DCU

Ollscoil Chathair
Bhaile Átha Cliath
Dublin City University

DÁMH NA hINNEALTÓIREACHTA AGUS NA RÍOMHAIREACHTA
FACULTY OF ENGINEERING AND COMPUTING

Expo 2020

Faculty of Engineering and Computing

Final Year Projects
Class of 2020

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Welcome

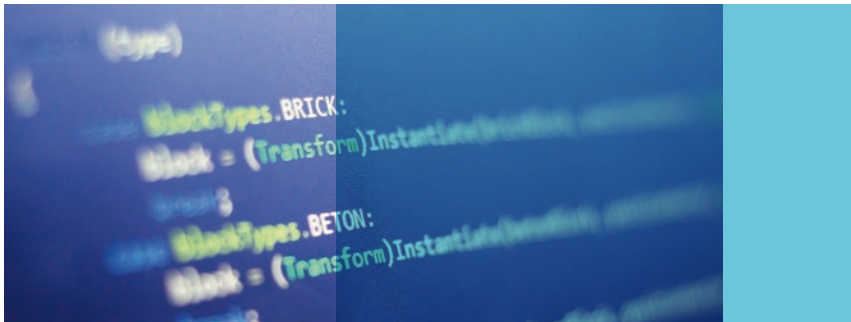
Welcome to the Final Year Projects booklet showcasing the work of the graduating BSc and BEng classes of 2020 from the DCU Faculty of Engineering and Computing.

Our details and respective projects can be found within this booklet. The projects demonstrate how we put into practice the knowledge gained during our time here in DCU. They cover many areas within computing, electronic engineering and mechanical and manufacturing engineering and are inspired by time spent on INTRA (work placement), staff research interests, collaboration with companies and original concepts. These projects demonstrate our hard work and innovation.

We would like to extend our thanks to lecturers, supervisors and the support staff for all their help and assistance throughout our time here. Without their support we would not have been able to complete these projects.

And last, but not least, thanks to all the companies you represent for showing an interest in our work – we hope you enjoy it.

Faculty of Engineering and Computing
Final year students 2020



Introduction

Congratulations to each and every one of our future alumni for successfully completing your final year project. I am certain that our Industry partners, your supervisors, and families are very proud of the work you have completed. I encourage you all to take this opportunity to be very proud of what you have achieved in recent times.

In the year of an unprecedented global pandemic you the class of 2020 finished your studies at DCU in a virtual environment. In the absence of an on campus event this booklet contains video demonstrations of each project and this will be viewed by Industry representatives across all sectors of the ICT and STEM sector in Ireland.

This event started as a single School of Computing event three decades ago and has grown from 25 projects back in the late 1980s to quadruple that number of exhibitors at the present day. Today, we have the opportunity to recognise and celebrate all the work you have done. We all go through many stages in our careers and lives and today, for you, marks an important milestone. This booklet displays a major highlight of your academic achievements for your peers, their academic mentors, and for the many others who will access this booklet over the coming weeks both from industry and the wider DCU community. At its core, our Faculty's focus is to release the potential which our students have, to have impact i.e. transforming lives and societies. We believe that the range of Final Year Projects on display here today reflects the great opportunities for these young graduates to contribute to the advancement of Irish society over coming years. Many of the projects displayed in the booklet represent products with immediate commercial potential and all of them demonstrate ingenuity, skill and technical capability of the highest calibre.

To the students, congratulations and well done! Some of you will now go on to careers within the engineering, computing or other sectors of the Irish economy; others will continue your formal education either here in DCU or elsewhere; some may travel across the world; and some may choose to develop your careers into new and different directions – management, accounting, consultancy, maybe even politics! But we hope that all of you will look back with fondness at your time here at DCU, and also – and perhaps more importantly – at the friendships you have made here. We here in the Faculty always enjoy hearing how former students are developing in their careers. Do please stay in touch, and come back and visit from time to time – you will always be welcome!

Message from the Dean

To our Students and Industry guests, this booklet represents a lot of hard work over recent months. We hope that you enjoy your "visit" and are impressed with the depth and breadth of the work that our students are presenting. Impressive though they are, these projects still represent only a small sample of the learning that the students have achieved in the course of their studies.

Do please refer to the video link assigned to each project and hear directly from the student and explore more fully what the DCU education experience represents. DCU is well-known for its strong relationship with enterprise, innovation and entrepreneurship. We are confident that the students you "meet" here will go on to have a strong impact on the various industries and sectors that you represent.

We look forward to marking the success of these students in the future and again, congratulations from us all here in the Faculty of Engineering and Computing and DCU.

Prof Lisa Looney
Dean, Faculty of Engineering and Computing

INTRA: The DCU-Industry Work Placement Programme

Relevant work experience through DCU's INTRA (INtegrated TRAining) programme has been a central feature of education at DCU since the establishment of the university, and is an integral part of all undergraduate degree programmes in the Faculty and Engineering and Computing. Under the INTRA programme, undergraduate students complete a six month work placement during their third year of study, running from February/April to September inclusive. In many cases, students are subsequently recruited to work with their INTRA employers after they graduate.

Why Offer an INTRA Placement?

Every year, employers in Ireland and overseas hire more than 1,200 students from DCU for an INTRA placement. Ranging in size from the largest multinational, to the sole trader or start up, these employers are convinced of the merits of choosing DCU students and come back to INTRA year after year. INTRA provides the following opportunities for an employer:

- Access to a supply of highly motivated young people who have proven that they can make a real contribution
- An opportunity to evaluate and train possible future employees
- Frees existing staff from time-consuming but routine tasks
- Allows relief or assistance during seasonal peak work loads
- Permits new projects to be undertaken
- Develops existing staff by providing mentoring opportunities
- Raises awareness of your company and products/services among the DCU community
- Provides an ideal opportunity for employers and academics to establish long-term relationships and the potential for working together on projects
- Provides an opportunity for involvement in the development of graduates with the required key skills essential to the Irish economy
- Helps to promote and reinforce a lifelong learning culture within an organisation through the establishment of strong links with a third level institution

For more details, contact
Maeve Long, Head of INTRA
T: +353 (87) 685 4529
E: maeve.long@dcu.ie

Connecting You With Your Future Talent

DCU graduates have a well-deserved reputation as highly skilled, flexible and motivated recruits, which means they continue to be highly sought after by employers.

Partner with DCU Careers Service to recruit graduates for your talent pipeline from our Engineering and Computing programmes:

— Advertise opportunities on our online platform: Our Jobs Board offers you the facility to reach a potential audience of over 17,000 current students and recent graduates (up to 2 years post graduation).

— Participate in our annual Careers Fair: This flagship event, with attendance of up to 2,000 talented DCU students and graduates, is the perfect showcase for your brand.

— Engage in Careers events and activities to raise your company profile: We provide opportunities for companies to engage with our students in a meaningful way by participating in Skills Sessions, Alumni Panel Events, Careers Clinics, Careers Week and Mentorship Programmes.

— Participate in Timetabled Careers Classes with Final Year and Masters Students: Work with a specialist Careers Advisor to input into Careers classwork in areas such as whiteboarding, tech talks and labour market topics.

— Contribute to our Online Employer Showcase: Submit video content, provide a presentation deck about your company, or take a guest spot on a Careers podcast.

Use our expertise to connect your company with DCU students both on campus and online. We look forward to working with you!

To learn more about how DCU Careers Service can assist you, visit **dcu.ie/careers** or contact:

Miriam Jones, Employer Engagement and Operations Officer
E: miriam.jones@dcu.ie
T: +353 (01) 700 5129

Collaboration on Undergraduate Projects

One way in which companies can raise their profile among graduating students is by submitting projects which students can work on as part of their coursework. Companies are also invited to provide in-house support for projects undertaken by students, or to provide financial support for projects assigned to students. There are several benefits to the company, not least of which is the opportunity to get valuable research undertaken that might not be possible within the company due to operational limitations.

If you are interested in finding out more about possible collaboration with students in our Schools the contact details are below:

School of Computing

T: +353 (01) 700 8980
E: computing.info@dcu.ie

School of Electronic Engineering

T: +353 (01) 700 5131
E: ee.info@dcu.ie

School of Mechanical and Manufacturing Engineering

T: +353 (01) 700 5104
E: mme.info@dcu.ie

The School of Computing

The School of Computing at Dublin City University has earned a strong reputation for excellence in research and teaching. In addition to its existing programmes, the BSc in Computer Applications degree and the BSc in Enterprise Computing, we have launched a new and innovative BSc in Data Science **datascience.dcu.ie**. This course is the first of its kind in Ireland and is aimed at students who are interested in a career in Big Data, data analytics and related data science roles. We also offer a range of innovative taught programmes aimed at producing graduates with the professional and personal skills most sought after in the Information Economy.

The School also enjoys a lively, supportive environment for research in many areas of computing, with its numerous PhD and MSc research students producing work of significance at both national and international level. With close industry links and fee support for EU students, the School's teaching and research programmes reflect the current and anticipated needs of Ireland's industrial and commercial sectors while at the same time meeting the most rigorous national and international academic standards.

The range of undergraduate and postgraduate programmes are:

— BSc in Data Science

— BSc in Enterprise Computing

— BSc in Computer Applications

— MSc in Computing (with a major)

— MSc in Computing (Artificial Intelligence)

— MSc in Computing (Blockchain)

— MSc in Computing (Data Analytics)

— MSc in Computing (Secure Software Engineering)

— MSc in Electronic Commerce

— MA in Data Protection and Privacy Law

The School of Computing is a major stakeholder in two Science Foundation Ireland (SFI) research centres: the Insight SFI Research Centre for Data Analytics and the ADAPT SFI Research Centre for Digital Content Technology. Furthermore, staff are significantly involved in a number of other research groups including Lero the Irish Software Research Centre, ENABLE the SFI Spoke on IoT and the SFI funded FinTech Fusion spoke.

The School of Electronic Engineering

Student Knowledge and Aptitudes

The objective of our taught BEng/MEng programmes in Electronic and Computer Engineering is to produce qualified engineering professionals who will:

- Have a sufficient understanding of basic sciences and mathematics appropriate to developing their careers as professional engineers
- Be competent in electronic circuits, systems and software design
- Have a detailed knowledge of the most important sub-disciplines related to their programme of study
- Have a capacity to model and analyse the dynamics of a range of technological systems
- Understand the overall requirements of product design
- Understand the structure and organisation of industry and have relevant industrial experience as a support to attaining the previous objectives
- Be capable of approaching problem-solving in a creative and innovative way
- Have developed a range of communication skills – oral, written and visual
- Have sufficient personal and inter-personal skills to enable them to be effective contributors to technology-based industrial development
- Be critically aware of the impact of engineering on society
- Embody the professional qualities of discipline, discrimination and application
- Be aware of the need to update or deepen their knowledge and skills and have an ability to do so through research, academic or professional training

Full details of the School of Electronic Engineering's taught programmes can be found at: **http://ece.eeng.dcu.ie/**

Work Areas

Students from our taught BEng/MEng Engineering programmes have the ability to work in a range of different engineering areas, some of which are listed below.

BEng in Electronic and Computer Engineering

- Majors offered in Systems and Devices, High-Speed Communications, Digital Interaction, and the Internet of Things (IoT)
- Building on successes of previously offered BEng programmes in Electronic Engineering, Information and Communications Engineering, Digital Media Engineering

— Hardware design and development of embedded systems

— Development of optical communications systems

— Semiconductor and nanoelectronic materials and device manufacturing

— ASIC design/testing

— Building real-time distributed system infrastructure and applications software

— Development of computer and machine vision solutions

— Analysis, development, refinement and optimisation of DSP algorithms

— Network design and operation for public telecom operators

— Private network design and operation for utility companies, government organisations and/or financial services applications

— System design, concentrating on hardware, software or both

— Technical marketing, including network design

— Telecommunications research organisations and consultancies

— Telecommunications software development

— Systems development for diverse database-backed web services

— Hardware design of digital media devices (incl. mobile phones, tablets, mobile robotics)

— Development of virtual reality, telepresence and visualisation applications

— Web applications and interfaces for delivery of content to diverse environments

— Systems architecture design for e-commerce/B2B applications

— Developing archival or browsing systems for libraries of multimedia content

BEng in Mechatronic Engineering (jointly in collaboration with the School of Mechanical and Manufacturing Engineering)

— An understanding of the principles of fundamental sciences, engineering sciences, technology and mathematics

— An understanding that a few powerful unifying principles govern the function of many different mechatronic systems

— A thorough knowledge of modelling and design, system integration, actuators and sensors, intelligent systems, robotics, computer integrated manufacturing and automation, motion control and image processing

— A capacity to take a problem and redefine it in an engineering context; in the course of designing a system, component or process to meet specified needs

— Proficiency in the design and running of experiments and the analysis and interpretation of data

— A knowledge of the resources required to put in place a solution to an engineering problem taking into account the practical constraints from a technical, human resources and financial perspective

— The capability of efficient project management maximising use of available resources to produce a successful outcome in a pre-defined time frame

— An ability to demonstrate professional conduct in diverse, complex and unfamiliar situations at all times being aware of the implications of their work

— An understanding of the need for high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment

— An understanding that sustainability, recycling and product life cycle must be considered at the design stage

— An ability to work as part of a multidisciplinary team using their hybrid mechatronic training to integrate technologies in a synergistic manner

— An awareness of the need to update or deepen their knowledge/skill set and an ability to conduct further training through research, academic or professional training

— An ability to independently acquire further expertise and to ensure that the use of this expertise complies with the ethical standards of the profession

— An understanding of the importance of the engineer's role in society and the need to communicate effectively within this environment and to other engineers

— An ability to embrace all modern media for the purposes of communication, with a strong emphasis on visual computer aided design methods

— An understanding of the need for the highest ethical standards of practice

— An understanding that, as part of a team, it is important to consider the opinions of other members and to put in place a plan/design/process that is cognisant of these opinions

Full details of the DCU INTRA programme are available at: **dcu.ie/intra**

Taught MEng in Electronic and Computer Engineering

— Major in Nanotechnology

— Major in Advanced Data Networks

— Major in Internet of Things

— Major in Image Processing and Analysis

— Major in Semiconductor and Plasma Technology

The School of Mechanical and Manufacturing Engineering

Student Knowledge and Aptitudes

The objective of our taught BEng/MEng programmes in Mechanical and Manufacturing Engineering disciplines is to produce qualified engineering professionals who will:

- Have a sufficient understanding of basic sciences and mathematics appropriate to developing their careers as professional engineers
- Be competent in design, professional development, dynamics and control, solid mechanics, fluid mechanics, materials and manufacturing, sustainable manufacturing systems, biomedical engineering and business (depending on their discipline)
- Have a detailed knowledge of the most important sub-disciplines related to their programme of study
- Have a capacity to model and analyse the dynamics of a range of technological systems
- Understand the overall requirements of product design
- Understand the structure and organisation of industry and have relevant industrial experience as a support to attaining the previous objectives
- Be capable of approaching problem-solving in a creative and innovative way
- Have developed a range of communication skills – oral, written and visual
- Have sufficient personal and inter-personal skills to enable them to be effective contributors to technology-based industrial development
- Be critically aware of the impact of engineering on society
- Embody the professional qualities of discipline, discrimination and application
- Be aware of the need to update or deepen their knowledge and skills and have an ability to do so through research, academic or professional training

Work Areas

Students from our taught BEng/MEng Engineering programmes have the ability to work in a range of different engineering areas, including new emerging fields, some of which are listed below.

