

**PROJECT TITLE LIST**

**PROFESSIONALISM AND PROJECT MODULE**

**6CS007**

**A18/19**

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# AI/MACHINE LEARNING

## Depth Information from Multiple Images

Design and implement a system to extract depth information from multiple images taken at different locations (such as stereo cameras) and to produce OBJ output files which are standard 3D Object Format files. The ideal outcome would be to take multiple pictures of an object all the way round the object and then be able to produce a good 3D representation of the object in an OBJ file and view this object in a standard 3D OBJ viewer such as Open 3D Model Viewer. You can choose to implement the system as either Web-based (PHP/MySQL), or Mobile (Android/PhoneGap/Zamarin), or desktop program (Windows/Linux/Mac).

## Sentiment Analysis

You will develop a sentiment analysis system:

([https://en.wikipedia.org/wiki/Sentiment\_analysis (Links to an external site.)Links to an external site.](https://en.wikipedia.org/wiki/Sentiment_analysis)) to determine if these is a link between the value of cryptocurrencies such as Bitcoin and sentiment expressed through user created content on forums/social media etc. (This will be for you to decide)

Your solution should be implemented in Java or Python and make use of existing machine learning tools/libraries

Your research will focus on how sentiment analysis can be applied to this problem, the best methods of doing so and how your system compares to alternative solutions.

## University Chat Bot

A chatbot is a service, powered by rules and sometimes artificial intelligence, that you interact with via a chat interface. The service could be any number of things, ranging from functional to fun, and it could live in any major chat products (Facebook Messenger, Slack, Telegram, Text Messages, etc.).

Your task will be to design and develop a new chat bot that could be used within the University, for example to answer eVision Helpdesk calls, answer complaints, give out course information, or talk to UCAS applicants.

Your research will focus on the viability of these tools and how they could have an impact within an institutional environment. You should look at commercial alternatives and compare them to your own chat bot, highlighting important considerations such as security and user experience.

**Knowledge/Skills Required:** PHP/Or Alternative Web Language, REST API's

## Sports Predictions

You will decide on a sport for which you wish to predict the results of upcoming fixtures/events. You will then collect a vast amount of historical data on this sport, in order to do this you may need to develop or extend an existing web scraper.

You will then develop and train a machine learning algorithm using an existing library in Java (WEKA) or Python (scikit-learn) that will be used to predict future results in your chosen sport.

Your research will focus on the specific tools and techniques that are most useful for predicting the result of your chosen sport and how this might differ between sports. You should also perform a comparative analysis of existing techniques when applied to your sport when compared with your own artefact.

**Knowledge/Skills Required:** Java/Python, HTML/CSS

## Computer controlled car using machine vision

Requirements: Basic understanding of OpenCV

Using a Raspberry Pi with a camera, you will create a program which processes the image taken from the camera (mounted on the vehicle) and generate an appropriate output in the form of control. You will be investigating different methods on how to transfer data back and forth from the computer to the car, and successfully navigate it around a simple circuit.

## Autonomous vehicle

Using an embedded system of your choice, you will program a completely autonomous vehicle to navigate its way around a dynamic circuit (changing circuit). You MAY use multiple sensors attached to the vehicle such as obstacle detection, line detection and cameras to aid the navigation.

## Investigation into machine learning platforms

Machine learning platforms such as SciKit Learn, Tensor Flow and other general neural network systems have become popular when designing and building machine learning programs. You will research different machine-learning platforms and evaluate their performances by comparing and analysing results of similar algorithms. You may also wish to build your own applications to benchmark results.

## 3D tracking using multiple webcams

Using multiple webcams, you will track a flying object such as a drone with a static background environment. The first part of this project is to track an object in a 2D scenario using a simple moveable object such as a ball or remote control car (1 webcam). Once you have got the x and y coordinates of the object tracking program working, an additional webcam will be introduced to monitor the z values.

## Managing user behavior; using intelligent software (CS)

Users are frequently perceived as the weakest link in any security system.

This project involves the development of some intelligent software that will manage user behavior. It is not straightforward, as we know that warning message boxes tend to be ignored. Therefore, part of the research will involve investigating ideas around better ways to warn users when, for example, they may be clicking on an infected link.

The other part of the project will involve developing some software which will test out the efficacy of the proposed solution, using appropriate analysis, design, implementation and testing techniques.

## Emoticons say it all

Develop an emotion detection system for text data.

# DATA SCIENCE

## Automatic Marking System

You will develop a prototype web application that can be used to automatically mark student work. This might involve running popular static analysis tools, compiling programs, running unit tests and analysing version control logs. The application should give a visual indication of a student’s current progress and grade based on this analysis.

Your research should focus on how a platform like this could be used as an educational tool while learning to program. You should identify existing alternatives and perform a comparative analysis, paying particular mind to issues such as security and user experience which are critical in an educational environment.

