, C++, PostgreSQL, Node.js

Research

Drone Interfacing

Project Category**Research and Development**

Project Title**Machine Learning-based Sentiment Analysis Application****16****Brief description**

Sentiment analysis help analyses people's opinions and attitudes from their textual expression such as posts, message, comments.

Companies can use sentiment analysis to measure the attitude of customers on individual products or marketing campaigns. Politicians can adopt sentiment analysis to understand the opinions of voters.

This project aims to develop a desktop-based (Windows, Mac or Linux) application that can analyse the sentiments and then validate the system.

The main tasks in this project are:

Build a desktop application taking advance of machine learning-based engines (e.g., Pytorch, TorchText) to help analyse the sentiments from texts.

Validate the reliability of the engines and the developed application using state-of-the-art software testing techniques.

Project Specialisation

Research; Systems Analysis & Design; Software Testing

Project Skills

Systems Analysis; Project Management; Software Programming

Project Environment

Python, Jupyter, PyTorch

Research

Software Testing, Machine Learning, Sentiment Analysis

Project Category**Research and Development**

Project Title

Production statistic control

17

Brief description

Goal is to research production processes and develop a live production parameters capture system. Activities are split in to sub goals. Investigate how production processes can be measured and what type of sensors can be used for it.

For example, we have a standalone offline braiding machine, how can we measure if it is working, is it working on a product or was there an error? What sensors can be used to measure it, mechanical button, infrared, RFID?

Desired output: List of process steps, with list of parameters that could be captured, list of sensors and capture method for each parameter.

Investigate and come up with a detailed proposal how the data from the sensors can be collected, stored and communicated to other systems.

Desired output: List of modules for each process step with SW. Proposed SW for data storage, network map and proposed API.

Create maintenance and expansion plan for the proposed system. If Arduino will be used, what images should be used and where they should be stored.

Desired output: Maintenance map, what modules need to be checked when and for what? Module images database.

Project Specialisation

Research, Electronic design (Preferably something simple like Arduino), Automation mechatronics, Database design, Network design.

Project Skills

Electronic module use and programming. AVR, Arduino, other. Software programming. SQL not mandatory but would be an advantage. Industry 4.0. self controlling algorithms.

Project Environment

Arduino, Xbee, Windows scripting, Python or Java, SQL.

Research

Goal is to research production processes and develop a live production parameters capture system.

Project Category

Research and Development

Project Title

Sentiment Analysis of Social Media

18

Brief description

To assess sentiment on specific topics based on analysis of social media feeds.

This project will further expand on a study conducted in 2021 to assess sentiment for a local government area. Tweets were characterized on a 5-step scale ranging from very negative to very positive by comparison to a lexicon.

This project will comprise:

Investigation of which social media platform to focus on (eg Facebook, Instagram, Twitter)

Assessment of approaches for analysing social media data

Development of analysis and presentation tool using Python or RStudio

Deployment of sentiment analysis system on internet

Application of system for sample local or national issues

Writing report and developing presentation

Project Specialisation

Research, Data Mining, Machine Learning, Natural Language Processing, Sentiment Analysis

Project Skills

Software Programming, API usage, database

Project Environment

Windows, Python, R Studio, R, Data Mining Tools

Research

See papers cited below

Project Category

Research and Development

Project Title

Smart kerbside parking app for loading zone utilisation

19

Brief description

Lack of available loading zones causes difficulties for vehicles deliveries and has an adverse impact on traffic congestion due to double parking or cruising for parking. In addition, according to Victoria Rules, the parking loading zone cannot be exceeded. Enforcement of this law requires frequent checking at all demanding loading zones, which is costly and impractical. Therefore, developing an app-based platform is needed to manage selective loading zones.

This project aims to provide a platform that offers parking demand management for authorised vehicles to use the loading zone efficiently.

Project benefits: - Drivers can find location loading zones near deliveries. The app-based platform can avoid the underutilisation of certain car parks and overcrowding in other areas.

- Based on historical and on-demand data, parking duration limits varies over time
- Enforcement of parking regulation without requiring additional resources
- Recording deliveries data in a Cloud dashboard to be used for freight and transport planning purposes,

Project Specialisation

Mobile Application Design (Android) Database Design

Project Skills

Experience developing Android apps Experience with PostgreSQL and other database technologies

Project Environment

Android, SQL

Research

Review the similar applications available in the market

Project Category

Research and Development

Project Title

Smart Mailbox

20

Brief description

Covid 19 has forced on us new ways of working. As a consequence many are working from home and intend to continue doing so. Another consequence is the up surge of on-line shopping plus increase demand on Courier services.

