CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

DEPARTMENT OF COMPUTER SCIENCE

4th YEAR PROJECT SHOW 2018

Architecture Factory – May 9th – 17:00 to 19:00

I'm delighted to invite you to the 4th year Project Show 2018 for the Department of Computer Science at Cork Institute of Technology. The show will be held on Wednesday May 9th from 17:00 to 19:00 in the Architecture Factory, Melbourn Building, Bishopstown Campus.

On display will be final year project poster presentations by students from our honours degree programmes. These projects demonstrate the quality of CIT Computer Science graduates and their ability to solve real world problems.

Please join us on the day for what promises to be a great celebration of our students' achievements.

Tim Horgan, Head of Department

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Student Name: Aaron Dunlea	**Supervisor:** John O Brien
Project Title: Motorcycle Emergency Response System	
Research Question: Can the number of fatal motorcycle crashes be reduced by having a faster response time by emergency services?	
Project Abstract: MERS is a mobile application that focuses on reducing the amount of time that it takes for emergency services to be contacted in the event of an accident. Using the accelerometer already located in most modern smartphones it would detect a sudden drop to a sudden stop of a rider and register this event as a possible crash. Once triggered, this application would let out an alarm of sorts notifying the rider that if they do not turn off this feature before a certain amount of time has been elapsed then emergency services or a pre-set emergency contact would be notified with the location of the rider based off of the phones location services. As well as this, the application will be configurable to contain the riders essential medical information (e.g blood type, date of birth etc.) which will also be sent out in the text message giving the contact as much info as possible.	
Technologies used: Java, Android Studio, Android, Google Maps, Maven, Firebase	

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Student Name: Adam Cotter	**Supervisor:** Ruairi O'Reilly
Project Title: Tradesmen Website	
Research Question: Can a tradesmen website help benefit both homeowners and tradesmen by providing them with an area to market themselves?	
Project Abstract: The aim of this project is to provide a website through the use of a content management system which is known as Drupal. It will help two user types which are tradesmen and homeowners by bridging a gap that is currently there as many tradesmen have the skills but they do not get the recogniton for their work which leads them to not have enough work during certain periods of the year. The website will allow the tradesmen to market themselves on the website, while allowing homeowners to display jobs that they need done in their homes. Both parties will be able to contact one another through the website via a messaging system, from there they can arrange a viewing of the job.	
Technologies used: Drupal, Acquia, Javascript and HTML	

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Student Name: Adam Manley Kelly	**Supervisor:** Meabh O'Connor
Project Title: An Investigation of RFID Security	
Research Question: How susceptible are current RFID systems to attacks and what can be done to improve upon them?	
Project Abstract: RFID Technology today is found everywhere in everyday life, from 'Tap to pay' bank cards, student cards, travel cards e.g. leap cards, hotel room keys and general access cards, each containing an RFID tag. Smart-phones today have a feature called NFC, a small antenna inside the phone allows the device to communicate data with an RFID reader as if it were an RFID tag. NFC enabled Smart-Phones are typically secured with a password/code, a fingerprint scanner or facial recognition, making them instantly more secure than a standard RFID tag. Security surrounding RFID technology is dependent entirely on the user, RFID tags are able to be read and copied discreetly from a distance leaving the attacker with an exact copy of the tag. The aim of this project is to investigate the current standards of security surrounding this technology and its future	
Technologies used: RFID, NFC, MIFARE, Java, Android, Firebase	

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Student Name: Aidan Mitchell	**Supervisor:** John O Brien
Project Title: An Intelligent Honeypot	
Research Question: What is the effect of incorporating intelligence into honeypots?	
Project Abstract: Honeypots are an essential element in current cyber defensive arsenals. With IT becoming such a large part of the world, malicious attacks such as the Wanna-Cry virus are growing in numbers. Honeypots are a way of trapping these attackers before they even get a chance to get in to your system. This project involves the creation of an intelligent honeypot for network monitoring. The basic premise is for the honeypot to respond positively to attacker vulnerability probes. For example, if port 445 is probed then the honeypot takes on a windows profile and simulates vulnerability for a SAMBA attack. The honeypot could potentially simulate multiple simultaneous personalities/profiles. This will, if successful, confuse the attacker and obfuscate network profiling and thus improve the security of the system.	
Technologies used: ScaPy, Python, T-Shark, CentOS, VMware Workstation	

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Student Name: Alan Buckley	**Supervisor:** Denis Long
Project Title: Identifying Cyberbullying and Analyzing Emotions in Twitter	
Research Question: Can we detect cyberbullying and analyse emotions from a Twitter users tweets?	
Project Abstract: The purpose of this project is to create a web application which allows primarily Parents,Guardians, Mentors, Loved ones etc. to monitor the Twitter activity of the children in their lives. It is a tool designed to detect cyberbullying using a machine learning and lexicon based algorithm as well as analyze the emotions displayed in tweets to monitor the emotional health of today's youth.	
Technologies used: Django, python, sqlite3, html, bootstarp, Git, CSS	

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Student Name: Alan Kelly	**Supervisor:** Meabh O'Connor
Project Title: A Distributed Control System IP Scanner & Monitor	
Research Question: Can a DCS monitor reduce the downtime of a DCS and therefore increase production?	

Project Abstract:

Distributed Control System(DCS) is a control system, that is specifically designed to handle processes in an industrial setting. DCS's are made up many individual parts but the four main elements are: Engineering PC's, Controllers, Operator Interface Terminal(OIT) and transmission infrastructure.

Due to the extensive number of nodes essential for the faultless operation of the DCS a staggering amount of data is generated. This data can vary in importance but could be anything from the time an active pharmaceutical ingredient(API) batch started to sensor data required to track the variances in the batch.

One of the many issues facing the Pfizer API plants is there isn't a specific monitoring system available for monitoring DCS's. Thus for this reason it is essential that the DCS components require constant monitoring by human operators.

The primary goal of this project is to create and implement an application that can send alerts via email to selected individuals when issues are detected on the DCS's nodes. The ability to scan the DCS's networks and record the
required data with respect to each node is fundamental to this application's success.

Technologies used:
C#, SQLite, Visual Studio, GitHub, .NET, Wireshark, TCPDump, BHyVe Hypervisor

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Student Name: Alan McGrath	**Supervisor:** Mary Davin
Project Title: Barker-Improve the Interactivity with Our Dogs!	
Research Question: Can we use Internet of Things to improve the interactivity with our dog?	
Project Abstract: Internet of things is the inter-networking of physical devices embedded with electronics.Via software, sensors, actuators and network connectivity, these objects can be controlled remotely to collect and exchange data. The use of Internet of Things is forever growing as it can be used in a multitude of ways. In this project, we want to use the Internet of Things-based sensors so as to improve the interactivity with our dog. Primarily tracking movement patterns to track dog whereabouts and ensure the safety of the dog. With the aid of GPS and Google Maps, the user will be able to see in real-time exactly where their dog is. There will also be a social network included in the application to enhance the social aspect of dog walking. User can add friends and message to organise dog walks together.	
Technologies used: Android Studio, Android, Arduino, Firebase, Google Maps	

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Student Name: Aleksander Chmiel	**Supervisor:** Ruairí O'Reilly
Project Title: Heart Monitoring Solution using Activity Tracker Data	
Research Question: Can Activity Tracker data be used to facilitate a monitoring solution for health improvement?	
Project Abstract: With increasing popularity of activity trackers, the need to make use of health-related data has been on the rise. This project develops a general purpose monitoring solution for the continuous acquisition, analysis, and visualization of that data. The solution will analyze the data in terms of Heart Rate Recovery, Resting Heart Rate, and Maximum Heart rate over long period of time. These data analytics aim to help users acquire necessary knowledge and progress about their health.	
Technologies used: C#, ASP.NET MVC, Entity Framework, Plotly, jQuery, HTML5, CSS3	

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Student Name: Alex Barbarosie	**Supervisor:** Vincent Ryan
Project Title: Fibre Channel SAN: A Port Management Tool solution	
Research Question: Can the status of a Switched Fabric be monitored and updated in a live environment?	
Project Abstract: The overall goal for this project is to provide a tool for administrators to utilise for the purposes of documenting/viewing the status of individual f_ports on a switched fabric topology. Currently, the only management tools available on the market simply serve to provide a single system view of the connected devices or require costly licensing to acquire the aggregation reports needed. However, an administrator cannot view/reference the ports that are not in use without having to check physically on the switch or the associated cables connected. This inconvenience creates huge expenditure in the long run in relation to the Fibre Channel/HBA infrastructure due to continual impulse purchases of said components. The core requirements for this project to succeed relies on the development of a Graphical User Interface (GUI) to facilitate a vendor specific API that can output the status of a switch's port status and represent the information graphically. This GUI will aid the user in cross-referencing active, passive, and empty ports based on the output given.	
Technologies used: Brocade based API, Python, PyQt, QT Designer, Paramiko	

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Student Name: Alex Kirwan	**Supervisor:** Ruairi
Project Title: Exploratory Data Analysis On Cryptocurrency Markets & Community Activity	
Research Question: Can time series analysis techniques provide a features selection model	
Project Abstract: Use time series analysis techniques to extract meaningful statistics and other characteristics from the data with the aim of providing better feature selection based on lagged correlation and causation effects between time series. The analysis is conducted on the activities occurring within the cryptocurrency community and the media that surrounds it. Using the feature sets selected by the time series analysis methods, machine learning models are evaluated against traditional black box procedures.	
Technologies used: Golang, Doker, GRPC, NATS, Puthon, Pandas, Matplotlib, Statsmodel	

