

Applied Computing

Independent Project Outlines

2023-2024



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Project title	Performance analysis of the bun library
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Web, SE
• A comparison of the bun library against alternatives e.g., Node.js and Deno. • An exploration of the current boom in JavaScript performance. • Link to a real-world digital healthcare project. Publication opportunity.	

Project title	A comparison of v8 and JavaScriptCore
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Web, SE
• A detailed comparison of JavaScript engines. • An exploration of the current boom in JavaScript performance. • Link to a real-world digital healthcare project. Publication opportunity.	

Project title	Automatic parallelism of embarrassingly parallel problems
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE
• Code analysis resulting in automatic modifications to thread appropriate sections. • Large scope for iterative development; could be relatively simple or extremely advanced. ○ Could include more than one method of parallelism. ○ Potential for inclusion of synchronisation. ○ May investigate less trivial problems.	

Project title	Search engine optimisation with single page applications
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Web, SE
• An investigation into how different web scrapers handle single page web applications. • Work to remedy some of the challenges, using SSR, tagging, etc., with an assessment of success.	

Project title	Structured code analysis to grade code against best practice specifications and recommend improvements
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE/DIS/WD
• Code analysis resulting in a report of how well code measures up against best practice specifications. ○ May include a “grade” by way of a percentage. • Suggestions for improvements to better meet best practice. ○ Automatic implementation of these modifications could be considered as an advanced feature.	

Project title	Investigate, analyse and demonstrate the importance of network security and penetration testing.
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	CNets
Design a prototype network scanner that will help novice network users run basic scans to uncover network vulnerabilities. Give novice users the information they will need to overcome most common network attacks so that they can secure their network. Simulate the affect different attacks have on a home network using a relevant network simulation and modeling software.	

Project title	Develop a Computer Network Test-Bed to compare security between firewall and Access Control List (ACL)
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	CNets
- Use Linux to build own firewall. The Shoreline Firewall more commonly known as 'Shorewall' (a high level tool for configuring Net-filter to provide security, quality of service and network management) may be used or other Linux net-filter features for firewall configuration. The Webmin feature may also be installed to give a GUI. A machine/computer will be given to design the Linux firewall of your choice. The firewall should entails all or most of the following components: - Network Zone - Network Interfaces - Default Policies - Firewall Rules - Masquerading - Static NAT - Proxy ARP - Set up test bed to carry out various penetration tests to examine the strength of security implementation and firewall entries. - Do a comparison of both Firewall and network boundary ACLs results (critically analyses them). State the better method or should both work simultaneously? Full justify your statement. - Recommend action to be taken in order to fortify the network against similar threats.	

Project title	Simulation or test-bed security utilities
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	CNets
With the use of simulation or test-bed explore two main security utilities such as firewalls and ACL's in networking. To investigate how each methods works and identify the best option to be used on a certain network. Provide an investigation report outlining how the test has been implemented and final results.	

Project title	Real-time Network Intrusion Detection/Protection
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	CNets / CNT
Intrusion detection is a security measure that protects organizations from hostile attacks from outside and also from misuse or attacks from inside the organization. The goal of intrusion detection is to detect illicit access and abuse of computer systems by both insiders and external intruders, in order to guarantee the system's integrity, confidentiality and usability. Presents an in-depth study of the intrusion detection/protection techniques, the approaches and systems developed from these approaches as well as a number of issues and ways in which researchers have attempted to ameliorate them.	

Project title	Any Cyber Security and Forensics project idea students may have.
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	Computer Networks & Cyber security
Contact to discuss any cyber security and/or computer forensic investigation project idea you may have. Other Security and wireless ideas included but not limited to: Internet of Things (IoT) Wireless networks Penetration testing Information Security Threats and Attack Vectors Hacking phases experiments Other emerging trends such as Blockchain Contact info carlene@campbell@uwtsd.ac.uk	

Dr Mike Dacey

Project title	Investigate SwDevOps Approach to Building Applications
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Games / SE / WD
Build an application using SwDevOps services that automates GIT checkouts, builds and software tests. Demonstrate the effectiveness of this approach for a software team.	