BEng/MEng in Mechanical and Manufacturing Engineering

— Design of engineering materials, processes and components, and related developing technologies

— Create models (CAD or otherwise), deriving appropriate equations and specifying boundary conditions and underlying assumptions and limitations

— Use of appropriate mathematical methods for application to new and ill-defined mechanical and manufacturing engineering problems

— Investigate the performance of systems and components through the use of analytical methods and modelling techniques, and develop software tools including numerical techniques to solve engineering problems

— Product design and development of mechanical systems, 3D printing and robotics

— Sustainability of manufacturing processes and renewable energy

— Project management skills and teamwork

BEng/MEng in Biomedical Engineering

— Modelling and design, production technology, biomaterial science and the requirements for regulatory compliance

— Understanding of anatomy, physiology, biomechanics, image processing, sensors and statistics

— Bio-engineering, tissue engineering, and applications of advanced technologies

— Development of computer-based designs to mimic and solve bio engineering problems

— Application of ethical standards and duty-of-care towards the end-users of biomedical products

BEng in Mechatronic Engineering (jointly in collaboration with the School of Electronic Engineering (see page 10).

Project Listing

School of Computing Projects

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School of Computing Projects

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School of Computing Projects

Computational Problem Solving and Software Development

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School of Mechanical and Manufacturing Engineering

Mechanical and Manufacturing Engineering

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School of Mechanical and Manufacturing Engineering

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School of Electronic Engineering

Electronic and Computer Engineering

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School of Electronic Engineering

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School of Electronic Engineering

Study Abroad Projects

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All project areas
and technologies
for all projects can
be viewed here:

shorturl.at/klvS0

School of Computing Projects

Computer Applications

Project Title	A Simple Society – Game Theory
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Programme	Computer Applications
Supervisor	alistair.sutherland@dcu.ie

This project aims to find the optimal strategies for agents to employ in order to survive. Agents will be passive or aggressive to simulate a predator/prey scenario. The system will study the key concepts found in Game Theory such as cooperation, deception, sharing of resources and so on. Users also have the ability to change key aspects of agents behavior and their surroundings and watch them react in real-time.

Project Video	shorturl.at/rxEH4
Project Area	3-D Modelling, Artificial Intelligence, Gaming, Simulation
Project Technology	C#, Unity

Project Title	Agent Based Model to Simulate the Effects of Inequality on Crime
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Programme	Computer Applications
Supervisor	renaat.verbruggen@dcu.ie

This research project is a simulation that's use can assist in fields like Social Sciences, Economics and Politics. Nobel Prize winner Gary Becker first suggested that there was a link between the levels of crime in a society and the level of inequality in that society. Agent based models are a powerful tool to study emergent behavior among individuals or "agents" in a closed system. The level of access to wealth, goods and services in a population, and its distribution is known to affect the level of happiness of its people. This simulation allows the user to create an environment with customisation levels for access to wealth and assess what types of behaviour emerge.

Project Video	shorturl.at/jnrTY
Project Area	Artificial Intelligence, Simulation, Software Development
Project Technology	Java

Project Title	AudioFlow
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Supervisor	stephen.blott@dcu.ie

AudioFlow is a music streaming application aimed towards the more niche genres of music e.g. choir music and opera music, but it will offer a wide range of functionalities to its users, such as streaming their own choice of music, the ability to play/pause music, restart/skip songs and favourite/rate them as well as create playlists of songs they may like.

Project Video	shorturl.at/tyL58
Project Area	Android, Databases, Mobile App
Project Technology	CSS, HTML5, JavaScript, SQL, React Native

Project Title	BioRhythmic
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Supervisor	tomas.ward@dcu.ie

BioRhythmic is a health journaling app that prioritises episode tracking which allows the user to trace factors that impact the episodes they may have, e.g a non epileptic seizure(NES), migraine, or both. The user can journal some aspects such as food, emotional state and whether they had an episode. The rest of the inputs will be collected using android sensors in the app such as logging steps, locations and sleep quality. The data gathered will be analysed and presented to the user in a visually concise manner that makes it easier for the user to see their behavioural patterns and possible episode triggers.

Project Video	shorturl.at/cdn59
Project Area	Android
Project Technology	Java, NoSQL, XML

Project Title	Chirp – Audio Social Updates
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Our project is a mobile application that will change the way users interact with the popular social media platform, Twitter. Users can record and share voice messages via our application, which will be played in real-time to other users. This allows a new, rapid, more in-depth form of communication between people, all from within a single mobile app.

Project Video	shorturl.at/qwHJ6
Project Area	Android, Cloud Computing, Device Design, Mobile App, Social Networking, Software Development
Project Technology	Java

Project Title	Clever Carpooling
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Programme	Computer Applications
Supervisor	ray.walshe@dcu.ie

Clever Carpooling is an Android application which aims to facilitate and improve navigation and peer-to-peer ridesharing, utilising Google Maps API. Users may sign up as either a driver or a passenger, or both. Drivers may 'post' a route which they plan on undertaking, and passengers may request a lift if they are going anywhere on that same route within a given distance. Clever Carpooling has many applications to our society as a whole, including helping to attack the climate problem, and making student/commuter life easier, to name but a few.

Project Video	shorturl.at/qAT02
Project Area	Android, Databases, Energy Conservation, GPS/GIS, Instant Messaging, Mobile App, Software Development
Project Technology	Java, Python, SQL, XML, jsoup, Firebase, Google Maps

Project Title	comet – A Code Metrics and Analysis Tool
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Programme	Computer Applications
Supervisor	geoff.hamilton@dcu.ie

comet is an intuitive, powerful and comprehensive code metrics and analysis tool. A python-based parser built on the ANTLR parser generator produces insightful and valuable performance and structural metrics and models for submitted codebases. Requests are serviced by a Django REST API with abstract responses, designed to be useful in the context of comet's sleek React.js web application, or as an integration with a deployment pipeline to provide a means of implementing metric-based checkpoints into the CI/CD cycle.

Project Video	shorturl.at/jluJL
Project Area	Automation, Software Development, Web Application
Project Technology	JavaScript, Python, REST, ReactJS, Django, ANTLR

Project Title	Curo
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Programme	Computer Applications
Supervisor	paul.m.clarke@dcu.ie

The Project has been developed to have a simple development environment inside a web browser. Admins can create groups of users linked to a repo. Users can edit code, create files and commit code.

Project Video	shorturl.at/chuPV
Project Area	Databases, Filesystems, Software Development, Web Application
Project Technology	CSS, JavaScript, MySQL, Nodejs, PHP

Project Title	Datative
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Programme	Computer Applications
Supervisor	ray.walshe@dcu.ie

Datative is a web-based analytics and dashboard tool. It gives users full control of their data and allows them to visualise their data in a way that is meaningful to them. It offers rich, personalised analytics with full customisation. The application offers a number of algorithms which users can perform on their data to gain meaningful insights. These insights are then displayed in custom visualisations on the dashboard. The dashboard can be exported as a pdf report.

Project Video	shorturl.at/cefkU
Project Area	Web Application
Project Technology	HTML5, Java, JavaScript, SQL, Spring MVC

Project Title	DCU Campus Chatbot
Name	Sam Wood
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Programme	Computer Applications
Supervisor	gareth.jones@dcu.ie

Our project is a web app designed to answer queries about the Dublin City University campus. The main functions of the app are to decipher building codes on the campus map, provide directions to the buildings and lecture rooms, give images of certain buildings on the campus and to answer frequently asked questions about DCU. Our goal is to provide an intuitive and aesthetically pleasing application that is useful to anyone that uses it.

Project Video	shorturl.at/mHT36
Project Area	Artificial Intelligence, SMS, Software Development, Web Application
Project Technology	CSS, HTML5, JavaScript, Python, XML, AIML

Project Title	DCU xDrive
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Programme	Computer Applications
Supervisor	stephen.blott@dcu.ie

xDrive provides a centralised, easy-to-use, first-party private cloud solution for staff and students in DCU. This is achieved by having a desktop client that automatically synchronises specified file systems to the cloud (in order to provide back-ups), while also allowing files to be accessed from any machine of the user's choice. As well as this, xDrive comes equipped with two clients, one for the desktop (to synchronise/view files) and another on the web – where a user may view, add, and remove synchronised or added files of their choosing. Finally, in addition to previously mentioned features, users may also upload/download other files of choice from/to the cloud platform effortlessly, with the assurance that their data is stored securely and safely on the DCU's xDrive system.

Project Video	https://tinyurl.com/yb4c5kmm
Project Area	Cryptography, Databases, Educational, Filesystems, Security, Web Application
Project Technology	CSS, Docker, HTML5, JavaScript, MongoDB, Nodejs, REST, React

Project Title	Digital Flashcards & Spaced Repetition
Name	Ciaran Hand
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Programme	Computer Applications
Supervisor	monica.ward@dcu.ie

This Project is an Android app that will enable the user to take photos of some text that they wish to memorise and automatically generate a flashcard & prompt. This system will also remind the user when to attempt to remember the content of the Flashcard occasionally.

Project Video	shorturl.at/knwR3
Project Area	Android, Computer Vision, Natural Language Processing, Optical Character Recognition
Project Technology	Java, Python, XML

Project Title	Dublin Bus Realtime
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Programme	Computer Applications
Supervisor	mark.roantree@dcu.ie

This project is an analysis of Dublin bus real-time information and uses this to make predictions for more accurate bus arrival times. The application is for android users and it uses real-time information as well as historical data to make these predictions. It stores all historical data in an online database and all computations and analysis on this data is done using cloud computing.

Project Video	shorturl.at/nquGI
Project Area	Android, Cloud Computing, Data Analytics, Data Mining, Mobile App
Project Technology	Docker, Eclipse, Java, MySQL, Python

Project Title	EdConnect
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Supervisor	andy.way@dcu.ie

EdConnect is a management system for use in secondary schools across the country. It provides a paperless way of carrying out various tasks which are performed in a secondary school environment. It also provides a source of communication between teachers and students and also teachers and parents. EdConnect is a potential way of enabling online learning in secondary schools, which is an area that clearly needs addressing.

Project Video	shorturl.at/vJ136
Project Area	Educational, Web Application
Project Technology	CSS, HTML5, JavaScript, MySQL, PHP

Project Title	Einstein
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Programme	Computer Applications
Supervisor	stephen.blott@dcu.ie

The name Einstein is an application which resides Dublin City University's. The purpose of this system is to provide students enrolled in various programming related modules a means of verifying if their code is written to a sufficient standard by passing test cases.

The existing Einstein system is highly coupled within the architecture inside of Dublin City University. The goal of the project is to enable ease of deployment inside any institution while having all the necessary components tied within a single modular package.

It also focuses on coordinator orchestration and enhancing students experience on command line and getting them more comfortable in a GUI'less environment by enabling file uploads to the system via the terminal.

Project Video	shorturl.at/fsLNS
Project Area	Content Management System, Databases, Educational, Filesystems
Project Technology	CSS, Docker, HTML5, JavaScript, MySQL, REST, React, Redux, Docker compose

Project Title	Emotion Detection for Lecturers
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A web application that enables lecturers to monitor the emotion of an audience throughout a lecture via face detection, emotion classification and speech recognition to provide visual feedback in the form of graphs. Providing unbiased audience emotion information for the lecturer and enhancing the student's learning were the main goals of this project. Audience images are collected using the lecturers mobile phone and are processed using REST services, making the application transferable to alternatives to university settings.

Project Video	shorturl.at/pxABH
Project Area	Artificial Intelligence, Computer Vision, Image/Video Processing, Software Development, Speech Recognition, Web Application
Project Technology	CSS, HTML5, JavaScript, NoSQL, Python, REST, React

Project Title	Environmental Monitoring & Prediction Web Application
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Programme	Computer Applications
Supervisor	mark.roantree@dcu.ie

This project involved the creation of a web application that allows users to see a visual representation of changes in the Irish environment over time. It's primary purpose is to translate large quantities of numerical / geographical data into a visual format and make well informed predictions about said data.

Project Video	shorturl.at/dkACP
Project Area	Data Analytics, Data Mining, Environmental Mapping, Web Application
Project Technology	CSS, HTML5, JQuery, Python, SQL, Django

Project Title	ExerFit
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Supervisor	monica.ward@dcu.ie

Exerfit is an exercise tracking mobile and web app for groups of users.The purpose of this app is for admins to assign exercise tasks to users using the web app. Users can then view tasks on their mobile app and complete the task which is recorded off a wearable device (Fitbit API / Apple Health Watch). The admins and users will be able to view stats from each task and will also receive a generated score based on their results.

Project Video	shorturl.at/dgnB9
Project Area	Mobile App, Software Development, Web Application
Project Technology	CSS, JavaScript, Nodejs, React, React Native, Firebase

Project Title	Foghlaim
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Programme	Computer Applications
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This project is an educational tool for any people wishing to learn or revise some basic vocabulary in a foreign language. This project restricts the foreign language to Irish. The project consists of an Android application which prompts the user with a word in Irish and the user is tested on how quickly they can find and take a picture of the item which the word describes. Correctness is determined through a Convolutional Neural Network as part of the Application.