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Student Name: Andrew Mintern	**Supervisor:** Ruairi O'Reilly
Project Title: Analysing sensor technologies to determine their suitability in the sport of rugby	
Research Question: Can technology be utilized to reduce human error in the referee's and Television Match Official's(TMO) decision making	
Project Abstract: The aim of this project is to examine existing goal-line technologies and sensors from various sports and apply the most viable option to the field of play in Rugby Union along with a GPS ball tracker that can detect a forward pass	
Technologies used: Raspberry pi, breadboard, jump wires, LDR, photoelectric sensors, LCD Screen, GPS Tracker	

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Student Name: Brain Sarsfield	**Supervisor:** Meabh O'Connor
Project Title: Machine Learning in Video Games	
Research Question: The goal of this project was to explore the use of a neural network to provide more advanced AI to non-playable characters in video games.	
Project Abstract: Basic forms of artificial intelligence have been used in video games since the earliest examples of what would later be called 'video games' first started to appear in the 1950's. However, the type of AI used in most modern games, while having evolved in complexity and scope, is not what could truly be considered AI. This is because the techniques used do not constitute active decision making or implementing machine learning techniques; but rather is implementing a predefined state which is triggered by a user's action. Non-playable characters could implement more realistic behaviours by using machine learning algorithms that would take far longer to code conventionally and make NPCs more resilient to a user's actions.	
Technologies used: Unity, C#, Visual Stuido	

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Student Name: Brian Coveney	**Supervisor:** Ignacio Castineiras
Project Title: Mobile App for Speech Therapists	
Research Question: Can we create a mobile app to assist speech therapists on their sessions with children?	
Project Abstract: Speech therapy is the science that specialises in the evaluation, diagnosis, and treatment of communication disorders, cognition, voice disorders, and swallowing disorders. It includes word finding issues, social communication difficulties, structural language impairments, literacy impairments, voice difficulties and cognitive impairments. Gamification is the term used for the application of game-design elements and game principles in non-game contexts. In this project we create a mobile app allowing speech therapists to introduce interactive gamification-based activities during their sessions with children.	
Technologies used: Java, Android Studio, CMU Sphinx, MVP, Dagger 2, mongoDB, Git, GitHub, JUnit, Jenkins, AWS, Firebase, Google Maps	

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Student Name: Brian Reynolds	**Supervisor:** Ignacio Castiñeiras
Project Title: CIT Timetable Automatic Scheduler	
Research Question: Can we solve the CIT-specific Instance of the Academic Timetable Problem?	

Project Abstract:

In mathematics, computer science and operation research, optimization is the selection of a best element from some set of available alternatives. A combinatorial Optimisation Problem is in which an optimal solution must be identified from a finite set of candidates.

The problem of coming up with an optimal timetable for CIT lectures and labs is a Combinatorial Optimisation Problem. A feasible assignment on scheduling lectures/labs implies assigning each module to rooms, such that there is no lecture/room clashes in terms of time, and rooms are big enough so as to fit all of the students taking the class. Different criteria can be established to consider a feasible solution better than another one, including the gaps between classes, moving each group as little as possible, etc.

The idea is to apply optimisation techniques to the problem with the aim of setting up a tool for finding at least feasible solutions to the problem.

Upon completion, this scheduler should benefit both students and lecturers, as timetables will be created with efficiency in mind. Success will be measured based on the timetables that are created as an output. A successful outcome will have a single lecture/lab assigned to a single room at any given time, with enough seats inside the room for each student.

Technologies used:
Java, JavaFX, Firebase, Eclipse, Android Studio, GitHub, Dropbox

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Student Name: Cian Dowling	**Supervisor:** Ignacio Castineiras
Project Title: Optimised Travel Routes For Tourists	
Research Question: The problem this project is based around is the lack of an advanced route planning applications for tourists to use when visiting destinations in a city.	
Project Abstract: In this project, I investigate the well known traveling salesman problem. I discuss solutions and propose a plan for application that uses this solution to enhance tourist attraction routing. I also developed an easy to use android application that allows a user to plan an optimised route in only 3 steps. The application implements a greedy algorithm , to find a near optimal route. It factors in opening times , closing times , estimated time needed and travel times to generate a route from the attractions entered.	
Technologies used: Android Studio, Java, Google Places API, Google Maps API, Git, Maven, XML	

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Student Name: Cian Woods	**Supervisor:** Ruairi O' Reilly
Project Title: VoiceKit - Create Your Own Alexa Skills Without Coding	
Research Question: Is it possible to reduce the barrier of entry and allow anyone to create skills for Amazon's Alexa.	
Project Abstract: The main aim of VoiceKit is to give organisations and individuals the ability to create skills for Amazon's Alexa without needing to know how to code or spend a fortune on development. As the use of digital assistants rise and natural language processing is becoming more accurate and the availability of digital assistants on almost every smartphone our society is using their voice more than ever to get tasks done online. This means businesses need to adapt quickly and no longer just need a website or a Facebook page. They need to be available everywhere. VoiceKit makes the process of getting your information on to the Alexa digital assistant much easier than ever before. It provides a friendly user interface that gathers all relevant information given by it's users to develop a skill for Alexa. Later, VoiceKit provides the ability to monitor skills and gather queries asked by users so that the skill owner can learn about the most requested information and refine the skill accordingly.	
Technologies used: HTML, CSS, VueJS, NodeJS, CoffeeScript, MySQL, ChartJS, Lambda, S3, Docker & Kubernetes	

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Student Name: Clara Martin	**Supervisor:** Meabh O'Connor
Project Title: Honeypot Investigation	
Research Question: An investigation into a number of honeypots to learn how to install them, attack them and gather the attack results in order to understand the attacks and learn how to prevent against them.	

Project Abstract:

In today's society, network security is of paramount importance as we connect more and more machines and devices to the internet. Attacks can be directed by hackers at any and all of these devices, exploiting vulnerabilities and this can seriously damage servers, clients, IoT devices and mobile phones, just to name a few. In order to learn about these attacks and figure out ways to block and combat them, research is required to simulate attacks and study the effects of each on a system.

A honeypot is one such method that is used in cyber defence to attract attackers. A machine is set up to look like all other machines but it is actually being monitored securely and appears to offer something of value to hackers to entice them to attempt to attack it. Once a hacker attacks, they can then be blocked from the system, blacklisted using their ip address and probed ports can be shut down.

The purpose of this project is to investigate some currently available honeypot software to learn how to install each honeypot, to attack them and to study the logged results of the attacks. Once we know the attacks being used we can then take steps to counteract these attacks. For example, if a TCP Connect Scan is being used against a machine it can be avoided by making sure port 445 is closed so no connection can be made from an attacking machine.

For this project I am investigating 3 different honeypots:

- A Honeyport, which is a simple version of a honeypot that listens for incoming connections on a specific port.
- A phpMyAdmin honeypot which reacts to access of the login page and successful /unsuccessful login attempts.
- A Honeytrap which is used to catch attacks against TCP and UDP services.

Technologies used:
VMware Workstation, LAMP Server, phpMyAdmin, Kali Linux, Nmap

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Student Name: Colin Murphy	**Supervisor:** Seamus Lankford
Project Title: Engineering Excellence	
Research Question: To redesign and modernize a project management system in use by McAfee security.	
Project Abstract: The Engineering Excellence is a project evaluation tool that will allow management to monitor the health of a project on a large scale, by visualizing and analyzing the data and thus increasing the productivity of the organisation by highlighting problem areas. The conception of the excellence engineering dashboard came from a discussion with my manager during work placement - at every quarter, team managers are required to complete a self-assessment form evaluating the progress of that team. The director of each division collects and tracks the progress and health of the numerous projects under their supervision.	
Technologies used: Mongo, Express, React, Node, D3, JavaScript	

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Student Name: Colm Power	**Supervisor:** John O Brien
Project Title: Vulnerability Scanner for IoT Devices	
Research Question: With the rapid increase of IoT devices, how can you manage the security of all these connected devices effectively?	
Project Abstract: In 2018, the estimated number of IoT devices in the world is 23.14 Billion, it is expected that by 2020, there will be an estimated 30.73 Billion IoT devices. As time passes, more and more IoT devices are being introduced into the average household. More connected devices will mean greater security threats and more points of entry into your home network. In a survey of 5000 enterprises, 85% of these are in the process of deploying IoT devices, but only 10% are confident that they can secure these devices. This statistic shows that there will be a serious demand for IoT security in the coming years. The goal of this project is to put a vulnerability scanner on a Raspberry Pi which will have the ability to scan your internal network and inform you of potential security issues on your network. This device will tell you what ports are open, the OS running on each device and will also detect new devices added to the network. This will allow the user to quickly identify which IoT devices on their network require security attention. This project will involve finding out what are the most common vulnerabilities in IoT devices, what devices are most commonly infected, steps which a user can take to prevent infection and the use a threat actor has for taking control of your IoT device.	
Technologies used: Raspberry Pi, Raspbian, Bash, Nmap, AWS, Winscp	

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Student Name: Conor Twomey	**Supervisor:** Mary Davin
Project Title: Detection Of Life Buoys Removed From Their Housing	
Research Question: Is it possible to create a system which will detect when a life buoy has been removed?	