**Skills Required:** Java and JUnit, Web Frameworks, Git/SVN, HMTL/CSS, Javascript

## University Social Media Network Analysis

You will develop a web or desktop application that collects and analyses data from University and related social media accounts. You will explore this data to determine how universities make use of social media and connect with existing/potential students.

Your research should focus on the effectiveness of social media usage by universities in the UK and how institutions within the sector compare to one another based on a series of metrics you define (e.g. reach, % of different types of posts, followers, engagement etc.). You should produce a series of compelling web visualisations to demonstrate these metrics, presenting your findings in away that is meaningful and easy to understand.

**Knowledge/Skills Required:** PHP/Other Web Language, Web API's, HTML/CSS, Javascript, MongoDB Or alternatives, D3.js

## Social Media Link Analysis

You will build a desktop or web application that retrieves posts from social media and stores them in a database or flat file format. Your program should then analyse these tweets to search for URL's embedded within them.

Your goal will be to analyse these links using a variety of algorithms to summarise or determine the topics and/or mood/sentiment contained within them. You should develop a number of easy to understand and compelling visualisations to present your data and any insights into the use of links on Twitter that you perceive through your analysis.

Your research should look at different methods of link summarisation, topic analysis or sentiment classification depending upon which you choose.

**Knowledge/Skills Required:** Python/Java HTML/CSS, Javascript

## Investigation into OpenCL, CUDA and POSIX threads

GPGPU computing is becoming more useful in programs which require processing of large data sets. You will compare and analyse different parallel programming platforms such as POSIX threading, OpenCL and CUDA.

## Smart Marketing

How can social networking data in targeted advertising? **A data mining exercise!**

Learn more: [6 Ways to Use Social Data for Targeted Marketing by James Arnold (Links to an external site.)Links to an external site.](https://www.entrepreneur.com/article/253022)

## Web mining - eBay prices (historical and present)

Using a range of web technologies such as frameworks, API’s and scripting languages, you will design and create a website which calls the eBay API to monitor and analyse various desired information such as prices, popularity, ratings etc. The overall artefact and direction of research will be subject to discussion.

## Web mining - Amazon prices (historical and present)

Using a range of web technologies such as frameworks, API’s and scripting languages, you will design and create a website which calls the Amazon API to monitor and analyse various desired information such as prices, popularity, ratings etc. The overall artefact and direction of research will be subject to discussion.

## Web mining - Road trip route planning API

To plan a road trip, you need to consider many variables such as weather, places of interest, route directions etc. Using a range of web technologies such as frameworks, API’s and scripting languages, you will design and create your own API from existing API’s and a basic webpage to show requests being made to it. The overall artefact and direction of research will be subject to discussion.

# SMART Technology (IoT)

## Object Tracking via Stereoscopic Vision

This project investigates the strategies and techniques required for identifying and tracking multiple moving objects via a pair of cameras and locating the objects in 3D coordinate space. You need to be able to program in C/C++.

## Battling Spiderbots and Computer Vision

For this project you will be modifying a pair of Radio Controlled Spiderbots, adding either Raspberry Pi's or Arduino's, and cameras to add Computer Vision, to enable the Spiderbots to search, track and do battle. You need knowledge of Electronics and know how to program and interface the Raspberry Pi's and Arduino's.

## Autonomous Arduino Robot

Design and build an Arduino-controlled mobile robot to map out a prefined space/room with random obstacles and to work out the shortest path between any points within the room and navigate successfully between them. You will need some basic knowledge of electronics and sensors and how to program an Arduino.

## Raspberry Pi SNORT IDS Security Appliance

Design and build a Standalone Security Appliance based on a Raspberry Pi and the open source intrusion detection software SNORT, with a web-based user interface, for plugging into any network, to detect and report on a defined range of intrusion scenarios. You will need basic It Security knowledge and how to program in PHP or Python on the Raspberry Pi.

## Arduino Control of a 12 Degrees of Freedom Robot

This project is to integrate and control a 12-joint robot with an Arduino controller and investigate the algorithms necessary for successful movements, particular walking.

## Computer controlled car using environment sensors

This project involves using multiple Raspberry Pi’s/Arduino’s which will be externally tracking a car to move around a circuit. You will use multiple components such as cameras, distance sensors, pressure sensors etc to communicate to a central computer to command the car.

## Smart house system using web technologies

Using Arduino’s/Raspberry Pi’s, you will build a smart house system which can be controlled by either a web or android app. The project initially involves building a web interface which simulates a standard home structure (rooms, corridors, floors etc). The web page will constantly request information from a database which dynamically changes depending on any events taking place within the house.

## Data extraction and analysis from RC car (Racing)

You will use an Arduino/Raspberry Pi to monitor a remote control car from the on board sensors. Your research will focus on the analysis of data that is captured and how it can be used to improve lap-times. You will use various data visualisation techniques to represent lap-times for all the data collected in a user-friendly view.

## Voice to text exploration using Intel Galileo

Your mission should you decide to accept it, is to spend the year working on a real voice interface for a chat bot that will go into a robot, and if things progress well, a possibility of publishing a joint paper/white paper on the project.