Project Video	shorturl.at/blNQ5
Project Area	Android, Educational
Project Technology	Java, Python

Project Title	FurnishMe
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Programme	Computer Applications
Supervisor	gareth.jones@dcu.ie

FurnishMe is a augmented reality based android app. It allows for a collaborative interior design experience. It provides an all in one solution for designing your home. Users can select and place 3D models of furniture into their environment using only their phone camera.

Project Video	shorturl.at/vLNWZ
Project Area	Android, Augmented Reality, Cloud Computing
Project Technology	Java, Nodejs, XML, AWS (Amplify, Cognito, DynamoDB, Lambda)

Project Title	GhostDB
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GhostDB is a distributed, in-memory key-value data store that delivers single-digit microsecond performance at any scale. Only network latency can slow it down.

GhostDB is designed to speed up dynamic data driven websites by storing data in RAM in order to reduce the number of times an external data source must be read.

GhostDB can handle thousands of concurrent connections to each node in your cluster. Your clusters are live modifiable; if you need to scale up, GhostDB will adjust to your changes.

GhostDB also provides multiple persistence options so you don't lose your data if a node goes down. We also provide at-rest encryption for your snapshots and give you access to fine grained system and application level metrics so you have the best possible visibility over your cluster.

Project Video	shorturl.at/afnAQ
Project Area	Cloud Computing, Databases, Distributed Systems, Information Retrieval, Software Development
Project Technology	Go, NoSQL, Nodejs, Python, REST, TLA+

Project Title	GymVision
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Incorrect form while performing gym exercises is one of the leading causes of injury among gym goers. The purpose of this application is to provide users with a platform both on android and desktop to asses their gym exercise form. The application allows the user to perform an exercises in front of the camera and will provide feedback advising the user of how correct their form is while performing the exercise.

Project Video	shorturl.at/yzGR1
Project Area	Android, Computer Vision, Software Development
Project Technology	Java, Python

Project Title	HomeCare
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Programme	Computer Applications
Supervisor	monica.ward@dcu.ie

HomeCare is a home healthcare, database management and logistical route optimisation android and web application. The goal of the project is to allow for efficient management of scarce organisational resources and timely cost effective delivery of care to people in their homes. The web application provides admin capabilities and manages data which is then passed to the android application which provides a number of different services and functionalities that help health care employees provide efficient care.

Project Video	https://bit.ly/3gkbKdh
Project Area	Android, Artificial Intelligence, Databases, GPS/GIS, Mobile App, Web Application
Project Technology	CSS, HTML5, JQuery, Java, JavaScript, XML

Project Title	ICE
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Programme	Computer Applications
Supervisor	renaat.verbruggen@dcu.ie

With the on-going dangers of today's society, our safety has become more a priority than ever before. It's inevitable that people make trips alone, be it short or long, but it wouldn't be as daunting if provided with the reassurance that your guardians knew your location and that help was easily accessible.

This is where the ICE application comes into play, transforming your mobile into its own personal safety device, providing that reassurance, extra comfort and protection.

Project Video	shorturl.at/DRU89
Project Area	Instant Messaging, Mobile App, SMS, Social Networking, Speech Recognition
Project Technology	JavaScript, Firebase, React Native

Project Title	IOT Garden
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Programme	Computer Applications
Supervisor	donal.fitzpatrick@dcu.ie

This project was developed as a web application that controls and monitors a plants environment through an array of sensors and pumps. Users are able to monitor in real-time the status of their plant from anywhere as well as automating plant care when they are away from home. The platform was built with a cloud-focused architecture, making use of various AWS services including EC2, RDS and Lambda.

Project Video	https://bit.ly/3duVH9E
Project Area	Automation, Cloud Computing, Device Design, Internet of Things, RaspberryPi, Sensor Technology, Web Application
Project Technology	HTML5, JavaScript, Python, SQL, Flask

Project Title	ISL Interpreter
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Programme	Computer Applications
Supervisor	donal.fitzpatrick@dcu.ie

This project is a resource for learning and practicing the Irish Sign Language Alphabet. This alphabet consists of a hand signal for each letter. Through use of a Neural Network, the user will be able to learn and practice these hand shapes using the camera on their phone. The program will instruct users on what the proper hand shape should be, and give them a space to practice their Alphabet signs.

Project Video	shorturl.at/dstRS
Project Area	Computer Vision, Image/Video Processing
Project Technology	Java, Python, XML

Project Title	Juke
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Programme	Computer Applications
Supervisor	donal.fitzpatrick@dcu.ie

Juke is an online jukebox web app. Users queue up songs by searching them from a database and then vote on other songs in the queue to continue playing if they like it or skip the song if they dislike it.

Juke is also a venue recommender. It looks at your past history of played songs as well as similar users' tastes and recommends venues that tend to play similar genres of music.

Project Video	shorturl.at/aCEF6
Project Area	Databases, Multimedia, Web Application
Project Technology	AngularJS, CSS, HTML5, JavaScript, MySQL, Python, Firebase

Project Title	Mini Mental State Exam Application
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Programme	Computer Applications
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The project aims to assist and improve the current methods of conducting and analysing the Mini-Mental State Exam (MMSE). The MMSE is a test used to gauge cognitive functions and levels of cognitive impairments in patients. In an overloaded healthcare system, we hope that this application can relieve some time by improving efficiency and freeing up medical professionals. As a proof of concept we hope to implement an integrated full stack application as a tool to assist medical professionals.

Project Video	shorturl.at/szI78
Project Area	Android, Data Analytics, Databases, Mobile App, Software Development
Project Technology	.NET, C#, SQL, Xamarin

Project Title	Modelling an Ant Colony
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Programme	Computer Applications
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A study of Machine Learning and Genetic Algorithms through the implementation and simulation of a Virtual Ant Colony. This simulation mimics the behaviour of ants traversing their environment to find food. In nature, ants are extremely efficient at finding a path from their home to a food source using chemical trails. This simulation models the interaction between the ants and these chemical trails in order to find the shortest path to a food source. Applies this behaviour to emergency response vehicles facing the same shortest route problem.

Project Video	shorturl.at/fzHK8
Project Area	Artificial Intelligence, Educational, Simulation
Project Technology	Java, Java Swing, Java AWT

Project Title	Mona Compiler / Mona Programming Language
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Supervisor	david.sinclair@dcu.ie

Mona is a compiler built to help novice software developers to learn the basic programming concepts. Mona is a first programming language and its goal is to help novice programmers to learn programming and easily transition from Mona to commercial programming languages such as java and python. Mona is built using java-cc jjtree and llvm ir. Mona code is compiled into llvm ir and can run on any platform. The programming language is hosted online and runs on an amazon ec2 instance.

Project Video	shorturl.at/dgjCQ
Project Area	Software Development, Web Application
Project Technology	CSS, HTML5, Java, Python, javacc, LLVM IR

Project Title	Movement Prediction in Games Using Machine Learning
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Programme	Computer Applications
Supervisor	tomas.ward@dcu.ie

Our project offers an API as a service to be used by game developers which aims to reduce the impact a bad network connection has on their game's gameplay experience.

Developers can use our API to send their game's player movement data to the cloud where AWS Lambda is used to predict the movements players will make using machine learning.

The predictions can then be pulled from the cloud (using our API) and can be applied to the developer's game. Our project will include a demonstration of this.

Cloud based gaming (e.g. Google Stadia, which requires a strong internet connection), AI player movement and erratic network conditions are examples of this project's use cases.

Project Video	https://bit.ly/2YYgtte
Project Area	Cloud Computing, Gaming, Information Retrieval
Project Technology	C/C++, Python, Unity, Unreal Engine

Project Title	Multi user Boids (MUBS)
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The aim of this project is to implement a boids algorithm, to control the on screen agents, along with the aim of having in multi-user environments in the format of a multiplayer game. All of the computations are handled client-side and the server is used strictly for coordinating movements between the two clients which may join a game. We have implemented this using JavaScript, 3.js, node.js and WebSockets.

Project Video	shorturl.at/wKPX3
Project Area	Graphics, Simulation, Software Development, Web Application
Project Technology	CSS, HTML5, JavaScript, Nodejs, OpenGL, JQuery, WebSockets, Mocha, Chai

Project Title	Mylio
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Supervisor	michael.scriney@dcu.ie

The project is aimed towards the average person, college student who is indecisive to a degree of what to prepare for dinner, lunch or breakfast.

The procedure of using the application involves a user's regular input to record home commodities, how this is done is the user will take a picture of their receipts of purchase goods.This data will then be parsed, stored and processed against recipes that the user can make. Recipes and Products are sourced from web scrapersT.

Project Video	shorturl.at/lpHRZ
Project Area	Computer Vision, Data Analytics, Data Mining, Databases, Image/Video Processing, Mobile App
Project Technology	Java, MySQL, Python

Project Title	NBA Fantasy Simulation
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Programme	Computer Applications
Supervisor	graham.healy@dcu.ie

The project allows you to predict the outcome between NBA teams or with teams of your making, also known as fantasy teams. A Web App was developed to help display the data and to improve User interaction. A machine learning back end takes the teams and predicts using a trained model, which is displayed on the Web App.

Project Video	shorturl.at/diU04
Project Area	Software Development, Web Application
Project Technology	CSS, JavaScript, Python, React

Project Title	Odin Job Scheduler
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Programme	Computer Applications
Supervisor	stephen.blott@dcu.ie

Odin is an distributed, programmable and observable job orchestration system which schedules, manages and executes user created tasks on Linux systems. Odin is designed to eliminate the DevOps definition of toil; work tied to running a service which is manual, repetitive and automatable. DevOps is practiced in the tools a team uses, and when traditional job schedulers fail they introduce a new level of toil in debugging.

Odin is equally concerned with both the execution and the expected behavior of your job, which is described entirely by the user's code. Observability into live values in code is achieved through the use of Odin's language specific libraries. For teams, this means Odin can directly help diagnose where the problems are and get to the root cause of any interruptions.

Project Video	shorturl.at/AINZ8
Project Area	Automation, Control Systems, Data Analytics, Distributed Systems, Software Development, Web Application
Project Technology	Go, JavaScript, MongoDB, Nodejs, Python, REST, Raft Consensus Protocol

Project Title	Ouvie
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Ouvie is a backup storage facility and version control system for video editors. It provides an in-cloud storage solution for editors to backup their projects as they progress through their workflow.
It facilitates version control for each commit they make on the platform and uses content-defined deduplication to accelerate the upload process by comparing their current remote version with that of their local version and uploading only the deltas. This removes the need to re-upload a large video file with every commit, thus drastically reducing bandwidth costs.

Project Video	shorturl.at/ELRS1
Project Area	Automation, Cloud Computing, Content Management System, Control Systems, Cryptography, Filesystems
Project Technology	CSS, HTML5, JavaScript, MongoDB, NoSQL, Python, REST, AWS S3

Project Title	ParkLet
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Programme	Computer Applications
Supervisor	stephen.blott@dcu.ie

ParkLet is an Android app that allows homeowners to rent their driveways to commuters in a hassle free way. Renters can easily search for driveways suiting their needs and wallets through the Google Map API. The app utilises NFC to allow contactless check-in functionality and Firebase Cloud Messaging to inform the homeowner of the progress of the booking. Designed using the MVVM design pattern.

Project Video	shorturl.at/mszIJ
Project Area	Android, Cloud Computing, Databases, Mobile App
Project Technology	Java, JavaScript, NoSQL, Firebase, NFC, Google Maps API, Firebase Cloud Messaging

Project Title	Performing Ecological Momentary Assesment via a Picroft and Mobile Application
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Programme	Computer Applications
Supervisor	tomas.ward@dcu.ie

Ecological Momentary Assessments (ECA) are survey questions asked in real-time when they are most valuable. Examples of this vary from consumer testing to receiving Electronic Patient Reported Outcomes (ePRO) in clinical trials. This project aims to enable researchers to perform ECA via a home assistant or mobile device. It uses context detection to determine which device is best to use for a user depending on their situation.

Project Video	shorturl.at/lnwy5
Project Area	Android, Databases, GPS/GIS, Mobile App, RaspberryPi, Software Development, Telecommunications, Wireless Technology
Project Technology	Java, NoSQL, Python, REST, SQL, XML

Project Title	Pick 60
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Programme	Computer Applications
Supervisor	mark.roantree@dcu.ie

Pick 60 is a web application that incorporates machine learning and blockchain technologies. The machine learning element of the web application will predict the outcome of games taking place each week in the National Football League (NFL). The users can then place wagers by agreeing on smart contracts with other users. Creating a secure way for users to place wagers on the predicted game is the primary goal of this project.

Project Video	shorturl.at/enDMX
Project Area	Cryptography, Statistical Analysis, Web Application
Project Technology	JavaScript, Python, Solidity

Project Title	Pocket Trainer
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Programme	Computer Applications
Supervisor	tomas.ward@dcu.ie

PocketTrainer is an Android application that employs the OpenPose library developed by CMU's Perceptual Computing Lab, a computer vision library which identifies the location of key body points in image and video, to evaluate exercise form. A user records themselves performing an exercise, and the footage is analysed with the use of OpenPose. Once the key points on the body have been located, a set of mathematical heuristics such as the slope, angle and distance between points are evaluated to determine whether or not the exercise has been performed correctly. Pocket Trainer can evaluate four exercises: Bicep curl, pull up, squat and deadlift. The aim of the application is prevent injuries occurring from movements being performed incorrectly, and to improve overall exercise efficiency.

Project Video	shorturl.at/auwIY
Project Area	Android, Computer Vision, Mobile App, Motion Analysis
Project Technology	Java, Python

Project Title	Quickways
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This project was developed to be a delivery management system ready for use in the delivery industry. It comprises of a web app and mobile app that communicate with one another via an API to efficiently manage drivers and their deliveries from one central hub.

At the core we are trying to develop a system that solves the multi travelling salesman problem.

Project Video	shorturl.at/uFGO7
Project Area	Android, Databases, GPS/GIS, Mobile App, Security, Software Development, Web Application
Project Technology	CSS, Docker, HTML5, Java, JavaScript, MongoDB, Nodejs, Python, REST, Spring MVC, XML, VueJS, Kotlin

Project Title	Remote or Autonomous Mobile Platform (RAMP)
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Programme	Computer Applications
Supervisor	alistair.sutherland@dcu.ie

This project is a small autonomous vehicle that uses image processing to detect objects in a trained neural network. Two cameras are mounted on the unit, one will relay both day and night vision images to the user while the other is used for object detection and logging. The unit can map its surrounding area using GPS coordinates, altitude, temperature and pressure while relaying this and gyro data to the user in both autonomous and manual modes.