Project Abstract:

This project is to aid in the problem of disappearing life buoys in Cork City or any city. It is very possible that the buoys may be blown away, disappear during floods or even be stolen. According to the Cork City Council, with almost 200 life buoys in the city, 300 replacements are made every year due to vandalism or being lost. This costs €15,000 per year.

This project has a collection of sensors to detect the movement of a buoy which notifies a central system of this movement. This notification could come with a contact to emergency services to assist in case it's needed.

Using Sigfox, a low power wide area network radio technology, a sensor which detects the movement of the buoy will notify a central system designed to listen for the location and movement of the buoy. The central system will then notify users of the issue.

The Cork City Council would benefit from this as it would reduce the costs from tampering with the buoys and make it easier to recover them. Anyone who happens to need a buoy would also benefit from having a much lower likelihood of them disappearing in the moment that they need them.

Technologies used:
Python, Flask, PostgreSQL, Arduino, C++, Sigfox, Git

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Student Name: Daniel Deloughry	**Supervisor:** Cliona McGuane
Project Title: Machine Learning for Parking Reservation and Traffic Management	
Research Question: Can a mobile application be created that can assist traffic management in a busy city centre, by estimating the status of traffic through machine learning, and also by helping motorist find parking?	

Project Abstract:

In a busy city centre (e.g. Cork City) the traffic is heavier more times than others, usually during rush hours in the morning and evening. The heavy traffic levels at certain times of the day can result in a lot of wasted time for motorists.

Another issue is the parking. During busy times there is always an enormous demand for parking. There are many large car parks around the city. These car parks usually fill up. This can be a nuisance for both, the drivers that want to go to a certain car park and other drivers on the road around the car park. It is a nuisance to the driver wanting to go there because they have then wasted their own time, and to other drivers due the increased traffic on that road. Even if there are spaces in the car park, a lot of time can still be wasted though, due to the traffic at the car park.

The objective of this project is to create an Android Mobile Application that shall assist traffic management in Cork City. Motorists shall be able to view details about the car parks in the city. After seeing the details, they shall then be given the option to reserve a space in the car park. The space shall then be reserved for them until they arrive.

In the interests of other motorists desiring to make use of the car park, a space can only be reserved for approximately an hour. So, if a motorist arrives more than an hour after they reserved their parking space, it shall no longer be reserved.

Using machine learning the application shall also inform the user of the predicted status of the traffic. The predicted traffic status shall be in the format of the approximate number of minutes delay going to each car park. This shall be calculated based on previous traffic delays in minutes and other contributing factors, such as the time of the day, the day of the week and weather conditions.

Technologies used:

Google Maps API, Python, Intellij, Pandas, Java, Scikit-learn, Android, Android Studio, GitHub, Firebase, Maven, Gradle, JSON, Spring Boot

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Student Name: David Cantwell	**Supervisor:** Meabh O' Connor
Project Title: Extraction of ESXi Backtraces and Matching of Known Issues	
Research Question: This project is aimed at speeding up and automating aspects of the analysis related to known ESXi crashes.	
Project Abstract: This project consists of a script and database that runs on a Linux server against a customers ESXi log bundle, post purple screen of death. The script will extract key information. With this information we can search a database with known issues, therefore matching the customers crash with one in our compiled database.	
Technologies used: VMware Workstation, JSON, Python, MongoDB, PyCharm, Ubuntu Server	

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Student Name: David Coughlan	**Supervisor:** Cliona McGuane
Project Title: College Pal	
Research Question: Can a system be put in place to help guide students to their classes?	
Project Abstract: Students struggle to find their room or forget about their lecture. The campus can be a daunting environment to both freshers and Erasmus students who are unfamiliar with the layout of the buildings. To help facilitate this process, an application is required to make it easier for students to keep to the assigned schedule and raise the overall attendance by notifying them of their class beforehand and guiding them to the location. This will act as an aid to students to help them navigate the campus and receive information about their daily schedule. The resulting application would feature an Android application with a highly usable interface. The student can see their schedule for the day and choose to see a classes location and the student's current location on a map with its relevant information. The use of push notifications would be used to alert students of their upcoming class with the ability to guide them to the location.	
Technologies used: Android, Java, Google Maps, Firebase, HTML5, CSS, JavaScript, BootStrap, Sass, Beautiful Soup and Python.	

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Student Name: David Cremen	**Supervisor:** John Creagh
Project Title: Mobile Application for Transition Year Students	
Research Question: Mind-Wandering in Students	
Project Abstract: Research into why students mind-wander and how it affects their work ethic in a working environment. Objectives are to provide an app for transition year students who are at work experience in ARUP to stop mind-wandering and provide a platform to educate the students at the same time.	
Technologies used: sublime text editor, phpmyadmin database, phonegap	

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Student Name: David Murphy	**Supervisor:** Ignacio Castineiras
Project Title: Machine Learning For Solar Energy Optimization	
Research Question: Modeling climate, can machine learning regression be used to estimate solar photovoltaic production? Subsequently, how could this inform a strategy of energy optimization in a producer/consumer environment.	
Project Abstract: It is undeniably an exciting time for renewable energy. As governments seek to pursue sustainability in energy production, renewable capacity is sure to increase. To meet the benchmark of 20% consumption of by 2020, Ireland hopes to install a total renewable capacity of 40%.This is encouraging news for people with an interest in sustainable energy, but suggests that much of the energy produced will not see use. Is there any way we could be making more of renewable energy resources? This project will explore energy management for homes with generation and consumption concerns, and how an accurate prediction model of power generation along with process automation could improve renewable energy utilization. The renewable technology focused on will be Solar Photo-voltaic and co-operated on with Solartricity from Bantry, West Cork. MET Data is drawn from MET Eireann's records.	
Technologies used: Python Anaconda distribution, scy-kit learn toolkit, K Nearest Neighbor, Linear Regression	

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Student Name: David Regan	**Supervisor:** Meabh O' Connor
Project Title: Implementation of an Automated TVM Utility	
Research Question: Can an an automated TVM utility be used to affordably improve security in smaller businesses?	
Project Abstract: Threat and Vulnerability Management (TVM) is is the cyclical practice of identifying, assessing, classifying, re-mediating, and mitigating security weaknesses together with fully understanding root cause analysis to address potential flaws in policy, process and, standards such as configuration. TVM is a resource intensive practice for smaller businesses, where the amount of money budgeted to security is usually significantly lower than that of a larger business. My project seeks to address this issue by implementing an Open Source TVM Utility. The Utility can Identify security weaknesses in the network, provide information on the vulnerability and how to fix it, and provide threat intelligence in the form of a PDF report. The Utility significantly shortens the process of completing the tasks involved manually, and all of the technologies used are completely free and open sourced. The aim is to allow smaller businesses to implement TVM practices and improve security in smaller businesses ensuring their survival against larger businesses with larger security budgets.	
Technologies used: Python, Nmap, bash, Kali Linux, Virtualization, Beautiful Soup, ReportLabs, NVD	

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Student Name: Dylan Coss	**Supervisor:** John Creagh
Project Title: Backend as a Service for processing API calls through user defined modules	
Research Question: With the ever growing number of mobile devices such as smart phones, smart watches and embedded systems in smart houses, connecting and processing these devices on a large scale has become difficult. Backend as a service is a alternative to the traditional way of developing backends, providing out of the box services. I aim to provide a simple backend as a service solution, providing a platform for sharing API functionality to quickly build backends.	
Project Abstract: As more and more mobile devices emerge, so does the need to connect them. The process in which these devices are connected, and the functions they serve are often very similar. This has led to development of back-end as a service (BaaS). BaaS is a simple service that is easily implemented by mobile devices or micro-services. BaaS's implement user defined progressing for API calls and often include storage for the client. The ever-growing uses of machine learning will soon demand that these back-end services provide processing for machine learning algorithms. This thesis will research where by user defined modules are written in python to serve API calls in a BaaS environment. The chosen language being python as it's fast, developer friendly and implements some very powerful open source packages for machine learning.	
Technologies used: redis, mongodb, postgres, django, angularjs, docker, bootstrap, json, python, oath2, pycharm, fontawesome	

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Student Name: Eoin Cronin	**Supervisor:** John Creagh
Project Title: EBIA Data Lake Customer Profile Management System	
Research Question: Is there a way to have a centralised view of Dell EMC's customers that are using DELL EMC's data lakes.	
Project Abstract: Due to the merger that took place between Dell and Dell EMC there exists an issue of merging data lakes (which are essentially big data repositories). Within DELL EMC's EBIA Business Data Lake (BDL) team, there is no centralized view of Dells Business Partners and their activities across EBIA on these Data Lakes. These Business partners are the customers that the BDL team support on the Dell/Dell EMC Data Lakes. This creates problems on the BDL teamss part as there is confusion when dealing with customers which causes both wasted time and resources. Customers lack a view of what datasets they have access to on their respective data lakes. This thesis will into the implementation of a solution for the BDL team.	
Technologies used: Angular 5, Spring Boot , REST, maven, angular cli, MySQL, webpack, java, JWT	

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Student Name: Eoin Lynch	**Supervisor:** John O'Brien
Project Title: Genetic Algorithm for the Efficient Stacking of Shipping Containers	
Research Question: Stacking shipping containers to allow for minimum reshuffles when unloading the stack.	
Project Abstract: Year on year, the amount of containers being shipped globally is ever increasing. This puts increased pressure on container terminal operators to handle containers to a high degree of efficiency. Although the number of containers being shipped worldwide is on the increase, the storage space for these containers is not expanding at the same level. Containers are often stacked with no regard for consequences of the unloading time of the stack. The unnecessary re-shuffling of containers is known to contribute a great deal to the overall handling cost per container. This is an area that could be improved through the implementation of an effective container storage plan and would in turn increase the productivity levels of the container terminal as a whole. A genetic algorithm is proposed to generate stacking solutions for a container stack that will require minimum unproductive movements to empty the stack.	
Technologies used: Python, PHP, Ajax, Bootstrap, MySQL.	

