

School of Computer Science and IT

Final Year Projects 2021

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Computer Science Projects

Welcome

The School of Computer Science and Information Technology is very proud to have had you as a student of the BSc Computer Science and BA Digital Humanities and Information Technology for the last three / four years. It is with regret that it is not possible to hold the traditional Final Year Project Open Day on campus this year due to the Coronavirus Covid 19 pandemic.

This year, we have had to move everything online. Our lecturing staff and our colleagues from industry are looking forward to meeting you at the open day via dedicated Teams rooms.

The school would like to acknowledge the work you have completed. The projects are diverse in nature and demonstrate the knowledge gained by students across topics such as cybersecurity, data analysis, databases, human-centred computing, multimedia, software development and the web etc.

I would like to congratulate you on behalf of the school and wish you all a very successful and rewarding career.

Professor Cormac Sreenan

Head of School, Computer Science and Information Technology

Serverless Functions + Data Pipeline Processing

Leveraging Serverless Cloud Functions to Perform Big Data Pipeline Processing

Cloud Services

Cloud server providers have a relatively new offering *Serverless Functions*. The goal of this project is to investigate and create a framework that can leverage these functions to build complex data processing **pipelines**. While **serverless** functions are effectively free to set up, there is a cost associated with data transactions and storage, this project will evaluate both the cost effectiveness and performance of using these providers in a **Big Data** processing setup. These providers expose statistics and metrics that one can use to track their performance and cost.

Real World Use Cases

It's worth noting that the "**Big Data**" source could be traditional or it could be "live" IOT devices, connected to a lightweight API or a mobile backend. However the overall cost benefit depends on ones own use case, on many non-trivial scenarios we can see that this could be a feasible solution for processing **Big Data**. Factoring in the ease of use and quick response times while also removing the need for proprietary data centers.

Keywords: Serverless, Big Data, Pipeline, Stream Processing

Technologies: Cloud Function Providers, C#, Azure, AWS

Aherne, Bradley

Supervisor:
Gavin Russell

<p>Aylward, Oisin</p> <p>Supervisor: John Morrison</p>	<p><i>Compiling to WebAssembly and exploring practicality and performance.</i></p> <p>Can we shrink down and speed up the web?</p> <p>WebAssembly is a technology created with the goal of redefining how web applications are created. WebAssembly is a binary format that can be run in all major browsers. Implemented as a stack machine, the WebAssembly virtual machine can be accessed through a JavaScript API. It is designed to allow near-native code execution in the browser.</p> <p>This project explores WebAssembly's role in high-performance web applications by implementing a new programming language that compiles to WebAssembly, exploring how much of an increase in speed and decrease in file size we can achieve when comparing it to JavaScript.</p> <p>Keywords: WebAssembly, compiler, programming languages</p> <p>Technologies: WebAssembly, Go, JavaScript, TypeScript</p>
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<p>Bindemans, Daniels</p> <p>Supervisor: Laura Climent</p>	<p><i>Shortest path problem in Smart Cities</i></p> <p>The shortest path problem consists of finding the least-cost path between two nodes in a graph. This project consists of finding the shortest path in a smart mobility context by calculating routes for vehicles in a city to minimise more than one objective. Minimising travel time or distance are generally not the only goals in the real world, there are others such as minimising gas emission or the variance of a route.</p> <p>We tackle the multi-objective shortest path problem which consists of finding the Pareto optimal points between two nodes in a graph where each edge has several costs associated with them. We look at two mono-objective algorithms A-Star and Dijkstra's, and how to adapt them to the multi-objective problem.</p> <p>In this project we looked at the implementations of each algorithm, solutions retrieved and visualisation of the Pareto solutions.</p> <p>Keywords: Dijkstra's, A-Star, shortest path, graph, mono-objective, multi-objective, Pareto frontier.</p> <p>Technologies: Python3, Plotly (3D graphing)</p>
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Covid19 Contact Tracing Apps

Comparison of COVID-19 contact tracing apps in different countries

The main goal of this project was to investigate and compare existing Covid-19 contact tracing apps. Analyzing the used technologies and evaluating the used protocols in apps, Investigating the implementations, and describing the success of the apps. Evaluating these apps based on surveys and comparisons in these areas.

Chen, Xi

Supervisor:
Utz Roedig

The Covid-19 contact tracking app is available in many countries. In most cases, Bluetooth is used to determine the range of phones and to share identifiers. The identifiers transmitted by this user are released once a person has tested positive for Covid-19 and all other users will check if they have been in touch.

In terms of technology, protocols, and functions that they include, the apps used in different countries vary. There are three main system architectures: centralised, decentralised, and hybrid both. The main protocols are Exposure Notification, DP-3T and BlueTrace. Different countries' apps use different security settings and privacy protocols.

Keywords: Apps, Bluetooth, Covid-19

Technologies: Decentralised architecture, Contact tracing, Privacy protection

WhatsApp vs. Telegram vs. Signal - a security comparison

Different key management

The project is about looking at how Telegram, WhatsApp, Signal, etc, work, and the protocols they used then compared them. What I need most care about is security, especially transmitting protocols?signal protocol vs MTProto?and key management. Nowadays most of the communication protocols used end to end encryption with other complicate progress. Different processes have different security and different processing speeds. Generally speaking, the higher the security level, the more cumbersome the process. This project did not use a lot of programming, most of the time is reading the paper and official documents. Sometimes using Wireshark to capture the packet and analyse, sometimes downloading apps on the different platform and use them to learn it.

Chen, Yang

Supervisor:
Paolo Palmieri

Keywords: Telegram, WhatsApp, Signal

Technologies: signal protocol, MTProto, key management

CAPTCIA - Telling Competent and Incompetent Humans Apart

What is CAPTCIA?

We purpose a set of testing methodology to prevent the spread of misinformation online - CAPTCIA. The aim of the concept is to classify competent and incompetent people in order to reduce the potential for those who are incompetent to spread misinformation. Upon a closer inspection in the problem of misinformation, We identified that an exam-style gatekeeping approach may be ineffective and problematic. To put a complete stop to the creation and propagation of misinformation online is unrealistic. Throughout this research, we want to explore ways in which we can lessen the effect of misinformation. Via our further look in existing methods and heuristics in combating misinformation, We devised a plan to set up a self-diagnostic tool aiming at nullifying the impact of misinformation, by better understanding an individual's sensitivity to misinformation; And educating them to promote a more thorough look at the integrity and intention behind the information they encounter.

Keywords: Misinformation, Inoculation Theory, Digital Literacy

Technologies: HTML, JavaScript, Python

Cheung, Tsz Ho

Supervisor:
Frank Boehme

Augmented and Virtual Reality based framework for remote viewing of real world locations.

This project sets out to create both Augmented and Virtual Reality applications to allow users to experience real world locations from the comfort of their own homes. The applications have the means to provide a interactive experience for any person which has access to either a web browser, a VR capable device, or a modern android smart phone. The applications allow users to create portals, allowing a user to step through the portal and be transported to this other reality. Users can interact with a map which users can select specific areas from, and a Console which can be used to select which map to display. All of the data the user can access is stored on a MySQL database. The project also provides a web application which allows for users to create their own maps and publish these to the database to provide access to all users. The web interface provides a user-friendly experience for users, built using PHP and utilizing JavaScript and AJAX for the smooth loading of data, complemented by a modern style provided by Bootstrap. The projects applications are built using the Unity Game Engine with C#.

Keywords: C#, Unity, MySQL, JavaScript, PHP

Technologies: Virtual Reality, Augmented Reality

Condon, Dillon

Supervisor:
Jason Quinlan

Modularising legacy Maven codebases

During the life-cycle of a typical development process software is generally designed in a structured manner. Overtime, code is redesigned and changed with each iteration of the development process and is often paired with changes in team members or is passed between teams. As a result, the level of discipline in design and implementation varies and can be sometimes lower than the original team/developers design. This can lead to issues such as blurred mental models and overall poor code comprehension.

Cronin, Thomas

Supervisor:
John Morrison

This project creates a prototype tool, *Legacy Butler*, that will fix these legacy code-base issues and endeavor to reduce their effects on developers. *Legacy Butler* will enable easier maintenance of a code-base by modifying the code-base structure and creating a better mental model for existing developers. This will reduce the overall negative effects of legacy code.

Legacy Butler is able to make both small incremental changes as well as overhaul code-bases, integrate with most development processes and is capable of communicating with developers about changes it makes.

Keywords: Legacy Code, Modular

Technologies: Java, Maven, Git

Rubrics

Background

Rubrics are an unassuming part of academic life, used without much afterthought. However, they're an element of numerous forms of assessment and can be a useful tool from many perspectives, not only the grader but the candidate and the institution also.

Design

This project aims to leverage modern technology to create a tool that can transform existing scoring rubrics and build an interactive platform around them while retaining traditional rubric use. It would expand by using its digital nature to promote more flexibility for everyone involved. This project aims to implement a functional, easy-to-use prototype that delivers a digital representation using a standard scoring rubric.

Implementation

The intended workflow for this system works with a user-supplied rubric in PDF format. Processing the file using Optical Character Recognition (OCR) was considered suitable after testing. Throughout the design and implementation process, attention was paid so that expanding the platform to easily support additional features such as data analytics,

Keywords: Rubrics, Remote Working, Education, Web App

Technologies: OCR, Tesseract, Python, Javascript, SQLite

Curtin, Jack

Supervisor:
John O'Mullane

Modeling threats to Covid-19 tracing

Security Vulnerabilities of Covid-19 tracing applications

As Covid-19 continues to effect our everyday lives, we become more dependent on ways to monitor and prevent the spread of the virus. Covid-19 tracing applications are one such way that we have adopted in order to monitor and prevent the spread. While these applications can help, the implementation of Bluetooth has raised the question of vulnerability to these applications. Bluetooth, while being a fantastic way to quickly and efficiently connect two devices together, is not well known for its security. With these applications sending Bluetooth messages everywhere you go, the question becomes how safe are you while using these applications. In this project, I set out to answer this question and discover how secure both Bluetooth and Covid-19 tracing applications are while we are going about our daily live

Keywords: Bluetooth, Covid-19, Security

Technologies: Bluetooth Low Energy, Wireshark, Covid Tracker

Dolan, Tadhg

Supervisor:
Paolo Palmieri

Benchmarks for many-core smart phones

Project Objectives & Goals:

- Understanding mobile benchmarking and creating a set of benchmarks which accurately reflect what typical smartphone users use their device for daily.
- Collecting a set of smartphones ranging from quad-core to octa-core processors possessing different core configurations.
- Recording system traces on each smartphone device while applications were running and analyzing them in order to observe core behavior and usage on each device.
- Conduct tests on each application regarding aspects such as CPU, memory & energy usage, from these tests tables are created containing a synopsis of the findings which can be used as a potential guide for future smartphone users

Duffy, Edward

Supervisor:
Dan Grigoras

Project Achievements:

The following benchmarks were developed using both the **Java** and **Kotlin** programming languages:

- Video streaming Application.
- Local Video Playback Application.
- Audio Streaming Application.
- Factorial Application

An overall guide was developed explaining the differences between how smartphones of different core-configurations and processors differentiate in the execution and running of processes and applications and their limitations using data obtained from tests conducted as part of the project.

