



6G5Z1108

# Professional Development

## Project Options

Computer Science

Software Engineering

Computing



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## Tournament Organisation Tool(s)

<b>Project Description</b>	<p>Tournaments are a popular technique for determining a ‘best’ amongst a population – whether that’s a sporting competition, playing a competitive board/card game, or comparing the popularity of different tools.</p> <p>Running a tournament requires a certain level of organisation, and there are many things to consider: Registering participants for entry, how the ‘matches’ will be played, how the tournament will be structured, and reporting the outcome of individual matches before identifying a winner (and any runner-ups as necessary).</p> <p>Many tournament organisers use software tools to facilitate the smooth operation of a tournament, ensuring that match-ups are randomised and fair, that participants can report the outcomes of their matches, and to share information about their tournament more widely.</p> <p>The aim of this project is to research existing tournament organisation tools, learn more about the different methods and strategies for organising tournaments, and develop a software tool – or set of tools – that helps a tournament organiser facilitate such an event.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• <b>Tournament Scheduler:</b> <a href="https://tournamentscheduler.net/">https://tournamentscheduler.net/</a></li> <li>• <b>Challonge:</b> <a href="https://challonge.com/">https://challonge.com/</a></li> <li>• <b>Toornament:</b> <a href="https://www.toornament.com/">https://www.toornament.com/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A software tool – either an executable, a website, or a mobile app – or set of tools which can be used to facilitate the organisation of a tournament.</p>

## Point of Sale Software

<b>Project Description</b>	<p>The electronic cash register revolutionised the way shopping works, and over time, has been iterated on and refined in many ways. We are now at the point where electronic point of sale devices come in a variety of sizes, shapes, and offer a diverse range of functionality - for example, consider the POS devices at the Apple store (which are really just iPhones running custom software/firmware), and those in your favourite bar.</p> <p>The best POS devices are tailored specifically to the service they are providing, though this is usually a costly endeavour, and most outlets use a customised version of an existing package, rather than a bespoke piece of software.</p> <p>Your task is to identify the core features required of point of sale software and investigate how this can be implemented. As a minimum, you should make something which can complete transactions (either by manual input of items, or automatic identification - barcode scanning, for example), provide a receipt/invoice (perhaps as a PDF?) and complete an 'end of day' process.</p> <p>Your software could be aimed at an ecommerce venture, e.g. a POS for a digital store, or a brick-and-mortar establishment which may use more traditional cash register hardware.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• <b>Square Point of Sale:</b> <a href="https://squareup.com/gb/en/point-of-sale">https://squareup.com/gb/en/point-of-sale</a></li> <li>• <b>Loyverse:</b> <a href="https://loyverse.com/">https://loyverse.com/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A point of sale system that facilitates the transaction of goods. This could be a piece of software intended to operate as a Mobile POS (e.g. a phone app), an online system for a web store, or a desktop app for a physical cash register.</p>

## ‘Odd One Out’ Game

<b>Project Description</b>	<p>A popular example of the ‘odd one out’ game is Out of the Loop [ <a href="#">iOS</a>, <a href="#">Android</a> ]. This is one example of many - there are similar games, like Spyfall and The Chameleon, where the core mechanic is identifying which member of a group is missing key information. These games are fantastic for icebreakers, teambuilding, and helping to learn people's names – but can also have limitations – for example, Out of the Loop only offers you the ‘food’ package for free, and many of the foods are a bit... well, American! What even is Jello?!</p> <p>The objective of this project is to create a new game, centred around the core mechanic of ‘odd one out’. You should think about making sure that it's engaging, but also making sure that it's free, easy to play, and achieves the goal of helping people get to know each other in the same way.</p> <p>Ideally, the game should be cross-platform, accessible and - crucially - either contain a broad set of words/phrases/icons/images, or allow the end user(s) to customise the game so that it suits them.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• <b>Out of the Loop:</b> <a href="#">iOS</a>, <a href="#">Android</a></li> <li>• <b>Spyfall:</b> <a href="https://www.spyfall.app/">https://www.spyfall.app/</a></li> <li>• <b>The Chameleon:</b> <a href="https://bigpotato.com/gb/games/the-chameleon/">https://bigpotato.com/gb/games/the-chameleon/</a> (not digital)</li> </ul>
<b>Expected Deliverables</b>	<p>A piece of software – either a desktop app, a website, or a mobile app – which facilitates the playing of an ‘odd one out’ game for multiple players. This could be local, i.e. everyone sits together and plays using one copy of the game, or networked, i.e. everyone joins separately and the game helps to facilitate communication.</p>