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Student Name: Eoin O Driscoll	**Supervisor:** Mary Davin
Project Title: Wild Atlantic Wave	
Research Question: Can a mobile application help surfers to get into the water easier and quicker by show weather conditions and by predicting how good the surf is.	

Project Abstract:

Ireland is home to some of the most iconic landscapes in the world. The Atlantic ocean, for thousands of years, has been creating some of the most beautiful beaches along west coast of Ireland where tourists travel to from all over the world.

The reason that I have decide to choose this topic is that I have spent all my life living on the Wild Atlantic Way. Here I have been exposed to the natural beauty that the route holds and I have taken advantage of every aspect of it. The main problem with surfing is that you never know where is the best place to go at a certain time. Loading up cars with equipment is painful and can sometimes be in vein when there is no surf. My application will eliminate this problem and will make surfers lives easier as well as giving tourist a map of the Wild Atlantic Way with featured beaches on the route map.

This mobile application will address a number of problems that surfers in Ireland face. The application will:

• Allow surfers to get users into the water as efficiently as possible.
• Allow for users to view weather conditions fro a specific beach at that current time.
• Provide a surf predicting system that will give users a rating on how good the surf is.

Technologies used:
Android Studio, Java, Open Weather Map, Google Maps API, Firebase Realtime Database

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Student Name: Jason Quinlan	**Supervisor:** John Creagh
Project Title: Smart Metronome	
Research Question: Is it possible to track a drummer's playing and inform them if they are out of time so they can correct their playing and improve?	
Project Abstract: Playing in time is extremely important for drummers, so using a metronome when practising is great to improve timing. But it can be difficult to know if you are playing exactly on time with the metronome. This project focuses on tracking the drummers playing and notifying the drummer when he/she is out of time with a metronome. This will be accomplished using a timing program connected to an electronic board (mbed LPC1768) which will have a vibration sensor that tracks the drummers playing.	
Technologies used: ARM mbed software (mbed LPC1768), C - programming language, Visual Studio Community, Tera Term	

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Student Name: Jeremiah Cotter	**Supervisor:** Diarmuid Grimes
Project Title: IoT Efficiency	
Research Question: In what areas,can IoT improve a buildings efficiency?	

Project Abstract:

As fuel costs are set to increase in the future, making a house as efficient as possible will become a real problem for people. To start you must first be aware of how your home currently performs.

With the use of IoT this project, each room in a house can be monitored and the data collected in a database. By using various sensors, information, such as temperature, humidity and light could be gathered. With this information, an overall view of the house can be generated and patterns found. If a room is always colder than others, this might indicate a problem such as a damaged double-glazed window that needs replacing.

While collecting all this information by itself is useless to the user the system uses data visualisation to display the data in a way that is easy to understand. The occupant can easily see their overall data, and by clicking certain areas can break it down further. This gives the user a good idea of how their stats were previously and where/if they changed.

The system has a central web application that all access to the database must go through. The web application provides a website for the user to view along with access for the mobile and sensor applications.

Going forward this could be expanded in many ways. It could incorporate sensors for open windows, if a window is open and the heating is on, the occupant would be notified. It would also be useful for businesses because during the winter months heating can be a company's biggest overhead, this would allow the company to see up to date statistics while also seeing the history in a clear efficient way.

Technologies used:
JavaEE, PostgreSQL, Arduino, D3, Android, AWS

33

Student Name: Joe Hehir	**Supervisor:** Ruairi O'Reilly
Project Title: Hotspots	
Research Question: Can a collaborative tool for designing visual media be provided in a framework agnostic manner and be capable of integrating with existing web-apps?	
Project Abstract: Hotspots facilitates design collaboration in existing web applications by enabling users to add notes and/or tasks to embedded visual media. Delivered as a highly configurable library with no external dependencies, its features are provided based on the data available. Hotspots enables visual media to become an interactive communication canvas.	
Technologies used: JavaScript, Sass, Webpack, ESLint, Babel	

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Student Name: Joshua Nuttall	**Supervisor:** Ignacio Castineiras
Project Title: 0/1 Knapsack Problem, A Comparison of Common Approaches	
Research Question:	
Project Abstract: A comparative study into common algorithm design paradigms aimed towards the 0/1 knapsack problem. Algorithms such as Branch & Bound, Backtracking, Greedy and Generate & Test will be compared based on accuracy, speed, implementation effort and algorithmic complexity. Test results are produced by use of benchmark testing and candidate data sets generated with methods including Weibull distribution and normal distributions.	
Technologies used: C++, Python, flask, javascript, css	

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Student Name: Kevin de Vries	**Supervisor:** Mary Davin, David Murphy
Project Title: Study Better™ A Study Network Application for Students	
Research Question: Can an easy-to-use application be developed to help students improve how they study?	
Project Abstract: Apps are currently being developed to assist with all manner of day-to-day life and I believe an application can be provided to students which can help make college life less stressful by allowing them the opportunity to be part of a network aimed at improving productivity and helping students achieve a realistic goal. This project provides an Android application which will assist students throughout their studies by creating a study network where they can make requests to fellow students to become a study partner or set up study groups. With the use of Google Maps, students will be able to search for other nearby students looking to set up study groups with a similar topic in mind. The Study Better Application also allows for teachers or tutors the opportunity to provide an easy-to-use way of offering grinds to students. My research centred around studying development in similar applications and researching concepts and varying methodologies used.	
Technologies used: Android Studio, Firebase, Google Maps, Trello, Visual Paradigm	

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Student Name: Killian Nolan	**Supervisor:** Mary Davin
Project Title: Statia - A statistical analysis tool to improve sports performances	
Research Question: Can introducing technology to GAA clubs help improve performances?	

Project Abstract:

The objective of Statia is to provide an easy to use and effective performance analysis tool for collecting statistics in Gaelic Football/Hurling matches. Analysing performances is now a key part of professional sports. Although the GAA is an amateur organisation, we are also seeing these technologies being introduced to County setups. Finances in the GAA has substantially risen in recent years but not all clubs have the resources to invest in these technologies. On reviewing the market, GAA clubs have limited access to affordable and worthwhile performance analysis tools.

Performance Analysis can be a massive benefit to coaching a team. The collection and analysing of statistics from matches can identify any strengths or weaknesses in a team's performance. Coaches can use this data to aide training plans and can work on improving their team's statistics. Statia provides a coach with the ability to collect multi-layered key performance indicators during a live match. The and action performed, player involved, time on the clock and pitch location is collected as one key performance indicator to provide richer data to analyse. Coaches can view live statistics during a match to aide in-game tactical decisions. Post game analysis identifies further strengths and weakness in a team's performance. The monitoring of key performance indicators over a number of chosen games can also identify if training plans are working at improving their team's performances. Providing players with the ability to view their own statistics will also encourage them to keep improving.

Technologies used:
NodeJS, VueJS, Express, BootStrap, ChartJS, HTML, CSS, MySQL, Pivotal Web Services, Github

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Student Name: Leslie McCarthy	**Supervisor:** Colin Manning
Project Title: Type 1 diabetes & Epilepsy Monitoring Web App	
Research Question: Can we create a web based API and client mobile app to monitor Type 1 diabetes & Epilepsy	

Project Abstract:

The projects main goal is to provide a web based application along with a Mobile client app that will allow a parent or guardian maintain data for a type 1 diabetic, who also suffers from epilepsy.

The project achieves its main objectives by providing to the user:

- Highly Available Cloud API with secure endpoints to support Mobile data.
- User encrypted authentication credentials.
- Graphical overviews of all data collected.
- Support for multiple web browser screen sizes.
- Keep up-to-date records of medication being administered.
- Simple to use Mobile app to quickly store and fetch data from the cloud.

Technologies used:
Spring Boot, Android, MySQL, jQuery, JSON, HTML 5, JS, CSS 3, Bootstrap, Thymeleaf, Pivotal Cloud Foundry

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Student Name: Lorna Costelloe	**Supervisor:** Karl Grabe
Project Title: Management booking system and application for medical based practice	
Research Question: How can the standard medical practice system be improved for productivity and ease of use?	

Project Abstract:

The booking system will consist of several microservices, and a database, and will use several different technologies. The system will use a Cassandra (NoSQL) database. This works well with Spring boot, is extremely fault tolerant, reduces administration costs and overhead and provides fast read and write times to reduce lagging in the system and quick response time.

Appointment Poller Service (Spring Boot and Gradle): This microservice will poll the database to check for new appointments and update the front end of the system accordingly. It will also compare the current appointments with the database to find cancelled appointments, and free up the slot on the system.