Project Video	shorturl.at/kPY39
Project Area	Arduino, Automotive Technology, Computer Vision, Control Systems, Device Design, GPS/GIS, Image/Video Processing, Network Applications, Power Electronics, RaspberryPi, Robotics, Sensor Data, Sensor Technology, Software Development, Vehicle Control, Intell Transport System
Project Technology	C/C++, Python

Project Title	Search & Rescue
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Programme	Computer Applications
Supervisor	alistair.sutherland@dcu.ie

A remotely controlled track-based land vehicle with cameras and sensors. It is used in hard to reach places during a rescue operation such as collapsed tunnels or buildings, to map the situation and look for signs of trapped people inside. The vehicle is controlled by an operator remotely. It streams telemetry data back to the operator and they are relayed to the server. Spectators can remotely observe the entire operation through web application watching live video stream and telemetry data.

Project Video	shorturl.at/bsILT
Project Area	Arduino, Cloud Computing, Distributed Systems, Environmental Mapping, GPS/GIS, Network Applications, RaspberryPi, Robotics, Sensor Data, Sensor Technology, Software Development, Vehicle Control, Web Application, Wireless Technology
Project Technology	AngularJS, CSS, HTML5, Java, NoSQL, Nodejs, Python, REST, Spring MVC

Project Title	Smart-City
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Smart-City is a landmark and building recognition mobile application. The app aims to remove the manual process of searching for information about a landmark that is unfamiliar to the user. It completes this action by using a pre-trained Convolutional Neural Network that is independently hosted on a server. The application will identify the building by a photo submitted by the user and display the name and related facts about the landmark.

Project Video	shorturl.at/iruQ6
Project Area	Artificial Intelligence, Computer Vision, GPS/GIS, Image/Video Processing, Information Retrieval, Mobile App, Software Development
Project Technology	Python, React native, Flask, Google Cloud

Project Title	SmartMusic Selector
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Supervisor	mark.roantree@dcu.ie

SmartMusic Selector is an android application which uses data from a detector device to determine the most suitable track to play from the user's music database. e.g. an android phone working in conjunction with a smartwatch that can takes in heart rate data in real-time. The app will return a suitable music track with criteria that fits the moment.

Helps users achieve a Zen-like experience by syncing music to heart rate with harmony and customisable preference.

Project Video	shorturl.at/rE234
Project Area	Android, Automation, Mobile App
Project Technology	Eclipse, Java, Python

Project Title	StudySmart
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Programme	Computer Applications
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StudySmart is a web application hosted on AWS that implements Natural Language Processing & Machine Learning techniques to extract questions from a source text, file or HTML page. The application then allows users to answer these questions and receive a score based on the correctness of their answers. StudySmart was developed in order to assist users, specifically students when attempting to learn or understand a source text.

Project Video	shorturl.at/dAEIJ
Project Area	Natural Language Processing, Software Development, Web Application
Project Technology	Docker, Python, REST, SQL, AWS, Django

Project Title	Sudoku Solved
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Sudoku solved is a web application. Its purpose is to solve sudoku puzzles and to provide a visualisation of the path traveled to find the solution. It was created using flask and coded primarily with python and javascript.

Project Video	The app is available online at http://samcoogan.pythonanywhere.com shorturl.at/fuNPR
Project Area	Web Application
Project Technology	CSS, HTML5, JQuery, JavaScript, Python

Project Title	SwingFix – Golf Swing Improvement Application
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Programme	Computer Applications
Supervisor	alistair.sutherland@dcu.ie

This project is an android application developed using Flutter to analyse a golfer's swing. It uses human pose estimation to identify key poses of the swing and returns metrics to the user via the user profile on the Android GUI. The computation is carried out using docker in a serverless container (Google Cloud Run).

Project Video	shorturl.at/mrtJN
Project Area	Android, Computer Vision, Image/Video Processing, Mobile App, Social Networking, Software Development
Project Technology	Docker, Python, REST, OpenCV, OpenPose/OpenVino, Dart, Flutter, CloudRun, Pub/Sub, Firebase

Project Title	Tetris TrAIner
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This project is a recreation of the puzzle game Tetris with an AI, which has been taught through reinforcement learning. The Tetris game was designed from a pseudo-3D perspective, and the AI was developed using the Unity ML-Agents package. The goal of the project was to create both a faithful Tetris version, which included both single and two player modes and to be able to implement this AI, to both play the game by itself and against a user.

Project Video	shorturl.at/hkDZ4
Project Area	Artificial Intelligence, Gaming
Project Technology	C#, Unity

Project Title	Unity Based Texas Hold'em Game
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Supervisor	david.sinclair@dcu.ie

This project is a Unity Based Texas Hold'em game that allows a person to play poker with friends or against an AI based computer to test their skills.

Project Video	shorturl.at/aiAH7
Project Area	Gaming
Project Technology	.NET, Unity

Project Title	Vicinity
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Vicinity is an Android / Web Application developed in order to inspire or help people find new things to do based on their interests be it food, music, sport among many other things. Users are provided a list of top activities tailored for them each day but also have the option to filter results. Users can also provide information such as reviews and tags to places they have been in order to help the system grow organically.

Project Video	https://bit.ly/3eEi7XD
Project Area	Android, Mobile App, Natural Language Processing, Web Application
Project Technology	Java, JavaScript, NoSQL, Nodejs, Python

Project Title	Visual Sheet Music
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Supervisor	monica.ward@dcu.ie

This project is a Web Application aimed to help those who are beginning to learn the piano. For anyone starting to learn piano, sheet music might be very confusing to follow along to and comprehend as there are lots of musical notations for them to understand. With this Web App, users are able to upload a picture of their piano sheet music and a video will generate with on-screen instructions that the user can follow along to. Users will be able to see which keys to play, when to play and how long to hold the note for, as well as see which notes are coming up next.

Project Video	shorturl.at/lBHJ7
Project Area	Graphics, Image/Video Processing, Web Application
Project Technology	CSS, HTML5, JQuery, JavaScript, MySQL, OpenGL, PHP, Python, XML

Project Title	We Live in a Society
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Programme	Computer Applications
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This project is a gamified simulation of multiple societies interacting with one another to claim resources on a 2D map. The goal of the simulation is for the user to maintain a stable society while also reacting to the actions of competing societies. The winner is chosen at the end based on a score which is calculated throughout the simulation. This simulation runs in a self made 3D graphics engine. This engine incorporates rendering through the use of OpenGL vector rendering with matrix manipulation. This project incorporates the NEAT algorithm to teach AI societies how to interact with the world by making decisions.

Project Video	shorturl.at/kEQT1
Project Area	3-D Modelling, Artificial Intelligence, Gaming, Graphics
Project Technology	Java, OpenGL, OpenAL

Project Title	whiteBox
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Supervisor	stephen.blott@dcu.ie

A web application for students to submit code for automatic grading and evaluation. The platform allows lecturers to create programming tasks using markdown that students can then access and attempt. whiteBox utilises Docker to execute user code in a sandbox environment, ensuring safety from malicious code. Students are able to see insights into their performance, while lecturers can avail of information about the entire class.

Project Video	shorturl.at/uwFMY
Project Area	Automation, Databases, Software Development, Web Application
Project Technology	CSS, Docker, HTML5, JQuery, JavaScript, Nodejs, Python, REST, Firebase, Firestore

Project Title	Word Challenge App
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Supervisor	monica.ward@dcu.ie

This is a Computer Assisted Language Learning(CALL) project in the form of an android mobile game application for a Less Taught Language (LTL) called ga.

The project idea was motivated by a real need to assist young learners with Ghanaian descent, ga belongs to the Kwa group of Niger-Congo languages spoken in the Greater Accra region of Ghana, West Africa.

Project Video	shorturl.at/rMOQ7
Project Area	Android, Mobile App
Project Technology	Java

Project Title	xDrive
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This project aims to provide an alternative to other file storage cloud platforms. XDrive allows the user to host their own instance of the platform on their own server, meaning that their data will never leave own control if they don't want it to. This project was developed with data sovereignty in mind, a concept that is slowly making its way to the forefront of consumers' minds.

Project Video	https://drive.google.com/file/d/1s2CiQ8Mvj1Q2N4ZJUzDHelbFKv5KL1AX/view
Project Area	Databases, Filesystems, Web Application
Project Technology	CSS, HTML5, MongoDB, Nodejs, ExpressJS

School of Computing Projects

Enterprise Computing

Project Title	Á la Mode
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Á la Mode is a multi-sided booking platform. The first side caters for independent service providers in the beauty industry who operate form their home or travel to houses. The second side is for the clients of these service providers. The first side of the application, 'Á la Mode Beauty HQ' will allow service providers to create accounts, set their location, display their services and availability, and manage their diary. The second side, 'Á la mode', will let clients create accounts so that they can search and book appointments automatically, leave reviews, and manage their appointments.

Project Video	https://tinyurl.com/yayrztlm
Project Area	Mobile App
Project Technology	HTML5, Python, SQLite

Project Title	Affix – Music Artist Booking Marketplace
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Affix is a Music Artist Marketplace that will transform how artists source a gig in Ireland. Our system revolutionises this booking process by providing an Online Marketplace to allow Music Artists and Booking Agents(Venues) to collaborate and communicate in a quick and efficient manner. Booking Agents can explore registered Artists and book them to perform at their Venue, agreeing upon all minor details of the gig. Affix helps artists to kick start their career by showcasing their talent and offers a platform of connectivity to all users.

Project Video	shorturl.at/hkyEP
Project Area	E-Commerce, Social Networking, Web Application
Project Technology	CSS, HTML5, MySQL, Python

Project Title	Ai1 Fitness
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'Ai1 Fitness' aim is to create a sole platform for all your fitness needs. Currently, leading a healthy lifestyle and getting fit may not be very accessible to a lot of people. Ai1 Fitness will make 'getting fit' easy for anyone. From workout suggestions based on users requirements to nutritional advice Ai1 Fitness will house all your fitness needs in one place. This idea will greatly improve efficiency around leading a healthy lifestyle and make users much more knowledgeable about the topic.

Project Video	shorturl.at/gkyFZ
Project Area	Databases, Mobile App, Web Application
Project Technology	CSS, HTML5, JavaScript, MySQL, PHP, Python

Project Title	Applied Behavior Analysis Data Collection Application
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Data collection application for use by professionals in the field of ABA (Applied Behavior Analysis), a common treatment for children with autism and other developmental disorders.

This application gives Behavior Technicians the capability to input, record and view graphs of data recorded during sessions with their clients.

ABA data is primarily recorded using paper datasheets and a timer, then manually entering into a database for further analysis. Our application will allow Behavior Technicians to record this data using their phone or a tablet.

Project Video	No video available for this project
Project Area	Data Analytics, Databases, Mobile App
Project Technology	Python, Kivy for Python3

Project Title	Audio Transcribing Application with Cloud Storage Capabilities
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The general description of the project is to create a mobile application with audio recording abilities that will harness features of Google's Cloud Speech-to-Text software to recognise and transcribe an audio source to a text file. Using this technology to provide the users with capabilities to extract, edit and locate various terms/sentences from an audio file. Using Google Cloud Services to provide a storage component for users.

Project Video	shorturl.at/bBNR1
Project Area	Cloud Computing, Databases, Mobile App, Speech Recognition
Project Technology	Java

Project Title	AudioFreq
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The aim of this project is to help audio enthusiasts test audio-out equipment. An application was developed which generates sound frequency graphs from mp3 files. Users can record audio played through their chosen output, the recorded output can then be compared with the original mp3 file to allow users to see if music is being played the same way that the musician/producer wanted it to be heard.

Project Video	No video available for this project
Project Area	Mobile App
Project Technology	Python

Project Title	Auground
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Auground is a web application that allows customers to create their very own Augmented Reality experience, displaying information through text, image and animations. The tools provided are easy to use, with minimal technical knowledge needed. Anyone can simply visit the website and view the AR filters at their location. Come and augment your reality with us!

Project Video	https://bit.ly/2WRvEEE
Project Area	Augmented Reality, Cloud Computing, Web Application
Project Technology	CSS, HTML5, JQuery, JavaScript, MySQL, Nodejs, Google Cloud, WebXR

Project Title	Automated Security Testing
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In the 10 seconds it takes you to read this, 750 records have been stolen from organisations due to cyber-attacks. Our project is a security testing tool for organisations to combat this. Our security framework carries out automated security testing on an organisation's system producing an automated report upon its completion.

Project Video	https://tinyurl.com/y7xahweg
Project Area	Automation, Security
Project Technology	.NET, Python, XML, JSON, Jenkins CI, Jmeter

Project Title	Baile Brea
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Baile Brea is an online property-hunting application which uses Data Analytics to provide personalised recommendations to users. A range of open-source data sets have been acquired on topics such as transport, public amenities, leisure facilities and educational facilities. The user enters their preferences into our user interface, and our algorithms recommend the properties / locations which are suitable for the user.

Project Video	https://tinyurl.com/yak2uhf2
Project Area	Data Analytics, Databases, E-Commerce, Information Retrieval, Software Development
Project Technology	CSS, HTML5, JavaScript, PHP, R

Project Title	Click to Brick
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Click to Brick offers a new customer experience that has yet to be done by any other retail company. It is an online, sustainable e-commerce clothing retailer with a central collection hub that contains dressing rooms. Customers can order products to the store, where they can go in and try on their goods in the changing rooms available. Any items they don't want they can leave in store and receive a full refund.

Project Video	shorturl.at/ijlqv
Project Area	E-Commerce, Web Application
Project Technology	CSS, HTML5, JQuery, R, SQLite

Project Title	ConfidentVote
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ConfidentVote is a new, innovative way of conducting opinion polls. This project uses Implicit Association Tests (IATs) to determine participants' feelings towards certain topics. IATs work by timing participants' responses to categorising images and words. These times then determine if the participant feels stronger towards one category than another. IAT experiments were carried out on members of the public using PsychoPy and the results were correlated with results of quizzes on the topic of Irish peoples' views of the UK.