Project title	Angular/React/Vue
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE / WD
Analyse common JS frameworks and construct an application that clearly demonstrates the advantages of their use. The project may take the form of: • A comparison of two or more frameworks • An application designed to demonstrate the benefits and drawbacks of a specific framework • A demonstration of mobile first development • A usability study related to using such frameworks	

Project title	AI
Project type (Delete as appropriate)	Development/Study
Target degree lines (Delete as appropriate)	Games / SE / WD
Create a web application that implements an e-Commerce product recommendation system. You may use an existing library, with the focus on applying the data mining approach to a web application rather than building data mining algorithm itself. Alternatively, this project may investigate “distributed intelligence” i.e. the analysis of data gathered from thousands of web users in order to discover crowd behaviour that can be used to promote/present more appropriate content to each user.	

Project title	Graph Databases
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Games/ SE / WD
Construct a webservice that demonstrates the use of a graph based database for tracking links between data. Examples include: • A social media application • A contact tracing application such as mobile applications for Covid19 track and trace • A large scale multiplayer game or an open world game containing many entities	

Project title	Amazing Mazes
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Games/ SE / WD
Construct an application that builds various mazes and demonstrates various approaches to solving them. Solutions may obviously consider path finding and influence maps.	

Project title	Cloud Computing
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Games / SE / WD/ DIS
There are a number of related projects: 1. Investigate a Big Data technology and NoSQL 2. Performance optimisation of SQL using key-value databases such as Redis 3. Investigate architectures for storing large quantities of unstructured data, such as images and audio, within a database. 4. Install and manage a distributed database within a cluster (or pseudo cluster). 5. Deploying applications to the cloud such as your own webserver or webservice 6. Creating a virtual world	

Project title	Language Teaching App Evaluation
Project type (Delete as appropriate)	Survey
Target degree lines (Delete as appropriate)	All
The aim here is to investigate a subset of existing language teaching software applications and to evaluate them identifying strengths, weaknesses, approaches, etc. You would be expected to create a small study to compare the effectiveness of two leading apps e.g. Duolingo and Rosetta Stone so it will involve finding at least one other willing participant and the desire to learn a new language!	

Project title	Steganography – the art and science of hiding messages within messages.
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE, Web, DIS, CNETs, Games
The aim here is to investigate steganography methods and to develop steganographic software that can hide a text message within an image. It would also involve a review of existing software and methods. Would suit any student who has studied C, C++, C#, java, etc.	

Project title	A.I. car controller
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE or Games
Previous students have developed a Unity Based Car Test Track that can generate and log all the car physics and control data for a race car. The aim of this project is to use the test track to log data and to then develop, train and evaluate a supervised learning algorithm (for example Naive Bayes, Neural Networks, etc.) that can autonomously control a race car. Several versions of this project are available.	

Project title	AI Pathfinding
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE, Games, CIS, Mobile
Finding the best path through a dynamically changing environment and navigating this path in a realistic manner is an important goal for a good Game AI bot. You will review existing methods, select approach(es) suitable for a given game genre, implement and evaluate your solution(s).	

Project title	Agent Based Modelling
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE, Games, Web, DIS.
Agent Based Modelling (ABM) is used to investigate the emergent properties of systems made up of thousands of interacting agents that follow a simple set of rules. Examples of systems simulated using ABM include epidemiological studies that model the spread of smallpox in a population; crowd panic scenarios and the famous “El-Farol bar” problem. Some well developed software tools such as Repast and NetLogo are used by many researchers and you would be expected to use one of these ABM tools to model one of several world problems. Please contact me for details. Several projects available.	

Project title	Teaching through Motivation in Video Games
Project type (Delete as appropriate)	Survey / Development
Target degree lines (Delete as appropriate)	All streams
The use of computer games to facilitate teaching and learning has become fashionable in e-learning systems in part because it can motivate students to learn by satisfying the need for competence, autonomy and relatedness. This project aims to identify and evaluate the properties of video games that satisfy these psychological needs and select and apply them appropriately to develop a teaching game/app. If the project is selected as a dissertation then there will be no development of software, the goal might be a framework document and an evaluation of selected existing educational games against this framework. More than one project is available.	