## Movie Database Presentation Tool

<b>Project Description</b>	<p>The aim of the project is design and develop a database driven tool that will allow users to look up information about movies including their title, overview, genre, release date, runtime, budget, revenue generated. Information about the films' cast and crew should also be available. The tool should allow the user to filter the displayed information based on the above information.</p> <p>A freely available dataset (available at: <a href="https://www.kaggle.com/rounakbanik/the-movies-dataset">https://www.kaggle.com/rounakbanik/the-movies-dataset</a>) can be used to acquire the raw data. You will need to examine this dataset and create a suitable database in order to import and store this data. You will need to decide if a relational database management system (e.g. MySQL or Oracle) or a NoSQL system (such as MongoDB) will be the most appropriate type of database. If a relational database is chosen, an Entity Relationship Diagram (ERD) should be produced to document this design. Note that the data may need to be cleaned or manipulated to make it suitable for your design.</p> <p>You will then develop a web-based front-end in the language(s) of your choice that will allow users to browse this data in a user-friendly manner and satisfy the requirements below.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• <b>IMDb:</b> <a href="https://www.imdb.com/">https://www.imdb.com/</a></li> <li>• <b>The Movie Database:</b> <a href="https://www.themoviedb.org/">https://www.themoviedb.org/</a></li> <li>• <b>Rotten Tomatoes:</b> <a href="https://www.rottentomatoes.com/">https://www.rottentomatoes.com/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A piece of software – either a website, or a mobile app – which allows users to:</p> <ul style="list-style-type: none"> <li>• Browse information on movies and be able to filter the data to show:</li> <li>• Films falling into one or more selected genres (e.g. 'Action' and 'Adventure').</li> <li>• Films released in selected years.</li> <li>• Films with a budget within a selected range</li> <li>• Films which generated revenue within a selected range</li> <li>• Films starring selected actors</li> <li>• Films directed by a selected director</li> <li>• Search for a specific film title, actor or director.</li> </ul> <p><b>Additional Requirements</b></p> <p>The information should be presented as clearly as possible, so the use of drop-down/expanding sections could be considered.</p> <p>The performance of the system should be considered and the data transfer between the front-end interface and back-end database should be as efficient as possible. Only sending data that is required and/or minimising the number database queries should be considered during the design and development.</p>

## Friend Finding App

<b>Project Description</b>	<p>Social isolation is a concern for many, and this has been greatly exacerbated by the ongoing pandemic. Meeting others with similar interests is surprisingly tricky in the modern era, especially if you are not already an active member of clubs or societies related to your interests.</p> <p>One way in which technology has attempted to alleviate the concerns of social isolation is the introduction of friend finding apps. These apps range from apps which allow for brief periods of contact in times of panic or peril with a semi-stranger, to apps which identified local meetups and hobbyist groups based on an individual's interests.</p> <p>Through this project, you will be required to investigate the moral and ethical considerations of a friend finding app, plus consider the legal responsibilities of an app which can put people in contact with each other. You may also choose to investigate additional features such as a match-making algorithm or advertisement services (e.g. for hobbyist groups).</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"><li>• <b>Meetup:</b> <a href="https://www.meetup.com/">https://www.meetup.com/</a></li><li>• <b>Nextdoor:</b> <a href="https://nextdoor.com/find-neighborhood/">https://nextdoor.com/find-neighborhood/</a></li><li>• <b>Friender:</b> <a href="https://frienderapp.com/">https://frienderapp.com/</a></li><li>• <b>Meet My Dog:</b> <a href="https://meetmydogapp.com/">https://meetmydogapp.com/</a></li></ul>
<b>Expected Deliverables</b>	A piece of software – most likely either a website, or a mobile – which offers individuals the opportunity to identify potential sources of social contact with others.