<p>Dunlea, Ben</p> <p>Supervisor: Cathal Hoare</p>	<p><i>Carbon Footprint Tracking App</i></p> <p>Helping people get to net-zero emissions</p> <p>The aim of this project was to develop an iOS mobile app that provides users with the tools to quantify and understand their carbon footprint, as well as providing the user with the knowledge on how to reduce their emissions. The app focuses on three main areas of a person's footprint; diet, travel, and energy usage.</p> <p>The problem of a user's carbon footprint is approached in 3 ways; tracking, reducing, and offsets. In tracking, the app focuses on logging users' activities as seamlessly as possible and then providing a user-friendly way for these activities and the greater footprint to be analyzed in order to allow a user to better understand their footprint. In reducing, the app focuses on user habits. It provides a selection of habits a user can choose to work on and it provides educational material on the habits' impact on the environment and tips to help the user adopt the habit into their lifestyle. Finally, there are offsets. Here a user can offset the remaining portion of their footprint which they could not reduce.</p> <p>Keywords: climate change, carbon footprint, iOS, mobile application</p> <p>Technologies: Xcode, Swift, Firebase</p>
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<p>Entcheva, Gabriela</p> <p>Supervisor: John Morrison</p>	<p><i>Posture Monitor</i></p> <p>About</p> <p>The aim of the project is to create a system which successfully monitors the relationship between points of interest, and alerts the user if this relationship is violated. This system may be configured, to be used when working out (in the gym or at home), it may also be used to ensure a driver is not falling asleep behind the wheel, it could also be used to monitor inanimate objects.</p> <p>In the case of this prototype, the points of interest are body parts of the user which are visible to the camera. The project consists of a user interface, which provides the user with two modes of use: custom and general. The custom mode allows the user to select the body parts they wish to be monitored, while the general mode will monitor predefined body parts.</p> <p>After using the system, the user would hopefully be more aware of their sitting habits, and change them, to help avoid posture related health issues.</p> <p>Keywords: posture, monitor, system, relationship, points of interest</p> <p>Technologies: python, openCV, pose estimation, dnn</p>
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The Vehicle Routing Problem

The demand for delivery services has surged during the Covid-19 pandemic. Many people, particularly those in ‘at risk’ groups, now rely on delivery services to deliver essential items such as groceries and medicines to their homes. With this increased demand, delivery services need to ensure they are optimising the routes that they travel to deliver their orders.

This task of optimising delivery schedules is known as the **Vehicle Routing Problem (VRP)**. VRP aims to provide an optimal set of routes for a fleet of couriers to traverse to deliver a given set of orders. VRP aims to reduce the overall required travel distance to fulfil all of the orders.

Customers may want to establish a time window for their order - an acceptable time interval delivering the order. This is commonly seen in grocery delivery services. This problem is known as the **Vehicle Routing Problem with Time Windows (VRP-TW)**. VRP-TW needs to satisfy all of the time windows while still optimising the overall travel distance. This project uses greedy methods and local search methods to provide solutions for both VRP and VRP-TW. This methodology is formally known as GRASP or Greedy Randomised Adaptive Search Procedure.

Keywords: Algorithms, VRP

Technologies: Python, GRASP

**Fitzgerald,
Raymond**

Supervisor:
Ken Brown

Diagnosing faults in real-time systems

Fault Diagnosis - An Abstraction Based Approach

The task of fault diagnosis is an important but difficult problem. Fast fault diagnosis is essential in real-time systems where time constraints are critical to the safe and effective functioning of the system. Rapid fault diagnosis allows real-time systems to report or correct for faults and continue operating.

Abstraction is a powerful idea that is used widely in many disciplines for the purposes of modelling, reasoning about, and explaining the behaviour of systems through mapping to a more tractable search space. Abstraction has been advocated as a remedy for the computational cost of model-based diagnosis; an NP-Hard problem.

In this project, I employ hierarchical abstraction to the task of model-based diagnosis. This involves creating a hierarchical decomposition of the system where sets of components are aggregated into single units. A set of diagnoses is then computed at the more abstract level. I investigate the effects on performance and accuracy of two hierarchical abstraction methods and compare and contrast their advantages and disadvantages with the traditional approach.

Keywords: fault-diagnosis, abstraction, hierarchical abstraction

Technologies: python

Flavin, Tony

Supervisor:
Gregory Provan

Streamlined Throughput Prediction for Cellular Networks

We live in a world where cellular technologies provide us with an abundance of mobility and connectivity. As cellular technology currently stands, cellular data can be relatively unstable, especially while traveling between different environments. Research has proved that Throughput Prediction for cellular networks is very effective, however, these methods rely on trained models, which intern don't adapt very well to the variable conditions of cellular data. This can definitely be observed during travel between locations.

Forde, Michael

Supervisor:
Ahmed Zahran

The aim of this project is to use continual learning techniques to predict throughput for cellular networks. Continual learning is the process of retraining a model with the latest available data repeatedly. This allows for the model to make more informative predictions based on the current environment and enables the model to improve accuracy over time. This project explores how continual learning can be used to provide more consistent accurate predictions for throughput prediction in cellular networks.

Keywords: machine learning, continual learning, cellular networks, throughput prediction

Technologies: continual learning, real-time prediction

<p>Gaudino, Cristiano</p> <p>Supervisor: Alejandro Arbelaez</p>	<p><i>AI for Football (or Soccer) Analysis</i></p> <p>In this project, we attempt to accurately predict the result of a given football (soccer) match. This project is focused on achieving the following goals:</p> <ul style="list-style-type: none"> • Identifying relevant attributes that will influence the outcome of a given match. • Studying the correlation between expert ratings vs. (Machine Learning) predictions. <p>The result in this case consists of three possible classes: <i>Home Win, Draw, Home Loss</i>. To accurately predict these results, a custom dataset was built using web crawling techniques. This allowed for a wide variety of publicly available team, and player, statistics to be used in training various models. The data used in this project, provided www.fbref.com, allowed us to marginally improve upon the accuracy of expert Bookmakers.</p> <p>Various models were trained and tested until the best model was chosen, which ultimately had an accuracy of 60%. This model was then extensively tweaked and tuned, at which point we could begin comparing with the bookmakers. Using the odds given by multiple bookmakers, over multiple different seasons, it can be proven that the best bookmakers are 58% accurate.</p> <p>Keywords: Artificial Intelligence, Football Results Predictions, Web Crawling, Machine Learning, Classification</p> <p>Technologies: Python, Scikit-Learn</p>
<p>Gomez, Christopher</p> <p>Supervisor: Derek Bridge</p>	<p><i>If Wishes Were Horses, Beggars Might Ride</i></p> <p>A Counterfactual look at the AI Black Box Enigma</p> <p>What if I had studied more? What if I took that job offer? What if I practised harder? These are all examples of what we call, Counterfactual thinking or reasoning. Counterfactual reasoning revolves around the notion of creating hypothetical scenarios which produce different outcomes or results in regards to a current situation. The aim of this presentation is to, in an interesting and engaging manner, present the findings of my final year project which is about the use of Counterfactual Based Reasoning to bridge the gap between humans and complex AI in a field known as Explanative AI.</p> <p>Keywords: AI, Explanative AI, Internet of things, Counterfactual Reasoning</p> <p>Technologies: Python, Artificial Intelligence</p>

GenoTrace - A mobile app to track and trace animals using their DNA

Background Information

Genomics is the study of an animal's DNA to help better predict how well an animal will perform in the future. A genotype is a segment of this DNA, containing the genes that determine some of the animal's traits, such as milk yield. When an animal's DNA is recorded in the database, it is used by ICBF for parentage verification, genetic disease removal, farm to fork traceability and in breeding schemes. Because of this, it is important to ensure that the genotype given for an animal is correct.

Gunnarsson, Paul

Supervisor:
Gavin Russell

GenoTrace

GenoTrace is a mobile application that was developed to ensure that the genotype on record for an animal is correct. It accomplishes this by comparing the genotypes stored for the animal, with the genotypes stored for its offspring. It is expected that if the genotype on record for the animal was correct, it would genetically match the genotypes on record for its progenies. This information and more, is presented to the user along with charts to enable them to quickly assess the state of the animal's genotype.

Keywords: Genomics, Genetics, DNA, Mobile Application, Genotype

Technologies: Ionic, Angular, SQL-Lite, Procedural SQL, PHP

Intelligent mHealth Apps for Cancer Detection

Mobile Application for Skin Cancer Detection

Due to COVID-19, many medical fields are working at a reduced capacity. This has led to a longer waiting time for patients to meet with consultants. This has a profound effect on cancer patients. These longer waiting times, increase the time it takes for patients to begin treatment.

Hanley, Jonathan

Supervisor:
Sabin Tabirca

The aim of this project was to create a mobile application that allows patients to monitor the progression of their moles and to have them classified into either benign or malignant. Other features include the current UV index as well as the forecast for the next three days.

The web application allows the consultant to monitor each of their patients by seeing all the images uploaded as well as the classification for each image. The consultant can also view the answers given by the patient for the risk quiz.