## Local Data Storage for chat bots using an Intel Galileo

Your mission should you decide to accept it, is to spend the year working on methods of data storage for a chat bot on an embedded system, and if things progress well, a possibility of publishing a joint paper/white paper on the project. The data storage needs to be local not via a web service or other.

## Computer Vision

Monitoring and Controlling Traffic in a school cafeteria can be problematic. A new cafeteria in a high school was built to accommodate 400 students, which is more than the old cafeteria could sit. However, the student population at the school increased to 600 that same year! As a result, the serving area of the cafeteria has to be managed. At the moment it is controlled by a teacher who lets in an arbitrary number of students in approximately every 2 minutes, depending on how many people are already inside. This often leads to overcrowding if the teacher lets too many students in at once. Often delays are caused and it generally takes students longer to purchase food and exit. The students only have 30 minutes for lunch!

There have been many complaints and the school now seeks to rectify the problem. Can you help them find a solution?

The problem could be alleviated by using some sort of electronic counter, which utilizes information about the serving area’s optimum capacity to determine the entry rate. At the threshold (peak capacity) the flow through the serving area could be maximised.

## RFID: Radio-frequency Identification

**Radio-frequency Identification (RFID)** can be used to identify and to track humans, animals and objects. They are capable of providing solutions to problems to do with recording school attendance, tracing missing pets and tracking money; just about anything an RFID tag could be attached to. Research this technology and use it to provide a solution existing in a real-world setting. [Click for project ideas. (Links to an external site.)Links to an external site.](http://electronicsforu.com/electronics-projects/top-20-rfid-project-ideas)

# CYBER SECURITY

## Advanced Web Security Measures

You will build a prototype website that allows users to authenticate themselves using several advanced security measures, such as fingerprint recognition, facial detection, iris scanning or QR codes. In this project you will look at the benefits and shortfalls of these web security measures, the impact on user experience and present recommendations for the future based on your findings.

**Skills Required:** PHP/Other Server Side Language, HTML/CSS, Javascript

## Web security

Investigate the common threats and solutions to overcome them. Design and implement a simple web application and perform some security testing against it.

## Serious Games (Corporate Security)

A computer game based approach to educating corporate/business users on corporate computer security best practice (dangers of phishing, secure passwords, corporate image etc.). The literature review would be expected to cover current security threats to businesses/corporations, the artefact will be a computer game based on the findings of the literature review.

## Modelling cyber-attacks; creating a teaching tool (Computing)

Cyber education is in its infancy to some extent, and so there is a great need for effective resources. You are asked to create a teaching tool to model some aspect of a reasonably complex cyber-attack, whether that is a model of how malware might replicate itself, how botnets work, or how cyber criminals have managed to hack into bank accounts.

You will be expected to do appropriate research into best ways of using and developing tools to model key learning concepts, and to use appropriate analysis design and development techniques when creating the artefact (in line with bcs requirements.

## Security ('Smart Home'/Security Implications)

Investigation into ‘Smart Home’ technology and its possible security implications in the building and construction sector. An artefact has to demonstrate how to migrate and be applied in a practical setting.

or

Evaluate the security and reliability of smart technologies that could be used in a hospital environment.

## Strengthening a Business Cyber Knowledge Management Capabilities

Lack of cyber perspective and impact until it is too late and a cyber-incident has occurred and the cyber consequences have already occurred. In this project you need to evaluate approaches to increase and strengthen a business cyber knowledge management capabilities and create an application to show steps that should be undertaken to support a business.

## Cyber Resilience

In this project you will focus on the concept of cyber Resilience. Explore existing and emerging information system cyber threats and their root causes. Through this you will create an artefact to educate, which demonstrates the pitfalls and how to migrate.

## Cyber Awareness and Up Skilling SMEs

How to create a corporate culture of cyber security, what are the challenges and issues, what best practices can be adopted and how these can be enforced.

## Setting up a system for cyber security research

This project would aim to set up a small environment (probably 2 computers, one victim and one attacker) in a configuration that could be used for security research / teaching / testing. It would identify the hardware and software components required along with software tools for ethical hacking. It is likely to include virtual machines (e.g. VMWare, Virtual Box).

## Cyber Security Information Sharing

This project will research and assess the information needs of organisations and attempt to understand what "situational awareness" means in terms of cyber. The project will provide opportunity to work on information from the Cybersecurity Warning, Advice and Reporting Point (WARP) that the University has successfully developed and run for the past 10 years.

## Log File Analysis for Cyber Security

Evidence of a security breach is often available in log files, but frequently they are not reviewed. This project would review the different types of log files and the tools used in their analysis.

## Cyber Security in Schools

Attempting to identify the security issues that are more likely in schools (and whether there are any issues that are unique to schools?) and their solutions. This may present an opportunity to undertake some research with High Schools during the project - existing links with schools would be useful

## 

## Risk Management

An investigation into Risk Management and how to use this in an organization, paying particular attention to the IS/IT department. This is a wide topic and your proposal will need to be discussed and agreed.