## Discord/Twitch Bot

<b>Project Description</b>	<p>Online communities, such as those that form on Discord or Twitch, often require a range of automated functionality to facilitate meaningful interaction. For example, many Discord servers use moderation bots to ensure that language used is appropriate, and Twitch moderation restricts the pasting of links to reduce audience advertisement (and in an effort to defeat spambots from tricking unsuspecting people into clicking dangerous links).</p> <p>Bots also offer opportunities to add additional functionality to these existing apps. For example, some Twitch communities use bots to facilitate small mini-games (slots, for example), and some Discord communities use bots to facilitate the hosting of radio stations connected to YouTube.</p> <p>Your task for this project is to scope out and identify a useful bot that doesn't currently exist (or, at least, for which the existing bots are lacking an important feature) and implement the bot. You will need to carry out appropriate testing and implementation.</p> <p>Both platforms offer libraries and APIs, and so there's a wide choice of implementation languages, and bots can be hosted freely/cheaply on a Raspberry Pi, Heroku, or a free Amazon Web Services account.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• <b>Nightbot:</b> <a href="https://nightbot.tv/">https://nightbot.tv/</a></li> <li>• <b>Stream Elements:</b> <a href="https://streamelements.com/">https://streamelements.com/</a></li> <li>• <b>carl.gg:</b> <a href="https://carl.gg/">https://carl.gg/</a></li> <li>• <b>Dyno:</b> <a href="https://dyno.gg/">https://dyno.gg/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A piece of software, or collection of scripts, that facilitate the hosting of a bot which works through Discord or Twitch. For basic functionality, you might hard-code this to join a specific Discord server/channel, or Twitch chat, but a more advanced project might want to investigate how to implement a front-end offering users the opportunity to add/remove the bot from their server.</p>



## COVID-19 Information Dashboard

<b>Project Description</b>	<p>During the pandemic, it has been most governments' intentions to ensure that the latest data and statistics are publicly available, to help the general public understand both the severity of the current situation, and also to monitor the current status of the pandemic, e.g. in their local area.</p> <p>To facilitate this process, a number of agencies have established comprehensive APIs to obtain up-to-date statistics on the pandemic. For example, the UK Government provides an API for downloading comprehensive and detailed Coronavirus statistics, <a href="https://coronavirus.data.gov.uk/">https://coronavirus.data.gov.uk/</a>, as well as providing summarised data in the form of an information dashboard.</p> <p>The objective of this project is to research information display and prepare a COVID-19 information dashboard which presents key information on the pandemic. You may wish to add functionality to allow the end-user to customise the way this data is displayed, or to edit which elements of data are shown, or – for example – to adapt and change search ranges.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• UK Government Coronavirus Dashboard: <a href="https://coronavirus.data.gov.uk/">https://coronavirus.data.gov.uk/</a></li> <li>• COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at John Hopkins University (JHU): <a href="https://www.arcgis.com/apps/opsdashboard/index.html">https://www.arcgis.com/apps/opsdashboard/index.html</a></li> <li>• World Health Organisation (COVID-19) Dashboard: <a href="https://covid19.who.int/">https://covid19.who.int/</a></li> </ul>
<b>Expected Deliverables</b>	A website or app which offers users insight into a subset of the Coronavirus dataset from a recognised source (e.g. the UK Government's API).