If we presume that parcel delivery to the home will increase in the future then we need to re-design the humble mailbox.

The new mailbox should now accommodate the ability of receiving and monitoring parcel deliveries without having to meet the courier at the door - much like traditional mail.

The new mailbox should allow delivery of the majority of parcels without meeting the courier at the door. It should inform the householder that a delivery has been made. It should allow multiple deliveries.

One possibility is a refrigerated mailbox for grocery deliveries. The functionality can be expended through further consultation.

Project Specialisation

IoT, Mechatronics, Wireless connectivity, Bluetooth, software programming, Mobile apps

Project Skills

project management, Software programming, interface design, Android and IOS

Project Environment

see above

Research

as required

Project Category

Research and Development

Project Title**Automated eForensic analysis system****21****Brief description**

Design an automated eForensics system that will conduct an eforensics analysis against a mounted drive (static analysis) and generate a report with the discovery of hidden, deleted, renamed, and/or carved files.

Project Specialisation

eForensics System analysis and design

Project Skills

eForensics, Software Programming, IT Security

Project Environment

Linux Programming language/s that has libraries or can be used to build all or one of the following (Probably Python):

- Mount a target external drive
- Create a MD5 hash of the drive
- Scan for any file irregularities such as hidden, deleted, renamed or carved files

Research**Project Category****Software Development**

Project Title**Bike Hiring System****Brief description**

This project is an assignment submission system for report. It will look at assignment and conduct required analysis.

Research:

Prepare a research report for each the following (with references)

Content Management System - features Webhosting and Domain - costing and support

Must enable the client to make an informed decision on what platform to use and where to host the solution

Implementation:

Build a web-based prototype

Build the bike hiring web application

Perform the following function

Provide tourist information of Inverloch

Provide an admin system to manage bike inventory

Provide a booking system

Final Report:

Prepare at least a 1-page report for each of the following

User guide on the administration of the web application

Technical documentation if the web application is to further improve'

Project Specialisation

Database design, web development, WordPress

Project Skills

The skills that will be needed or required by the students is the knowledge of database (SQL), software development and documentation.

Project Environment

Backend – MySQL Frontend – Relevant technology

Research

Students will have the opportunity to research on the web hosting costing and functionality.

Project Category**Software Development**

Project Title

CLOCS-A Journey Location Identifier

23

Brief description

If CLOCS-A accredited trucks can have a secure app for identifying where they are located at any time and raise alerts if they deviate from agreed paths this will provide confidence to the community, major projects and contractors with regards to safe freight.

- Develop app which is secure and identify location of a truck
- Each truck must have its own identifying code aligned with the truck
- The app identifier can be seamlessly check when entering and leaving sites.
- App can have an approved journey plan entered which can be updated as required and safely alert the driver of changes.
- Driver logs on whilst stationary at the start and during each load/unload
- Trucks deviating from agreed route raises alert – driver is able to provide notes for reasoning and alert goes to sub-contractor

Project Specialisation

Project Skills

Software Engineering, Data Science, Machine Learning, Android/iOS app development

Project Environment

Research

Project Category

Software Development

Project Title**Cross Platform Desktop App****Brief description**

This project is a cross platform desktop system that manages basic database operations using the Electron Framework.

Research:

Prepare a research report for each the following (with references)

Development and deployment environment

Libraries required to deploy the system

Implementation:

Build a cross platform desktop application

Build a desktop application with the following functionalities

Master file management

Master-Detail transaction management

PDF Report Generator

Excel File Export

Build a database

Provide a setting option for system data management

Final Report: Prepare at least a 1-page report for each of the following Technical report for developer to continue the project)

Project Specialisation

Database design, web development, basic NLP

Project Skills

The skills that will be needed or required by the students is the knowledge of database (SQL), software development and documentation.

Project Environment

Backend – MySQL Frontend – Electron Framework

Research

Students will have the opportunity to research on a cross platform framework

Project Category**Software Development**

Project Title**Develop AI prototype into a commercial product****25****Brief description**

In 2021 we finalised the AI project with the Swinburne team.

Now Vidversity is working on the UI/UX and the integration of the prototype in order to make a commercial product for sale.

This involves developing a new UI to incorporate the AI and then delivering to current and new clients.