Rules Engine Service (Spring Boot and Gradle): This microservice will contain the rules for making an appointment, how the database is accessed (DAO's, Controllers, Services), and decide what action to take next, be it to progress to booking, payment system or to place patient on cancellation waiting list. When an appointment is cancelled, the rules engine service will be notified by the Appointment Poller Service and assign a patient to the slot and then send a notification via twilio about the appointment. Online Payment System (Spring Boot and Gradle): Patients should be able to pay online through a secure system, and be provided with the option to store their details for repeat appointments. It will also determine if they are entitled to a free appointment.

Front – end appointment booking system (Bootstrap): The system should provide secretary with the option to create an appointment for a patient, cancel an appointment or insert available appointments. Patients should be provided with the option to cancel a previously made appointment, make an appointment, add themselves to the the waiting list, subscribe to the social media feed, or answer a series of question to determine the urgency of their appointment, what member of medical staff they need to see and to determine if they should bypass the medical practice and go straight to the hospital.

The system will notify patients via text message of appointments, send reminders and ask for confirmation. To this, it will use twilio text messaging service which will send an SMS message to their phones asking them to confirm when they are automatically slotted in

Technologies used:
Spring Boot, Gradle, Cassandra Database, Pivotal Web Services, Twilio Text messaging service, Bootstrap

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Student Name: Louise Walsh	**Supervisor:** Dr. John Creagh
Project Title: Machine Learning in Premier League Fantasy Football	
Research Question: Can a machine learning algorithm make better player predictions than an everyday Fantasy Football player ?	
Project Abstract: This project will be used to determine the players in the Premier League that will accumulate the most points in a week. This project uses past season statistics and match fixtures, paired with Fantasy Football regulations, to predict the higher scoring Fantasy Premier League player. Using these findings, this can be automated for a week on week basis, using Jenkins. This dynamic football team is then measured against a skilled Fantasy Football user, to determine if it can outperform the Fantasy Football player.	
Technologies used: Python, Pycharm, Jenkins, GitHub, PostgreSQL	

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Student Name: Maciej Szaflarski	**Supervisor:** Dr Diarmuid Grimes
Project Title: IoT Edge Analytics System	
Research Question: How can we define rules for analysing data at the edge by IoT Gateways? Is there a viable way of managing IoT Gateways and analytic rules remotely?	
Project Abstract: Depending on the source, it is estimated that there are between 6 and 9 billion connected IoT devices, which does not include smartphones, tablets and computers. It is estimated, there will be over 20 billion connected IoT devices by 2020. Huge amount of raw data is being sent off-site for analysis. It puts strain on the networks and central systems analysing vast amount of data, which in turn increases response times between sending the data and receiving the result or instruction that should be carried out as soon as possible. Another issue would be sending raw sensitive data (e.g. GPS data, streams from cameras or microphones). Edge analytics addresses above problems with pre-processing data at the edge, i.e. on-site where the data is gathered. Sensitive data can be pre-processed and only privacy compliant data is sent to the Cloud for further analysis. When low latency response is needed, data could be analysed on-site in compliance with pre-defined algorithms or policies and acted upon much faster. It takes a load off the network and makes the system more robust to connectivity issues. This paper proposes Edge Analytics System composed of IoT Edge Gateway utilizing WSO2 Complex Event Processor for analytic logic, and Management Platform for defining and managing analytic rules, managing gateways, and visualisation of data received from gateways. System uses IBM Internet of Things Platform (a cloud service on IBM Cloud) for messaging between gateways and Management Platform.	
Technologies used: Java, JavaScript, C/C++, Node.js, HTML, CSS, AngularJS, Siddhi Query Language, IBM IoT Platform, Cloudant DB	

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Student Name: Mario Schnell	**Supervisor:** Cliona McGuane
Project Title: Animal Tracker App	
Research Question: Can we use IOT and real-time geolocation tracking to monitor and learn about our domestic animal's activity.	
Project Abstract: The "Internet of Things" is changing the way we can obtain invaluable data. Through the use of sensors, we can gather and analyse data much more efficiently. The continuous flow of data we can obtain from these sensors allows us to generate very accurate results. The goal of this project is to use IoT sensors to gather data about our animal's activity through sensors connected to the animal's collar. This will allow us to better understand our animal's activity and allow us to map the area covered by our animals. Another aspect of this project will be the creation of an android application with a user-friendly interface that allows users to view the data gathered. The user will be able to view their animal's current real-time location on a map and also view their animal's feeding activity. This will allow us to analyse how certain conditions impact an animal's movement patterns.	
Technologies used: Arduino, 1Sheeld, C++, Android Studio, Java, XML, NFC, GPS, Google Maps, Firebase	

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Student Name: Mark McCormack	**Supervisor:** Meabh O'Connor
Project Title: Detecting Falls in a Video Stream Using Machine Learning	
Research Question: Through the use of machine learning algorithms can a fall be accurately detected?	
Project Abstract: The objective of this project is to design, and implement a system to aid in the care of the elderly who are living in assisted living facilities. The main goal of the system is to be able to classify human pose in a video stream. By associating the pose of "lying down" with a fallen person, the system will be able to detect falls. The system will be implemented in Python, and uses the machine learning libraries Tensorflow and Keras to implement a type of neural network known as a Convolutional Neural Network (CNN) to classify human poses from the video stream. The neural network will be trained on a dataset consisting of images gathered from third party sources along with additional images that I will record. The accuracy of the the trained neural network will be based on it's performance on a collection of unseen data.	
Technologies used: Python, Tensorflow, Keras, Amazon Web Services (AWS), MongoDB, React JS	

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Student Name: Martin Murphy	**Supervisor:** Dr Sean Mc Sweeney & Denis Long
Project Title: IoT Hidden Dangers	
Research Question: How can IoT devices be hardened for home users and business use?	
Project Abstract: Currently there is no law stating that a security layer needs to be implemented into the design architecture of IoT devices. It is for this reason coupled with new manufacturers inexperienced in this field that threats are posed to these devices. Carrying out successful hardening methods on IoT devices involved penetration testing. These tests exposed weaknesses and proved the solutions implemented had successfully worked.	
Technologies used: Raspberry Pi (IoT device), Kali Linux (attacking platform), Attify Badge (IoT hardware exploitation tool), Wifi Pineapple Nano (Wifi attacking)	

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Student Name: Matthew Shallow	**Supervisor:** Larkin Cunningham
Project Title: Micro Mobile Defenders	
Research Question: Educating children to be cyber secure using a mobile game	

Project Abstract:

Cyber secure is a term used to describe when a person or thing is adequately protected against cyber threats. Smartphones and tablets have become ubiquitous in the home with an increasingly high rate of dissemination. Therefore, young children are frequently exposed to these devices and to the potential cyber threats that using these devices pose. This project involves the research and development of a mobile game that can potentially teach young children to be cyber secure. Research was conducted on how young children interact with mobile devices, the parental views on mobile device usage and the best ways to teach young children using games. Research was also conducted on the features of games that are successful in educating young children and the new technologies/methods that might aid in developing more effective educational games. The project looks at the challenges that are faced when designing educational content for young children and the complexity in designing games that keep young children entertained. The culmination of this research will support the development of a mobile game that can potentially teach young children to be cyber secure.

Technologies used:
Android Studio, Construct 2, Github, Gimp, Cordova,

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Student Name: Max Deasy	**Supervisor:** John O' Brien, Noreen Gubbins
Project Title: AED Locator	
Research Question: Finding the nearest AED in a hurry	
Project Abstract: A locator service for keeping an accurate and publicly available list of user-submitted AEDs.	
Technologies used: Nginx, Parse Server, Android, Node.js, REST API, Google Maps API	

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Student Name: Megan Kearney - IT Management	**Supervisor:** Mary Davin
Project Title: Vehicle Breath Analyser with Biometrics and Ignition Locking	
Research Question: How can we reduce road fatalities and deaths caused by drink driving?	

Project Abstract:

Drinking and driving is a significant problem worldwide. Alcohol is estimated to be a contributing factor of 1 in 3 fatal collisions. Every injury or death caused by drunk driving is preventable.

The main focus of this project is to develop a prototype that will test an individual before they can start a vehicle.
Biometrics are used to scan the finger of the driver to ensure they carry out the breathalyser test. After successful authentication, they are requested to provide a breath sample. The vehicle will be enabled or disabled depending on the limit of alcohol present in the breath sample.

The development of this prototype was carried out on a single board computer, with a fingerprint sensor and breath analysing hardware attached. A mobile application was developed to create a user-friendly interface for interaction with the device.
The Vehicle Breath Analyser with Biometrics and Ignition Locking proof of concept prototype proves that such a device has multiple applications:

- Provide a solution to drink driving resulting in less road fatalities and deaths.
- Centralised cloud based database to provide statistics that can be analysed by organisations and authorities.
- Biometrics will prevent passengers from taking the breathalyser test. Future work for this device would add facial / Iris recognition.
- Learner drivers could install this system in their vehicle to reduce insurance costs.
- Individuals could install this system in their vehicles to ensure they are under the legal driving limit

Technologies used:
Arduino, Blynk, Adafruit, C++

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Student Name: Michelle McGinty	**Supervisor:** Mary Davin
Project Title: Performify – Employee Performance Software	
Research Question: Can analysing and tracking of Performance Appraisals and Employee Engagement be beneficial to a company in a web based solution?	