# NETWORKING

## P2P Fault tolerant MPI Java or MPJ

The MPI standard normally requires a predefined group of computers on the same network to start the same task together. This project investigates the issues and strategies involved in enabling a diverse group of computers on different networks to work in a similar manner to the MPI standard, with fault tolerance for failures and late starts, in a P2P configuration. The work should be done in Java for maximum flexibility.

## Serverless Secure Instant Messaging

The vast majority of popular instant messaging system currently in use transmit messages in cleartext and these messages are stored on a server for later retrieval. This is insecure. This project aims to implement a secure encrypted messaging system for Android mobiles without the use of a server, using P2P overlay-network technologies. You need to be able to program in Java or C#.

## Peer-to-peer Off-grid Group Chat App

The design and development of a group text-chat app using only peer-to-peer WiFi-Direct and Bluetooth, and no internet or routers. This app will allow a group of people to communicate over the range of their combined WiFi and Bluetooth connections and use mesh-networking to extend beyond that range in situations where there is either no mobile signal or internet available. You will be using either Java or C# on Android.

# SOFTWARE ENGINEERING

## Reverse Engineering a complex Simulation Model

Based on an existing (but complex) simulation model developed using the C language the objective is to apply various reverse engineering techniques to generate a set of UML diagrams that represent the original design architecture.

## Code conversion - From C to Java

In this project you are required to convert a complex Command Line Interface-driven network simulation model developed in the structured programming language C into an equivalent object-oriented Java equivalent application.

## Software Metrics: A Practical Case Study

In this project you are required to take a complex and existing simulation model developed in the C programming language and evaluate its size, quality, and complexity by producing and using a range of available metrics and measurements by way of case examples of good engineering practice.

## Cloud Adopting and Risk Management Strategies

Evaluate why businesses adopt Cloud and the pitfalls that needs to be overcome to ensure this doesn’t result in security issues.

## Adrian Priest

Program and Project Management - A wide area for discussion and agreement. A comparison of project management methodologies and the suitability to use them within the Information systems environment, i.e. implementing new systems. This is a wide topic and your proposal will need to be discussed and agreed.

# GAMES

## Game of Hex

The game of Hex was first invented in 1942 by Piet Hein, a Danish mathematician. A few years later John Nash, who later won a Nobel prize in economics, reinvented the same game while he was a graduate student at Princeton. Martin Gardener popularized the game in his writings—The Scientific American Book of Mathematical Puzzles and Diversions, volume 1, chapter: The Game of Hex, pages 73 — 83. Simon and Schuster, New York, NY, 1959, and Mathematical Games: Concerning the game of Hex, which may be played on the tiles of the bathroom floor. Scientific American, page 144ff, July, 1957.

The two players of a Hex game use stones of different colours - say black and white. One interesting property about Hex is that a game can never end in a tie/ draw. Research Hex to understand how it is played, and the challenges involved in programming it. Fortunately, your task is much simpler. Write an algorithm that determines whether an arrangement on a Hex board signifies one of the players has won. This is something that could be easily determined by the human eye, but much more difficult for a computer to do.

## MasterMind: a code breaking game

**A** code breaking game. [Click for more. (Links to an external site.)Links to an external site.](https://en.wikipedia.org/wiki/Mastermind_(board_game)) Can you implement this on a computer by writing your own code? [You can play an online version here (Links to an external site.)Links to an external site.](http://www.kidsmathgamesonline.com/logic/mastermind.html) (you might want to turn the volume on your computer down).

## Table Craps

Craps is a game played with dice. Each die is a cube with 1 to 6 on its faces. Design and code a craps program for a charity event on campus. Your programs should include an attractive GUI. [Click for more on table craps. (Links to an external site.)Links to an external site.](https://en.wikipedia.org/wiki/Craps) [https://en.wikipedia.org/wiki/Craps (Links to an external site.)Links to an external site.](https://en.wikipedia.org/wiki/Craps)

# WEB/MOBILE COMPUTING

## Mobile Treasure Hunt App

The design and development of a location-sensitive mobile app that uses the location services on Android phones to facilitate a competitive or collaborative treasure hunt game, that may be suitable for an adventure park or a university Open Day, or events of that nature. You will be using Java on Android to build this app, and you will also need to build a server-side web management app using PHP/MySQL to manage and coordinate all the users/players.

## Web-based Location-aware Treasure Hunt App

The design and development of a web app that uses client-side location APIs on modern mobile web browsers to facilitate a competitive or collaborative treasure hunt game, that may be suitable for an adventure park or a university Open Day, or events of that nature. You will be using HTML5/JavaScript on mobile web browsers to build this app, and you will also need to build a server-side web management app in PHP/MySQL to manage and coordinate all the users/players.

## Mobile Proximity Sensing

The design and development of a cross-platform mobile app (to work on both Android and iOS) that will be able to detect the presence of Bluetooth and Wi-Fi devices around it, and by sending this information, along with compass direction and speed, to a central server system, and then using this same information from other mobiles running the same app, be able to determine whether the other mobiles are in the same location. You will using a cross platform mobile development system such as PhoneGap, Cordova, Xamarin or similar.