## Tabletop Game Companion

<b>Project Description</b>	<p>Tabletop games have seen a recent resurgence in popularity, and many families and friendship groups have been discovering tabletop games (or 'board games') beyond the usual games of Monopoly. As these games continue to innovate, many incorporate the use of a digital companion, which offers many advantages such as:</p> <ul style="list-style-type: none"> <li>• Introduction the game and demonstrating how to play</li> <li>• Facilitating a game that requires a moderator</li> <li>• Offering variants where the player(s) play 'against' the companion</li> <li>• Augmenting the game with digital elements</li> <li>• Adding opportunities for augmented/mixed reality</li> </ul> <p>The objective of this project is to identify an existing tabletop game which could be augmented with the introduction of a digital companion. You will need to research existing companion apps to identify their common usages, and the strategies for incorporating them within the game, and develop a suitable website or app which either simplifies the process of playing the game or facilitates some additional gameplay functionality.</p> <p>An ambitious team may choose to use this opportunity to develop a tabletop game of their own design, which interacts dynamically with the supplied digital companion.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• One Night Ultimate Werewolf moderator: [ <a href="#">iOS</a>, <a href="#">Android</a> ]</li> <li>• Gloomhaven Campaign Tracker: [ <a href="#">iOS</a>, <a href="#">Android</a> ]</li> <li>• XCOM: The Board Game: <a href="https://boardgamegeek.com/boardgame/163602/xcom-board-game">https://boardgamegeek.com/boardgame/163602/xcom-board-game</a></li> <li>• Beasts of Balance: <a href="https://boardgamegeek.com/boardgame/185709/beasts-balance">https://boardgamegeek.com/boardgame/185709/beasts-balance</a></li> </ul>
<b>Expected Deliverables</b>	A desktop executable, website or mobile app which acts as a digital companion for either an existing, or a newly designed, tabletop game.

## Restful Sleep Tracker

<b>Project Description</b>	<p>Routine is a key element of ensuring that you have a restful night's sleep. A regular bedtime, and waking time, ensures that your body is able to follow appropriate cues and wind down accordingly. Many technological solutions are aimed at helping people get better sleep – think about the 'night time' settings on your monitors or phones, for example.</p> <p>A key element in the arsenal for improving sleep is the tracker. At its most basic level, a sleep tracker can manually track key points of data about sleep: The time a person goes to bed, when they rise, and how they feel upon awakening. At a more advanced level, some sleep trackers have built-in functionality to automatically track various data: Activity during sleep hours, sounds during sleep, etc.</p> <p>The objective of this project is to research existing sleep tracker apps, and to investigate the literature and theory on sleep tracking to implement your own version of a sleep tracker. This might be a website, or more likely a mobile app, which encourages regular tracking. You may wish to research and incorporate aspects of gamification, rewarding the user for engaging with a regular nighttime ritual, for example.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• SleepCycle: <a href="https://www.sleepcycle.com/">https://www.sleepcycle.com/</a></li> <li>• iOS Sleep Schedules: <a href="https://support.apple.com/en-gb/guide/iphone/iph2d7daf6fc/ios">https://support.apple.com/en-gb/guide/iphone/iph2d7daf6fc/ios</a></li> <li>• Sleep as Android: <a href="https://sites.google.com/site/sleepasandroid/">https://sites.google.com/site/sleepasandroid/</a></li> </ul>
<b>Expected Deliverables</b>	<p>Most likely a mobile app (though could also be a website or desktop app, but this would make it more difficult to incorporate automated tracking) which allows a user to track their sleeping habits. You could also investigate integrated hardware solutions and their connectivity to other devices (e.g. smart watches) if you have the hardware readily available.</p>

## Video Overlay Editor

<b>Project Description</b>	<p>Simple video editing is a powerful tool and can turn a simple video recorded by a mobile phone into an educational tool, something to commemorate a special memory, or to share jokes with friends. Overlays are a powerful way to watermark images, add branding, or obfuscate sensitive regions of a video.</p> <p>The objective of this project is to develop a simple video editor, specifically focusing on the ability to add an overlay to a video. For example, you might give the user a selection of stickers they can choose to add over the top of a video.</p> <p>A more advanced version of this project might start to explore customizable overlays, with different positions, customizable text, etc. And a more advanced version yet again might consider different overlays for different portions of the video, or the ability to crop/trim/cut segments of video.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• Kapwing: <a href="https://www.kapwing.com/tools/watermark-video">https://www.kapwing.com/tools/watermark-video</a></li> <li>• Video Watermark: <a href="#">Android</a></li> <li>• Adobe Spark: <a href="https://spark.adobe.com/make/video-maker/">https://spark.adobe.com/make/video-maker/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A desktop executable, website or mobile app which allows for users to edit existing videos, specifically to add an overlay. More ambitious teams may choose to add customisation to the overlays.</p>