Project Abstract:

A report carried out by Deloitte in 2015 reported that 82% of companies surveyed showed that annual performance reviews were not worth the time.

Performance appraisals can provide many benefits to the individual and to a company when conducted correctly. Having an adequate performance appraisal system in place will aid the progress and awareness of employees. Such reviews can highlight the employee's strengths and weaknesses, providing both the employer and employee with an invaluable asset as this outlines the areas of improvement required for the employee and thus the company to succeed.

Performify offers an attractive and user friendly solution that will track Employee Performance Appraisals using Self Appraisals and using Rating Scales Method. It will also evaluate Employee Enagagement in the form of a questionaire.
This data can be analysed and results visually displayed to indicate overall performance of an individual employee or team of employees.

Technologies used:
Node.js, Express.js, MongoDB, mLab, Heroku, Chart.js, GitHub , Sass, Bootstrap, Pug.js, Javascript, Passport.js, bCrypt.js, NPM, Gulp.

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Student Name: Monika Ivanova	**Supervisor:** Clíona McGuane
Project Title: Helping to Improve and Monitor School Attendance	
Research Question: Can school attendance be improved by increased monitoring by teachers and parents?	

Project Abstract:

Chronic absenteeism often results in academic problems for pupils at school. About 56,400 students miss school every day in Ireland. The Education (Welfare) Act states that parents are responsible for their children to obtain a good education. It is their job to mentor and monitor children's behaviour, attendance and progress at school.

Education also plays important role in children's development and encouragement for high achievements. Monitoring of attendance must be increased in schools. Parents should be informed about the importance of attending school and they should be warned when students begin to show absenteeism patterns. Parents should be aware of the risk factors for youth absenteeism, truancy and any other anti-social behaviours.

The aim of my project is to allow parents to easily monitor and review children attendance in school. The platform is user-friendly, and it allows users to check attendance records with the use of graphs for easier data visualisation. A notice board is available for each teacher and the principal, which notifies them when a student is absent for 20 days. Thus, the parent can be contacted through the platform messaging system immediately. In the event of continuous absenteeism, the issue can be addressed at early stages and the problem can be easily solved. The notice board includes notifications for upcoming birthdays which is something thoughtful to be aware of as a teacher. Attendi is a valuable administrative tool that generates monthly and annually reports required by Tusla with a simple button click. Statistics are handled by the system to provide valuable data to school staff.

Technologies used:
Node.js, Express.js, MongoDB, mLabs, Passport.js, RESTful API, CSS, JavaScript, Pug.js Bootstrap, Docker, Pivotal Web Services, NPM, Chart.js, GitHub

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Student Name: Niall Hennessy	**Supervisor:** Paul Davern
Project Title: Real-time Emergency Drone(R-TED)	
Research Question: Can a drone be used to respond to emergencies or events in real-time?	

Project Abstract:

Emergencies response to events is still an issue to this day due to timing restrictions and possible lack of knowledge on the event. Whether it would someone in need of medical supplies such as an inhaler or any small item that is required within a short space of time.
A use of an autonomous drone will be able to fix this issue.

The main goal is to deliver useful supplies to those in need. A user in need of supplies will log into their mobile app and request aid to the drone from the app and also provide information on what is needed. This and the using users GPS location will be sent to Google's firebase to give precise location on where they are. The drone will then be dispatched to that location. Using a raspberry pi and an onboard internet connection, the drone will receive real-time coordinates and will automatically fly to that location. Using the on-board connection to firebase, the drones current location will be displayed on the mobile applications map menu to show how close it is and to track where it lands.

People in need of quick medical items are the ones who will benefit the most from this. It could also be applied other items that people need but it will depend on the item weight. The success of the project will be measured on how well the drone can preform on a request to the mobile application and can fly without failure.

Technologies used:
Python, Raspberry Pi, Android, Java,3DR solo, Firebase, SITL

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Student Name: Nicusor Daniel Vlasin	**Supervisor:** Mary Davin
Project Title: Shredded - Dream body in no time	
Research Question: Can a fitness app help people to achieve their dream body in short period of time?	
Project Abstract: This app is aimed at people who want to lose fat and achieve their dream body fast and efficient. Diet as many people know is the 80% of the workout the rest of 20% is the actually training. This is where most people don't know what to do or they do it wrong. The application also includes a section where the user can see his/hers diet plan also shaped for the body category identified at the start. It will include a list of meals and ingredients that the user can cook every week to lose fat. The app will take care of people who had injury in the past too. It will be a feature build in to prevent such injury to happen again. It will have a section where users can access in order to get a special warm-up before the actually exercise. This feature will present to the user some of the common injuries and base on the user selection will display the special warm-up. User will benefit from this project as it will allow them to live a healthy life and shape they body as they please.	
Technologies used: Java, Android Studio, Firebase, JSON, SQLite, google-play-service, Maven	

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Student Name: Norbert Skurzewski	**Supervisor:** Larkin Cunningham
Project Title: Unity 3D Game Development and Virtual Reality Implementation	
Research Question: 3D game development and establishing the principles and requirements for VR conversion.	
Project Abstract: An in-depth research was carried out to develop a fully functional web based game, convert it to android version and from there port the game to Virtual Reality. The main goal of this project was to develop the 3D game and create a set of principles for converting it to VR. Virtual Reality is one of the new, revolutionary technologies in the gaming field, offering players new level of experience, which was the reason to investigate the topic. The project was carried out using Unity 3D Game Engine and editor as well as C# and JavaScript.	
Technologies used: Unity Editor, Unity 3D Game Engine, WebGL, Android, Samsung GearVR by Oculus, Visual Studio, WinSCP, C#, JavaScript	

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Student Name: Olivier Cateysson	**Supervisor:** John Creagh & Mary Davin

Project Title: Mobile Application to Aid in the Post Stroke Recovery

Research Question: Can the use of a Mobile Application help in the post stroke recovery?

Project Abstract:

There are 10,000 people affected by strokes every year in Ireland, and it's the leading cause of complex disability, as sufferers can be paralysed and unable to communicate, and my father was one of those people. After my father was let go of the hospital, he didn't have any help from doctors, physicians etc. for a couple of weeks until he was assigned one.

And so, what I envision is that with a mobile application, stroke victims would not be alone any way of their journey to a full recovery, meaning that with the app they would have access to a wide range of exercises on the app for them to do while also have pre-defined workouts available to them. All the while giving them the ability to record their workout, so that when they are assigned a specialist (such as occupational therapist) that they have an idea on what the stroke victim did to get themselves back to 100%.

With this idea, there are many ways to expand the app. From giving the user their own account which would keep track on how the user is doing and from there a will have a view on how they are doing remotely. Even have a way to discuss certain things to a doctor (like a chat) to a doctor if the user has any queries about anything or implementing a way for users of the app to talk to each other to not make them feel like they are alone in the world fighting for a full recovery.

Technologies used:
Android, Java, Firebase

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Student Name: Paddy Kelleher	**Supervisor:** Larkin Cunningham
Project Title: Improving Phishing Awareness Within An Organisation	
Research Question: Are there tools available to improve the awareness of phishing emails within an organisation?	

Project Abstract:

The increase of phishing emails that are sent and targeted to employees within organisations is on the rise. 76% of organisations experienced phishing attacks in 2017. With a single click employees are typing credentials into fake websites and downloading malicious malware without even knowing which creates all sorts of problems for organisations. By training employees phishing attacks will be reduced and employees will become aware of the dangers that are associated with phishing emails.

The objective of this project is to improve the awareness of phishing emails within organisations by building a software application. In order to achieve this task a number of technologies will be used. Gophish is the main technology but the addition of many other technologies were needed in order to complete the project requirements. Gamification was added to keep employees interested. Each employee will receive an email which will begin at level 1. If an employee reports a test phishing email they will advance to level 2 and so forth, with each level increasing in difficulty as employees increase levels. If an employee clicks on a link contained in a phishing email they will decrease a level also decreasing in difficulty. A prize will be awarded to employees that reach the maximum level.

Technologies used:
WAMP Server, Python, Splunk, phpMyAdmin, Photoshop and VirtualBox

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Student Name: Padraigh Jarvis	**Supervisor:** Cliona McGuane
Project Title: Using SmartWatches to promote mental health	
Research Question: Can SmartWatches be used to make people more aware of their mental heath	

Project Abstract:

The number of people that suffer from mental health issues is very concerning especially coupled with the fact Ireland has the fourth highest teenage suicide rate in all of Europe. With the advancement of technology wearable devices such as Smartwatches the number of sensors that can be found on such devices have increased.

With known links between stress and mental illnesses, as well as the knowledge that stress has an effect on a person's physiological features such as their heart rate this project's goal is the creation of a system that detects the stress levels of a user and makes it available to third parties such as therapists .