## Mobile Distributed Computing

Implementing MPI on Android, to provide for a distributed/parallel computing environment on mobile devices. You need to be able to program in Java and have an Android phone.

## JavaScript Scripting Environment for Android

Design an implement a PhoneGap based JavaScript scripting shell such that users will be able to code and run arbitrary JavaScript programs on an Android device. You need to be very comfortable with JavaScript and Java.

## Social Geo-Wiki Mobile App

Implementing MPI on Android, to provide for a distributed/parallel computing environment on mobile devices. You need to be able to program in Java and have an Android phone.

## Web-based Social Geo-Wiki

The design and development of a Web Application for mobile devices for crowd-sourced contributions to a map-based wiki. This will require PHP, HTML5 and JavaScript web programming skills.

## Augmented Memory

This is a voice based note taking and searching app for dementia and Alzheimer's sufferers. Design and implement an Android-based system for transcribing voice notes into text and storing the text, and a provide a voice based search to recall the text.. You need to be able to program in Java on Android.

## Mobile App for Indoor Location

The design and development of an Android app to detect Wi-Fi, Bluetooth, along with compass direction and speed, and other data signals from existing wireless devices to determine the Android device's indoor location. All the sensor data will be sent to a central server-based management system and stored in a database. You need to be able to program in Java on Android, and you will also need to know how to create a basic PHP/MySQL web-based information management system to store and retrieve the sensor data.

## RFID/Biometric Voting System

You will develop a prototype voting system that authenticates users using student cards/fingerprints or alternative technologies. In addition, you will also be expected to produce a website that can display results in real time through a series of compelling visualisations.

Your research will involve performing a comparative review of existing technologies and traditional methods of recording votes. You should also focusing on potential issues such as security and user experience, which might harm the adoption of such technologies and produce a list of recommendations on how these might be overcome.

**Knowledge/Skills Required:** HTML/CSS, JavaScript, embedded systems (Arduino/Raspberry Pi), Python/Java

## Static Analysis Tool

You will develop or extend an existing static analysis tool that detects common problems in Java/Python programming code such as indentation, duplication and excessive comments. This work should be based on Refactoring literature (i.e. [https://www.amazon.co.uk/Refactoring-Improving-Design-Existing-Technology/dp/0201485672 (Links to an external site.)Links to an external site.](https://www.amazon.co.uk/Refactoring-Improving-Design-Existing-Technology/dp/0201485672)).

Your research will focus on evaluating and comparing existing tools, and how they could be used in an educational environment as a learning tool to teach programming.

**Knowledge/Skills Required:** Java/Python, Refactoring

## Android Geriatric Care App

Most modern smartphones have a number of built in sensors. Two of the most important of these are the accelerometer which is used by apps to detect the orientation of the device and the gyroscope which works with the accelerometer to detect the rotation of the phone.

You will develop an Android application that makes use of these sensors and others to detect sudden falls, long periods of inactivity or other health issues. This could be used to facilitate geriatric care where a patient is in an emergency situation and needs urgent support, but there is nobody around to help them. In cases like this their phone could still be used to call for help if a problem is detected, without the need for a dedicated device.

Your research will analyse the effectiveness of using a smartphone application to facilitate geriatric care and compare your system to alternatives already on the market.

**Knowledge/Skills Required:**Java, Android Development

## Exotic Zoo (Mobile App)

'Exotic Zoo' ([http://www.exoticzoo.co.uk/ (Links to an external site.)Links to an external site.](http://www.exoticzoo.co.uk/)) is an animal education centre in Priorslee Telford and is home to some of the worlds most amazing animals. They run full time college courses and do a lot of work with local schools, educating and encouraging an interest in conservation and the natural world. Having moved to a brand new site and opened to the general public for the first time, Exotic Zoo are looking to introduce some technological enhancements to their experience.

Your mission if you choose to accept it will be to develop a mobile phone application for Android (or cross platform with PhoneGap/Xamarin) that can be used to 'catch' and view pictures and information about the animals in the zoo. Animals should be 'caught' when a person gets close enough to the animal information plaque using Bluetooth, RFID, or by scanning a QR code. Exotic Zoo is expanding all the time; therefore, it will be essential that they have the capability to self-manage the chosen solution through a desktop or web interface when they need to add new animals or multimedia to the zoo’s mobile application.

Your research should focus on comparing and contrasting these technologies for the current use case, before deciding upon the most appropriate to build your application.