Project Specialisation

The students would be able to assist with: Research, Dev Opps, Integration with AWS , Helping knit together the UI using java script

Project Skills

Business Analysis and research, UI/UX, Dev Ops, AWS, Video editing in the cloud

Project Environment

Android , IOS, Java Script, Angular JS, View JS, HTML

Research

The use of AI to assist teachers.

Project Category**Software Development**

Project Title**Developing an online platform for conference management based on Web and APP****26****Brief description**

Every year, the lab will hold several international conferences in Melbourne, which attract many researchers from all over the world to share their recent outcomes and ideas.

In order to better manage the conferences as well as their submission of researchers' papers, the lab initialises a demand for web and app management of the conference, including paper submission and reviewing process.

Project Specialisation

App design; SQL; Web Development and Design.

Project Skills

Software development; Web development.

Project Environment

SQL; Web; APP design

Research

Research on software development.

Project Category**Software Development**

Project Title**Developing blockchain-based platform for asset insurance reporting****27****Brief description**

Every year, there are many assets reported for insurance claims. At this moment, insurance companies highly rely on labour to check and collect asset information, and then upload them into the system.

In this project, we are going to develop an online platform based on blockchain, which can be used to accomodate the asset information from customers.

In addition, Our staff can easily use a mobile phone with camera to upload the photos into the blockchain.

The information collection will be based on AI techniques such as automatic object recognistion and classification.

Project Specialisation

APP Development & Web Design; blockchain development; AI

Project Skills

Web Development; Software Programming. Experience/Knowledge of blockchain and AI will be better.

Project Environment

Blockchain, Android, HTML

Research

AI for Object recognistion and classification

Project Category**Software Development**

Project Title

Document Submission System

28

Brief description

This project is an assignment submission system for report. It will look at assignment and conduct required analysis.

Research:

next 3 week

Prepare a research report for each the following (with references)

Current state of contracting cheating

Definition and metrics of plagiarism and contract cheating

Describe how you search for these information

Implementation:

Build a web-based prototype

Build an assignment submission web application

Perform the following analysis on the submitted assignment

During submission

Generate at least 5 multiple choice questions with answers from the submitted code

Present these questions to the student for the student to complete the submission

Keep the question, answer and result in a table

After submission

Perform a web search in the submitted solution against posted in the assignment help or code repository website

Generate analysis report such as reference summary, sentiment analysis

Update table with the status

Send a notification email containing the questions and answers to convenor

Provide an admin to manage the data in the web application

Final Report:

Prepare at least a 1-page report for each of the following Architecture of the implemented system

Sample output with screenshot and explanation

Discussion of the results of the tool

User feedback (if time permits)

Project Specialisation

Database design, web development, basic NLP

Project Skills

The skills that will be needed or required by the students is the knowledge of database (SQL), software development and documentation.

Project Environment

Backend – MySQL Frontend – Relevant technology

Research

Students will have the opportunity to research on the issue of contract cheating.

Project Category

Software Development

Project Title**Dynamic (Web) application security scanning tool****29****Brief description**

Design and create an automated application that can crawl and scan/test for common web security vulnerabilities of a live website and generate a security vulnerability report for the user.

Project Specialisation

Application development, Scripting/coding, Systems Analysis & Design, Web vulnerability analysis

Project Skills

IT Security, Software Programming

Project Environment

Programming language/s that can do all or one of the following (Probably Python due to the extensive libraries): • Access, crawl and interact with web pages • Create an interface to allow for setting configuration (or CLI or settings configuration file to configure scan/attack parameters • Conduct automated security attacks/tests on the crawled target site map Linux

Research**Project Category****Software Development**

Project Title

Gamification of Parcel Delivery Routing Optimisation**30****Brief description**

Solving complex routing problems is a key skill needed by supply chain professionals, and methods of teaching these skills involve several theory and mathematical evaluation on top of practical implementation.

Such problems involve understanding various contextual parameters, including time-windows, capacity limitations, customer satisfaction and resource optimisation.

Traditional approaches for instruction of such problems typically involves paper-based and desktop techniques, lacking the authentic experience and engagement. Hence, an interactive digital platform would be extremely useful to instruct routing problems in a more practical, authentic and engaging fashion.

To help nurture problem-solving experience, this project aims to develop an educational game for students studying transport, logistics and supply chain management of all ages to physically enact transport routing problems using mobile technology.

Specifically, this project will develop a mobile/web-based application to implement a physical game of parcel delivery.