Keywords: Cancer, Classification, Machine Learning, Mobile Application, Medical

Technologies: TensorFlow, Flutter, Django

<p>Holden, Conor</p> <p>Supervisor: James Doherty</p>	<p><i>The pipes are calling...with no strings attached!</i></p> <p>Virtual Instrument of the Uilleann Pipes.</p> <p>The main goal of this project was to create a virtual version of the uilleann pipes. The virtual instrument can be used in a DAW and accepts midi input and automation. For this, a way to generate sound was needed and a framework to implement that generator.</p> <p>Sound Synthesis</p> <p>The first types was physical modeling where sound is generated using a mathematical model. Next was subtractive synthesiser where filters are used to subtract frequencies from complex waveforms. Finally, was sampling synthesis, which was chosen, where audio files are played when note is pressed.</p> <p>Technologies</p> <p>The instrument plugin was implemented using the JUCE 6 framework. This is a C++ framework that provides various libraries for digital signal processing and can be compiled into different plugin formats, such as VST or AU.</p> <p>Download for Compiled VST3 and Source Code + Samples</p> <p>Keywords: Music, Instrument, Synthesizer</p> <p>Technologies: Audio Programming, Sound Synthesis, JUCE, C++</p>
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<p>Jansen, Arthan</p> <p>Supervisor: Derek Bridge</p>	<p><i>Melanoma Classification</i></p> <p>Melanoma is a type of skin cancer that affects the cells that make melanin. It may be possible to design a Neural Network which can use visual differences in moles to decide whether a patient has melanoma. The data comes from a Kaggle competition which ran from May to August 2020. The competition is particularly interesting since it has images of different moles from the same patient which is something not often seen in machine learning projects. It will be possible to also get some inspiration from submissions in this Kaggle competition. The goal of the project is to experiment, to see what techniques work well and which don't. I also perform further experimentation on different datasets to determine whether techniques are transferable between datasets or if they are unique to a dataset.</p> <p>Keywords: neural networks, machine learning, melanoma</p> <p>Technologies: Python, Keras, Tensorflow</p>
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<p>Kearney, Tadhg</p> <p>Supervisor: Laura Climent</p>	<p><i>Self-driving vehicles & car pooling</i></p> <p>Description</p> <p>This project is based off of a problem presented in the qualification round of Google Hash Code in 2018. This problem looked at how a fleet of self-driving vehicles can efficiently get commuters to their destinations in a simulated city. Hash Code is a yearly competition that looks at real-world engineering problems that you might face at Google. The goal for this competition was to assign cars to riders in the most optimal way possible. The problem description can be found here.</p> <p>Goal</p> <p>This project explores how to create an optimal solution to this problem and compares the use of both greedy and local search solutions in doing so. This solution would then best inform us of how to manage a fleet of self-driving vehicles.</p> <p>Keywords: Greedy Algorithm, Local Search, Data Analysis</p> <p>Technologies: Python</p>
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<p>Kelleher, Colin</p> <p>Supervisor: Gregory Provan</p>	<p><i>Designing Next-Generation IoT devices</i></p> <p>Introduction</p> <p>The Internet of Things is a network of “<i>things</i>”. This project examines a section of IoT - the Internet of Medical Things (IoMT). The adaption of IoT in healthcare has only begun to proliferate. Demand for specific IoT health applications such as IoT monitoring and digital diagnostics is increasing. The rapid development of the Internet of Medical Things, however, has meant that <i>security</i> and <i>privacy</i> of these IoMT often have received insufficient attention.</p> <p>This Project</p> <p>This project researched methods to design smart IoT medical devices that will guarantee privacy and security. This project examined Bluetooth Low Energy as a communication protocol for IoT devices along with examining privacy and security in detail. Simulation-based analysis was also a technique used for simulating IoT devices in this project.</p> <p>Keywords: Security, Privacy, Simulation, Pairing, Next-Generation</p> <p>Technologies: Python, BLE, IoT, IoMT, NFC, Socket Programming</p>
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<p>Kennedy, Micheal</p> <p>Supervisor: Cormac Sreenan</p>	<p><i>A mobile app for inferring personal risk of exposure in a pandemic</i></p> <p>Project summary</p> <p>The aim of the project is to create a mobile application that will allow users to gauge and monitor their risk of exposure during a pandemic based on inference. The app aims to do so by giving users a level/amount of exposure based on a user's range of movement and/or through the number of device interactions found by their device throughout the day. The application should highlight areas and times when a user may have increased exposure, how this affects their overall degree of exposure and present it to the user in a meaningful manner.</p> <p>To achieve this, the application will make use of Bluetooth, WI-FI and location services to gather information and implement various method to calculate the users degree of exposure.</p>
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<p>Lennon, Niamh</p> <p>Supervisor: Cathal Hoare</p>	<p><i>An Educational Game for English Language Idioms</i></p> <p>Speaking a language with any degree of fluency requires that learners amass an understanding of idioms and other non-literal expressions. The word 'idiom' is taken from the Greek word, idi?ma, meaning peculiar phraseology. These illogical and idiotic expressions help us to describe or express language in a more illustrative and colourful way. However, due to their figurative nature, they can prove challenging for second language learners to translate.</p> <p>An IOS gamified language learning app was created that teaches users the expressions, their meanings, contextual usages, similar idiomatic phrases, along with past and present usages through cultural etymological stories and famous literary quotes.</p> <p>The study evaluates the pedagogical advantage felt while using this mobile application. Demonstrations and surveys were conducted to assess the effectiveness of this game to teach idioms and their subparts to second language learners. The cross linguistic influence of the users primary language in acquiring idioms was also examined.</p> <p>Keywords: idioms, non-literal phrases, English language learning, mobile application</p> <p>Technologies: IOS, iPhone, iPad, Xcode, Firebase</p>
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Personality Analysis of Characters in Films

Task:

- The project's main task is to apply the text analysis techniques to analyse characters' personality in films, using dialogue from the Internet Movie Script Database.
- Focuses on the sentiment analysis of characters' lines.

Achieved:

- The sentiment lexicon based analysis uses natural language processing techniques and the NRC sentiment lexicon. Two kinds of visualisation results are obtained: static and dynamic visualisation.
 - ○ Static visualisation results include histograms of characters' emotional distribution at different period and histograms of characters' emotions trend with scenes. Help users compare the characters' emotional distribution and emotional changes in the film script.
 - ○ Dynamic visualisation translates the emotional data into a dynamic representation (bar chart race) that helps users understand the film characters' emotional process in a fun and intuitive way.
- The machine learning-based analysis result is an emotion classification model for analysing movie lines, which helps users judge the characters' personalities by classifying their lines' emotions.

Keywords: NLP, EmoLex, Data visualisation

Technologies: Text analysis, Sentiment analysis, Data visualisation, Machine Learning

Liao, Jingyi

Supervisor:
John O'Mullane

<p>Lyu, Tengfei</p> <p>Supervisor: Utz Roedig</p>	<p><i>Replica Placement Strategies for HDFS</i></p> <p>As society becomes more and more computerised, data in all its forms expands dramatically. Because of the rapid growth of data, there are more and more data-intensive applications on the network, how to safely, securely and effectively store large amounts of data is an important research direction of cloud computing, and HDFS (hadoop distribute file system) is an open source distributed file system to solve the problem of massive data storage.</p> <p>The purpose of this project is to modify the location of the HDFS replica. The aim is to have location-aware replica locations. It should be possible to describe for each file stored in HDFS on which cluster node the file can be stored. For example, sensitive data (and its replicas) may only be allowed to be stored on nodes located in a trusted environment.</p> <p>Keywords: HDFS, Replica Placement Strategy, Virtual Machine</p> <p>Technologies: Java, Hadoop</p>
<p>McCabe, Jack</p> <p>Supervisor: Frank Boehme</p>	<p><i>CSS Meets AI</i></p> <p>Aesthetically optimizing website designs</p> <p>While it may be easy to imagine a website design that is bad or difficult to use, such as one that uses grey text on a black background, the idea of a good website design is largely subjective to the user and their aesthetic preferences. In this project, an artificial intelligence system is created to help solve issues related to web design and aid in optimizing the design process. Specifically, A genetic algorithm is created to generate and evolve website designs in an effort to produce better results. A neural network is trained in an effort to predict aesthetically pleasing websites and attempt to categorize them. I uncover the characteristics that contribute to an aesthetically pleasing website and document the results of running my algorithms to generate better designs</p> <p>Keywords: Web Design, Artificial Intelligence, Genetic Algorithms, Optimization</p> <p>Technologies: Python</p>

Vehicle-to-Grid

The transition to fully electric transportation is fraught with challenges.

McDonald, Conor

Supervisor:

Alejandro Arbelaez

Maximising environmental and societal benefit is constrained by the need to seamlessly integrate with existing routes, in addition to minimising retrofitting costs and the overall total cost of ownership. In the course of addressing these issues, charger placement and battery longevity must also be tackled. Previous papers have shown that a transition to electric buses with minimal timetable disruptions and reasonable costs is possible. In this paper, we address these challenges using heuristics with the aim of producing useful solutions that are much faster to compute, whilst being less performance intensive than their complete counterparts. We present a simulation tool based on discrete-event simulation to determine if electrifying Cork's city buses, and maximising renewable energy usage using V2G is tenable. The results show a heuristic approach is able to generate feasible solutions quickly in minutes rather than the days or weeks of complete commercial solvers. It is possible also to increase renewable energy usage significantly without further timetable disruption or requiring additional chargers.

Keywords: electric, bus, renewables **Technologies:** python, pandas, gdfs

Philosophers' Football

Objective

The objective of this project was to build software to play a game called Phutball. We developed three versions, where the computer would make a move:

- at random,
- using an algorithm, or
- by reinforcement learning.

This was developed using Python and has an interactive webpage where users can play against these versions. There is also an experiments webpage where users can pit versions against themselves to see how they fare.

Random

All possible moves are generated and one is chosen at random.

Algorithm

Using Minimax, the computer will look at the board and try to determine what move it should make based on what it thinks you will do. This involves valuing a given board's state and looking ahead to subsequent states.

Reinforcement Learning

Through repeated training sessions, the computer will learn which moves are good and bad in a given board's state. By 'remembering' what it did in a previous state, it can make a move based on those past events. We use Q-learning as our method of reinforcement learning.

If you have any questions relating to this project, be sure to stop by my Teams channel at the Open Day!

Keywords: reinforcement, learning, artificial, intelligence, algorithm, q-learning, game

Technologies: python, tensorflow, html, web

Meade, Jack

Supervisor:
Derek Bridge

<p>Montes, Ian</p> <p>Supervisor: Gavin Russell</p>	<p><i>Failed Test Type Detector</i></p> <p>Project Aim/Goal</p> <p>The aim of this project was to create a Neural Network that was effective at detecting specific "audio failures" - these failures are briefly explored in the video presentation.</p> <p>From the outset, it was decided that a Neural Network (specifically, Convolutional Neural Networks) should be utilized rather than simpler Machine Learning technology due to the complexity of Audio datasets.</p> <p>The initial goal of the project was the ideal situation – creating a model that can take any recording and perfectly label them; if there is a failure, exactly which failure it could be. The degree of success of this depended wildly on the models.</p> <p>Keywords: Audio, CNN, Industry-standard</p> <p>Technologies: Python, TensorFlow, Neural Networks, Machine Learning</p>
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<p>Murphy, Ronan</p> <p>Supervisor: Ken Brown</p>	<p><i>Avoiding other agents in path-finding</i></p> <p>Motivation</p> <p>Many large companies are moving to automated warehouses and manufacturing facilities to save on labour costs. In these facilities, automated robots carry goods and parts from one location to another. A complex problem arises from this – the Multi-Agent Path Finding (MAPF) problem. This is the problem of finding cost efficient paths for all agents (robots) from their start locations to their goal locations without colliding with other agents or other objects in the environment. This project aims to find fast approximate solutions to MAPF problems by comparing the performance of greedy search algorithms with complete and optimal search algorithms.</p> <p>Overview</p> <p>The first part of this project focuses on the evaluation of MAPF algorithms in static benchmark scenarios while the second part of the project investigates the ability of these algorithms to react to changes in the given environment through the introduction of static and mobile obstacles.</p> <p>Keywords: Greedy, Optimal, Fast</p> <p>Technologies: Python, matplotlib</p>
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Lyr_assist – meaning to a muse!?

Objectives

The Objective of this project was to experiment with song generation, this could be broken down into Lyric Generation and Music Generation. The goal for the Lyric Generation aspect of the project was to create tools which could generate realistic looking lyrics for songs, while the Music Generation hoped to generate audio which could accompany the generated music.

O Longaigh, Eoin Barra

Supervisor:
James Doherty

Achievements

The primary focus of the project was Lyric Generation and a number of Natural Language Generation (NLG) systems were created to generate lyrics based on a dataset from Genius.com. Other methods involving word pairings and randomness were also explored. Different methods provide varying qualities of output but overall many of the systems could create reasonable interpretation of song lyrics. The Music Generation aspect of the project was less successful due to the relative lack of tools available for audio generation in Python, despite this a simple audio generator was created but this lacked the complexity of many of the methods used for Lyric Generation.

Keywords: NLG, Text Generation, Audio Generation

Technologies: Python, Machine Learning,

Charging Location of Electric Buses

Looking to the future, one charge at a time

The goal of this project is the placement of charging stations to optimize and facilitate longer journeys within major cities (e.g., Cork - Galway - Limerick) of Electric buses. The implementation of a sustainable and efficient electric transportation network requires addressing multiple concerns such as: limited driving range and battery charging/discharging time. This involved sourcing and contrasting available existing data of public timetables (e.g. BusEireann). AI technologies were used to optimize critical components for the electrification of the public bus transportation system. This resulted in a viable methodology that can be implemented in other major cities across the world with suitable datasets.

O Mahony, Jack

Supervisor:
Alejandro Arbelaez

Keywords: ai, ev, electric cars

Technologies: artificial intelligence, python, heuristic

Template-based online tool for use in dyslexia assessment

Project Summary:

This project aims to implement a platform which will allow the Disability Support Services (DSS) in UCC to assess the needs of current and incoming students in a **remote** and **standardised** fashion. It particularly focuses on the identification of **dyslexia** and **dyscalculia**.