**Skills/Knowledge Required:** Java, Android Development, PhoneGap - HTML/CSS, JavaScript

## Class Cover

Design and implement a web-based class cover system that meets the following requirements. A teacher’s request for cover first needs to be approved by the head. Once approved, the teaching schedule of all teachers at the school needs to be examined to find out who is available to cover the absent teacher’s classes. The available teacher needs to be checked to see if s/he has covered other classes previously, and if so how many. A threshold is set for each teacher, above which the teacher would need to be paid for covering classes. Ideally, the system should avoid having to pay for class cover. Once a suitable cover teacher (CT) is identified, the absent teacher (AT) is informed of who will cover his/ her classes. It is also necessary for the school to have a list of supply teachers whom they may need to contact in situations when no internal cover can be found. These external cover teachers get paid a higher rate (say £300 per day, £200 for 8.00am – 1.00pm, £100 for 1.00pm – 5.00pm). Whenever external cover is brought in, the system needs to ensure that this individual covers as many classes as possible on that day.

In this project you should research issues such as usability (user experience), security, integrability and extensibility.

## Web Accessibility

The web is moving forward faster than ever, with new standards created monthly… but what does it all mean for disabled users? How accessible are SPAs, RIAs, CSS3, HTML5, SVG etc…? You will research the various standards and guidelines, and implement an artefact to illustrate your findings.

## Mobile/touch HCI

Small, touch-enabled screens present both challenges and opportunities. You will research the latest trends in terms of mobile HCI, build an artefact and perform some usability testing.

## Progressive Web Apps

Progressive Web Apps aim to compete with Native Apps, and offer a more enjoyable and reliable mobile experience. You will investigate the current progress in the field, implement a progressive web app and evaluate the outcomes.

## Mobile App: Golden Text Memorizer Assistant

In this project you are required to develop an application (Desktop or mobile) that enables the user to select and memorize passages of text (or verses).  Clues are revealed and scoring maintained of performance and progress.

## Mobile App: SMS Text Management tool

This project is to develop a mobile app for managing text messages.  This includes the ability to categorize and maintain a search archive of received SMS messages, and generate templates for rapid creation and send of messages.

# BUSINESS INFORMATION SYSTEM

## Visual Voting

Design and implement a visual voting system that could be used for the election of a university president. The results should be shown as numbers for each of three candidates, and as sectors on a pie chart. Below is a snapshot of what the output of your program could look like. In this project you should research issues such as usability (user experience), security, integrability, data protection and extensibility

## Monte Carlo Methods

Monte Carlo methods are computational algorithms that use a statistical approach to derive approximate solutions to problems.  (Monte Carlo is a famous gambling resort in Monaco). They are used to solve problems—from a variety of fields—that are hard to calculate by analytical methods. For example, Monte Carlo methods can be used to estimate the perimeter of an ellipse. This number may be useful for finding the length of the elliptical orbit of a planet or a satellite. See Wikipedia for more examples. Implement a solution using Monte Carlo methods to a problem from one of the following fields: mathematics, finance or geophysics. [See Wikipedia for some examples. (Links to an external site.)Links to an external site.](https://en.wikipedia.org/wiki/Monte_Carlo_method)

## Picture Slideshow

Write a program to display several images in sequence; provide the option to choose a particular image from a pull-down list. The program loads the images from the images subfolder; it assumes that all the files there are valid image files (such as .jpg, .gif, or .bmp). The program arranges images in the same order as they are currently arranged in the folder. Provide left and right arrow buttons take you to the previous or the next image in the sequence, respectively. When the beginning or the end of the sequence is reached, the program “wraps around” and shows the image from the other end.

## **Miniature Stock Exchange**

Implement a miniature stock exchange and electronic brokerage, in which users are safely offline and don’t pay commission to a broker. (This way you avoid being one of those unscrupulous online brokerage firms who encouraged “day trading” in which traders hold stocks for a few hours, or even minutes, rather than for months and years). Your system should stay out of trouble!

Focus only on keeping track of buy and sell orders placed by traders, and automatically execute orders when the highest “bid” price to buy stock meets the lowest asking price for that stock. Orders to buy stock at a certain price (or lower) or to sell stock at a certain price (or higher) are called “limit” orders. There are also “market” orders: to buy at the currently offered lowest asking price or to sell at the currently offered highest bid price. In this project you should research issues such as usability (user experience), security, data protection and extensibility. [See Wikipedia for more information on how stock markets work. (Links to an external site.)Links to an external site.](https://en.wikipedia.org/wiki/Stock_market)

## **Dormitory Weekend Plans**

A Dormitory Director at a school is looking for a programmer to design and code an electronic system to automate the student exeat process. Currently, each student wishing to leave campus on the weekend is required to complete and submit a form, at least three days in advance. Certain checks have to be put in place and relevant information needs to be emailed campus security and the cafeteria chefs. Can you automate this system?

**Currently Process:** any student who wishes to leave the dormitory for some time over a weekend is required to complete and submit a form no later than the Wednesday prior to his/ her departure. The form asks for the student’s name, mobile phone number, day and time of departure and return, details of the adult who will be in charge the destination, the type of transport which will be used to get to and from the destination, and any additional information which may be applicable. The completed form is handed to the dormitory administrator, who then checks it. Each Thursday, the administrator contacts the Cafeteria to inform them of how many fewer meals—breakfast, lunch and dinner—need to be provided over the weekend. Also, Campus Security is provided with the names of students leaving the campus, along with their departure and return times.