Project title	Attendance Monitoring using Face Detection and Recognition using Deep Learning Methods
Project type (Delete as appropriate)	Development/Experiment
Target degree lines (Delete as appropriate)	SE/Games
Face Detection using Deep Neural Networks has come of age in the last few years and several machine learning libraries and training sets have been published which can detect and recognise faces in real-time. This project asks you to use these technologies to implement an attendance register using face recognition systems. The completed system is not the goal at this stage, instead the focus is upon creating a system that can recognise a face reliably and assessing the accuracy of the method.	

Project title	Depth Maps and silhouette recognition using Microsoft Kinect
Project type (Delete as appropriate)	Development/Experiment
Target degree lines (Delete as appropriate)	SE/Games
The School has a number of Microsoft Kinect devices which are capable of capturing a depth field which can be used to recognise objects in real-time. The project will make use of this technology to investigate how effectively an individual's outline profile can be detected and their posture estimated.	

Project title	Augmented Reality using Fiducial Markers
Project type (Delete as appropriate)	Development/Experiment
Target degree lines (Delete as appropriate)	SE/Games
A fiducial marker is an object placed in the field of view of a camera which can then be used to locate a point in the scene. A 3D rendered virtual object can then be incorporated in the captured image. This project will assess the effectiveness of several existing fiducial marker libraries. Other projects are available that use augmented reality, for example the development of an application that can support the display of virtual documents in a virtual meeting environment.	

Project title	The impact of touch screen technology
Project type (Delete as appropriate)	Survey / Experiment
Target degree lines (Delete as appropriate)	CG / DIS / SE / WD

Project title	Alternative methods for data input and user interaction
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	CG / DIS / SE / WD
Alternative methods for data input and user interaction (using touch input, Wii remotes, Microsoft Kinect, VR gloves etc)	

Project title	An investigation into DAM
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	DIS / SE / WD
An investigation into DAM (Digital asset management) (dissertation)	

Project title	Construction of a DAM
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	DIS / SE / WD
Construction of a DAM (digital asset management) system (software development)	

Project title	Cloud computing: The pros and cons
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	DIS / SE / WD

Project title	Changes in portable computing
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	CG / CIS / SE / WD
Portable computing: A study into future trends and implications.	

Project title	Copyright violation detection tools
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	CG / DIS / SE / WD
Net based Copyright violations and tools for detection (e.g. TinEye for web image searching) A study of, or construction of tools for detection.	

Project title	AI Music
Project type (Delete as appropriate)	Development / Survey / Experiment
Target degree lines (Delete as appropriate)	SE
The use of AI algorithms for the production of computer generated music	

Electronics Project Titles

Robotic arms / Remote buggies

Micro-generation and/or monitoring of power (turbine, solar etc)

Solar power - tracking the sun with a heliostat

GPS tracking device (e.g. for lost pets, dementia sufferers, vehicle tracking)

General Purpose or specialist data/temperature logger (Freezer lorries, horticultural aspects, general scientific data gathering, weather data etc)

Car park controller

Intelligent Traffic light systems

Home security – Intelligent alarms, remote webcams etc

Fridge alert (e.g. text message when the temp gets too hot)

Remote control/telemetry weather station

Data telemetry via gsm/internet (collecting gas/electric/water meter data)

Ultrasonic devices for distance measurements (car reversing sensors, water level indicators, digital tape measures etc.)

Galvo control to deflect mirrors in laser scanning applications.

Using a/interfacing to, a PLC in an industrial control application/simulation

Designing, Implementing and testing a PID control loop system to control an industrial control application/simulation

Medical monitoring devices (heartbeat, temperature, pedometer etc.)

Digital Voice recorder using a microcontroller

Analogue/Digital effects for music processing (guitar effects pedal, digital delay/reverb, chorus etc.)

Custom music synthesis devices – (drum machines, bass rhythm sequencers, complete synthesisers)

Music performance interface devices – (laser harp, Theremin types, wearable input devices using accelerometers etc.)