## Greeting Card Maker

<b>Project Description</b>	<p>Online services to choose, create, and customise greetings card have revolutionised the way that people share greetings. They often offer users the opportunity to choose a design from a library, add their own text (and sometimes photos), before checking out, and having the card automatically printed and delivered to the recipient.</p> <p>The objective of this project is to develop a greeting card maker, which provides the functionality for creating and customising greetings cards for different occasions. You would not need to implement the functionality to print and deliver the cards, but would instead need to think about how to prepare the card in a printable format (e.g. PDF), and maybe facilitate the sending of ecards (e.g. through email).</p> <p>An ambitious team may consider adding functionality to the greeting card maker to allow a user to save particular designs, layouts and customisations, to re-open these to make further changes at a later date.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"><li>• Moonpig - <a href="https://www.moonpig.com/uk/">https://www.moonpig.com/uk/</a></li><li>• Funky Pigeon - <a href="https://www.funkypigeon.com/">https://www.funkypigeon.com/</a></li><li>• Thortful - <a href="https://www.thortful.com/">https://www.thortful.com/</a></li></ul>
<b>Expected Deliverables</b>	<p>A website or mobile app which allows for the customisation of greeting cards, which can then be saved to a printable format (e.g. PDF) or sent electronically (e.g. through email).</p>

## Activity Tracker

<b>Project Description</b>	<p>Fitness trackers, particularly those with external peripherals (such as smart watches) are attempting to revolutionise the way people engage with exercise. The idea behind an activity tracker is relatively simple: Encourage people to partake in exercise by tracking and plotting their engagement, building a routine, and trying to beat their own previous records.</p> <p>Some fitness trackers provide functionality oriented around recording activity, for example Strava is aimed very much at tracking runs and cycles and includes the ability to plot routes on a map.</p> <p>Other fitness trackers are aimed more at the gamification aspects, and encouraging people to participate in exercise, for example, Zombies Run! Encourages people to participate in exercise to experience an immersive story/podcast.</p> <p>Another type of fitness tracker provides direct guidance and communication with a user, offering a 'personal trainer' style experience. These apps have functionality such as establishing and recommend workout routines, having live/pre-recorded exercise classes, and may also include functionality to track calorie intake (and make meal plans).</p> <p>The objective of this project is to develop an activity tracker. The team will need to research what works in activity and fitness, learning about different strategies and approaches for recording, measuring, and increasing engagement with, activity, fitness and exercise.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• Strava - <a href="https://www.strava.com/">https://www.strava.com/</a></li> <li>• Zombies Run! - <a href="https://zombiesrungame.com/">https://zombiesrungame.com/</a></li> <li>• Google Fit – <a href="#">Android</a></li> </ul>
<b>Expected Deliverables</b>	<p>A website or mobile app which provides some activity tracker functionality. At its most basic, this would ask a user to manually record activities, such as exercise. A more advanced version of the project might look at any of the additional features of an activity tracker, such as automatically tracking activity based on the capabilities of a mobile device.</p>