Project Video	shorturl.at/dEIV0
Project Area	Model View Controller, Statistical Analysis, Web Application
Project Technology	C/C++, HTML5, JavaScript, Python, PsychoPy

Project Title	CyberArrive
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CyberArrive is a mobile application to be utilised by the Young and Inexperienced drivers of Ireland. The application utilises a user's smartphone camera to record their journey, which will then be analysed and available to watch by the user and insurance company. Insurance Companies who work in partnership with CyberArrive will have the opportunity to view a driver's journeys in order to resolve claims and also gain a more knowledgeable opinion on their customer's ability while on the road! Programming Languages implemented within CyberArrive include HTML, CSS, PHP and JavaScript! These languages work together to provide an easy-to-use application suitable for all levels of technology know-how.

Project Video	shorturl.at/ivyKV
Project Area	Android, Image/Video Processing, Mobile App
Project Technology	CSS, HTML5, JavaScript, PHP, SQL

Project Title	Development of a 3D controller
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Android devices provide access to a vast range of sensors including accelerometers, gyroscopes and magnetometers. This project will involve leveraging these sensors to create an Android based 3D controller for use in medical imaging applications. The controller should be capable of rotation and translation operations and other operations relevant to the manipulation of medical image data.

Project Video	https://tinyurl.com/yd88644l
Project Area	3-D Modelling, Mobile App, Sensor Data, Web Application
Project Technology	HTML5, JavaScript, PHP, Kotlin, X3DOM

Project Title	FamilyTracker
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This project helps parents ensure their child's safety by allowing them to request their location through the app.

Project Video	shorturl.at/duWZ7
Project Area	Android, Databases, GPS/GIS, Sensor Technology
Project Technology	Python, Kivy

Project Title	Foodgeo
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FOODGEO is a web application providing customers with a tool for locating a restaurant based on their dietary needs and preferences. The web app will display restaurants based on a customers choice of location, e.g. Dublin City Centre. The customer will then be able to filter on this list to show gluten-free, vegan & vegetarian food offerings available for each restaurant.

Project Video	No video available for this project
Project Area	Databases, Web Application
Project Technology	CSS, HTML5, JavaScript, MySQL, Python, SQLite, Django

Project Title	Fuisce Whiskey
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'Fuisce' is an eCommerce website that offers whiskey enthusiasts the chance to experience premium, locally crafted Irish whiskey from distilleries all across Ireland. Our aim is to deliver great tasting whiskey from across Ireland that people may not have had the opportunity to taste before. These bottles will be specially selected from the smaller distilleries that will not be widely available across supermarket shelves. The service will be delivered to each users doorstep.

Project Video	shorturl.at/bKLSX
Project Area	E-Commerce
Project Technology	Python, Django

Project Title	IT-Me
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IT-Me is a online business-to-business facilitator, which links SMEs and IT firms for e-tender. IT-Me intends to break the conventional IT procurement process by providing a comprehensive platform, which allows SMEs to post their required projects and IT firms to create bids for that project. The main goals of IT-Me are to reduce costs for SMEs while simultaneously driving revenue for IT organisations.

Project Video	shorturl.at/ioqYZ
Project Area	E-Commerce
Project Technology	CSS, HTML5, JavaScript, Python, SQL

Project Title	Keep on Rollin'
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Keep on Rollin' is a mobile application with the aim of making life easier for road users by allowing these users to be able to mark potential hazards on the road (potholes, debris etc) this is able to alert other road users of any potential danger they may encounter, as well as allowing users to notify the local emergency services (for e.g livestock) that may need to be cleared.

Project Video	shorturl.at/noDN1
Project Area	Android, GPS/GIS, Mobile App
Project Technology	CSS, HTML5, Python, React Native

Project Title	MaithMedia
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Supervisor	rob.brennan@dcu.ie

MaithMedia provides a platform for primary schools to upload and share multimedia content with pupils' parents taken at school events during the year.

At school events, such as a school play, only an appointed school representative is allowed to take photos and videos at the event. The school's captured content is then uploaded onto MaithMedia where it is securely shared with pupils' parents.

This service supports tighter control over who can record at such events, making it a safer environment for school children.

Project Video	shorturl.at/elzM4
Project Area	Content Management System, Security, Web Application
Project Technology	CSS, HTML5, Python, SQLite

Project Title	Med-Pal
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Programme	Enterprise Computing
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Med-Pal is a web-app that allows users to input critical medical information to their account that is stored in a database, and can be viewed by scanning a QR code that is placed on a wrist band, or smart watch band. This would be used in cases of emergencies where first responders may need to know some existing critical information about the patient.

Project Video	No video available for this project
Project Area	Content Management System, Databases, Internet of Things, Mobile App
Project Technology	HTML5, MySQL, PHP, SQL

Project Title	OcuWaste
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Programme	Enterprise Computing
Supervisor	alan.smeaton@dcu.ie

OcuWaste is a waste management device that will allow people to discard their waste, and have it automatically sorted into either rubbish, recycling or compost bin compartments.

Items will be placed into a compartment in the bin, and once the identification and categorisation of the item is completed, using a Raspberry Pi camera, the item will be dropped into the correct bin using a sliding mechanism.

OcuWaste aims to capitalise on the ever-increasing interest and pressure on being eco-friendly and sustainable.

Project Video	shorturl.at/exY48
Project Area	Computer Vision, Image/Video Processing, Internet of Things, RaspberryPi, Sensor Technology
Project Technology	Python, Tensorflow, OpenCV

Project Title	Paired Purchase
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Supervisor	rob.brennan@dcu.ie

A website was developed to allow user the purchase goods in bulk collectively. The purpose is to avoide high mark ups usually applied by generic retailer's. Users make bulk purchases through the site and receive the percentage of the total order they paid for.

Project Video	No video available for this project
Project Area	E-Commerce
Project Technology	CSS, HTML5, JavaScript, MySQL, Python

Project Title	Parlay
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Parlay is a service which seeks to leverage AI/Machine Learning by transforming the way small independent restaurants manage customer phone orders, mediating the need for a human operator and replacing the human with an intelligent voice system capable of interacting with customers, recording their food orders and relaying those orders to the kitchen. Stored orders are displayed on a web application which can be accessed by individual restaurants for the purposes of order management and fulfilment.

Project Video	shorturl.at/qRWX4
Project Area	Artificial Intelligence, Cloud Computing, Natural Language Processing, Speech Recognition, Telecommunications, Web Application
Project Technology	Python, SQL, Flask, Voximplant, Dialogflow, Bootstrap, HTML

Project Title	Payday
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This web application was developed in order to aid SMEs, to move away from the time consuming and money-wasting excel and paper-based time management systems. Payday is a cloud-based web application that allows easy access from any location or device. Although time management is the main function of Payday, it also provides other services such as holiday booking, end of month pay calculation, rostering and a to-do list. It's simple and intuitive UI is suitable for non-tech savvy users.

Project Video	shorturl.at/jBO12
Project Area	Databases, Information Retrieval, Web Application
Project Technology	CSS, HTML5, Python, REST, Django

Project Title	Privacy By Choice
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Programme	Enterprise Computing
Supervisor	tomas.ward@dcu.ie

Privacy By Choice is an interactive web application that was designed to automate the generation of GDPR required documentation for specific business sectors located in Ireland. Based on the user requirements, the web app will generate and recommend what documents and steps are needed to be compliant. Along with the generation of documentation, Privacy By Choice also includes interactive training courses that are deemed necessary for the customer to take depending on the nature of the company and the data they hold.

Project Video	No video available for this project
Project Area	Databases, Information Retrieval, Web Application
Project Technology	CSS, HTML5, Python, SQL

Project Title	RentSpot
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Supervisor	jane.kernan@dcu.ie

RentSpot is a property rental application, aimed at digitising the application process and filtering the volume of applications made.

Landlord users will have the ability to set lease requirements for a tenant and our tenant users will upload all the necessary information that is required by a landlord to be stored on their profile. Upon application from the tenant users, the landlord will be granted access to view the tenant users information and schedule a viewing.

Project Video	No video available for this project
Project Area	Databases, E-Commerce, Web Application
Project Technology	CSS, HTML5, JavaScript, Python, SQLite, Django, Bootstrap, GCP

Project Title	"Serv-Wishes" Final Year Project
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Programme	Enterprise Computing
Supervisor	monica.ward@dcu.ie

Serv-Wishes is a cloud-based appointment booking solution for all service needs. It offers appointment scheduling, calendar management, advisory/review elements, online payments and marketing management functionalities within a suite.

Our application provides SMEs and entrepreneurs with little to no online presence with all the resources they need to market & sell their business/product.

Serv-Wishes thrive to match skilled and qualified local service providers to customers who need jobs doing in their home, quickly and easily. Serv-Wishes innovative network connects you to a range of services in your area, so whatever the job, your wish is our command.

Project Video	shorturl.at/jpDFY
Project Area	E-Commerce, Social Networking, Web Application
Project Technology	CSS, HTML5, Python, Django

Project Title	Smart Instructor
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Supervisor	alan.smeaton@dcu.ie

Smart Instructor is a mobile application designed to help learners improve their driving. The application provides real-time feedback while they are driving along with a summary of each trip. This is done by analysis of telematics data which is generated by the sensors on the user's device. The application was developed to help people tackle the biggest problem of acquiring a driver's license, cost. Smart instructor also has a theory test feature which allows users to practice for the theory test.

Project Video	shorturl.at/mnDE2
Project Area	Data Analytics, Mobile App, Sensor Data
Project Technology	Python, XML, Kotlin

Project Title	StockHut
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StockHut is a web application aimed at Bars and Nightclubs to enable them to monitor, control and manage stock levels with up to date notifications to their smartphones. Unique log in details are provided to businesses to access this information. As many businesses deal with large quantities of stock on a regular basis, this application provides them with a platform to control this easily, removing any human error.

Project Video	shorturl.at/jHLNP
Project Area	Databases, Software Development, Web Application
Project Technology	CSS, HTML5, Python, Ruby, SQL

Project Title	StudentStay
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StudentStay is a web application developed to allow landlords to advertise their properties to students. With increasing demand for student accommodation, there is a lack of student specific platforms for students to source accommodation. StudentStay tackles this issue, bridging the gap between landlords and students, bringing them together. The platform enables landlords to advertise their properties and allow students to view and enquire about properties that interest them. Students can also find other like -minded students to house share with. StudentStay makes renting easier and safer for both landlords and students.

Project Video	shorturl.at/hjrS3
Project Area	Web Application
Project Technology	CSS, HTML5, JavaScript, Python, SQL

Project Title	SuitsU
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SuitsU is a platform designed to provide emergency/temporary work for people. Once a user has created an account and filled out the requirements (previous work experience, education results, personality traits, job aptitude tests), they can search a place, date and time they wish to work, and our platform, working with a Google API map, will show results matching to the criteria searched. SuitsU allows users to find temporary work at a place and time that suits them.

Project Video	shorturl.at/oqCO5
Project Area	GPS/GIS, Mobile App, Web Application
Project Technology	CSS, HTML5, JavaScript, MySQL, Python

Project Title	Swapzies – The Online Localised Swapshop for Clothing Items
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Programme	Enterprise Computing
Supervisor	monica.ward@dcu.ie

Swapzies is an online platform that enables users to choose the planet friendly alternative to Fast-Fashion. The platform works as a solution for users to swap clothes with fellow swappers in a distance that is specified by each user. The user creates an account on the app and then has the accessibility to upload items they wish to swap, search for items they wish to obtain and finally have an in-app conversation with the other swappers to arrange the swap.

Project Video	shorturl.at/aDKLR
Project Area	E-Commerce, Instant Messaging, Mobile App
Project Technology	MySQL

Project Title	TakeTheTest
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Supervisor	monica.ward@dcu.ie

TakeTheTest aims to improve the way people learn to drive in Ireland. The first part of the application allows Driving Instructors to keep track of the Learner Driver's driving skills during a lesson, by scoring their driving on different factors in real-time. The route travelled during the lesson is also tracked and all information is made available after the lesson to review. The second part of the application is a marketplace for finding the best driving instructor in your area, based on different factors such as price and customer ratings.

Project Video	shorturl.at/kquY6
Project Area	E-Commerce, GPS/GIS, Software Development, Web Application
Project Technology	CSS, HTML5, Python, SQLite, Django; Google Roads API; Bootstrap

Project Title	TaskHive
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TaskHive is a web application platform created for the gig economy. It provides an opportunity for one group of users, the Service Seekers, to outsource jobs they are not capable of doing themselves due to time constraints, lack of tools or skills. The platform is also available for another group of users, the Service Providers, who will be willing to complete these jobs for extra income. The platform will match both of these users together depending on the Seeker's inputs to provide a quick and efficient service, as opposed to the long traditional method of finding a worker to complete your job.

Project Video	shorturl.at/kvyA7
Project Area	Databases, Information Retrieval, Model View Controller, Web Application
Project Technology	CSS, HTML5, JavaScript, Python, SQL, Django, Bootstrap

Project Title	The Design and Build of a New Cargo Aviation Auditing Process
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Supervisor	donal.fitzpatrick@dcu.ie

The project objective is to design and build a new Graphic User Interface that optimises the process of air cargo second pass auditing. The team worked in conjunction with Aviation Services Ireland for this project. The application sorts and filters data received from cargo airline companies and displays the data in a more reader friendly and usable format for the auditor. The use of auto calculated algorithms removes the possibility of human error, which is likely to happen from manual processing.

Project Video	shorturl.at/wGNSU
Project Area	Automation, Databases, Web Application
Project Technology	.NET, Excel/VB, SQL, XML

Project Title	ticketNOW
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ticketNOW is an online application that is aimed at all types of events that still use paper tickets, such as GAA/FAI matches or certain music festivals, and provide them with an electronic based ticket system instead. A simplistic website was developed for people to easily purchase, swap or resell their tickets to these events. A separate python script allows for the generation of the E-ticket, which will consist of a QR-code that stores necessary information about the event, which can be scanned upon entry of events.

Project Video	shorturl.at/dlCHN
Project Area	Databases, E-Commerce, Web Application
Project Technology	CSS, HTML5, Python, SQLite, Django

Project Title	Translicate
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Programme	Enterprise Computing
Supervisor	monica.ward@dcu.ie

Translicate aims to help digital language learning companies to increase their course offerings. By using a combination of machine translation evaluation metrics, Translicate chooses the best machine translation solution for each language pair, allowing companies to quickly and cost-effectively develop beta courses for low resource languages, thereby increasing their potential userbase. Through a web application, users simply choose their source and target languages, upload their document and Transilcate will choose the best machine translation option and return the translated document.