Benchmarking / measurement device design for imaging devices. E.g.:

- A device that will be able to measure the shutter/EVF lag time in modern cameras.
- A device to allow measurement of shutter shock/mirror slap in DSLRs

Programmable autopan device for controlling and triggering cameras for timelapse photography/video (think BBC nature programs when time is sped up)

Dr Gary Jones

Areas of interest include:

- Digital electronics
- Microcontroller-based design and implementation
- Instrumentation
- Sensors and biomedical devices
- Communications
- Image processing
- Remote vehicles
- Robotics
- Analogue electronics and power electronics
- Energy management, energy generation
- Environmental monitoring
- Electronics design methods and techniques

Dr Nitheesh Kaliyamurthy

Hi Everyone,

Thinking about working on your Major Project? The areas in Computer Networks, Network Programmability, Securing Cyberspace and analysing digital evidences (Digital Forensics) are wide spread and has potential scope in exploring your interest and knowledge. These are few areas, that could you consider working with. However, if you have different thoughts and wish to discuss with one of us, feel free to write an email.

- Software Defined Networks
 - Building and Securely managing a SD Networks
 - Security Enhancements in SD Networks
 - Securing SDN Environments (Securing Controllers, Applications etc)
 - Monitoring, Testing and evaluating security in SD Networks
 - Optimal Protocols/APIs and Controllers in Software Defined Networking Environment
 - **For who?: Students in Computer Networks, Cyber Security, Applied Computing, Any other courses with basic Computer networks knowledge (Completed Advanced Networking Module – ACCA5024)**
 - **What type of Projects?: Experiment and Development**
- IoT
 - IoT – Device Security (Use and Test any existing methodology/ framework in securing IoT Devices)
 - IoT – Securing Applications in real-time environments (Smart Cities, HealthCare, Agriculture, Environmental Scenarios, Industrial Automation, Wildlife Conservation)
 - IoT – Data Security (Explore options by implying other technologies like Blockchain to enhance the security of data transactions in IoT environments)
 - **For who?: Students in Computer Networks, Cyber Security, Applied Computing**
 - **What type of Projects?: Experiment and Development**
- Network Programmability/ Automation
 - SDN Security Automation
 - Automated Network Implementation (Apply existing framework to configure and manage network devices via code/ automation)
 - Automated Network Testing
 - Optimize Network using Automation
 - **For who?: Students in Computer Networks, Cyber Security, Applied Computing and any other courses with basic Computer networks knowledge (Completed Advanced Networking Module – ACCA5024)**
 - **What type of Projects?: Experiment and Development**
- AI in Securing Cyber space
 - Artificial Intelligence solutions to identify and mitigate phishing attacks

- Artificial Intelligence solutions in real-time Intrusion Detection and Prevention
- **For who?: Students in Computer Networks, Cyber Security, Applied Computing, Data Science, and any other courses with basic Computer networks knowledge (Completed Advanced Networking Module – ACCA5024)**
- **What type of Projects?: Experiment and Development**
- Social Engineering Techniques
 - **For who?: Students in Cyber Security**
 - **What type of Projects?: Experiment and Development**
- Threat Intelligence
 - Open source Threat Intelligence Analysis and Automation
 - **For who?: Students in Computer Networks, Cyber Security**
 - **What type of Projects?: Experiment and Development**
- Network Traffic Analysis
 - **For who?: Students in Computer Networks, Cyber Security**
 - **What type of Projects?: Experiment and Development**
- Mobile Device Forensics
 - Data Carving and Recovery Techniques
 - Incident Response Simulation
 - Forensics analysis on Wearable Devices
 - Cross Device Data Recovery
 - Mobile Device Privacy Assessment
 - Forensics Analysis on Social Media Data
 - Analysis on Mobile Malware
 - **For who?: Students in Computer Networks, Cyber Security**
 - **What type of Projects?: Experiment and Development**

1. VFX Production Final Year Project:

Project Title: "Enhancing Visual Effects in [Film/Games]"

Project Description: This project aims to enhance and integrate high-quality visual effects into a selected film or project. The goal is to improve the overall visual appeal, storytelling, and realism using VFX techniques.