By developing a digital educational game, students of varying ages can be exposed to the field of logistics management, while not requiring in-depth knowledge or mathematical experience. By packaging the solution in a mobile form, the possible target audience dramatically increases without relying on expensive hardware implementations.

The basic principles of the game consist of several delivery/pickup locations denoted by physical locations around an area such as a university or school campus.

A list of required tasks is presented to the participants who are required to fulfil all tasks in the most efficient way possible. Each action is recorded by the participants devices through both collecting and travelling with NFC/RFID tags, and scanning QR codes.

Project Specialisation

- Mobile application capable of communicating with the cloud game management software
- Cloud-based game management software
- Implementation of base game functionality

Project Skills**Project Environment**

- Mobile application development:
- Android/iOS development (React Native, Swift, Kotlin, Flutter, etc.)
- Basic web/backend/database skills with technologies such as:
- JavaScript/Typescript, NodeJS, Go, SQL
- Frontend development skills such as:
- React, Angular, Vue, JavaScript, HTML

Research**Project Category****Software Development**

Project Title

Grammar and Linguistic Search Engine for Academics

31

Brief description

As a non-native speaker writing in English, one encounters many problems. Doubts concerning the usage of a preposition, the mandatory presence of a determiner, the correctness of the association of a verb with an object, or the need for synonyms of a term in a given context are issues that arise frequently.

Printed collocation dictionaries and reference tools based on compiled corpora offer limited coverage of word usage while knowledge of collocations is vital to acquire a good level of linguistic competency.

We propose to address these limitations with a comprehensive system aimed at helping the learners “know a word by the company it keeps”.

The system based on a large-scale dataset of academic papers (to be collected by the students) is designed to be a broad coverage language reference tool for researchers to write research articles in English.

It is conceived to search information related to word usage in context under various conditions. The syntax of queries involves basic regular expression of keywords enriched with wildcard PoS and synonyms.

Project Specialisation

Web Development & Design; Database Design; Information Retrieval; Natural Language Processing

Project Skills

Web Development; Software Programming. Experience/Knowledge of Natural Language Processing techniques is a plus.

Project Environment

Linux; Apache; MySQL; PHP/Python

Research

Natural Language Processing (N-Gram, LDA).

Project Category

Software Development

Project Title**Integration of SQL and python in managing workflow and information in an office environment****32****Brief description**

Information within an office environment is typically a time-consuming task that relies on sole individuals manually review and assessing from the ground up. This results in poor knowledge sharing and high redundancy.

The adoption of databases to manage common data and knowledge in a work environment could be a solution but has a high barrier of entry.

What can be done in lowering the accessibility and development of a system for broader use/appeal? Given current tools and database platforms (eg SQL or other) what can be applied in managing documents and any relationships with respect to topics? Can these be readily adopted without much cost imposition if at all and why not? Can the system be agnostic enough to be able to handle multiple inputs of varying compatibility and be capable of exporting the data back in the right format? Eg. Construction audit reports for projects include written assessment, actions and photos.

These components entering the database have to be able to be called up separately and as a whole for various purposes. Photos for example could be tagged and brought up in a separate discussion on a design component

What can be done to ensure that the system is maintainable on a day-to-day basis without requiring high level database expertise?

Project Specialisation

Database Design

Project Skills

Systems analysis, software programming, business intelligence

Project Environment

Android, IOS, Python??, SQL

Research**Project Category****Software Development**

Project Title

In-truck Condition Monitoring Platform (InTruck)

33

Brief description

Certain goods require more visibility along their freight journey. In this context, environmental conditions of a truck loading space are difficult to monitor, due to truck ownership differences and data integration complexities.

Certain goods require standards of transport to be met, and lack of compliance can cause major problems for the products and companies involved. The majority of small to medium transport and logistics companies are unable to facilitate item-level tracking due to variance in truck contents, and cost overheads.

To improve supply chain visibility in situations where there is a lack of accessibility to tracking of specific items of freight, this project aims to develop a truck-level condition monitoring solutions that is accessible and cost effective for small to medium sized transport operators with diverse fleet characteristics.

More specifically, this project will develop the required hardware and software systems that will be used to monitor the environmental conditions inside a truck loading space. Furthermore, the solution could potentially provide greater visibility to the shipping journey.

Project Specialisation

- Hardware solution, consisting of sensors, microprocessor, power management, and mobile communications (LTE-based).
- Web-based portal for displaying captured information
- Optional: integration to a mobile device using Bluetooth, to be used instead of LTE-based communications.