The tests implemented on the screener are based on a proposal written by the DSS in 2016. It provides ten different tests which assess different aspects of literacy and numeracy. The web based screener has two levels of privilege for students and administrators.

Students can:

- Complete the tests that have been assigned to them

Administrators can:

- Create/delete users
- Assign tests to users
- View/download test results
- Edit data and variables used to present different tests

The screener itself does not come to any conclusions but instead aims to provide the administrators with as much data as possible to assess the students needs.

Keywords: dyslexia, dyscalculia, screener, DSS

Technologies: HTML, CSS, PHP, JavaScript, SQL

**O Sullivan,
Louise**

Supervisor:
Ian Pitt

Internet of Things air quality monitoring system

Background

Air pollution leads to around **1,300 yearly deaths in Ireland** and over 150 million globally. Environmental air parameters affect our quality of life, changing daily even hourly. Over the past few decades there has been a rapid increase in industrialisation, followed by the want and need for people to monitor their local air.

Particle Matter (**PM**) is considered one of the most dangerous air pollutants. PM could originate from natural sources such as volcanic ash or desert dust particles, but the main source of PM comes from the human impact on the environment such as industrial processes, transport and agriculture.

The goal

In this paper I will present a cost effective air quality measurement system using the Raspberry Pi 3 (RPI3) microcontroller and a PMS5003 air quality sensor. This device will allow people to measure the Air Pollution Index (**API**) in any location they wish. The main pollutants I will be focusing on will be PM1, PM2.5 and PM10.

By Placing a series of air quality sensor nodes around Cork City we can display data in different areas of the city on an interactive map where people can view the air quality in their area. Graphing each sensor 24 hours at time to display peak times of high particle matter count in each area.

Keywords: Air pollution, PM, Microcontroller

Technologies: IOT, Raspberry Pi, Cloud

O'Brien, Adam

Supervisor:
Dirk Pesch

<p>O'Connor, Rory</p> <p>Supervisor: James Doherty</p>	<p><i>Summarise</i></p> <p>My project is to determine how music may have changed over the last five decades and to analyze its trends.</p> <p>Checking for trends based on sentiment analysis seeing how positive, neutral, or negative a song's lyrics are and how objective or subjective it is. Also analyzing the trends from each decade to decade seeing how it reacts and any possible information we can extract from this data alongside graphs and results.</p> <p>This is done with Python alongside some Natural Language Processing and Data Analysis libraries. After gathering the data, sanitizing it appropriately, I then went about determining the overall sentiment behind the lyrics of each song and how positive and negative they are on a scale from -1 to 1 with 0 being neutral. I plan on upgrading this system with some AI Models in the future.</p> <p>If you have any questions feel free to contact me in a Teams meeting and we can go over it together.</p> <p>Keywords: Music, Natural Language Processing</p> <p>Technologies: Python, Sentiment Analysis, Database, NLTK, Pandas, TextBlob</p>
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<p>O'Donoghue, Peter Francis</p> <p>Supervisor: Ken Brown</p>	<p><i>Fair work allocation</i></p> <p>Description</p> <p>This project creates software that can be used to make work schedules which strive to allocate shifts and tasks in the most fair and balanced way it sees possible. The algorithm takes in scheduling specifications and restrictions which the schedule must abide by, as well as encoded preferences from each of the employees which it tries to satisfy and distribute evenly. The algorithm uses a constraint programming approach to create its schedules. The scheduling problem is modelled using hard constraints, for things that must be satisfied to create a valid schedule, and soft constraints, for the preferences which we would like to satisfy but might not be feasible to satisfy. When finding a solution, the programme finds schedules which satisfy all the hard constraints and then tries to optimise specified fairness metrics to return a fair schedule.</p> <p>After a solution is found, this software is able to provide different types of explanations to give reasons for different scheduling decisions it has made and to account for preferences it did not satisfy.</p> <p>Keywords: scheduling, fairness, explanations</p> <p>Technologies: constraint programming, chocosolver, java</p>
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Contact Tracing Using Sound and Light

Motivations

The Covid-19 pandemic has created a need for contact tracing systems to combat the spread of the disease. Contact tracing apps leverage Bluetooth Low Energy to determine who has been in a users proximity. Bluetooth signals can pass through objects such as walls and ceilings making accurate proximity detection difficult. Close contacts could be logged even if close proximity never occurred at all but a connection was made through a wall for example. This is known as a *false-positive*.

Keywords: Close contact, proximity, false-positive

Technologies: Bluetooth Low Energy

Project work

Stages of work carried out:

1. Examine current implementations of contact tracing apps.
2. Analyse different sensors in a mobile device and the data they return. [User Survey on mobile sensors](#)
3. Explore different approaches to proximity detection using these sensors.
4. Propose a system that could leverage these sensors to reduce false-positive rates.

Stages 1, 2 and 3 were all research and exploration.

In stage 4 a large portion of the work was exploring acoustics and how they are implemented on projects such as [chirp.io](#).

**O'Donoghue,
Patrick**

Supervisor:
Utz Roedig

Realistic Platooning Strategies for Car Convoys

The focus of this project is to use and extend simulation tools to evaluate different platooning controller models and to examine how changes to the platooning communication network impact the safety and reliability of the platoon. Plexe, an extension of Veins, is the chosen simulator. For this project, Plexe was extended to create scenarios and record data used to evaluate two platooning control strategies, those being the PATH controller and the Ploeg controller. Simulations were run under a variety of conditions, with particular focus on how changes to the communication network (such as a change in the communication beacon interval rate) affect the stability of the platoon. Then the results were graphed - speeds, accelerations, distance between platoon members and distance error (referring to how far the platoon strayed from its desired distance gaps) were all considered. Evaluation was then performed on these results.

Keywords: platooning, simulation

Technologies: Plexe, Omnet++, SUMO, C++

**O'Donovan,
Kevin**

Supervisor:
Aisling O' Driscoll

Artificial Intelligence for automatic temperature setting in dwellings

Aim

The use of Machine Learning techniques to predict the desired temperature and automatically set the HVAC system of residential settings was explored.

Overview

Well-developed forecasting techniques were explored to predict the internal temperatures of residences from observation of past temperature values. Apartments with different temperature profiles were analysed to test the generality of the models used. How other factors impact predictions were also explored.

Neural Net learning was used to teach A.I. relationship between heating system and temperature.

Results

Households that have a well-defined heating usage schedule had good temperature predictions. Heating usage and the external temperature are important factors. How the data is processed is important. Neural Net learning has potential, but results were mixed.

Keywords: internal temperature prediction, forecasting, A.I., Machine Learning, neural net

Technologies: R, RStudio

**O'Donovan,
Stephen**

Supervisor:
Laura Climent

<p>O'Donovan, Colum</p> <p>Supervisor: James Doherty</p>	<p><i>Exploring Algorithmic Reverb</i></p> <p>Simulating Reverberation Accurately For Use in Music Production</p> <p>Hi, my name is Colum O'Donovan, and my final year project studies a very common effect used in music production called reverberation, and how to simulate it in an accurate yet efficient manner in the form of a music plugin written in C++.</p> <p>The algorithm is based on a collection of different algorithmic reverb methods which date back as far as 1961. The algorithm uses linear algebra, matrix transforms, filtering, and feedback delay lines to create an echo density high enough to truly sound like the phenomenon in question.</p> <p>With zero digital signal processing knowledge and very little linear algebra, this was a tough project to do but enjoyable due to my strong interest in music. Studying digital signal processing and creating music plugins is something I will definitely continue to do in the future.</p> <p>Keywords: reverb, music, digital signal processing, signals, linear algebra, matrices, filters, modulation, delay lines Technologies: C++, JUCE, FL Studio 12</p>
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<p>O'Dwyer, Silvia</p> <p>Supervisor: James Doherty</p>	<p><i>Easier Media Editing Package.</i></p> <p>Automating Video Creation and Editing</p> <p>This final year project automates the video creation and editing process, allowing video editors and content creators to create videos using pre-defined templates, or to specify edits they would like to be applied to a batch of videos.</p> <p>Video editing has long been a process carried out using software such as Adobe AfterEffects, often involving the editor applying effects using a GUI, and on one video at a time. Programmatic generation of videos allows hundreds of videos to be generated at once, each video containing personalized content for the video.</p> <p>The project consists of a command-line tool, npm package, API, as well as a GUI frontend, providing developers with the opportunity to edit videos programmatically either using an API or npm package. However, non-developers can also automate video editing using a frontend GUI also.</p> <p>By automating this process, the editing process can become more efficient for video editors, thus leading to saved time in the long-term.</p> <p>Keywords: automated video editing, automated video generation</p> <p>Technologies: Node.js, React, JavaScript</p>
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Air-traffic control system for managing Unmanned Aerial Vehicles

Research Issue

The number of Unmanned Aerial Vehicles (UAVs), also called drones, is expected to increase in the coming years, due to increasing rates of both commercial and private use.

Drones and UAVs can pose a danger to the public and property present on the ground in the event of a failure, however this risk can be mitigated by path planning in the pre-flight stage. It is important therefore that drone traffic (and the task of routing it efficiently) is well understood.

Objectives

This project aims to create a model of drone traffic through an air-space, and then implement pathing algorithms which can be used by an individual drone to find the most efficient path through the traffic.

By using a graph-based model composed of nodes and edges, routing traffic becomes similar to the "shortest path problem", with the distinction that the pathing algorithm must account for interference caused by other drones.

This project will implement such an algorithm, and then compare the performance of least-distance vs least-time strategies.

Finally a demonstration piece of software will be produced to illustrate how future drone-traffic management systems could operate.

O'Gorman, Mark

Supervisor:
Cormac Sreenan

Word-Counting app to Assist Speech Therapists in Assessing Children with DLD

My Word Counter

Many children suffer from Developmental Language Disorder (DLD), which is associated with poor literacy skills in later life, limited employment opportunities, and mental health problems. Effective treatment for DLD exists, but accurately assessing individual needs presents problems. The current standard test involves counting the number of words a child learns over a given period of therapy. Research suggests that other variables should be taken into account e.g. how many times a child was exposed to a word before learning its meaning.

My Word Counter is an app that will record a child speaking target words during therapeutic activities. The app is able either to count the total number of utterances of the words and alert the users when a predefined total or time limit has been reached. Data gathered by the app is stored in a database, with provision for therapists to search and view the results.

This project is being conducted in collaboration with staff from the Department of Speech and Hearing Sciences at UCC.

Keywords: Android, Machine Learning, Speech, Mobile App Development

Technologies: Kotlin, Firebase, Android Studio, JavaScript, HTML, CSS, JQuery

O'Sullivan, Sinead

Supervisor:
Ian Pitt

8-bit gaming in Python

2D Side-Scrolling Platform Game

Oyedeji, Bridget

Supervisor:
Jason Quinlan

The aim of the project is to create an 8-bit(2D) game in Python that is similar in style with the retro arcade game Donkey Kong. The game is a side-scrolling platformer video game written in Python through Pygame in which the player's objective is to collect as many coins as possible and kill as many enemies as possible to raise their points. The game only ends when the user dies, or the user voluntarily exits the game.

Users can only play the game with the arrow keys on the keyboard (to move left, right and jump) as well as the spacebar (to attack enemies). Data of each running game is stored in a text document and is overwritten each game. This document stores the username of the player playing the current game, the coins collected as well as the final score of each game. The only part of the document not overwritten are the keepers of the highscore.