Project Phases:

1. Pre-Production:

- Identify specific scenes or sequences in the chosen film that require VFX enhancements.
- Research and select appropriate VFX techniques and tools.
- Develop a comprehensive project plan, including timelines and resource requirements.

2. Production:

- Execute the planned VFX work, including CGI, compositing, and special effects.
- Ensure seamless integration of VFX elements into the film.

3. Quality Assurance:

- Test and refine VFX shots to achieve the desired visual impact.
- Address any technical or artistic challenges encountered during production.

4. Documentation:

- Document the VFX workflow, techniques used, and challenges overcome.

Create a portfolio showcasing before-and-after visuals to demonstrate the transformation.

2. Sound Design Final Year Project:

Project Title: "Immersive Soundscapes for [Film/Games]"

Project Description: This project focuses on creating immersive and impactful soundscapes for a selected film or Game. The objective is to enhance the auditory experience and storytelling through innovative sound design.

Project Phases:

1. Pre-Production:

- Analyse the film or game to identify key sound design opportunities.
- Research and select appropriate sound design techniques and tools.
- Develop a detailed project plan, including timelines and equipment needs.

2. Production:

- Record and collect sound elements, including dialogue, Foley, and ambient sounds.
- Create a dynamic sound design that complements the visuals and enhances the storytelling.

3. Quality Assurance:

- Mix and master the sound elements for optimal quality.
- Conduct extensive testing to ensure the audio enhances the overall cinematic experience.

4. Documentation:

- Document the sound design process, techniques employed, and challenges faced.

Showcase before-and-after audio samples to illustrate the impact of the sound design.

3. Postproduction Final Year Project:

Project Title: "Streamlining Postproduction Workflow for [Film/Games]"

Project Description: This project aims to optimise the post-production workflow for a selected film or project, with a focus on efficiency, collaboration, and quality control.

Project Phases:

1. Pre-Production:

- Analyse the existing post-production workflow for inefficiencies and bottlenecks.
- Research and select relevant post-production software and tools.
- Develop a comprehensive project plan, including timelines and resource allocation.

2. Production:

- Implement workflow improvements, such as automated file management and collaborative editing solutions.
- Oversee the post-production process, including editing, colour grading, and visual effects integration.

3. Quality Assurance:

- Conduct quality checks to ensure the final product meets industry standards.
- Address any issues that arise during the post-production phase.

4. Documentation:

- Document the workflow enhancements made and their impact on the project.

Provide a report outlining the benefits of the streamlined pos-production process.

4. Virtual Production Final Year Project:

Project Title: "Exploring Virtual Production Techniques for [Film/Games]"

Project Description: This project focuses on the integration of virtual production techniques to enhance the filmmaking process for a selected project. The aim is to explore cutting-edge technology and its impact on production efficiency and creativity.

Project Phases:

1. Pre-Production:

- Research and select virtual production technologies, such as virtual sets and real-time rendering engines.
- Collaborate with the production team to plan the integration of virtual elements.

2. Production:

- Implement virtual production techniques during the filming process.
- Utilize real-time rendering to create dynamic virtual environments.

3. Quality Assurance:

- Monitor and adjust virtual elements in real-time to achieve desired visual results.
- Address technical challenges related to virtual production.

4. Documentation:

- Document the virtual production process, technologies used, and their impact on the project.
- Provide insights into how virtual production contributed to the creative and technical aspects of the film.

These project outlines provide a framework for final-year students in VFX Production, Sound Design, Postproduction, and Virtual Production to plan and execute their projects effectively. The specific details and scope of each project may vary based on the chosen film or project and the goals of the student.

Final-Year Project Title: "Exploring Advanced Lighting in Animation and VFX"

Project Description: This final-year project aims to delve into the intricacies of advanced lighting techniques in the fields of animation and visual effects (VFX). The objective is to push the boundaries of lighting design, improve realism, and enhance the visual impact of animated scenes and VFX shots.