Project Video	shorturl.at/exDP0
Project Area	Web Application
Project Technology	CSS, HTML5, Python, SQLite, AWS

Project Title	VR Sensory Room
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Programme	Enterprise Computing
Supervisor	murat.yilmaz@dcu.ie

This project is a subscription service mobile application that offers a form of VR therapy through virtual reality experiences of sensory rooms. The purpose of sensory rooms is to provide a secure environment away from stimulation for people with special needs, however these can be expensive and unavailable. The application is made specifically for children with special needs, as a way to provide an accessible safe space for when they become overstimulated.

Project Video	No video available for this project
Project Area	Android, Mobile App, Virtual Reality
Project Technology	C#, Unity

Project Title	Whatsmineisyours
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This project is a peer to peer renting website. It allows users to put their items up for rent and allow other users to borrow these items for a time of their choice. The website asks users to pay a listing fee of €3 for their advertisement and then offer users the option of delivery or self collection of their item.

Project Video	shorturl.at/lqQY0
Project Area	Web Application
Project Technology	Python

Project Title	Which Bin
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Which Bin is an app that allows users to scan a product barcode and present the user with an appropriate recycling method for the product material.

The idea behind WhichBin is to give people the opportunity to recycle their waste correctly, conveniently and reward them for doing so.

This app will help users to eradicate waste mismanagement at an everyday local level.

Project Video	No video available for this project
Project Area	Android, Data Analytics, Data Mining, Databases, Educational, Mobile App, Statistical Analysis
Project Technology	Java, SQL

Project Title	Zoomies
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Zoomies is a web application that allows users to track their walks with their dog using the GPS signal of their smartphone. It aims to discover places where other users walk their dogs by uploading their GPS activity to a database that converts it into a heatmap. Users may choose to keep their map private or share it with the public. The application includes a recommendation page that will recommend dog food and nearby pet friendly places to visit.

Project Video	shorturl.at/vzCET
Project Area	Data Analytics, Databases, GPS/GIS, Web Application
Project Technology	CSS, HTML5, JavaScript, Python, SQLite, Django

School of Computing Projects

Computational Problem Solving and Software Development

Project Title	funk.pub
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Programme	Computational Problem Solving and Software Development
Supervisor	jennifer.foster@dcu.ie

A federated social network for music lovers. Mobile, web, and 3rd party extensions publish what you're currently listening to in real-time.

Your listening history is available on your profile, and for the Fediverse to see.

Notable features include:

— Federated system; independent from large corporations and division of power
— Easy deployment; good for smaller communities running their own node
— Music recommendations and listening habit visualisations for users
— Fediverse integration: a Mastodon user can follow their friend on funk.pub

Project Video	No video available for this project
Project Area	Databases, Distributed Systems, Image/Video Processing, Social Networking, Software Development
Project Technology	CSS, Docker, Go, HTML5, JavaScript, Nodejs, SQL

Project Title	Musicloud
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Programme	Computational Problem Solving and Software Development
Supervisor	jennifer.foster@dcu.ie

Musicloud is a web based digital audio workstation (DAW) for producing and sharing music. Musicloud's aim is to lower the barrier to entry into music production by eliminating the need to download large desktop software and making the UI simple and intuitive to newcomers. Alongside the DAW, Musicloud offers a social network experience with user profiles, a feed and song sharing, accessible through both the web and mobile application. This empowers artists to create, share and promote their music, all on one platform.

Project Video	shorturl.at/mzTY7
Project Area	Android, Cloud Computing, Content Management System, Databases, Filesystems, Information Retrieval, Mobile App, Multimedia, Network Applications, Social Networking, Software Development, Web Application
Project Technology	CSS, Docker, HTML5, JavaScript, MySQL, Python, React, Redux

Project Title	Turas
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Turas: Intermodal Transit Planner

Combining multiple cutting-edge routing algorithms (Transfer Patterns, Connection Scan Algorithm, RAPTOR) we present a cross-platform transit planner that allows users to potentially reduce their commute time by up to 50% by leveraging the use dublinbikes alongside the traditional public transport network. Turas also provides users with real-time road work information and public transport arrival information in an attempt to make their journey as smooth as possible.

Turas' routing API is in Golang, mobile apps written in Flutter, real-time information API written in Python, web application written in React.js and data storage done with Postgres.

Project Video	shorturl.at/lBKRS
Project Area	Android, GPS/GIS, Mobile App, Web Application, Traffic Simulators
Project Technology	Docker, Go, JavaScript, Python, REST

School of Mechanical and Manufacturing Engineering

Mechanical and Manufacturing Engineering

Project Title	A feasibility study of Waste to Energy from Biofuel in DCU
Name	Richard Cahill
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Supervisor	anne.morrissey@dcu.ie

The aim of this project was to conduct a feasibility study of energy generation from a biofuel on the DCU campus. The biofuel chosen to carry out the study after reviewing the literature was biogas a fuel produced from a process called anaerobic digestion. Four scenarios where investigated each with different combination of feedstocks and modelled using Matlab software. For each scenario, a technical and economic analysis was carried out as well as the carbon dioxide emissions being evaluated.

Project Video	https://tinyurl.com/y9rlyu35
Project Area	Renewable Energy Technology
Project Technology	Matlab

Project Title	An investigation of refining high volume manufacturing maintenance scheduling, using statistical process control tools
Name	Michael O'Rourke
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Programme	Mechanical and Manufacturing Engineering
Supervisor	john.geraghty@dcu.ie

This project proposes that a financial advantage can be gained by a maintenance department, within a high-volume manufacturing facility, that implements statistical process control tools and methods. With the aid of such monitoring, management will be better informed on when to implement a maintenance activity. To investigate this, two mathematical models were built. One representing a maintenance department which uses a planned maintenance scheduling approach. The second represents a maintenance department which uses statistical process control to schedule maintenance activities.

Project Video	shorturl.at/pCEKR
Project Area	Lean Manufacturing, Mechanical Design and Manufacture, Statistical Analysis
Project Technology	Excel/VB

Project Title	Analysis of Ireland's Natural Gas Vehicles & their Utilisation in a carbon free Energy System
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Programme	Mechanical and Manufacturing Engineering
Supervisor	james.carton@dcu.ie

This project analyses Compressed Natural Gas Vehicles & their utilisation in an Irish carbon free Energy System. It investigates alternative energy production methods and technologies including Ireland's potential for biogas production, hydrogen production, upgrading biogas, biogas injection into the national grid and carbon capture and storage. Also comparing different fuel types for transport and their affect on the environment.

Project Video	shorturl.at/diEG3
Project Area	Automotive Technology, Electric Generation, Energy Conservation, Renewable Energy Technology
Project Technology	Excel/VB

Project Title	Bonding Using Galinstan-Directed Ohmic Heating
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Programme	Mechanical and Manufacturing Engineering
Supervisor	david.kinahan@dcu.ie

A major problem which has prevented the commercialisation of microfluidic devices is a lack of a universal bonding technique to bond together the various intricate layer of these devices. My project presents a new type of bonding technique, bonding using Galinstan-directed ohmic heating, which could be a potential solution to this problem. From analyses conducted, it was concluded that using the proposed bonding technique requires only 2.713s to melt the PMMA at the interface. When allowed to cool, it produced strong bonds with similar strengths to that of much more expensive bonding methods used.

Project Video	shorturl.at/aeGKS
Project Area	3-D Modelling, Data Analytics, Data Mining, Finite Element Analysis, Fluid Mechanics, Simulation

Project Title	Computational Simulation and Design Analysis of an Underwater Turbine Subjected to Mechanical and Fluid Stresses
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This project investigates the structural integrity of a flat plate turbine blade by method of a multiple reference frame model of Fluid Structure Interaction (FSI) analysis using ANSYS Fluent CFD and Mechanical FEA software. Steady and transient CFD simulations, and static structural stress and vibration simulations were investigated for the blade design. The design is intended for the use of turbulent flow experimentation so that no pitch angle was required from the blade design (pitch angle can allow a turbine to provide power generation or propulsion). The use of a flat plate design allowed for fluid flow validation using flat plate theory.

Project Video	shorturl.at/AHJM6
Project Area	3-D Modelling, Fluid Mechanics, Renewable Energy Technology
Project Technology	ANSYS Workbench, Excel/VB, Solidworks

Project Title	Demonstration Rig for In-Feed Centreless Grinding
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Programme	Mechanical and Manufacturing Engineering
Supervisor	tamas.szecsi@dcu.ie

The aim of this project was to design and manufacture a small demonstration rig for in-feed centreless grinding process. In-feed centreless grinding is used to finish parts that have projections or variation in diameters with the use of a grinding wheel and a regulating wheel. The rotation of the grinding wheel and regulating wheel is controlled manually.

Project Video	shorturl.at/cuNY2
Project Area	Mechanical Design and Manufacture
Project Technology	Solidworks

Project Title	Design, Build, Instrument and Test a Machine/Equipment Reliability Modelling Rig
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Programme	Mechanical and Manufacturing Engineering
Supervisor	john.geraghty@dcu.ie

The purpose for this project is to design, build, instrument and test a rig with the purpose of inducing failure in a machine component such as a bearing and to monitor a signal that would indicate the state of the component as it progresses towards failure. The goal is to prove that a rig can be developed for maintenance teams in manufacturing plants which can be used for predictive maintenance activities.

Project Video	shorturl.at/dmy14
Project Area	3-D Modelling, Data Analytics, Device Design, Mechanical Design and Manufacture, Motion Analysis, Sensor Data
Project Technology	Excel/VB, Solidworks

Project Title	Design, Fabrication, Testing and Modelling of McKibben Actuators
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Programme	Mechanical and Manufacturing Engineering
Supervisor	jeremiah.murphy@dcu.ie

A McKibben actuator is a form of pneumatic artificial muscle which consists of an expandable inner tubing, surrounded by a double-helix-braided sheath. Inflating the inner tubing causes the overall muscle to contract. The aim of this project is to fabricate and test different variations of these McKibben actuators, and then use them to investigate the accuracy of some of the mathematical models that have been produced to model the output force of the actuator for a given pressure.

Project Video	shorturl.at/abvN8
Project Area	Mechanical Design and Manufacture

Project Title	Development in the Design of an Electronic Kick Drum/Hi-Hat Pedal
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Programme	Mechanical and Manufacturing Engineering
Supervisor	alan.kennedy@dcu.ie

The aim of this project is to develop an electronic kick drum/hi-hat pedal that is cheap to manufacture and is simple to understand the operation. It must be able to operate as both types of pedals and easily be able to change from one sensor to another. This was achieved by doing numerous FEA (finite element analysis) test on Solidworks. Experiments were created to find appropriate locations for the sensors to be positioned using different electronic components to verify these positions. Final design was a mix of current ideas done from previous projects and new unique designs that helped create a functioning drum pedal. Future plans have been put in place for anyone who wishes to improve on this project and make it more accessible for drummers.

Project Video	shorturl.at/ahW56
Project Area	3-D Modelling, Sensor Technology
Project Technology	Solidworks

Project Title	Development of an External Thread Milling Demonstration Rig
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Programme	Mechanical and Manufacturing Engineering
Supervisor	tamas.szecsi@dcu.ie

This project investigates the design, manufacture and assembly of a demonstration rig that displays the thread cutting process of a cylindrical blank. The system design was formulated via SolidWorks, with several mathematical problems solved by conducting research of topics within a similar field. The demonstration rig outlines the basic principles of operation, along with a sample of a threaded component to give a representation of what thread milling could be used for in the manufacturing world.

Project Video	shorturl.at/coAMN
Project Area	3-D Modelling, Device Design, Mechanical Design and Manufacture
Project Technology	ANSYS Workbench, Excel/VB, Solidworks

Project Title	Development of an Internal Thread Milling Demonstration Rig
Name	Ali Raza Shah
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Programme	Mechanical and Manufacturing Engineering
Supervisor	tamas.szecsi@dcu.ie

This report studies the build of a rig which demonstrates the process of internal thread milling, where a thread milling cutting tool is used to machine threads on the internal surface of the workpiece. The rig is designed on Solidworks and the parts of the design a manufactured and assembled. Experimentation is also conducted on the final design rig to confirm the success of the demonstrating the internal thread milling process and to test if the final assembly has abided to all the constraints applied to the project. Softwares such as ANSYS workbench and Audacity were used during the experimentation process of the demonstration rig.

Project Video	shorturl.at/hEQRW
Project Area	Mechanical Design and Manufacture
Project Technology	ANSYS Workbench, Solidworks

Project Title	Electronic Drum Pad Design
Name	John Beattie
Email	john.beattie5@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	alan.kennedy@dcu.ie

To design, build and test a electronic drum pad by firstly making improvements to an existing drum. Secondly testing and development of an alternative design. Thirdly develop a new design that similar to simpler rubber drum pads.

Project Video	No video available for this project
Project Area	3-D Modelling, Arduino, Device Design, Digital Signal Processing, Mechanical Design and Manufacture
Project Technology	Excel/VB

Project Title	Finite Element Analysis of a Bike Frame
Name	Ikarma Ahmed
Email	ikarma.ahmed3@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	bryan.macdonald@dcu.ie

Bike is a very common machine used by many people in their everyday life. The objective of this project is to analyse a key component of the bike, the bike frame. Finite Element Analysis will be used to study key attributes of its overall geometry and its cross-sectional geometry. Techniques of making a frame superior in a competition bike will also be studied to obtain an insight of the key design elements.

Project Video	shorturl.at/czJOV
Project Area	3-D Modelling, Finite Element Analysis, Mechanical Design and Manufacture
Project Technology	ANSYS Workbench, Solidworks

Project Title	Green Toolkits for the GAA
Name	Michael Burke
Email	michael.burke43@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	anne.morrissey@dcu.ie

Green Toolkit for the GAA is a function modelling project. The main objective of the project is to build a toolkit for GAA clubs nationwide to use to become more environmentally sustainable. The method used to design the toolkit is a function modelling method entitled IDEF0. This method graphically represents the toolkit user experience with the end user in mind, while making considerations for a given club's limitations and resources. The models robust design ensures that the toolkit is applicable to GAA clubs regardless of the club's background.