Keywords: Side-Scrolling, Platformer, Video Game, 8-bit (2D)

Technologies: Python3, Pygame

Forecasting day-ahead market prices using AI.

Comparison of predicted and actual market prices.

Parker, Matthew

Supervisor:
Dan Grigoras

It is based around the Integrated single electricity market (ISEM). They oversee the electricity markets within Ireland and Northern Ireland. Their job is to accept supplier bids into the market in order to match the demand on a day-to-day basis. The day-ahead market is the main market/auction that deals with the electricity trading, and in turn the one I will be focusing on. Suppliers must bid into this market with prices they are willing to produce their electricity for whilst also being at a price ISEM will accept. Finally, I will use different artificial intelligence models to predict historical data using different data as features and compare the results with the actual prices to gauge which models would be best suited for predicting this specific time series of data.

Keywords: AI models, Forecast prices, electricity market

Technologies: C#, SQL, Python

<p>Przestrzelski, Karol</p> <p>Supervisor: Derek Bridge</p>	<p><i>Recommendation as a Balloon Debate</i></p> <p>The Problem</p> <p>Making choices is hard. We know what kind of things we like and why we like them so we should be able to choose between two similar items in relation to our preferences. However, there is often too much information attached to one item for us to take it all into account. Sure, we're able to pick items without much variables like food, but movies have a cast, a director, genres, ratings and many more variables to consider. How can we compare movies while using all this information to explain why we want to watch the movie?</p> <p>My Project</p> <p>My final year project is about exploring ways to use user ratings of movies to help them choose between movies. We need to be able to come up with explanations that will convince a user to pick this movie over the others. For example: "You liked 5 movies with Keanu Reeves in it, so you'll like The Matrix". We also need to come up with a way with a way of deciding which of these explanations is the best one to show the user.</p> <p>Keywords: Recommender Systems, Movies, Explaining Recommendations</p> <p>Technologies: Python, Flask, MySQL, VueJS, Azure</p>
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<p>Rodgers Orr, William</p> <p>Supervisor: Cathal Hoare</p>	<p><i>Island Identification App</i></p> <p>Problem is lack of easy to use applications for a quick method of identifying islands off of the coast of the country. At the moment the problem can be worked around using an application such as Google Maps to find out the island name. This however is time consuming when compared to the simplicity of a point and look style application such as Google Sky Map. The method of using an application such as Google Maps is also awkward to find out more information on a selected island if a user wishes to do so. The user has to leave Maps and use another application, such as the Wikipedia app, to find out more information about local plant and wildlife on the island their inquiry is about. The proposed solution is to build an application that is similar in style to Google Star Maps but for islands off of the coast of the country. The application will utilise existing AR packages in Unity for Android and iOS to provide an AR experience for the user.</p>
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Virtual Classroom - Leveraging Augmented Reality as a tool to supplement face to face training

Project Abstract

Traditional face to face learning has its limitations. There has also been a shift towards remote learning as face to face learning may sometimes no longer be possible. Face to face learning, along with remote learning tools such as text-based learning and video conferencing, also have the potential to be unengaging. Virtual Reality tools can increase engagement but have cost limitations, causing a barrier to entry. This project aims to alleviate the issues faced by these learning mediums and tools by utilising Augmented Reality, a readily available technology on most mobile devices, as a potential medium for providing engaging remote learning. By using a smartphone device, it's possible to augment training courses or classroom sessions to deliver training in an interactive and easy to understand manner. This project explores the best options for supplementing the classroom with a user-friendly application. The project proves that Augmented Reality can supplement a classroom with an engaging learning experience.

Keywords: Classroom, remote, learning, engaging, mobile

Technologies: AR, Augmented Reality, Swift, iOS, Google, Firebase, ARKit, iPhone

Ruane, Aengus

Supervisor:
Sabin Tabirca

Design and Implementation of a new Data Centric Programming Language

Hoshie Lang

*A new programming language focused on **Data Processing***

Smith, Alexander

Supervisor:
John Morrison

Having spent time working on several class assignments and hackathons there was a common need to load one or more raw data files and perform some initial processing and analytics to help understand and finally format the data before we could attend to the actual job or assignment at hand. Invariably this step was implemented in a very ad hoc way as it was a secondary concern, which ended up with the developer rewriting similar code in different circumstances and often with different programming languages.

Hoshie Lang attempts to simplify this process by presenting a data processing centric programming language. By design it encourages the programmer to define what data processing and analytics to perform on the data, without having to specify the **how to do it**. For example, Hoshie Lang has no keywords to "LOOP" or "STREAM" data, instead it has an abstraction of a **Pipeline**, one where data flows from the top of the pipe to the bottom, while passing through a series of **Activities** and **Sensors**, where an Activity alters the data in some way and a Sensor observes the data as it passes.

Keywords: Compiler, Data Processing

Technologies: TypeScript, JavaScript, ANTL4, VSCode

Timetable/Schedule Application

The Problem: Staff and students within a university find it very difficult to schedule and organize non time-table meetings and tutorials relating to their modules and lectures. The main reason for this is the start of year timetable of the student can become complicated due to subtle changes as-well as additions, this makes the timetable not wholly reliable as a guide to the availability of the student.

Smith, Michael

Supervisor:
Laura Climent

Objectives: The objective is to analyze the user requirements and develop and implement a mobile application which will be able to let both the staff and the student organize and schedule meetings.

Implementation: The mobile application will be developed and implemented using Android Studio IDE.

The Following were achieved:

1. Student Application User login/Create Account(Connected to Google Firebase). Main page (Calendar view), set reminder, timetable, sign out. Timetable(Recycler view)
2. Lecturer Application(same as student). Main Page : added student, will display students enrolled. Student : displays timetable, assignments, grades. Timetable : displays students timetable(view free timeslots).

Personality Analysis of Film Characters

The goal of this project is to classify the personality of film characters from movie scripts and the Sentiment, emotional disposition, and other features of the characters dialog and from this, observe potential trends in the personalities of characters with respect to the genre of the movie, the year of release etc and create visualizations from the data.

**Stocksborough,
David**

Supervisor:
John O'Mullane

The sentiment analysis and personality classification employs the use of machine learning techniques. Each movie character is classified with respect to The Big Five personality traits, Extroversion, Openness, Agreeableness, Neuroticism and Conscientiousness.

The prominent emotions in dialog and trends in a character's word usage are also analysed and visualized using natural language processing techniques.

Data generated is package in a UI developed with python as to allow the user to explore the data and derive information about the characters and their personalities that have appeared in movies over the last few years.

<p>Strolla, Cian</p> <p>Supervisor: Steven Prestwich</p>	<p><i>Solving Mathematical Puzzles by SAT Methods</i></p> <p>The goal of this project is to use Boolean Satisfiability to solve maths-based puzzles.</p> <p>SAT has many real-world uses and one way to use it is in solving puzzles. If you can find a puzzle that fits the requirements for SAT and can convert it into the correct form then a SAT solver will find you a solution.</p> <p>For this project, I started with the N-Queens problem and then moved onto a puzzle hub called BrainBashers. Once you have found a suitable candidate for SAT and convert it, it will give you an assignment for the variables in the puzzle. N-Queens is a very common place to start when it comes to SAT because it has simple rules and can be scaled up rather easily.</p> <p>If you have any questions please feel free to ask me.</p> <p>Keywords: SAT, puzzles, solvers, maths</p> <p>Technologies: Boolean satisfiability, python</p>
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<p>Tao, Jionglin</p> <p>Supervisor: Laura Climent</p>	<p><i>Reusing Machine Learning models for Bike rental Station data</i></p> <p>Reusing Machine Learning Models for Bike Rental Station Data Jionglin Tao College of Science, Engineering and Food Science, Computer Science, University College Cork, Ireland 120109498@umail.ucc.ie</p> <p>Abstract. The problem is Reusing Machine Learning models for Bike rental Station data, where the objective is to predict the number of available bikes in every bike rental stations 3 hours in advance and the main task is to reuse the models learned on 200 old stations in order to improve prediction performance on the 75 new stations. In this paper I use a model reuse approach exploiting Nearest-Neighbor Distance Method. It accords to the coordinates of the new station, select the model of nearest station or neighbor stations model to reuse.</p> <p>Key words: Model Reuse, Prediction, Mean Absolute Error (MAE) . Technologies: Model Reuse</p>
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Analyzing and Enhancing E-Learning

About

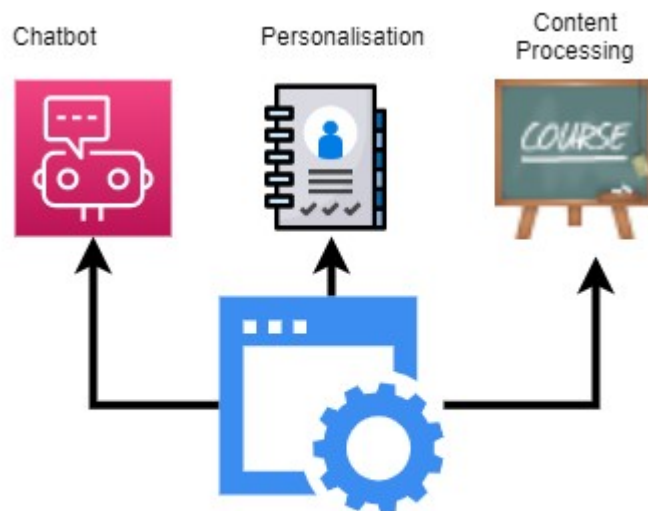
The Goal of this project is to engineer a system that can be content aware and host various software components, backed by research, to create a complete and modular environment for the student. The System's aim is to aid the user in achieving their learning outcomes, with the help of interactive features.

The Drawbacks of E-Learning

Research papers and studies significant differences in relation to learners environment and learning styles & modalities. E-learning excels at being widely available but falls short on providing the interactivity to the user, which the project aims to amend.

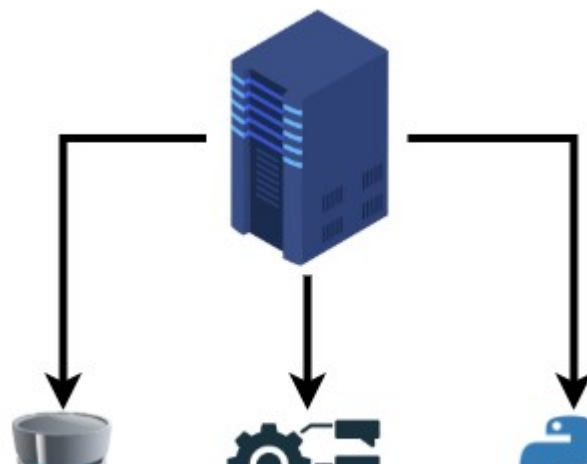
Engineering Solutions - The Prototype

The project touches on important aspects of learning styles and modalities and mixes in Human Computer Interaction research to provide a rough, self-judged template to create solutions. The prototype created uses the research shown to create 1 such solution.