Project Phases:

1. Research and Conceptualisation:

- Conduct an in-depth study of advanced lighting techniques in animation and VFX, including ray tracing, global illumination, HDR, and more.
- Identify specific challenges and opportunities related to lighting in these domains.
- Develop a clear project concept that showcases the application of advanced lighting.

2. Pre-Production:

- Create a project plan, including timelines, milestones, and resource requirements.
- Select suitable software and tools for implementing advanced lighting techniques.
- Develop a detailed lighting design that aligns with the chosen project concept.

3. Scene Preparation:

- Set up 3D scenes or environments for animation and VFX shots.
- Consider the placement of lights, materials, and camera angles.
- Ensure compatibility with advanced lighting features within the chosen software.

4. Advanced Lighting Implementation:

- Apply advanced lighting techniques to scenes, emphasising realism, mood, and storytelling.
- Utilize ray tracing for accurate light reflection and refraction.
- Experiment with global illumination to simulate natural lighting conditions.
- Explore high dynamic range (HDR) lighting for improved visual fidelity.

5. Rendering and Optimization:

- Configure rendering settings to maximize the benefits of advanced lighting.
- Optimize scenes for efficient rendering while maintaining quality.
- Address any technical challenges related to rendering times or artifacts.

6. Integration with Animation and VFX:

- If applicable, integrate advanced lighting seamlessly with animation sequences or VFX shots.

Ensure that lighting enhances the overall narrative and aesthetics.

Quality Assurance:

- Conduct thorough testing to assess the visual impact of advanced lighting.
- Seek feedback from peers or instructors and make necessary refinements.
- Address any issues related to rendering artifacts or performance.

7. Documentation:

- Create comprehensive documentation detailing the advanced lighting techniques used.

- Include render samples, comparisons, and explanations of lighting choices.
- Highlight the impact of advanced lighting on the project's visual quality.

8. Presentation and Showcase:

- Prepare a presentation to showcase the project's achievements and the significance of advanced lighting in animation and VFX.
- Screen the final project to an audience to demonstrate the practical application of advanced lighting techniques.

Project Deliverables:

- A final project showcasing advanced lighting techniques in animation and VFX.
- Detailed project documentation with explanations and visuals.
- A presentation summarizing the project's goals, process, and outcomes.

This final-year project provides students with the opportunity to deepen their understanding of advanced lighting techniques and their application in animation and VFX, allowing them to create visually stunning and immersive digital content. The scope and complexity of the project can be adjusted based on the student's goals and available resources.

Dr Steve Mosey

Project title	Smart AC circuit breaker
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE / DIS / CNetS / WD
Network connected device to monitor AC power usage and provide circuit protection.	

Project title	Automatic guitar tuner
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE / DIS / CNetS / WD
Device to turn machineheads on guitar in relation to pitch played on string. Ideally should also work for lute, gittern, and various sizes of ukulele.	

Munyaradzi Nicholas Murira

Project title	Firewall Configuration and Optimization:
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	Networking and Cybersecurity
Investigate different firewall configurations, set up a secure firewall, and optimize it for network protection.	

Project title	Penetration Testing on a Local Network:
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	Networking and Cybersecurity
Conduct ethical hacking experiments on a closed network to identify vulnerabilities and suggest security improvements.	

Project title	Network Performance Optimization:
Project type (Delete as appropriate)	Development /Experiment
Target degree lines (Delete as appropriate)	Networking and Cybersecurity
Analyse and optimize network performance, considering factors like latency, bandwidth, and quality of service (QoS).	

Project title	Vulnerability Assessment and Patch Management:
Project type (Delete as appropriate)	Experiment
Target degree lines (Delete as appropriate)	Networking and Cybersecurity
Identify vulnerabilities in a network or system and develop a patch management strategy to address them.	

I am open to mentoring students who have a keen interest in Computer Networks, Infrastructure Security, and Cybersecurity. It's important for them to select projects that closely match their abilities and aspirations.