Technologies used:
Android, Html, Css, Java script, Jquery, Firebase, Android Wear, Google Charts, Gitlab

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Student Name: Paul O'Connor	**Supervisor:** John Creagh
Project Title: Diabetes Day Center Help Desk	
Research Question: Could the implementation of a help desk assist both patients and staff of a Diabetes Day Center?	
Project Abstract: Having to attend a Diabetes Day Center myself, I found that an improvement in technology there could help both the patients and staff of the day center. I found that the length of times between appointments to be very long due to the busy nature of all hospital functions. I have often found myself with questions with managing my illness. There is no direct line of communication to the day center I attend, just a phone number for the secretary. I feel the implementation of a help desk where patients could submit tickets with descriptions of their problems, along with a file attachment of their blood sugar readings, to be handled by nurses and dietitians from the day center could provide many benefits for both staff and patients alike.	
Technologies used: PHP, HTML, CSS, JavaScript, SQL, Apache	

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Student Name: Peter Burton	**Supervisor:** Ignacio Castineiras
Project Title: Sentiment analysis for identification of online bullying.	
Research Question: Can we use sentiment analysis to accurately detect instances of cyberbullying?	
Project Abstract: Cyberbullying is the use of electronic communication to bully a person, typically by sending messages of an intimidating or threatening nature. Victims of cyberbullying suffer from a range of mental health issues, including low self-esteem and depression. With the rise of social media, cyberbullying is becoming much more widespread. Traditional methods of combating cyberbullying include standards and guidelines that website users must adhere to, moderators manually checking for abusive behaviour, checks based on profane word lists and using regular expressions. These mechanisms fall short when dealing with social media posts as they are time and labour intensive and don't scale well. The objective of this project is to develop machine learning models that are capable of identifying text that contains bullying content with a high degree of accuracy using Sentiment analysis. Sentiment analysis is the use of text analysis, natural language processing, statistics and computational linguistics to extract and identify the sentiment of a given piece of text. Generally speaking, sentiment analysis aims to determine the attitude of the writer of the text, but there can be challenges with this. There are nuances in natural language that machines have a hard time classifying. This project will report on the various machine learning techniques available, that can classify online interactions as bullying or not, and will also look at the various pre-processing techniques and attempt to use them to identify bullying sentiment from data sets as accurately as possible.	
Technologies used: Python, scikit-learn.	

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Student Name: Richard O'Callaghan	**Supervisor:** Seamus Lankford

Project Title: Developing a Contactless Payment System for Android in place of NFC enabled cards.

Research Question: Can a system be developed to allow students to use mobile device NFC to pay in place of student cards?

Project Abstract:

This project idea was conceived after I began using android pay outside of college and realized the convenience of not having to hunt for a card every time you need pay. When the college semester started again I realized how valuable a similar card-less system would be to the college especially for students whose mobile devices are constantly either in their hands or within reach. A system such as this would be convenient for both students and faculty members and would help alleviate queues that form in campus stores from people attempting to root out their cards from their bags.

This System consists of an Android app, a simulated POS system using a ACR122u card reader with a NodeJS server and a database back-end created using Firebase. This allows a user to register with the system login and complete transactions linked to their account using their mobile devices NFC and a NFC enabled POS terminal. It also allows them to view any previous transactions and account information associated with them.

Technologies used:
Java, Android, Firebase, Javascript, Nodejs, GitKraken, NFC, NPM

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Student Name: Robert Crowley	**Supervisor:** Mary Davin

Project Title: Baba: An Internet of Things Based Neonatal Monitoring System

Research Question: Can Internet of Things Technologies be used to enhance neonatal monitoring systems?

Project Abstract:

Parents number one priority is the safety of their children. Parents often struggle to juggle all their responsibilities when they have a young baby in the house as they are always kept busy due to the unpredictability of having an infant in the house. This project would hopefully aid parents manage their day to day living by giving the parents peace of mind when their child is sleeping leaving them to do other things. This project would essentially consist of Internet of Things Devices which all connect back to a base device. The Internet of Things devices would be all positioned around the room to monitor the sleeping baby. The Devices would monitor sound (to monitor if the baby is crying), heat/smoke (to monitor if there is a fire, or if the room is simply too hot or cold), movement (to monitor if an animal such as a dog has entered the room) and possibly an additional feature given I have time would be facial recognition (to detect if the baby has covered their face with a blanket, etc). These devices would transmit information back to the base device if anything is detected which will send an alert to the parents' mobile device or the online portal. As you can see in figure 1 which shows the system layout I hope to achieve at the end.From the parents' device, there will be options to disable specific alerts e.g. sound alerts. This would make the device more diverse meaning the device could still be used for young toddlers. Users will also be able to view a live feed from the Internet of Things Device. This will enable the parent to check in on their child without having to physically go into the room to check. Each base device will have to be registered with the mobile devices to ensure security and safety for the protection of the baby. Multiple Monitor devices could also be configured to one mobile device. Meaning parents can monitor two children in two different rooms on the same device if needed. This would require a database to manage devices, mobile devices registered to base devices and the preferences for each device. Additional security would need to be put in place for the database as well.

In Summary, the project will consist of devices that will monitor for stimulus, and when stimulated will alert the parents via application and/or via web application which will prompt the parent to check on their child. The aim is to aid busy parents to maintain the running of their household and to maintain their peace of mind.

Technologies used:
Python, JQuery, Java, Android, C, Thymeleaf, HTML, CSS, Bootstrap, Spring Boot

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Student Name: Rónán Crowley	**Supervisor:** John Creagh
Project Title: Chat application for mental illness sufferers	
Research Question: Can the introduction of a chat application as an alternative to phone calls help sufferers of mental illness get support	
Project Abstract: A recent study undertaken by the Royal College of Surgeons has shown that one in five young Irish adults aged between 19 and 24 experience mental health problems. It is estimated that Ireland may have a higher rates of mental health problems than youths in Europe and USA according to a new report. Available to these individuals are various helplines such as aware and samaritans , however not available to these youths is a messenger service where they can communicate their issues should they have a problem or fear of using the helplines. Childline offers support via text but for older adults this option is not available elsewhere, my project aims to tackle this. The application will allow the user to create an account without using their real name should they wish to remain anonymous. the location of the user will be tracked should they be deemed a threat to themselves or others, if this is the case they will be able to alert the authorities of their location. The user will interact with the application on an android device, the message will then be sent to the firebase database where the an agent will be able to access the message and reply to the user. Assumptions of the project are the user will have the latest version of the app downloaded and will either be connected to wifi or be using cellular data. In order to measure success a test device should be able to create an account and send a message to a test agent while sharing location and then receiving a reply to the message from the test agent	
Technologies used: java, android, php, html, firebase, atom, android studio	

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Student Name: Ryan Meany	**Supervisor:** John O'Brien
Project Title: CIT Sports and Societies Club App	
Research Question: Can a CIT Sports Clubs and Societies mobile application be developed for students of CIT using the correct design patterns and HCI principles?	

Project Abstract:

As of June 2017, there were over 180,000 third level students in Ireland with over 5 million apps to choose from on the two leading app stores (Google Play, Apple). Students have a wide range of applications to choose from so design patterns, accessibility and HCI principles can all impact on whether or not the individual actually continues to use the application.

CIT is home to a combined total of over 70 Sports Clubs and Societies that vary from ball sports to water activities and health to hobbies. Currently, no CIT mobile application exists for any Sports Club or Society that CIT has to offer. Therefore, the aim of this project was to create a mobile application that would provide informative and up to date information on all Sports Clubs and Societies in CIT. The mobile application should additionally have the look and feel of a CIT app.

The developed system allows information to be added from the web app to the database and all devices will be synchronised in real-time when a change occurs. An administrator can log into the admin section of the system and update/remove information as necessary. The mobile app showcases the researched design patterns, accessibility and HCI principles, on top of providing informative information. A user of the mobile app can also register interest in going to an event which will then be displayed to the admin of the system in the web app.

The developed mobile app has been designed in accordance with feedback from students of CIT themselves. This has been based on a number of factors such as navigation, content and the look and feel of a similar institutional mobile app.

Technologies used:
Android Studio, Android, Java, Firebase, HTML, CSS, JavaScript, XML, Git.

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Student Name: Samuel Rourke	**Supervisor:** John Creagh
Project Title: Vehicle Security Monitoring Using Sensor Technologies	
Research Question: Can more protection be provided for vehicles that are unattended at commercial car parks?	

Project Abstract:

A growing concern for motorists is being damage done to their vehicle while it is unattended. When this happens, it can be difficult to find the responsible party for the damage caused. This can leave the vehicle owner in a helpless situation whereby they are left with the costs of the repair.

Currently, there is very little protection in place for users of commercial car parks for these common occurrences. In most car parks, the company themselves claim no liability or responsibility for damage caused.

This project aims to achieve the following goals:
- Provide a responsive sensor network that can alert on potential dangers that come within a close proximity to the vehicle.
- Configure a camera system that will respond to alerts sent by the sensors and capture activity surrounding the vehicle.
- Create a mobile application to notify and display alerts from the integrated car park system.
- Provide the users with an live feed of their vehicle when an alert is triggered.

Through the combination of technologies, this project achieved the goals listed above to accomplish a user friendly application that can protect vehicle owners and their vehicles.

Technologies used:
Raspberry Pi, Rasbian Stretch, Thunkable, Android, Firebase DB, Motion, Python, Ultrasonic Sensors.

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Student Name: Seán Hickey	**Supervisor:** Colin Manning
Project Title: Platform to provide users with reliable news	
Research Question: Can technology be used to limit the effects of ‘fake news’ in the media today?	

Project Abstract:

Over the past year, the term ‘fake news’ has been popularized to describe false or misleading stories that are coming out in the media. The speed at which data moves around nowadays has placed more importance on the rate at which a journalist can get news out, rather than making sure the story itself is true. This has caused a major problem in the world today, where people can’t tell if the news they are reading is true, or if it is just another fake story, which can cause a lot of trouble.