What the user Interacts with

How the intents are resolved



Wolas, Michal

Supervisor:
John Morrison

<p>Woods, Rían</p> <p>Supervisor: Rosane Minghim</p>	<p><i>Data Visualisation for Soundscape Ecology</i></p> <p>GFF Tool & Soundscape Ecology</p> <p>The long term essence of the project is the gathering and analysis of soundscape data (sound recordings from a particular environment) for a range of applications. Including monitoring the progress of animal and plant species in particular areas; analysis of certain habitats; and monitoring humanity's impact on the natural world. These studies are extremely relevant in today's world at a time when environmental issues are in desperate need of solutions. The work involved in this project is helping to develop these solutions by providing accurate and reliable analysis of real world data.</p> <p>The aim of my portion of this project was to add /adapt some of the tool's functionality to better the visualisation of data. Also to help solve the issue of labelling / tagging acoustic events in soundscape data, to make the analysis of these recordings easier. The tool has been developed thus far using Python and the JavaScript library D3; and is supported on a web based framework.</p> <p>Keywords: Soundscape, Data Visualisation, Acoustic Events</p> <p>Technologies: Multidimensional Projections</p>
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<p>Xun, Tingting</p> <p>Supervisor: John O'Mullane</p>	<p><i>Teaching a Second Language to Children of Immigrants</i></p> <p>Abstract</p> <p>This project mainly researched gamification's feasibility in verbal learning and developed an iPad spoken language learning game. It was developed with Unity and Microsoft Azure Speech Recognition SDK and used XCode to deploy it on the iPad. The iPad was used as the operating platform because of the portability, universality, and ease of operation.</p> <p>The target group of the project is the children of second-generation immigrants aged 5-10. The target group is living in another country, lacking a particular training environment in their parent's mother tongue. This project aimed to improve this situation, allowed children to exercise and improve their verbal ability in their parents' mother tongue on iPad.</p> <p>It included a colourful game interface, easy-to-use and straightforward operation, and clear and precise voice prompts and subtitle prompts. The project includes user login, registration, spoken language exercise, spoken language breakthrough, scoreboard.</p> <p>Keywords: Second language, Verbal, Immigration, Children, Gamification</p> <p>Technologies: Unity, C#, Microsoft Azure, Speech Recognition SDK, XCode, iPad</p>
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<p>Yu, Zeda</p> <p>Supervisor: Frank Boehme</p>	<p><i>UCC Home Office in Your Pocket</i></p> <p>Nowadays working from home became more common and it might cause some chaos to mix working computer and personal computer. In some case, people need to change their operating system, install and configuration third-party applications. That might bring some unexpected problems. This project(Home Office in your Pocket) is aiming to solve this problem by using Persistent Linux live cd. User doesn't need to change anything on their original PC, sprite work and life with a flash disk. This project includes a guide software that helps you create a customized bootable live cd system that already installed some software you might need in daily work or study. The live cd system allows user to access all the resources in their host computer. Home office in your pocket also aims to "Lose weight" in a mobile workplace. Lecturers won't need to bring their laptop walking around in the Westen gate building. Students won't need to bring their laptop to the library. The user only need to do is bring a flash disk that contains the customized system, All the change will be saved and ready to use at the next different PC.</p> <p>Keywords: Working from home, flash disk, customized, portable,</p> <p>Technologies: Linux, GUI software,</p>
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<p>de la Cour, Liam</p> <p>Supervisor: Derek Bridge</p>	<p><i>Federated Recommender Systems</i></p> <p>Background</p> <p>Recommender systems are used throughout the web to provide personalised experiences to users. This personalised experience comes at a cost to the user's private data, however, as this must be given up to train these systems. Recently work has been undertaken to see if privacy can be introduced into these systems.</p> <p>Federated Learning</p> <p>Google recently devoloped a learning technique called federated learning, which aims to remove the necessity of users giving up their personal data to train machine learning models. In this project we explore how this technique can be incorporated into recommendation systems, specifically in a matrix factorization approach. We compare the predictive accuracy of these federated systems with standard centralised models. We also explore how we may be able to increase the speed of these federated systems.</p> <p>Keywords: Machine Learning, Recommendation Systems, Federated Learning, Federated Recommenders</p> <p>Technologies: Python, Numpy</p>
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Can you see me Alexa?

goals

The aim of this project is to build a smart speaker that can only be used if it recognises the correct face.

implementation

using amazon Alexa developer on a raspberry Pi with a python3 wrapper file for starting Alexa and processing face detection with carolinedunn GitHub

results

The usability of the system should be then evaluated and tested for if it was feasible protection mechanism?

After testing, results shows a drop in usability using a front facing camera in comparison to default Alexa but with an increase in security as only specific users could operate the system. The usability of the system is very hardware dependent as the usability increases due to factors like the camera being a nighttime camera or 360 cameras. The quality of the microphone is another factor which increases usability as well as the addition of a camera lens such as the fisheye lens which allows for a larger range in which a user can be found.

walsh, cathal

Supervisor:
Utz Roedig

Digital Humanities and IT Projects

Welcome

This year has been particularly challenging. In Digital Humanities and Information Technology we have always engaged with and encouraged our students to learn how to meet the challenges that arise at the boundry between human problems and technological solutions.

It is extremely gratifying to see how well our students have risen to the challenge both in their academic and personal lives this year. The quality of work which has been done appears to be comparable to other years, and this is very gratifying. We are all very proud of what the students have achieved this year, and we are confident that this years class will meet and positively shape the challenges of the future.

Dr Mike Cosgrave

Acting head, Digital Humanities

Digital Humanities and IT Projects

<p>Brannigan, Darragh</p> <p>Supervisor: Sabin Tabirca</p>	<p><i>User focused systems can for preferences for the growth of E-Commerce</i></p> <p>The purpose of this project was to further my knowledge of how a system works with user inputs. Checking for errors along the way and making sure the information that is passed and gathered is correct and allows for accurate processing. This is done through the use of computer science modules and the learning from Digital Humanities to create a working system to allow the users to select what they wish to see instead of being forced information that is not relevant to them. Creating a working application on a web-based server (Locally) in order to collect data from user submitted forms and registration forms has been the first major task that had to be completed. The database was done through the language MySQL and PhpMyAdmin and the forms were created with the use of 1 JavaScript function to highlight where their selection in a navigation menu was, php to query and operate the site with information pertaining to the users and html to present the information to them.</p>
<p>Burke, Chloe</p> <p>Supervisor: Laura Maye</p>	<p><i>Designing a Collaborative Digital Platform for Contributing Memories of Place at UCC</i></p> <p>The goal of this project is to facilitate digital memory archival through the development of an online memory depository which is geographically related to UCC. This project aims to investigate the importance of memory documentation and digitizing collective memory. The motivation for this project is to create a platform for people to tell their stories about a location. The platform features were designed with a focus group involving 4 people. The purpose of this is to help people express nostalgia to locations during these pressing times of lockdowns that we are facing in this pandemic where movement is restricted. It also explores the relationship between memory and places, collective memory and how this changes over time. At present there are many sites that allow you to listen to stories and memories of locations but not many that also allow you to contribute your own, which is why I am designing this particular platform.</p> <p>Keywords: collaborative, platform, memories, ucc</p> <p>Technologies: HTML, CSS, Javascript, Python, Wordpress</p>

How does New Digital Right Legislation such as the GDPR impact Open Source Ethos?

GDPR and its effect on Open Source Ethos

Since its implementation in May 2018, the General Data Protection Regulation (GDPR) has had an impact on many companies, including the open source industry. The correlation between free software and practices and GDPR has received little attention. This research project provides valuable insight into how GDPR affects open source ethos.

To investigate the effect of GDPR on open source ethos, I used quantitative and qualitative research methods. A quantitative analysis was used to perform a survey with 51 participants. I used cross-tabulation to analyze the sample. Structured interviews with ten participants were used to conduct the qualitative research. I used thematic analysis to investigate the interview results.

Both quantitative and qualitative research show a connection between GDPR and open source, indicating that the GDPR does have an influence on open source ethos. There are some elements that intersect, such as accountability and fairness for the individual user, despite the absence of a clear connection.

Keywords: Open, Source, GDPR, Ethos, Digital, Legislation

Technologies: HTML, CSS, JavaScript

Byers, Grace

Supervisor:
Shawn Day

<p>Bytyci, Irena</p> <p>Supervisor: Máirín MacCarron</p>	<p><i>The lived experience of immigration into Ireland</i></p> <p>Research Project</p> <p>My research project aims to explore an under-researched topic by establishing a cause-and-effect relationship. The cause being the migration from Albania to Ireland and the integration is the effect. I aimed to investigate the hardships of immigration as well as gain an insight on how people were able to integrate and adapt into a new culture. My objective was to place my project into action by sharing people's stories on immigration as well as my own. By doing so, I was able to spread awareness and inform others about what it is like to live in Ireland as a minority.</p> <p>Digital Artefact</p> <p>Deciding to create a podcast as my digital artefact was the most appropriate method of sharing my personal stories as well as the stories of my interviewees. It was something I was very interested in as it is an opportunity to have raw conversations on issues that many people are unaware of because they have not experienced it. This was also a chance for us to analyse the interviews and talk about what stood out to us or bring an important topic to light. The podcast is tied to an Instagram account for engagement with the audience and a way to answer any questions the listeners may have.</p>
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<p>Corkery, Cormac</p> <p>Supervisor: David Murphy</p>	<p><i>VR Environment to Represent Autism Experiences</i></p> <p>Digital Artefact</p> <p>Immersive technologies are becoming ever important in today's society. For the general population there is a lack of knowledge about people with autism and what the disorder is actually about, not knowing what or why their sudden change of behaviour can occur and how they can calm them down or fix the situation. For my project I created a virtual experience that shows how a room should be setup for a person on the autism spectrum and show why certain aspects apply within a room. Today's technologies mean that even the most basic of machines can power experiences such as this and open up the accessibility of these experiences to a much larger audience. The effectiveness of the teaching that immersive technologies such as my digital artefact can far outweigh traditional methods. The goal of this project is to outline how a room should be set up for a person on the autism spectrum and show the effectiveness of the immersive technology in regards to autism.</p> <p>Keywords: Autism, Virtual Experience, Education</p> <p>Technologies: Unity, Mac, PC</p>
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<p>Cremins, Fiona</p> <p>Supervisor: Mike Cosgrave</p>	<p><i>The Rise of the Far-Right Online</i></p> <p>Social Media has given the power and freedom for every person with an internet connection to have a platform and create a following, with the ability to post whatever they like regardless of fact-checking. Conspiracy theorists, fascists, and the alt-right has risen in numbers and are spreading “fake news” online.</p> <p>How does the alt-right use social media to radicalize others into joining their often dangerous views? And why do the algorithms of these platforms work in favour of these people?</p> <p>The aim of my project is to build a content moderation bot for Twitter that uses keywords combined with sentimental analysis to find people spreading misinformation and respond with the appropriate sources.</p> <p>Keywords: alt right, far right, social media, content moderation, Twitter bot, Covid 19</p> <p>Technologies: GoLang, sentimental analysis</p>
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<p>Cuthbert, Jane</p> <p>Supervisor: John O'Mullane</p>	<p><i>The Effect of Filters and Photoshopping on Body Image</i></p> <p>Filters vs Self</p> <p>This project investigates how common photo editing is on social media, and what the long-term impact of digitally altering your appearance is. It also looks at what is the same and what is different about beauty standards in history versus now. I created a survey to learn about people’s habits and relationship with filters and photo editing, and their impression of how others use and view social media. Findings suggest people underestimate how much editing they actually see. Several participants offered stories of their experience with forms of body dysmorphia stemming from editing their own image.</p> <p>Keywords: social media, snapchat, filters, photoshop, body image, survey</p> <p>Technologies: photoshop, facetune, survey, website</p>
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Negative Health Implications Associated With a Poor Transition to Plant-Based Diet

Planta

Issue

A large problem with lack of information on transitioning. There were no comprehensive guides on transitioning and what information I found was too complicated. This has disincentivised people to not do the necessary research to ensure a safe transition and not result in health complications.