Dr Nik Whitehead

Project title	Pattern block maker
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE / CGD
Cosplay has become a popular pastime in Geek culture, but costumes themselves can be very difficult to make because patterns are not available for many popular characters. A tool is needed that allows users to enter body measurements onto a simplified human form, draw the lines of the clothing they want, then automatically generates the patterns for the clothing as flat pieces ready for printing.	

Project title	Lego Mindstorms Rubik's Cube Solver
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE
Solving a Rubik's cube requires the solver to look at the cube, recognise the configuration of the coloured segments, then apply rotations to different segments so as to return each side to a single-colour condition. This can all be done quite effectively by a robot, even one made from Lego. You will design, build, and programme that robot.	

Project title	Lego Mindstorms Robot Pianist
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE
Design, build, and programme a robot that can take a file containing a suitably encoded piece of music and physically play it on an external keyboard. You will need to define a of encoding a piece of music method (preferably but not necessarily automatically) so that the robot can play any suitably-encoded piece.	

Project title	Exploring the Oculus Quest 2
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	CGD / SE
The Oculus Quest 2 is a headset VR system that can be used for gaming, business, leisure, or education. Suitable projects using this technology might involve designing and building a game, a tool to explore the usability of VR systems, or something similar. NB: There is a bursary available that will cover £250 of the current £300 cost of the Oculus Quest 2. At the end of the project the headset is yours to keep.	

Project title	A game-based usability demonstrator
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	CGD / SE / WD
There is a massive variation in visibility when objects of one colour are placed on top of a different background colour. This project aims to produce game-based demonstrator of this phenomenon that will also allow users with colour vision deficiencies to identify colour combinations that are particularly clear to them. NB: There is a bursary available that will cover £250 of the current £300 cost of the Oculus Quest 2. At the end of the project the headset is yours to keep.	

Project title	Data visualisation using Oculus Quest 2
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	CGD / SE
Visualising 3D data in 2D can be tricky. Visualising 10D data in 2D is very difficult. The hyperbox is a method of displaying large numbers of dimensions of data on a distorted cube-like display that can be rotated to bring any 2 dimensions to the front for viewing. This project aims to build a VR version of this where the user can physically rotate the hyperbox. NB: There is a bursary available that will cover £250 of the current £300 cost of the Oculus Quest 2. At the end of the project the headset is yours to keep.	

Project title	Semantic net-based chatbot
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE
A semantic net is a network of nodes that encode meaning. These can be used to predict sentences that can be used as part of a conversation with a human user. This project aims to create a semantic network that can hold a conversation with a user on a single pre-defined topic	

Project title	Air quality monitoring and warning system for cyclists
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE / CGD
Real-time information about air quality is available for many cities. This project aims to develop a system that will provide cyclists with information via their mobile phone / smart watch if they are entering an area with poor air quality.	

Project title	Eyegaze data analysis tool
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE/GD/DIS
Use the Windows Community Toolkit >> <i>GazeInteractionLibrary</i> to build a fixation analysis tool for the Tobii 4C eyetracker. https://learn.microsoft.com/en-us/windows/communitytoolkit/gaze/gazeinteractionlibrary https://learn.microsoft.com/en-us/windows/apps/design/input/gaze-interactions	

Project title	Eyegaze-controlled game
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE/GD
Use the Windows Community Toolkit >> <i>GazeInteractionLibrary</i> to build a game controlled using the Tobii 4C eyetracker. https://learn.microsoft.com/en-us/windows/communitytoolkit/gaze/gazeinteractionlibrary https://learn.microsoft.com/en-us/windows/apps/design/input/gaze-interactions	

Project title	Prototype home energy use display
Project type (Delete as appropriate)	Development / Experiment
Target degree lines (Delete as appropriate)	CNets / SE / WD
Ubiquitous interfaces are those embedded into objects in our environment. It would be possible to develop a mockup in Visual Studio or make use of electronics resources for development of a prototype. This could be conducted as a development project or an experiment involving comparison of alternative implementations.	

Project title	Prototype mobile interface for a given application
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	WD
With a focus on usability, this topic means the selection of a suitable task for a new mobile interface prototype. A survey would mean conducting analysis and developing and evaluating a paper prototype.	