Project Video	https://tinyurl.com/yasxaapd
Project Area	Environmental Mapping
Project Technology	Visio

Project Title	Hydrogen Generation Reactor Development and Test
Name	Therese Ferguson
Email	therese.ferguson2@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	james.carton@dcu.ie

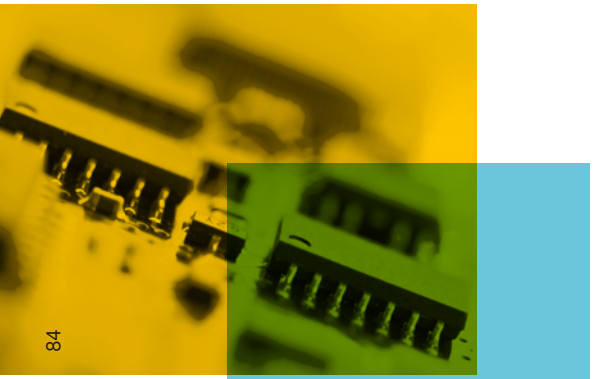
This project investigates the development and testing of a hydrogen reactor device. Hydrogen gas has always been an interesting molecule in fuel cell applications. However, some of its problems include its reactive nature, storage and the cost of storage in comparison to other fuels. This project involved the development of a rig to house the reaction of aluminum and water with the help of a carbon catalyst to produce a hydrogen gas sample. The gas was then analysed for the detection and volume of gases present in the sample.

Project Video	shorturl.at/jxI68
Project Area	Automotive Technology, Energy Conservation, Mechanical Design and Manufacture
Project Technology	Excel/VB, Solidworks

Project Title	Industrial Heat Pump System Design and Analysis
Name	Patrick Byrne
Email	patrick.byrne49@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	james.carton@dcu.ie

This study investigates the performance of a Kronoterm air-source heat pump water heater (ASHPWH) for use in dairy applications using a Fluke 435-II power quality analyser to collect the energy data from the ASHPWH. The study then compares the system with a number of other water heaters on the market in terms of ability to reduce carbon emissions and operational costs. A list of guidelines on how to operate the system to maximise its efficiency has also been included in the study.

Project Video	shorturl.at/pEX56
Project Area	Data Analytics, Energy Conservation, Renewable Energy Technology, Thermodynamics
Project Technology	Excel/VB, HVAC



Project Title	Performance monitoring and Upgrade of FMS processing station
Name	Sean Cosgrove
Email	sean.cosgrove8@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	paul.young@dcu.ie

This project will look at monitoring the screw insertion station on the FMS rig first as a preventive maintenance challenge and then as an improvement project.

The preventive maintenance challenge is to determine a monitoring mechanism to predict when the system will cause a failure by the discovery/creation of a signal which shows the trend of the system towards failure. The improvement project will look at re-designing the infeed mechanism to ensure that the failure does not happen.

Project Video	shorturl.at/dz256
Project Area	Automation, Sensor Data
Project Technology	Excel/VB, Solidworks, Arduino

Project Title	Prototyping an electric golf cart
Name	Stephen Walker
Email	stephen.walker7@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	brian.corcoran@dcu.ie

This project was to take an initial design from an external client and improve any necessary areas before manufacturing a prototype. The idea behind the design was a golf trolley that doubles as a ride on golf cart for people who struggle to walk for long periods of time. There was a strict design criteria.

1) Transportable by the user and fit in the boot of a saloon car.
2) Switch from walking to driving mode easily and quickly.
3) Finish an 18-hole game of golf on a single charge.

Project Video	shorturl.at/jnoA4
Project Area	Mechanical Design and Manufacture
Project Technology	Solidworks

Project Title	The continuous improvement of an ultrasonic welding system in an industrial setting
Name	Brian Fleming
Email	brian.fleming3@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	john.geraghty@dcu.ie

This project discusses the improvement of a core manufacturing process in a medical devices facility in Dublin. The process is an ultrasonic welding system comprising of six welders on a one of a kind assembly line in West pharmaceutical. The project aims to address the reliability and maintenance of the process, utilising methods of lean and six sigma manufacturing to achieve a higher performing process capable of increased output and availability.

Project Video	shorturl.at/fgixD
Project Area	Lean Manufacturing
Project Technology	Excel/VB, Minitab

Project Title	The effect of Thermocycling on EPDM gaskets under varying torque
Name	Tara McMullan
Email	tara.mcmullan2@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	brian.corcoran@dcu.ie

Failure of soft materials such as gaskets is the number one reason for contamination of pharmaceutical drug batches. The aim of this project is to gain a greater understanding of the premature degradation of EPDM gaskets due to the level and type of torque applied. A rig was designed to emulate the harsh conditions of a pharmaceutical plant. This rig was used to thermocycle a variety of gaskets which were installed using various magnitudes of torque and uneven torque.

Project Video	shorturl.at/puxZ2
Project Area	Advanced Material Engineering, Mechanical Design and Manufacture
Project Technology	Solidworks, PicoLog 6

Project Title	To Design, Build & Test a Single Stack Busbar System Capable of Powering at 2000 Amps
Name	Conor Morrison
Email	conor.morrison33@mail.dcu.ie
Programme	Mechanical and Manufacturing Engineering
Supervisor	paul.young@dcu.ie

This Project involves re-designing of a Busbar trunking system with the main objective to reduce heat generation and dissipate heat in order to pass IEC 61439-6 regulations. Using Solidworks Thermal Analysis and Heat Rise Tests the Busbar design is analysed to reduce heat generation, improve manufacturing efficiency and reduce the total cost of manufacturing.

Project Video	shorturl.at/cgQ08
Project Area	3-D Modelling, Lean Manufacturing, Mechanical Design and Manufacture, Thermodynamics
Project Technology	ANSYS Workbench, Matlab, Solidworks

School of Mechanical and Manufacturing Engineering

Biomedical Engineering

Project Title	3D Printing of wearables for Breath Rate Measurements
Name	Amelia McGuinness
Email	amelia.mcguinness28@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	dermot.brabazon@dcu.ie

The project investigates the use of conductive inks in the development of a wearable device for breath rate measurement. The development of the project focuses on the manufacture and optimisation of conductive inks as well as the most effective method of printing. Focus was also placed on optimising the electrical properties of the sample to improve the suitability for use as a sensor.

Project Video	shorturl.at/otFQ3
Project Area	Biomedical Engineering, Wearable_Technology

Project Title	A Computational Analysis on the Mechanics of Biological Membranes
Name	Hannah Grace-Parker
Email	hannah.graceparker2@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	david.macmanus@dcu.ie

This project uses FEBio finite element software to provide data on the mechanics of a biological model, which in this case is of a biological membrane tissue sample (e.g. meninges). The software is used to simulate an indentation experiment on the tissue which can then be used to gather mechanical data such as stress and strain. This data is then graphed and analysed and a colour map of the areas of stress and strain can be seen on the model.

Project Video	shorturl.at/glrsw
Project Area	Biomedical Engineering, Finite Element Analysis, Simulation
Project Technology	FEBio

Project Title	An investigation into the use of mosquito net for hernia repair in developing countries
Name	Morgan Mooney
Email	morganpatrick.mooney27@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	garrett.mcguinness@dcu.ie

This project investigates the mechanical properties of medical meshes used in Hernia repair, and assess the suitability of using mosquito net as an alternate material in developing countries. The project looks at identifying if the material deformation is homogeneous, and will behave in a similar manner to the tissue it acts in conjunction with.

Project Video	shorturl.at/foIV4
Project Area	Biomedical Engineering, Tissue Engineering
Project Technology	Excel/VB, Solidworks

Project Title	Development of Collagen-Based Bioinks for Bone Repair
Name	Damini Mantri
Email	damini.mantri2@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	tanya.levingstone@dcu.ie

The fabrication of a collagen-based bioink for bone tissue repair is executed and investigation of its properties is evaluated.

Project Video	shorturl.at/gjlq3
Project Area	3-D Modelling, Biomedical Engineering, Tissue Engineering
Project Technology	Solidworks, Slic3r software

Project Title	Examination of the factors that affect the Fracture Toughness of Avian Egg Shells
Name	Sean Moloney
Email	sean.moloney25@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	owen.clarkin@dcu.ie

This project used a new method of distributed loading and exposed eggshells, of various sizes, to a compressive force to see if the eggshells displayed a different response based on their size. This response was used to calculate a value for fracture toughness for eggshell which verified eggshell was independent of size and produced a response expected of a calcite-based material.

Project Video	shorturl.at/rtFK5
Project Area	Biomedical Engineering, Tissue Engineering
Project Technology	Excel/VB, Solidworks

Project Title	Finite Element Analysis of Bone Fracture Fixation Plate
Name	Eunice Lim Si Yin
Email	eunice.lim2@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	bryan.macdonald@dcu.ie

A 3D finite element model was built using ANSYS Workbench to examine the effects of bone fracture fixation plate on inter-fragmentary strain and stress shielding, two major factors affecting bone healing. This included examining the materials of fixation plate and screw, distance between the bone and fixation plate, number and configuration of screws and the insertion angle of screws. The project presented the use of software as an alternative to conventional experiments in assessing the functionality of a medical device.

Project Video	shorturl.at/cfit1
Project Area	Biomedical Engineering, Finite Element Analysis
Project Technology	ANSYS Workbench, Solidworks

Project Title	Finite Element Analysis of Stent Deployment
Name	Jordan Keating
Email	jordan.keating27@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	bryan.macdonald@dcu.ie

A finite element analysis was carried out on the deployment of a balloon expandable stent. This is considered a complex non-linear problem which analysed the interactions, behaviours and relationships between the balloon, stent and artery. The pre-processing, analysis and post-processing stages were performed using ANSYS Workbench/ Mechanical, while SOLIDWORKS was used to create all necessary models and assemblies. The results were broken into stages and each stage was validated by comparison to previous FEA studies or medical guidelines.

Project Video	shorturl.at/fST59
Project Area	3-D Modelling, Biomedical Engineering, Finite Element Analysis
Project Technology	ANSYS Workbench, Solidworks

Project Title	Finite Element Simulation on the Deformation of Arteries
Name	Kevin Bradley
Email	kevin.bradley5@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	jeremiah.murphy@dcu.ie

A Finite Element Simulation was carried out into how arteries deform to high blood pressure using ANSYS Workbench. The first model was analysed with normal blood pressure to compare the differences to moderate hypertension using a single layer model. The final model used a bilayer. The project involved the use of Mooney-Rivlin and Neo-Hookean material models which was vital to the success of this project and gave great insight into how biological tissue functions. FEBio an open source FE programme was also used to compare to ANSYS.

Project Video	shorturl.at/cfrY4
Project Area	Finite Element Analysis
Project Technology	ANSYS Workbench

Project Title	Investigation into functional test methods and critical properties of hydrocolloid biomaterials
Name	Alan Moran
Email	alan.moran37@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	garrett.mcguinness@dcu.ie

This project is concerned with characterising hydrocolloids based on their mechanical abilities which have clinical applications. The methods in which these, and other primary wound dressings, are tested are investigated in the literature and replicated in this project, with respect to standardised methods, in order to form a comparative baseline. This project essentially aims to categorise these intelligent dressings based off their performance.

Project Video	shorturl.at/bxBU3
Project Area	Biomedical Engineering
Project Technology	Solidworks

Project Title	Manufacture and characterisation of polymeric films for biomedical applications
Name	Ryan Judge
Email	ryan.judge4@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	garrett.mcguinness@dcu.ie

This project was focused on the preparation of poly (vinyl alcohol), or PVA, films using a solvent evaporation casting method, which is essentially drying a polymer-water solution. Wound-care products sometimes contain antimicrobial substances to combat infection, and composite films of PVA and natural substances such as honey was also investigated. The focus of the project was to examine the effect of process parameters such as polymer concentration, temperature and thickness on the drying time and eventual properties of the films. Tensile viscoelastic properties were studied using a Zwick mechanical testing machine, and mathematical models were produced to represent the behaviour of the films. Also the manufacture and investigation of a PVA/Manuka honey copolymer.

Project Video	shorturl.at/lpyCK
Project Area	Advanced Material Engineering, Biomedical Engineering, Mechanical Design and Manufacture
Project Technology	Excel/VB

Project Title	Material Characterisation of Contact Lens and Contact Lens Material Using Micro-Indentation
Name	Ryan Brady
Email	ryan.brady28@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	david.macmanus@dcu.ie

The focus of this project was to investigate the mechanical properties of new bio-materials being used to create contact lenses and compare them with commercial lenses currently available. Experiments were performed using a custom-built micro-indentation device and statistical analysis was performed of on the resulting data to determine if any significant differences exist between test categories.

Project Video	No video available for this project
Project Area	Biomedical Engineering, Data Analytics, Statistical Analysis, Tissue Engineering
Project Technology	Excel/VB, Matlab

Project Title	Quantifying the Spread and Dispersion of Anaesthetic Blockade Using Infrared Imaging
Name	Niamh Murray
Email	niamh.murray34@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	david.macmanus@dcu.ie

Carried out in conjunction with anaesthetists at Rotunda Hospital, this project was conducted to quantify the spread of anaesthetic through the body. Conventional methods currently in practice to stimulate nerves, such as the use of ice and blunt needles, are considered outdated as they do not test for a response at the surgical site, and are difficult to quantify. As anaesthetic causes vasodilation, subsequently heating the skin, the aim of the project is to use thermography to monitor the spread of the block. The study includes an evaluation of the data using MATLAB image processing and statistical analysis programmes.

Project Video	shorturl.at/mqyGT
Project Area	Biomedical Engineering, Data Analytics, Image/Video Processing, Statistical Analysis
Project Technology	Matlab

Project Title	The design of a rig for the mechanical testing of materials in hydrated, temperature controlled environments
Name	Stephanie Franqueira Nolan
Email	stephanie.franqueiranolan2@mail.dcu.ie
Programme	Biomedical Engineering
Supervisor	tanya.levingstone@dcu.ie

Tensile and compression testing is performed on biomaterials to analyse their suitability in biomedical applications. The mechanical properties of biological tissues and biomaterials are dependent on the materials hydration levels and the surrounding temperature.