Project Skills

Software Programming

Project Environment

- Basic hardware development such as: • Raspberry Pi, Arduino, I2C communication, LTE, Electronics
- Programming skills in any common systems programming language: • C/C++, Python, Rust
- Basic web/backend/database skills with technologies such as: • JavaScript/TypeScript, NodeJS, Go, SQL

Research

Project Category

Software Development

Project Title

Project Chroma

34

Brief description

Old approach to tech hiring and onboarding is broken.

We are going to fix it by pairing training with a powerful network of technology companies, 1:1 career coaching, and automated job search systems.

We will be building on the belief that mindful, nurtured candidate relationships and assessments make for stronger long-term hires.

The connections we make possible for our clients aren't luck — they're based on a deep understanding of people's needs, and a compassionate, honest understanding of both the candidate and the company.

We identify the candidates who can lead and support their teams towards greater collaboration, performance and resilience.

Project Specialisation

Mobile App development, React Native, Web dev (Admin dashboard), React

Project Skills

Software Programming

Project Environment

iOS, Android, Web, React Native, ReactJS

Research

N/A

Project Category

Software Development

Project Title

Project MicroRaptor

35

Brief description

MicroRaptor is an investment portal that connects early-stage companies and small businesses to the capital they need to grow through the crowd's contributions.

With MicroRaptor , private companies of all industries can raise up to 1.5MM, and turn their communities into investors with a minimum investment of \$100 AUD.

Project Specialisation

Mobile App development, React Native, Web development, React

Project Skills

Software Programming

Project Environment

iOS, Android, Web, React Native, ReactJS

Research

N/A

Project Category

Software Development

Project Title**Radzen rapid web application replacement****36****Brief description**

We currently have an in production application based on C# .net Core EF back end with a React JS frontend.

We have identified that maintaining this moving forward is limiting and requires uplift / replacement.

We have investigated modern web assembly products and are undertaking an uplift to replace existing application and features with a complete Radzen build which will include UI, backend event based microservices in a multi-tenant configuration.

Project Specialisation

This is a Web based application development project There are a small number of custom components which will be required to be built We use Microsoft Azure services for CI/CD and event based microservices

Project Skills

Rapid Application Design - Radzen Front end / back end Software Programming – C#
Data Analytics – SQL Server Azure Service bus console applications – C#

Project Environment

Radzen, Web Assembly, C#, Console Application Development, Azure Dev Ops

Research

Design / Build / Deployment of custom UI components into Rapid Application
Development environment Radzen
Use of custom UI components in a customer facing application

Project Category**Software Development**

Project Title**Real-time water monitoring system****37****Brief description**

We currently have a home-built prototype that works by streaming data wirelessly via Bluetooth.

The objective is to turn the system in an online version via wifi, and offering the option of monitoring via an app.

The prototype has 5 sensors connected to an Arduino board and there is a need to reprogram to make the system go live. (As a chemist, I have limited knowledge in IoT so I may not be using proper terminologies)

Project Specialisation

Research, Mobile application, telecommunications, wi-fi, real-time data

Project Skills**Project Environment****Research**

Environmental monitoring, IoT for environment

Project Category**Software Development**

Project Title**Service Mesh Microservice Simulator****38****Brief description**

In this project you will develop a server-side application that behaves badly!

The application will simulate of microservices that have variable performance and reliability.

The client for this project wants to use this simulator to train self-adaptive software systems with AI to become more resilient against failures and attacks.

To develop this simulator the team will be using cutting edge service mesh technologies running on containers.

You will be learning and working with a range of technologies that are becoming central to modern software development practices in industry. These technologies include platforms such as Docker, Dapr, Istio and Kubernetes.

Project Specialisation

Web service application development; Message and event driven software architectures; Database Research;

Project Skills

Project members will: be familiar with client-server architectures be enthusiastic about learning new programming platforms have good programming skills in at least one language such Python, Javascript, Java, Go, etc. We are also looking for team members who can bring a range of complementary knowledge/skills to the project. These might include familiarity with one or more of the following: Linux Docker containers Kubernetes Cloud computing architectures and RESTful webservices No SQL databases Developing web apps Writing clear documentation

Project Environment

The development environment (Linux | Windows) and programming language(s) to be used will depend on the existing skills on the team members and will be chosen in consultation with the Project Supervisors.