Solution

I decided to code an android application called Planta. Planta is an informative social media application that is aimed to help your transition to a plant-based diet as smoothly and as healthily as possible. Planta doubles as a social media along with a source of all the information needed to transition to a plant-based diet.

Key Features

- Timeline to post and interact with other users
- Restaurant locator to locate the best plant-based restaurants near you
- Information Section holding all the information simplified and in one place to help the user transition correctly
- Recipe Section where there is a list of recipes for beginners to try focusing on teaching them how to substitute meat for plant-based proteins
- Profile Section to display posts and search/follow other users

Keywords: Application, Health, Diet

Technologies: Android Studio, Firebase Database, Canva

Dadgar, Cian

Supervisor:

Marc van Dongen

<p>Dineen, Sarah</p> <p>Supervisor: Máirín MacCarron</p>	<p><i>Relationship between traditional media and social media in the creation, circulation and consumption of misinformation.</i></p> <p>DHIT Final Year Project - Sarah Dineen</p> <p>This is a study of the relationship between traditional and social media and their similarities and differences with regards to the creation and circulation of misinformation, along with their respective responsibilities for same. This is a particularly topical issue in recent times due to the occurrence of significant events, such as the recent controversial US presidential elections and the ongoing COVID-19 pandemic. Due to the potential of this study to be extremely broad-ranging, I intend to focus my investigation on one platform of each media source – namely, Twitter as a social media platform and print media as a traditional news source. I will also be conducting my research in the context of Ireland only.</p> <p>The questions I hope to address are: Are consumers more likely to accept misinformation as truth when engaging with traditional or social media? What are the responsibilities of both media sources regarding the authenticity of the news items they create and circulate?</p>
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<p>Edwards, Fionn</p> <p>Supervisor: Rosane Minghim</p>	<p><i>DHIT and Cyber Crime</i></p> <p>Introduction</p> <p>The aim of this study was to explore public perceptions of cybercrime and how gardaí treats these types of crimes, more specifically it sought answers from the public and a leading national victims helpline on how best to equip An Garda Síochána with the practical tools and techniques to tackle cybercrime. Since the explosion in the use of digital technology, frontline gardaí have to deal with an increasing volume of reports by victims of cybercrimes. There has been an acknowledged lack of State investment in training and equipping gardaí with current tools and techniques to investigate these crimes.</p> <p>Public expectation is for gardaí to not alone investigate these crimes, but to keep up-to-date with the latest developments.</p> <p>Visual data analytics compiled from the collection and analysing of data from a EU Open Data Portal report titled 'Europeans' attitudes towards cyber security' helped to show how critical an issue cybercrime is in the public's mind and how important it is to arm police forces, like An Garda Síochána, with the right tools and techniques.</p>
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An Exploration of the Phishing World

The aim of my project was to provide a greater understanding into the world of Phishing. My project tackles this topic from 4 angles ;

- How to identify a scam
- The Vectors used to scam.
- The consequences of being scammed.
- How to protect ourselves from scams

Then I designed a website in which to educate people on my findings such as,

- Being able to review the language used by scammers to identify a phishing attempt.
- Showing how slight alterations to a Major company email address can lead us to being scammed.
- The use of text message and phone calls as other vectors in which to scam.
- The different types of malicious content they can infect your system with such as Spyware & Malware.

The project will also include an interview with a business owner who fell victim to a Phishing scam and how they hope to prevent such an attack occurring in the future

Keywords: Phishing, Cybercrime, Hacking

Technologies: WordPress, Email, Microsoft

Fennell, Patrick

Supervisor:
Gavin Russell

How UI can resurrect statistics/usage for once a task that has been deemed as tedious?

UI and the User: Rekindling the Likeness of Task Completion of Tedious Tasks by the User

Objective

The objective of this project was to research Usability, it's issues and their prospective solutions that would verge on innovation. The idea was to determine current UI conventions and determine their downfalls and the possible ways in which processes can be preserved together with the users drilled in ideas of UI conventions, while simultaneously overhauling the usability without introducing a learning curve for the user.

What was Achieved

The research gathered was condensed down into an interactive website which can display through educational means the differences in UI conventions while also proposing thought experiments to engage the user cognitively , without simply depending on passive reading.

Keywords: UI, Usability, Design, UX

Technologies: Atom

**Glebicka,
Aleksandra**

Supervisor:
Gavin Russell

An investigation into Mary Shelley's authorial style related to her parents - using computational literary analysis.

Literary Analysis to compare Mary Shelley's authorial style against her literary parents, William Godwin and Mary Wollstonecraft.

Hyde, Lucy

Supervisor:
Orla Murphy

The project involved a research investigation into how or/and if Mary Shelley's authorial style relates to her parents, William Godwin and Mary Wollstonecraft, with the aid of a computational analysis software in R called 'Stylo'. The research methods centered around using the 'Stylo' software package to pull comparisons, trends, similarities from a collected corpus for each respective author and investigating and evaluating the resulting graphs and data produced and explore what these graphs and data visualisations revealed. An aim for the concluding evidence was to see if there were hints of familial resemblance in the writing styles of the three authors and to what extent if such resemblances were present. Five written pieces of work from each individual author were collected for the analysis and investigation.

Keywords: Stylometry, Mary Shelley, Analysis,

Technologies: R, Stylo

Do the use of digital tools in radio production and dissemination affect commercial and community radio equally?

Can you imagine a world without radio?

This project looks at the expansion of digital access across both commercial and community radio and their uses of digital space for producing and disseminating content. During the year, this project wanted to see the world from a radiojournalist's perspective to observe how their workplace is changing as the introduction of digital resources move towards radio. It was key to listen to voices from across the radio community to help this research obtain a grasp on how the world of journalism has changed shape because of digital influences.

Within its research, this project obtained sources from well-known commercial radio stations as well as local community radio stations; each source offered their own perspective on how digitally-driven ideologies drew a map to the future of audio technology. This project also looks at the changes with digitally-driven audio media in Ireland and where possible opportunity cost has hit the radio industry.

Keywords: radio, digital, world

Technologies: digital technologies, FM frequencies, audio technologies

Keeley, Fiona

Supervisor:
Shawn Day

<p>McCann, Henry</p> <p>Supervisor: Máirín MacCarron</p>	<p><i>Has technology made the game of Soccer more enjoyable for fans?</i></p> <p>My objective was to use data and a number of key components of the game to measure whether the introduction of technology into the game of soccer has made the game more enjoyable for fans.</p> <p>To achieve this objective, I created a survey with questions that were inspired by my research and literature review to gather the necessary data from soccer fans. After completing my research, I used my findings and data to produce a number of articles that I published on a digital media platform which I created called 'The Impact of VAR'. I added a Creative Commons license onto the platform to enable the free distribution of my project to allow others to share, use, and build-on my work.</p> <p>Over 70% (73.6%) of the survey respondents said that VAR has made watching Premier League soccer matches less enjoyable. I will give an insight into the significance of this finding using data I have gathered from an extensive literature review, and the questions in my survey.</p> <p>Keywords: Soccer, Fans, Sport</p> <p>Technologies: VAR, WordPress, Data-Visualisations</p>
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<p>McCormack, Neasa</p> <p>Supervisor: Orla Murphy</p>	<p><i>The Impact of Wearable Technology on Fitness</i></p> <p>The aim of this project is to investigate the impact of technology on participation in fitness. Here we will study the use of fitness technology among participants and find the most desirable features included in these technologies. Through research and the creation and distribution of a survey we will identify if technology has had a significant impact on participants willingness to exercise. Look at behaviour changes from fitness technology, as well as the main reasons for males, females, and non-binary people to use fitness devices. There will also be screenshots from the website which is being created to display this data, showing the most popular features of a fitness device, fitness app usage trends, and the history of fitness tracking technology.</p>
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How can gamification educate us on the prospects of supporting local business

Motivation Behind Project

Due the current Covid19 pandemic, local businesses are marketed across social media more than ever before. The idea behind this project was to create an engaging, playful way that the benefits of supporting local businesses could be made aware of. After discovering that gamification is frequently used in classrooms to create motivation and engagement, I decided to use it as a way to educate people on the prospects of local businesses. Research on gamification elements and features was conducted in order to create the most engaging and interactive game as possible. The goal was to design a game that when a user plays, they gain informative facts about local businesses and the benefits of supporting them.

Artefact Developed

A serious game was created using gamification elements. Several interviews were conducted in order to learn what people didn't know about shopping local. This helped to inform the design of the game and create the facts people needed to learn. The design of the game was created using storyboards, then developed and put to action using Twine. A multiple choice narrative quiz with rewards and many other features was created with the intention of educating the players of the game.

Keywords: Local, Business, Ireland, Gamification, Education, Serious

Technologies: Twine, HTML, CSS, Javascript, Code, Github

**Morrissey,
Chantelle**

Supervisor:
Laura Maye

<p>Newing, Danielle</p> <p>Supervisor: Máirín MacCarron</p>	<p><i>Rectifying histories lack of diversity through technology: An investigation into unsung female heroes of the 20th Century</i></p> <p>An examination into 20th century female heroes excluded from history in an attempt to bring some attention to their stories. Following this, researching how much women are included in history textbooks, the resulting impact on students and teachers and the development of a resource for teachers to use with information on each story. An initial literature review was conducted to identify viable sources. Through research and examination results show that the impact of having no representation in history books negatively impacts children and their view of the world. Not representing women in textbooks may influence a young girl's future choices regarding careers and other aspects. The methods teachers use to teach boys and girls may also be influenced negatively. Furthermore, when women are featured in history textbooks, they're usually represented as a group of people fighting oppression. There is also a focus on women's personal history. Following this, a website was created using WordPress and other tools as a resource for teachers to use when searching for new stories or information to include in their teachings.</p> <p>Keywords: history, women, students</p> <p>Technologies: website, wordpress, powerpoint</p>
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<p>O Halloran, Tadhg</p> <p>Supervisor: David Murphy</p>	<p><i>Visualising the Horgan Brothers photographic collection.</i></p> <p>Decades of digitization from cultural institutions such as museums, libraries, and archives have made vast amounts of digital cultural material available online. This massive amount of digital cultural heritage data should offer increased levels of access and new modes of engagement for academics and casual users yet the main interface to access these collections is still the search box which is incapable of representing this abundance. Using the concept of "generous interfaces" I will use a web-based visualization system to visually explore the Horgan Brothers Collection of photos held by Cork County Library. The system will provide a rich, browsable interface that will reveal the scale and complexity of the collection. By applying machine learning models to the collection I will visually trace characteristics across the collection by using computer vision algorithms such as image analysis, object detection and image similarity.</p> <p>Keywords: cultural heritage, data visualization, photography, computer vision, libraries, machine learning</p> <p>Technologies: HTML5, CSS3, Canvas / WebGL, pixi.js, d3.js, TensorFlow.js, ml5js,</p>
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Exploring the Significance of Online Communities for Small Eco-Friendly Businesses.

Research

This project analyses the importance of **online communities** when building small eco-friendly businesses in an increasingly commercial online environment. Recent years have seen a surge in the use of online communications for marketing by all businesses. Creating a community on social media allows entrepreneurs to informally engage with consumers, creating an atmosphere of **trust** and **satisfaction**. These online communities form around shared interests such as the environment. Through desk research, interviews and surveys, the objective is to develop a deeper understanding of how engaging in an online community benefits small business owners.