I carried out this project to act as a solution to this problem. I have analysed media outlets using a simple Python word detection program to measure the integrity of news sources. I then created a web portal for users to come to when they want to get reliable, trusted news. The media outlets who pass the test have been placed on this web portal, with sites guilty of spreading ‘fake news’ not making it onto the web portal.

Technologies used:
AngularJS, Python, HTML, CSS, Node.js

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Student Name: Sean Holland	**Supervisor:** Mrs Cliona Mcguane
Project Title: Diagnosing Atrial Fibrillation by Monitoring Heart Rate using Activity Trackers	
Research Question: Can wearable devices transmit regular pulse and inter beat interval readings to a database to diagnose Atrial Fibrillation (AF) and prevent stroke?	
Project Abstract: The aim of this research project is to examine the benefits of utilizing activity tracking devices for the gathering, monitoring and analysis of physiological data. There are a number of conditions that could be potentially monitored and treated using these activity tracking devices. One condition that affects the population over 60 years old, goes largely undetected, and is a leading cause of stroke, is Atrial Fibrillation. Developing an algorithm to detect and diagnose Atrial Fibrillation in a set of data recorded by these activity tracking devices will be the area I will be focusing on in this project.	
Technologies used: Android, Python, Python Django, Google Firebase, Bluetooth 4.0, RESTful web services	

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Student Name: Sean Keating	**Supervisor:** Cliona McGuane
Project Title: Using Mobile Technologies in Conjunction with Cork City Car Parks to Improve City Traffic Management	
Research Question: Can the creation of a mobile application which uses real time car park and traffic data have a positive impact on traffic levels in Cork City centre	
Project Abstract: Traffic levels in Cork City centre are due to reach their highest ever levels in 2018. Due to the nature of Cork as an old city it is not possible to expand the road network to help alleviate the congestion caused by this increased level of traffic, therefore a different solution must be found. The creation of a mobile application will give users access to real time traffic level data in the city as well as real time information on the car parks within the city centre. Using this information the application will route the users to their destination while taking into account car park occupancy levels and traffic along the route. By giving the best possible route and avoiding traffic the users will avoid congested areas and therefore not contribute to a high traffic area. When multiple users are routed at the same time it will lead to better traffic flow and therefore reduce traffic congestion.	
Technologies used: Android, Android Studio, Java, XML, Google Maps API's, Gradle, Google Cloud Platform, Voice Commands, Android Auto	

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Student Name: Sebastian Blesznowski	**Supervisor:** Arthur Tobin
Project Title: BuStop Tracker	
Research Question: Is it possible to help users of the public transport to navigate to the nearest and the most convenient bus stop?	

Project Abstract:

Public transport facilities, especially around CIT are often unable to accommodate the number of passengers that use it on an everyday basis. Anyone using bus services regularly will notice that the buses are repeatedly late or full which then results in people gathering at the bus stops and waiting for a long time. People that are not familiar with the public transport such as Erasmus students, tourists, or even car owners might find it difficult to find the nearest bus stops or to know when the bus is arriving. Statistically, in modern times there about 3.4 million smartphone users in Ireland. The aim of this project is to develop an android mobile application which would help public transport users finding their nearest bus stop.

The application allows users to register with their email address and password to create a profile to be used within the app. All details are then stored in the database and in order to use the application the user needs to log in. Then, user's device is located with the use of Global Positioning System (GPS) and Google Maps. The application then informs the user where they are situated at that moment and checks the location of the nearest bus stops around. The coordinates of the bus stops are stored in the Firebase Database using Google Maps Geolocation API. The user can see the bus stops on the map and is given option to begin navigating the route with the use of Google Maps, to view the shortest path to it or to check the timetable of the expected bus.

The use of this application will be extremely helpful to users that are not familiar with the public transport system in Ireland. The objective is to develop a location based android application that will navigate users and help them find themselves around the city. It will be beneficial to people who had just arrived in Ireland or have never been using public transport before and have limited knowledge about bus stations or bus stops locations and timetables.

Technologies used:
Android, Android Studio, Java, Firebase, Google Maps

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Student Name: Senica Searles	**Supervisor:** Noreen Gubbins

Project Title: Configuration Management for Automation, Consistency and Security across IT Infrastructure

Research Question: Can configuration management tools provide a complete solution for automation of IT tasks while providing consistency and increase productivity within a business?

Project Abstract:

We are currently living in an age where technology is evolving constantly so it's important for organisations to evolve too. For organisations it's important than ever to have characteristics like effectiveness and efficiency as they are essential in today's world. Statistics from the year 2016 show that a large amount of organisations use no configuration tools in their daily business. This is where the automation of configuration management comes in. Configuration management can make tasks that are normally difficult to setup more simplistic. This helps users that are not as skilled or proficient with IT in general manage these systems so they will function more effectively.

The objective of this project is to investigate whether software configuration management is a viable solution to solve these issues and what software tools are out there for small, medium and large enterprises. During the project two different architectures were created to illustrate how configuration management tools can be used widely across an organisation to build, manage and maintain an organisations IT architecture during its lifecycle. Two different environments were used in the development of the prototype and these were virtualization and cloud.

Technologies used:
VMware Workstation, Ansible, Ubuntu, AWS, Raspberry Pi, YAML, WordPress, MySQL, HAProxy, GitHub

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Student Name: Shane Corridon	**Supervisor:** John O'Brien
Project Title: Open Source Software Threat Analyser and Software Request Management System	
Research Question: Managing software download requests from employees with confidence of safety from malware.	
Project Abstract: This application is a software threat analyser combined with a software request management system. Users send a request notification to the admin. This request is then received as a notification to the admins email. The admin will then use a python script to interact with the Virus Total Api. The script will send the exe software installation file to the VirusTotal site for analyses against the presence of malware. This result is then received back in a text file. Based on this result the admin can then approve or reject the request using the intellect system. This will give confidence to the admin when approving requests. It will also provide a record of software requests and approvals made within the organisation. This is vital to ensure the organisation remains General Data Protection regulation compliant. There will be a full record of who requested the software, why they requested it and who it was approved by. The system ensures that the amount of software being downloaded onto the network is regulated. The larger the amount of software installed on a network, the larger the surface available for attack. This system will enable the admin to regulate all download requests from employee's working in other location such as Cape Town south Africa in my situation.	
Technologies used: VirusTotal, Intellect management system, Python, Snort, VmWare virtual machine, Sublime	

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Student Name: Shane Daly	**Supervisor:** Dr. Sean McSweeney & Mary Davin
Project Title: Remote Patient Monitoring	
Research Question: Can you improve the rate of patient discharge by remotely monitoring patient vital signs?	
Project Abstract: The aim of this project is to investigate the world of remote patient monitoring andto look at creating a new technology that will gather both current vital signs and thepatients history and display the information in one area.	
Technologies used: Objective-C, Swift, SQLite, CoreData	

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Student Name: Stephen McGrath	**Supervisor:** Ruairi O'Reilly
Project Title: TDV - Traffic Data Viewer	
Research Question: Can the creation of visualisations from road traffic data help in making future decisions on road maintenance?	
Project Abstract: The main objective of this project is to analyse road network data and to create visualisations based off the data. This tool will allow user interaction to create, interact and explore data that is being recorded on Irish Roads. The data source is a collection of routes in Ireland, from 2016. After pre-processing the data and sorting it into a maintainable manner, can the data then be ready to be further analysed. This will allow for the user of the tool to examine the data that is being collected, utilise the tool to help make informed decisions and discover any trends in the data.	
Technologies used: Python, CSV, DAX, PowerBI, SQL, MySQL, Pandas	

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Student Name: Tim Cummins	**Supervisor:** Clíona McGuane
Project Title: Android Attendance Taker	
Research Question: Can an Android mobile application be developed to take and track attendance for a class in an easy and efficient manner?	

Project Abstract:

Over 70% of students drop out of some higher education courses in their first year of college. This is not a pleasing statistic. In my opinion, I believe that students that are new to college can get overwhelmed with the responsibility that is shown to them as taking attendance is not mandatory in plenty of colleges. Therefore attendance is not taken in lots of classes. If students know that their attendance is not being monitored, they might not feel the need to attend class.
The aim of this project is to create an Android mobile application that will allow teachers and lecturers to take the attendance for numerous classes in an easy manner. The application also shows the attendance record for each particular student for every class that attendance has been taken for. I believe such an application will benefit lecturers, teachers and students as it will use precious time more efficiently and can provide students with an incentive for turning up to class more often.

Technologies used:
Android Studio, Android, Java, XML, Firebase Realtime Database, Firebase Authentication and GitHub.

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Student Name: Vilius Valiusis	**Supervisor:** Arthur Tobin
Project Title: Automated three-dimensional translation of floor plans	
Research Question: Is it possible to automate the process of translating architectural floor plans into their three-dimensional representation?	
Project Abstract: The the goal of the proposed system is to use already existing and readily available architectural floor plans to automatically generate their three-dimensional representation. The systems operates on a simple two stage architecture. Analyze input to generate output. That output is used to generate an intractable 3D model that can be embedded into any web page. One of the main use cases for this would be an alternative way of marketing houses/apartments.	
Technologies used: Python, OpenCV, JavaScript, Three.js	