Research

The team will need to familiarise themselves with using emerging web service platforms for distributed computing.

Project Category**Software Development**

Project Title

Student Flashcards

39

Brief description

The project is to build an API for Canvas that automatically generates a page containing a H5P flashcard deck of student images for each Section in Canvas.

These flashcards enable instructors to learn student names prior to meeting them which improves student engagement, sense of belonging and learning.

A complete and successful project has the potential to impact all Swinburne students. Moreover such API's can find markets beyond Swinburne.

API - Application Programming Interface is a software intermediary that allows two applications to talk to each other.

Canvas – the learning management system that Swinburne operates.

H5P is a free and open-source content collaboration framework based on JavaScript.

Section – these are individual class lists for activities such as Tutorials, Workshops, Laboratories.

Project Specialisation

Application Development

Project Skills

Project Management; Software Programming

Project Environment

Java

Research

STEM education : <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5332051/> Ed Tech

Project Category

Software Development

Project Title**Ultrafast Micro-Spectroscopy Experiment Control Software Suite Standardisation****40****Brief description**

The Ultrafast Micro-Spectroscopy facility performs physics research at Swinburne's Hawthorn campus.

To perform these measurements a suite of software is used to control devices (lasers, motorized stages, shutters, etc.), acquire data (using CCD cameras, spectrometers, etc), and to perform routine analysis of incoming data on the fly.

These experiments are split across several research labs, which perform similar tasks using similar equipment. Devices performing similar functions are often interchanged between experiments, leading to software incompatibility and delays in modifying the software.

The goal of this project is to standardize the user experience across the labs and enable seamless switching of devices into and out of measurement software as needed. Programming language will be Labview (or possibly Python)

Project Specialisation

Device control Data acquisition and management Computing for Academic Research

Project Skills

Project management, Software programming, Ideally some experience with LabView, interfacing with external devices

Project Environment

Labview (or possibly Python) Lab computers are running on windows.

Research**Project Category****Software Development**

Project Title	Web application firewall and simple intrusion detection system	41
Brief description	Design a portable web application firewall and simple intrusion detection system that can protect a standalone web server.	
Project Specialisation	Network Design and Security, Web application security	
Project Skills	IT Security, Software Programming	
Project Environment	Linux Programming language/s that has libraries or can be used to build all or one of the following (Probably Python): • Read traffic packets • Analyse HTTP requests • Drop traffic requests • Forward network traffic to different ports • Analyse server access logs • Prevent web server access from malicious IP addresses • Raise alerts when malicious threat actors are found on the server	
Research	N/A	
Project Category	Software Development	

Project Title

Web-RTC based telehealth platform

42

Brief description

The COVID-19 global pandemic has challenged modern society, including the healthcare industry. "Telehealth" becomes a usual way of people seeing GPs/specialists. However, approximately 90% of all telehealth consultations are simply phone calls. Therefore, a future telehealth system is demanded to assist better remote care.

Though remote consultation brings lots of inconveniences compared with face-to-face consultation, it eases the access to the technology that could bring better experiences in the consultation, for example, using deep learning-enabled techniques to assist in the scenarios such as: patients may not understand some medical terminologies that bring up by the clinician; non-native speakers may sometimes not understand the clinician; clinicians may take too much time file (by typing) the diagnosis and issue the prescription.

Therefore, we propose a WebRTC-based remote consultation platform, which has the following capabilities: basic video, audio, and data channel communication; real time medical devices data sharing; real time speech recognition; real time explanation of terminologies, etc.

Project Specialisation

Web Development & Design; Database Design; Information Retrieval; Application Development

Project Skills

Front-end and Back-end Web Development; Software Programming

Project Environment

Linux; Web-RTC; JavaScript; NodeJS; React

Research

The project involves using Natural Language Processing techniques to generate/summarize the explanations of medical terminologies.

Project Category

Software Development

Project Title**Ephemeral secrets sharing website****43****Brief description**

A secret sharing website that can be deployed through Docker that stores and provides passwords that can only be viewed once within a specified period of time before the URL and the passwords are destroyed from the web application and database.

Project Specialisation

Web development and design, Website security, Containers, Possible Linux

Project Skills

Web development, IT Security

Project Environment

HTML; CSS; JS; Ephemeral database i.e. Redis Possible Linux Docker/Containerisation software Encryption programming language (depends on the encryption packages that are used i.e. Python, Ruby etc)

Research**Project Category****Web Development**