## Children's Book Companion App

<b>Project Description</b>	<p>Reading with children is a crucial part of their development. Parents and carers often read with children to encourage linguistic development, to promote healthy curiosity and imagination, and to introduce different aspects of the world. As children grow, they begin to engage in the process more actively, attempting to share in the reading and to ask and answer questions. Many children's books facilitate this, for example, some books are tactile, encouraging children to interact with the pages, and some books have features such as lights and sounds.</p> <p>The objective of this project is to develop a children's book that is augmented via the use of a companion app. This companion app can interact with the children's book in many possible ways. For example, you might consider an app that provides a "read along", that provides additional information about the various pages, that brings the book to life using augmented/mixed reality, or which encourage the child to engage with the book without the aid of a parent or carer, for example through simple games.</p> <p>A team working on this project will need to explore the moral and ethical considerations of such an app, including any legal frameworks which the app may be governed by. They should also research the way that apps can be used in an educational context, particularly with young children.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• My Very Hungry Caterpillar: [ <a href="#">iOS</a>, <a href="#">Android</a> ]</li> <li>• Goodnight Lad: <a href="https://www.goodnightlad.com/">https://www.goodnightlad.com/</a></li> <li>• Little Magic Books: <a href="http://www.littlemagicbooks.com/">http://www.littlemagicbooks.com/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A mobile app which augments an original children's book. The method of augmentation is flexible and can be identified by the team but could include the facility to read-along with the book, or mixed/augmented reality features.</p>

## Carbon Footprint Calculator

<b>Project Description</b>	<p>Sustainability is a prevalent 21<sup>st</sup> century issue of great importance. There are myriad factors involved in thinking about a sustainable world, one of which is the carbon footprint of an individual.</p> <p>The objective of this project is to develop a website, or mobile phone app, which allows a user to estimate their carbon footprint. This is typically achieved by a user inputting certain details about their habits, e.g. how much they drive, and then extrapolating from this using an algorithm.</p> <p>A team working on this project will need to research carbon footprints, the contributing factors, and how they can be used to communicate to a user an estimated carbon footprint.</p> <p>An ambitious team may also consider implementing a carbon usage tracker, which allows a user to monitor their actual estimated carbon footprint over time. For example, it might allow them to log a specific journey, and identify patterns in their carbon usage to help reduce their average footprint.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• Carbon Footprint: <a href="https://www.carbonfootprint.com/calculator.aspx">https://www.carbonfootprint.com/calculator.aspx</a></li> <li>• WWF Environmental Footprint: <a href="https://footprint.wwf.org.uk/#/">https://footprint.wwf.org.uk/#/</a></li> <li>• Carbon Independent: <a href="https://www.carbonindependent.org/">https://www.carbonindependent.org/</a></li> </ul>
<b>Expected Deliverables</b>	<p>A website or mobile phone app which allows a user to estimate their carbon footprint usage. This could potentially also be a desktop app that has longer-term tracking built in, for example tracking the computer's usage, or allowing someone to keep a regular diary.</p>



## Digital Canvas

<b>Project Description</b>	<p>Computers have long facilitated the production of digital art, through a variety of different apps of differing complexities. Windows, for many versions now, has shipped with Paint as a simple example of an app which allows for basic drawing functionality, though many more complex examples exist.</p> <p>New hardware has enabled digital canvases to offer new functionality. Particularly, the introduction of digital tablets and touchscreen devices has increased the interest in a digital canvas, and offers the user the opportunity to recreate lifelike artworks through advanced features such as pressure sensitivity.</p> <p>The objective of this project is to produce a digital canvas, either as a desktop application, a website, or a mobile app. You will need to consider the toolkit that you would like to offer, and research the methods for implementing these techniques. At its most basic, this should allow a user to draw simple illustrations using various tools, e.g. pen, pencil, paintbrush, but a more advanced app might consider the use of things like layers.</p>
<b>Existing Examples</b>	<ul style="list-style-type: none"> <li>• Sketchpad: <a href="https://sketch.io/sketchpad/">https://sketch.io/sketchpad/</a></li> <li>• SketchBook: [ <a href="#">Android</a> ]</li> <li>• LineaSketch [ <a href="#">iOS</a> ]</li> </ul>
<b>Expected Deliverables</b>	<p>A desktop application, website or mobile app which allows the user to create illustrations. A simple version of the app might have a limited feature set, such as choosing different colours and brushes, whereas a more advanced version of the app might allow users to create vector shapes which can be moved and resized, and include features such as layers for advanced drawing and editing.</p>