In this project you should also research issues such as usability (user experience), security, integrability, data protection and extensibility.

## Modern Web usability in RIAs

You should research past and current usability trends (focusing on new technologies), design and implement a simple RIA website and perform usability testing.

## Website optimization

The speed at which a websites run is more important than ever. Investigate the common pitfalls and best practices, design and implement a simple website and conduct some performance testing.

## Build an HTML5 offline web application

HTML5 features several APIs that finally make working offline a reality in modern browsers. Investigate the proposed solutions and implement a simple offline application to demonstrate your findings.

## Accessing a phone’s hardware using open standards

The need for hardware access is crucial when deciding between a native or web app. You are to investigate current progress in the field, compare both approaches and design a prototype mobile website.

## Serious Games (Expatriate Security)

A computer game based approach to educating expatriate workers on security best practice whilst working abroad (i.e. checking for improvised explosive devices (IED’s), personal security practices, cultural awareness). The literature review would be expected to cover concepts of expatriate working, with reference to areas of the world where security might be an issue, the artefact will be a computer game based on the findings of the literature review.

## Virtual Reality (VR Security Game)

A game based VR tour (of a scenario) teaching an aspect of security/safety (i.e. Airport or Aircraft Security). The literature review would be expected to cover the topic area in detail, along with related security threats/concerns, the artefact will be a VR computer game based on the findings of the literature review.

## Virtual Reality (VR ‘Virtual Tour Guide’)

A game based ‘virtual tour guide’ aimed at international students studying at the University of Wolverhampton. The literature review would be expected to cover existing approaches that universities use to orientate international students, the artefact will be a VR computer game university tour based on the findings of the literature review.

## Past to present - an online event calendar

Detect global and local events from Twitter feeds and fill in event entry in an online calendar. Verify results against news resources.

The project is about scraping social media data e.g. twitter feeds and analyse it for popular events detection. You will be doing text analysis (e.g., trying to find most frequent talked topics, most re-tweeted tweets, looking at friend circles etc.) and building algorithms to predict events. You will be gathering RSS feeds from reliable online sources (e.g., Express and Star) to verify accuracy of your results. Finally, you will be presenting outcomes (popular event and date) via visual/graphical representations/tools (e.g., a web calendar).

The project requires programming knowledge (e.g., Python or Java).

## All about UoW

Design an information system to integrate data about the University of Wolverhampton from different social media sources (e.g. Twitter, Facebook), analyse it i.e., find who is talking (user name) about the University; what they are talking about specifically (sub-topic – student experience, employability, etc); from where (user location); and what they are saying or feeling about the sub-topic (positive/negative/neutral)? Finally, report all the outcomes as a University's visibility on the world map.

In this project you will be scraping social media data, doing text analysis to developing algorithms to detect sentiment embedded in a text automatically. The project requires programming knowledge (e.g., Python or Java).

## MyBestBuddies

Based on the common activities, interests and locations develop an interactive friend recommendation application. Data sources: Facebook, Twitter, YouTube.

## Children and online risk

Identify landscape of online risk to children, investigate one of the identified risks and develop an application to prevent the risk or develop a scenario to simulate the risk.

## MyDictionary - will you help me remember tough words?

Whether it is a non-native speaker or a voracious reader, while reading ebook or an article on smart devices, people often use dictionary to check meaning of unfamiliar words. Build a mobile app that captures all the checked entries and develop a personalised dictionary of the checked words to be referred later.

## The best and the worst

Use news feeds from different news sources and identify the best and the worst past events of the five countries. Develop an evaluation matrix to evaluate these events.

## Developing a personalized CANVAS learning course (IS)

CANVAS has the potential to manage user’s learning by identifying their strengths and weaknesses and presenting learning material accordingly.

I would like to work with a student to explore how this could be effectively used in learning.

The project will involve research into online learning approaches, and personalised learning, as well as having the requirement to create a prototype in CANVAS which will test out the effectiveness of such an approach.

It is particularly suitable for IS students, as it provides them with the opportunity to create a useful artefact and follow the BCS requirements of analysis, design, development and testing.

## Event detection and tracking

Time critical and sensitive event detection and tracking on social media.

# IT MANAGEMENT

## Change Management within the IS/IT context

A model of how an organization might implement a change or installation of new systems into an organization, this will look at theoretical models and produce a framework as a guide to the change porgramme. This is a wide topic and your proposal will need to be discussed and agreed.

## Strategic IS\IT Management

An investigation into the methods of implementing Information Systems into an organisation. This will take into consideration the softer skills such as stakeholder management and how to get the organisation to achieve their objectives. This is a wide topic and your proposal will need to be discussed and agreed.

# RESEARCH

## Information Systems Strategic Planning

An Investigation into the effectiveness of current approaches to Information Systems Strategic Planning.