Project title	Smart city technology
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	SE / WD
In smart cities, investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable development and a high quality of life, through participation and engagement. A development project would mean the construction of a smart city prototype on a suitable platform (perhaps mobile), for example around smart transport or heritage.	

Project title	Development of a Public Information Dashboard
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	DIS / WD
Large amounts of publicly-available data are generated every day by public authorities, but it is often the case that the data presentation leaves a lot to be desired. This project focuses on developing an interactive dashboard designed to allow members of the public to explore this data easily.	

Project title	Pseudorandom Number Generator
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	DIS / SE
Generating random numbers is difficult, so most computer systems generate pseudorandom numbers instead. This project requires you to compare the randomness of existing random number generators, to create your own, and to compare yours to the commonly used ones.	

Project title	Data Exploration in VR
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	CGD / DIS / SE
Build a tool that allows the user to explore hyperdimensional data within a VR environment. Users should be able to import data, select how to display it in 2D or 3D, and output 2D or 3D snapshots of the visualisation. Minimum visualisation set: line graphs, surfaces, 2D and 3D histograms, 2D and 3D scatterplots. Users should be able to interact with the visualisation by rotating it, zooming into and out of it. This would probably be built in Unity. Bonus points for displaying more than 1 scatterplot and selecting/brushing data points. NB: There is a bursary available that will cover £250 of the current £300 cost of the Oculus Quest 2. At the end of the project the headset is yours to keep.	

Project title	Boston Dynamics “Spot” Robotics (x3)
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	DIS / SE
The University has recently acquired a Boston Dynamics ‘Spot’ robot dog. There are 3 slots available for SoAC students to do projects using it. Do you have a cool idea for things to do with a long-armed, bright yellow canine robot? Come and talk to me about it. https://bostondynamics.com/products/spot/	

Project title	Student reward system: Investigation and development of a student reward system/application to enhance attendance engagement and assessment outcomes.
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	DIS, CG, SE, WD.
The student will investigate existing applications & systems and stakeholder opinions to identify best practices and relevant needs. Gamification will be a key feature of the investigation and application as will the ability to develop a responsive mobile web application. Example: the developed application could include a Virtual currency and Virtual/digital to physical reward system with aim of enhancing student attendance engagement and assessment outcomes.	

Project title	Project Library Management System: Investigation and development of a student project library management System.
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	DIS, CG, SE, WD.
The student will investigate existing applications & systems and stakeholder opinions to identify best practices and relevant needs. The developed application will likely include a log-in system, project catalogue, search & filter features and different user-level access including admin. user level. The application will also likely be a responsive mobile web application.	

Project title	Augmented Reality Game: Investigation and development of an Augmented Reality Game.
Project type (Delete as appropriate)	Development
Target degree lines (Delete as appropriate)	CGD, SE, WD.
Company: BrdSports Ltd. Project description: We are looking to develop an exciting new augmented reality game that will link the players physical world with the digital game. Augmented items will need to be placed at specific locations for collection on a board or kart (powered by gravity or an electric motor). The idea would be to create a game with similarities to Mario Kart in game play coupled with obvious real world physical activity health benefits. Taking what has been done with the Wiifit and Pokemon Go to the next level	

Project title	e-Commerce website: Investigation and development of an e-commerce website for a case study organisation.
Project type (Delete as appropriate)	Design/Development
Target degree lines (Delete as appropriate)	DIS, SE, WD.
Company: Hybrid Arts Café. Project description: The Hybrid Arts Café require an e-commerce site, that allow them to easily upload artists pictures, crafts and jewellery to sell. An option for potential customers to select an image and choose what they would like the image printed on (such as a cushion cover, mug, postcard, canvas, key ring, birthday card etc.). an online gallery where we can exhibit original artwork for sale. A blog to keep customers engaged in the cafe events, and an online calendar of events would be useful. A monthly subscription offer for customers. Possible further use of existing SQUARE point of sale (POS) till system, consideration for integration with the new website/e-commerce system.	