Digital Artefact

This project included a qualitative case study whereby a website was designed and implemented for a local entrepreneur selling natural products. Using **people-centred research**, a survey was completed by potential users giving feedback on the website's usability. The value of online communities is analysed further with survey results from participants who engage in social media to sell their products. Through **iterative development**, this project delivered a fully functional, tested, social media integrated, e-commerce website.

Keywords: online community, iterative development, people-centred research

Technologies: e-commerce solution, WordPress, CMS, social media integration

**O Herlihy,
Michelle**

Supervisor:
Orla Murphy

<p>O'Connell, Sean</p> <p>Supervisor: Mike Cosgrave</p>	<p><i>How Gaming habits have changed and how people use it to socialise</i></p> <p>How Gaming habits are changing, and how people use it to socialize</p> <p>Gaming has become a massive influence on our lives. It has become the most consumed form of digital media in the world. Today, it is also an extremely common form of socialising, especially given the current pandemic as face to face contact has been severely limited by the repeated lockdowns. Gaming offers people the chance to escape the monotony of everyday lives in ways that other forms of digital content cannot.</p> <p>My project focuses on exploring the relationship between our habits concerning gaming and what if any methods or tools are used to help connect people through games. Additionally my artefact focuses on creating a social network specifically designed at grouping individuals who are looking to play the same kinds of games.</p> <p>Keywords: gaming, social, connecting</p> <p>Technologies: wordpress, python,</p>
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<p>O'Donovan, Emily</p> <p>Supervisor: Utz Roedig</p>	<p><i>Exploring the end of end to end encryption</i></p> <p>A security report on potential future data breaches</p> <p>This project is an exploration of a number of potential scenarios which would cause massive data breaches with the end goal of producing a security report on those scenarios. This project is an investigation on how the world would look like and what would the implications if end to end encryption would not be available.</p> <p>The investigations into a number of these scenarios which are simulated through the use of personas are being explored for the purpose of investigating their impact on both society and the individual end user. The digital artefact for this project is an animated video which presents the findings of the security report in an easy to understand format. The artefact has the goal of preparing the viewer for one of the scenarios presented in the report and identity theft in general.</p> <p>Keywords: report, security, case study, scenario</p> <p>Technologies: encryption, security</p>
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<p>O'Flynn, Cathy</p> <p>Supervisor: Shawn Day</p>	<p><i>How can Data Visualisation lead to deeper engagement with data-driven dissertations</i></p> <p>Data Visualisation is not a new concept but many degrees still require the same static printed dissertation that limits its use. There are many new coding-languages such as D3 and websites such as Flourish that facilitate the easy creation of interactive graphs and cartography but there is still little research as to how these may be advantageous to future students completing research projects. By utilising historical economic datasets from 2 different sources in order to create several interactive and user-friendly visualisations using both D3 and Flourish, I plan to investigate how visualising data can increase user-engagement, interest and awareness in relation to data-driven narratives and how data visualisation can be beneficial for future dissertations.</p> <p>Keywords: data, visualisation, dissertations</p> <p>Technologies: d3, flourish, javascript</p>
<p>O'Connell, Niamh</p> <p>Supervisor: Gavin Russell</p>	<p><i>How cybersecurity threats and attacks along with leaving a digital footprint can affect the common and commercial user</i></p> <p>Objective</p> <p>This final year project aims to demonstrate the effects of cybersecurity attacks and threats among both common and commercial users. An analysis is conducted on the reasons behind cyber-attacks along with the impacts they perceive on both users. The overall goal is to identify the impacts and to research the effectiveness of online security awareness training. To assist this research project, a website was created and designed concerning cybersecurity awareness training. The website contains three elements, an interactive quiz created solely from HTML, CSS, and JavaScript with ten questions aimed to test your knowledge, giving a score at the end along with personalised tips. The second element is the tips and tricks page in which it is assisted visually with graphs, data, and interactive information to help online safety. The last element of the website is the interactive timeline in which a depth timeline is analysed from the three most common cyber-attacks, DDoS, worm, and ransomware.</p> <p>Keywords: cybersecurity, quiz, interactivity, attacks, website</p> <p>Technologies: atom</p>

<p>O'Drisceoil, Barra</p> <p>Supervisor: Orla Murphy</p>	<p><i>How pop culture defines cities and infrastructure</i></p> <p>The purpose of this project is to demonstrate a method in which to showcase filming locations of movies and tv shows in Ireland. I have found that there was no place dedicated to such a project and I believe it has a lot of potential, especially in the field of tourism where visiting filming locations of popular movies and tv shows has grown exponentially in recent years. In this project I used HTML to demonstrate how this would be achieved (as opposed to Omeka or Wordpress) and also touched on CSS in the design process. SVG also played a part in the code. The outcome I hope to achieve with this project would eventually be used for potential tourism by tapping into a market that explores pop culture. There's also the possibility of being used by a governmental agency in an attempt to lure major productions here by showing them what we're capable of doing.</p> <p>Keywords: Pop culture, Tourism, Movies</p> <p>Technologies: HTML, Mapping, SVG</p>
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<p>Radwan, Yasmine</p> <p>Supervisor: Orla Murphy</p>	<p><i>Building an Assignment Calculator to support student learning at UCC.</i></p> <p>Constructing Knowledge Through Meaningful Activity: Applying Constructivism to the Creation of the Assignment Calculator.</p> <p>Educational practitioners are transforming how students are experiencing pedagogy as a result of digital learning. By being cognizant of learning theories, specifically constructivism, in the creation of educational tools, teachers can better aid students in their academic studies. Constructivism is useful in this approach, as it emphasizes how learners construct knowledge based on experience. This project focuses on applying the main principles of constructivism, to the creation of a digital tool for students in higher-level education, the assignment calculator. Originally created by the University of Minnesota Libraries, the Assignment Calculator is a web-based app that generates an essay writing schedule based on each students' unique deadlines. This tool has been re-created under the UCC Skills Centre, an academic development department. By providing this tool through the Skills Centre, I hope to identify how this can support a more authentic, well-rounded learning experience for students in higher education. Keywords: Assignment Calculator, Constructivism, Educational technology Technologies: Web Application, Web Hosting, Client-side code</p>
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"Implementation of a neural network to investigate creative capabilities of Artificial intelligence"

Can machines think?

Many scientists are convinced that someday they will be able to think just as well as humans can, but maybe today this question is too simplistic. Perhaps a better question is, "What can machines currently do that is *like* thinking?"

Ryan, Mark

Supervisor:
James Doherty

Artificial Intelligence is certainly good at categorising information and making predictions from massive data sets. Performing calculations is a *form* of thinking, but this project is more concerned with capabilities normally associated with higher human thought; namely, creativity.

This project will implement a recurrent neural network (utilising machine learning libraries) that has been trained to write musical melodies. It will also investigate the philosophical implications of a creative computer. If something is capable of generating valuable novelties, does that make it more like a human?

Keywords: Creativity, Intelligence, Philosophy

Technologies: Artificial Intelligence, Machine Learning, Artificial Neural Network

<p>Shiel, Jack</p> <p>Supervisor: James Doherty</p>	<p><i>The potential negative and positive effects that the advancement of artificial intelligence</i></p> <p>Research</p> <p>This project will delve into the possible consequences that will come with society becoming totally reliant on artificial intelligence. The areas which I have particularly focused on is the impact that this advancement could potentially have on the working world and also, whether or not the introduction of artificial intelligence into everyday life could broaden the wealth gap in society. Numerous issues are analysed in my research such as the ethics surrounding artificial intelligence, and how to implement different legal restrictions to prevent areas of poverty being left behind as society progresses into a new era.</p> <p>Digital Artefact</p> <p>For my digital artefact, I collected statistics from different individual countries who are in the OECD (Organisation for Economic Co-operation and Development) in order to get a grasp which countries are the most, or least, advanced with regard to jobs being automated. Finally, I illustrated these statistics using Tableau in order to visualise my results.</p> <p>Keywords: Artificial Intelligence, Automation, Wealth Gap</p> <p>Technologies: Tableau, Excel,</p>
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<p>Stout, John</p> <p>Supervisor: James Doherty</p>	<p><i>Insights into academic texts through text and data analytics</i></p> <p>A Better Abstract - Rating Academic Abstracts and Creating an Accurate Summary to Streamline Knowledge Transfer</p> <p>The goal of this project is to research and develop a method for analysing academic texts, identifying key concepts and themes, and conveying those concepts in a manner that is easily understood at an appropriate level for the user. Exploring how to break down language into its most basic elements and how to extract meaning in the most efficient manner is in essence what this project is about, along with applying principles of data analytics in order to interpret this meaning and convey it in a manner that is more concise. An additional feature of comparing the abstract to the main body of the paper and generating an accuracy rating will allow for papers over a certain level to not require a summary as a highly rated abstract should fulfil this requirement.</p> <p>Technologies: Data Analytics, Stylometry, Text analysis, Natural Language Processing</p>
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<p>Traynor, Daniella</p> <p>Supervisor: Shawn Day</p>	<p><i>How Can Close Mapping Demonstrate Socio-Economic Change in an Urban Setting?</i></p> <p>Mapping Hyperlocal Socioeconomic History</p> <p>The purpose of this project is to explore how deep mapping and digital tools can enhance our understanding of socio-economic history in culturally rich urban areas. Can developing a new method for interacting with archives and information, enhance our knowledge of local history? Is it possible to use digital tools to explore historic data in a more engaging way?</p> <p>By combining deep mapping, geographic information systems and media archives, I created ExploringSHUA, a process for increasing engagement and interaction for people exploring hyperlocal socio-economic history.</p> <p>Keywords: ArcGIS, Digital Archives, Deep Mapping, Socioeconomics, Digital History</p> <p>Technologies: Python, GIS, StoryMaps, D3, Flourish</p>
<p>Walsh, Louis</p> <p>Supervisor: Sabin Tabirca</p>	<p><i>Fire Risk Assessment Calculator of Irish Forests</i></p> <p>##This project calculates the risk of fire in 14 given forested areas on an interactive map in the Republic of Ireland. ##The calculator uses Java Script to aggregate five factors which generates a fire risk assessment score. ##the page is made using HTML and CSS. ##Three of the five factors are hard coded and the temperature is fetched from an API and the soil moisture content factor is manually inputted . ##This score is then displayed in a colour coded format. ##The score scale is from 5 (which is the lowest) to above 38 . The colour code function displays the the score in either green(low risk), orange (medium risk) or red(high risk).</p> <p>Keywords: Forest fire, Interactive map, Fire risk assessment calculator.</p> <p>Technologies: HTML, CSS, Java script</p>

Conserveire

Digital Behavioral Intervention Platform to Reduce Residential Energy Consumption in Ireland

Anthropogenic pollution has catalyzed unprecedented concentration of greenhouse gases in the atmosphere. Ireland's current greenhouse gas emissions represent a gross failure to achieve binding greenhouse gas emission targets established in the Paris Agreement. This failure is projected to continue with current national climate change plans. Residential energy consumption is a significant contributor of carbon dioxide emissions in Ireland.

Radical changes in climate change plans are required to meet these targets, and the necessity for increased citizen engagement and behavioral change is recognized. The 'Conserveire' platform has been developed to address these issues in the context of residential energy consumption. Features implemented in this platform are informed by demonstrably effective behavioral intervention strategies targeted at energy-related behaviors, leveraging several theories of social psychology. This platform is suitable for evaluation under a longitudinal study to evaluate its effectiveness, the findings of which will inform potential public deployment.

Keywords: Climate Change, Psychology, Behavior

Technologies: Django, Python, SQL

Weaver, Conor

Supervisor:
Mike Cosgrave