## The business issues surrounding big data and business intelligence

An investigation into the awareness of the business issues surrounding business intelligence and big data amongst the local SME community.

## New products and services driven by big data and new technology architectures

An investigation into the new types of products and services driven by big data and new technology architectures.

## Web and social media knowledge extraction and analysis

An Investigation into how knowledge can be extracted from the web or social media, and analysed to create business advantage.

## 

## The effectiveness and management of social media

An investigation into the effectiveness and management of social media as a marketing tool for SME’s.

## Comment or a compliment?

Application to identify positive and negative comments from a discussion thread.

## Hybrid Cloud Solutions

Evaluation this form of cloud solutions from a security point of view.

## Intrusion detection systems for home networks

Could a home user know if the system was being attacked or was in fact successfully compromised?

## Virtual network appliances

Comparative performance evaluation of virtual and physical network appliances

## IP CCTV

Investigate the impact of CCTV traffic on the network

## Anonymous Web hosting

Anonymizing your web presence

## Mobile VPNs

Investigate the issue of implementing VPN over cellular networks

## Software defined networks for SMEs

Should SMEs move from traditional networks to SDNs? Cost and performance analysis

## Private cloud solutions

Evaluation of open source private cloud solutions

## Cyber Security Essentials Personalized

Cyber Security Essentials personalization to business type

## Security of Automatic Identification Technologies

Evaluate the security of commonly used AIDs such as RFIDs, biometrics, barcodes, etc..

## Security of sensor data

Evaluate the security and reliability of sensor data

## Cracking the Wi-Fi

Investigate the vulnerabilities associated with the WI-FI authentication methods available and plan and implement the mitigation of those vulnerabilities

# MORE TOPICS

1. Development of a portable games console using embedded technology
2. Embedded systems
3. Wifi / bluetooth control systems
4. Mobile apps (Android) for system control
5. IP video capture / control
6. RFID systems
7. Electronics / sensors / gadgets
8. Optical Based Non-invasive Glucose Monitoring Sensor.
9. 3D computer vision for depth mapping using a single aperture camera.
10. 3D image coding
11. Optical-Based Sensor Prototype for Continuous Monitoring of the Blood Pressure
12. Computer architecture for computation of 3D image coding.
13. An undergraduate project management system
14. Agent behaviours for crowd simulations
15. Satnav that learns users route preferences
16. Virtual Reality for Serious Games in Rail Industry Training (Prestigious Project – To be confirmed).
17. Mobile Serious Game for Rail Industry Training (Prestigious Project – To be confirmed).
18. Interactive Architectural Visualisations for Touchscreen Tables Combined with Augmented Reality (Prestigious Project – To be confirmed).
19. Augmented Reality.
20. Investigate the effect of real-time emotion recognition on serious games.
21. Virtual Reality.
22. Virtual Reality - Navigation. Explore the issues involved in moving through an environment in virtual reality. For example, reduce cybersickness. Also, explore novel approaches to VR movement. For example, arm Swinging and Rope pull.
23. Artificial Intelligence - Online Adaptation for Virtual Characters in Computer Games and Simulations.
24. Serious game for teenagers - Railway Safety.
25. Object Tracking in VR – tracking real-world objects in virtual reality.
26. Cyber Security Health Check
27. An analysis of advanced analytical methods, with recommendations for Higher Education Institutions, to provide solutions to problems in HE
28. An analysis of advanced analytical methods, with recommendations for Higher Education Institutions, to provide solutions to problems in HE
29. How could the use of big data positively reduce credit card fraud?
30. How is database technology involved in the development of the all –electric cars?
31. Design and Implement an Oracle based database system to assist businesses utilise contactless payment for goods.
32. Design and Implement an Oracle based database system to assist businesses utilise contactless payment for goods.
33. Design and Implement an Oracle based database system to assist businesses utilise contactless payment for goods.
34. Design and Implement an Oracle based database system integrate it with other software, applications, tools to develop a complete system for a business scenario of your choice.
35. Investigating Security in a database system
36. Comparison of relational and NoSQL databases
37. Design and Implement a Timetable system for the School's timetables
38. Investigation of storing and handling non-relational data, such as XML or JSON
39. Constantin Orasan
40. Integration of semantic information in matching and retrieval from translation memories
41. automatic summarisation (especially of tweets and other user generated content)
42. aspect based sentiment analysis
43. language processing for people with language disabilities
44. Cyber Security Health Check
45. What are the issues for a company in deploying IPV6 - modelling using riverbed modeller
46. Using Riverbed modeller to investigate the issues QOS and its affect on a large Enterprise network
47. Modelling the performance of a large network when stressed and using different routing protocols
48. Investigating the suitability of the differing types of network modelling tools for teaching undergraduates Network theory
49. Decision making tool for organisations to work with the impact of the GDPR
50. Business Analysis for an app
51. Business Information Systems Projects
52. Project Management Projects
53. The effectiveness of current approaches to IT Strategic Planning.

More topics:

<http://nevonprojects.com/year-projects-for-computer-engineering/>