This project involved the design and manufacture of a rig to allow for the mechanical testing of materials submerged in saline solution at 37°C, to assess how materials such as tissues, scaffolds and hydrogels react under tensile and compression loading within the body.

Project Video	shorturl.at/hnoKZ
Project Area	Biomedical Engineering, Mechanical Design and Manufacture
Project Technology	Solidworks

School of Electronic Engineering

Electronic and Computer Engineering

Project Title	An Evaluation of Ultra-wide Band (UWB) platforms for Geo-Fencing Applications
Name	Eoin Kavanagh
Email	eoin.kavanagh34@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	derek.molloy@dcu.ie

Ultra-wide band (UWB) is a technology that allows for the development of two-way-ranging real-time localisation systems using a very wide frequency band, with a very low spectral density. This allows for very accurate positioning of a sensor within an instrumented environment (akin to an indoor GPS) to within centimeters. The project uses the Decawave MDEK1001 UWB development kit and implements 3 unique designs to evaluate if UWB is a suitable platform for geofencing and secure bubble applications.

Project Video	shorturl.at/bfhxE
Project Area	Embedded Systems, Internet of Things, RaspberryPi, Sensor Technology
Project Technology	C/C++, Java, MQTT

Project Title	A VLF Radio Observatory
Name	Loman Sherlock
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Programme	Electronic and Computer Engineering
Supervisor	patrick.mcnally@dcu.ie

Very low frequency (VLF) radio waves covers the frequency range below about 30 MHz. The Earth's ionosphere has been observed to have a strange and interesting effect on these VLF radio waves which do not occur to higher frequency radio waves. This project researches into some of these effects and builds a VLF Radio Observatory to act as a receiver system from which some of these effects can be observed and analysed.

Project Video	shorturl.at/drzV8
Project Area	Circuit Modeling, Device Design, Wireless Technology
Project Technology	OrCAD Capture and pSpice, and SpectrumLAB

Project Title	Analysis and Smulation of Nonlinear Transmission Lines
Name	Kathryn Anderson
Email	kathryn.anderson5@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	marissa.condon@dcu.ie

This project focuses on the design and investigation of Nonlinear Transmission Lines by simulation in Matlab. The parameters and values of the nonlinear expressions, resistor loads, and number of circuit sections are varied to investigate the optimum value for maximum available power and frequency. The simulation time is recorded for simulating the Nonlinear Transmission Line. This simulation time intends to be decreased by model reduction via the technique of proper orthogonal decomposition.

Project Video	shorturl.at/oCSWX
Project Area	Circuit Modeling, Power Electronics, Simulation
Project Technology	Matlab

Project Title	Design and Evaluation of a Stochastic Computer
Name	Martin Connolly
Email	martin.connolly43@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	conor.mcardle@dcu.ie

Stochastic computing involves performing arithmetic operations using numbers which are represented with probabilities encoded in random bit streams. The project aims to design a co-processor that uses this principle to perform multiplication. An Arduino microprocessor runs an algorithm which utilises the co-processor for any required multiplication. The performance of the stochastic co-processor is then evaluated.

Project Video	shorturl.at/bvyT2
Project Area	Arduino, Device Design, Embedded Systems
Project Technology	C/C++, Java

Project Title	Design, development and testing of a networked low-cost open source sensor network for environmental monitoring
Name	Robert McMullen
Email	robert.mcmullen4@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	patrick.mcnally@dcu.ie

Current weather stations are expensive and are not easily transported. This project combines Arduino microcontrollers with various environmental monitoring sensors and instruments, along with radio frequency devices to develop a low-cost, networked weather station. This station overcomes the limitations of these current weather stations, as it is built at a fraction of the cost, can be easily transported by a single user, has the ability to measure environmental conditions in any given terrain and rivals their accuracy.

Project Video	shorturl.at/mnI36
Project Area	Arduino, Data Analytics, Internet of Things, Sensor Data, Sensor Technology, Wireless Technology
Project Technology	C/C++, Excel, Visio

Project Title	Development of a micro-controller managed laser source
Name	Sean Daly
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Programme	Electronic and Computer Engineering
Supervisor	prince.anandarajah@dcu.ie

This purpose of this project is to implement a programmable micro-controller-based control system into an optical communications network which would allow greater control over the output characteristics of the laser diodes in the networks. This allows for the implantation of new ideas in this area such as elastic optical networks and software defined networking which are not only going to improve the quality of the current networks in place but also improve the efficiency and sustainability of optical networks.

Project Video	shorturl.at/bEIU9
Project Area	Optical Communications
Project Technology	C/C++, Digital Signal Processing

Project Title	Hardware Acceleration of DEFLATE Compression Algorithms
Name	Oliver Browne
Email	oliver.browne5@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	xiaojun.wang@dcu.ie

This project concerns the development of a hardware acceleration core, used to accelerate the LZSS data compression algorithm. The purpose of the project was to take a well understood problem in the software domain, data compression, and approach it from the FPGA hardware domain, with the goal of using the problem selected to highlight the tools, techniques and technologies available when developing hardware/software co-designs on heterogeneous FPGA hardware.

Project Video	No video available for this project
Project Area	Circuit Modeling, Device Design, Embedded Systems, Simulation, Software Development
Project Technology	C/C++, FPGA, SystemVerilog, Data Compression, DEFLATE

Project Title	Improving VR User Experience by Using IoT Beacons
Name	Andrei George Rosu
Email	andrei.rosu2@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	gabriel.muntean@dcu.ie

This project investigates how IoT Bluetooth Low Energy (BLE) Beacons could be used to improve the user experience in VR applications. BLE Beacons are small bluetooth devices that continuously transmit data set by the user. This data can be received by other bluetooth devices (such as mobile phones or Raspberry Pis) when they come close to the beacons. The data can then be sent to a VR application over the network and can be used to trigger specific events within the application. A proof of concept VR application and an application to retrieve the beacon data were developed.

Project Video	shorturl.at/lCDW4
Project Area	Internet of Things, Network Applications, RaspberryPi, Software Development, Virtual Reality
Project Technology	C#, Eclipse, Java, Unity

Project Title	Investigating strategies for improving convergence in deep semi-supervised machine learning
Name	Purev-Ochir Ganbaatar
Email	purevochir.ganbaatar2@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	robert.sadleir@dcu.ie

This project investigates the strategies to improve on Pseudo-labeling semi-supervised learning approach with main goal of studying the impact of network initialisation and data augmentation when training using Pseudo-labeling approach to train network in semi-supervised setting.

Project Video	shorturl.at/jtK57
Project Area	Artificial Intelligence, Computer Vision
Project Technology	Python

Project Title	Investigation amplification of coherent WDM signals in Semiconductor Optical Amplifiers
Name	Conor Larkin
Email	conor.larkin25@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	liam.barry@dcu.ie

This project investigates the effects that coherent signal transmissions have on the received signal and how different parameters such as frequency offset, phase range, noise amplitude and the number of channels all vary the received signal. This investigation was conducted using Matlab and Simulink along with relevant toolbox add-ons for Simulink.

Project Video	shorturl.at/jqrwY
Project Area	Optical Communications, Simulation
Project Technology	Matlab, Simulink

Project Title	Multi-sensory-enhanced VR Experience
Name	John Patrick Sexton
Email	john.sexton5@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	gabriel.muntean@dcu.ie

A VR video experience, with automatically added smell and haptic feedback using machine learning techniques. This project investigates methods of using convolutional neural networks pretrained on 2-Dimensional image data to analyse a 360 degree field of view. Using this analyses the algorithm adds olfaction and haptic data to VR videos. A prototype playback setup has been created to playback VR video in the Oculus Rift headset along with the added multi-sensory data.

Project Video	shorturl.at/anGI9
Project Area	Artificial Intelligence, Augmented Reality, Image/Video Processing, Intelligence Pattern Matching, Virtual Reality
Project Technology	CSS, HTML5, Java, JavaScript, OpenGL, Python

Project Title	Resonance Behaviour of Coupled Oscillator
Name	Saima Shafi
Email	saima.parhiar@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	marissa.condon@dcu.ie

This project analyses the resonance behaviour of single and coupled oscillator. The resonance behaviour of oscillators was examined through simulations and experiment. The oscillators models were designed through Van der Pol equation. Single and coupled oscillator models were first implemented on MATLAB and later developed on a breadboard. Several cases of oscillators were examined by varying magnitude and frequency of the input signal. The project also compares the simulation results to the experimental results.

Project Video	shorturl.at/AHLZ7
Project Area	Circuit Modeling, Simulation
Project Technology	Matlab

Project Title	Seeing in the Dark Using Deep Learning Based Computer Vision
Name	Eoin O'Reilly
Email	eoin.oreilly47@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	paul.whelan@dcu.ie

This project uses deep learning techniques to improve the quality of images taken in low-light situations. A fully convolutional neural network was trained from scratch using Python and Tensorflow. Various improvements to the network were then experimented and tested with. This project showed good results in converting images taken at night to what they would look like during the day.

Project Video	shorturl.at/moCKR
Project Area	Artificial Intelligence, Computer Vision, Image/Video Processing
Project Technology	Python, Tensorflow

Project Title	Simulation and Performance Evaluation of Urban Traffic Systems using SUMO and NS3
Name	Zenouska Murphy
Email	zenouska.murphy5@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	ming.ming.liu@dcu.ie

This project proposes two different models (static and dynamic) for combining the functionalities of the traffic simulator SUMO and network simulator NS3 in order to evaluate VANET applications. In current VANET projects, assumptions are made during the testing stages regarding the signal transmission between vehicles. These assumptions most often lead to inaccurate results and conclusions. This project removes these assumptions, due to both models providing an accurate testbench for implementing VANET applications. A speed advisory system application is then applied.

Project Video	shorturl.at/MQS57
Project Area	Internet of Things, Network Applications, Vehicle Control, VANETS, Intell Transport System, Traffic Simulators
Project Technology	C/C++, NS-3, Python, XML, SUMO, VSimRTI

Project Title	Smartwatch Outdoors Application to Identify Location on the Irish National Grid
Name	John Corry
Email	john.corry3@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	martin.collier@dcu.ie

In this project a smartwatch application was developed on Wear OS for a user to determine their location on the Irish National Grid. The Irish National Grid is used in ordnance survey maps around Ireland. The application enables users to know exactly where they are on the map and in turn can enhance the experience of navigation using maps.

Project Video	shorturl.at/OUV26
Project Area	Android, GPS/GIS, Software Development
Project Technology	Java, Matlab

Project Title	Snake species identification using deep convolutional neural networks
Name	Radwan Duadu
Email	radwan.duadu2@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	kevin.mcguinness@dcu.ie

Bites from venomous snakes in tropical climates cause over 2.5 million poisonings and 100,000 deaths each year. The project involves creating a computer vision system capable of accurately identifying snakes.

The project involved the development of a deep convolutional neural network in distinguishing a small subset of the snake species containing 45 snakes dataset provided by AICROWD containing 82,000 images.

The project method involved testing of different architectures such as ResNet, ResNeXt, and EffecientNet. The project resulted in an accuracy of 82.8% for snake classification.

Project Video	shorturl.at/egBI5
Project Area	Artificial Intelligence, Computer Vision, Image/Video Processing, Software Development
Project Technology	Python

Project Title	The Simulation of a Vertical Cavity Surface Emitting Laser
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Programme	Electronic and Computer Engineering
Supervisor	pascal.landais@dcu.ie

This project carries out further developments on an existing simulation of a Vertical Cavity Surface Emitting Laser (VCSEL) in order to improve its ability to predict the static and dynamic properties of the device. The background information on LASERs and VCSELs required to develop a simulation is explored including semiconductor diodes, LASER types and properties, and rate equations which describe the dynamic properties of a LASER. The simulation was then carried out on MATLAB where the properties of the VCSEL were examined.

Project Video	shorturl.at/vFY78
Project Area	Simulation
Project Technology	Matlab

Project Title	Using Deep Learning Based Computer Vision to Undertake Natural Disaster Damage Assessment from Satellite Images
Name	Shane Tuite
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Programme	Electronic and Computer Engineering
Supervisor	paul.whelan@dcu.ie

The aim of this project was to develop a convolutional neural network(CNN) to automatically detect damaged buildings in satellite images. It involved experimenting with various deep learning techniques and CNN architectures in order to find an optimal solution. An effective solution could potentially be used to reduce the delay in the arrival of emergency resources following the occurence of a natural disaster event by streamlining the damage assessment process.

Project Video	shorturl.at/irBQY
Project Area	Artificial Intelligence, Automation, Computer Vision, Image/Video Processing

Project Title	Visualisation of 3D environments for ray tracing applications
Name	Keith Carroll
Email	keith.carroll8@mail.dcu.ie
Programme	Electronic and Computer Engineering
Supervisor	conor.brennan@dcu.ie

This project is a tool for creating virtual 3D environments from user-provided data sets. It is designed to visualise how a ray might interact with its environment, such as through reflection or diffraction, and allow the user to validate and investigate those interactions.

Project Video	https://tinyurl.com/y8krp6rf
Project Area	3-D Modelling, Software Development
Project Technology	C#, Unity

Project Title	Visualization of Wi-Fi Based Indoor Tracking
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Programme	Electronic and Computer Engineering
Supervisor	conor.brennan@dcu.ie

This project is about the visualization of Wi-Fi-based indoor tracking. This is to track a target device with the use of access points, Wi-Fi router and a laptop in an indoor environment. Then the target device would be displayed on a map as it is being tracked. This is done by just using Wi-Fi-based systems and not GPS or any outdoor tracking systems.

Project Video	No video available for this project
Project Area	Internet of Things
Project Technology	Python

Project Title	Web Resources for Self-Diagnostic Testing of Mathematics
Name	Christian Hope Crow
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Programme	Electronic and Computer Engineering
Supervisor	conor.brennan@dcu.ie

The purpose of this project was to develop a web application to aid students during online learning. The application would allow students to self-diagnose their mathematical ability while also being able to rectify common errors students make regarding basic mathematics. The application is comprised of multiple-choice questions, arranged in sets by topic. Each incorrect multiple-choice answer will trigger a short video to address the corresponding common errors the student has most likely made.

Project Video	shorturl.at/vD239
Project Area	Software Development, Web Application
Project Technology	CSS, Eclipse, HTML5, Java, JavaScript, MySQL, SQL, Tomcat

School of Electronic Engineering

Mechatronic Engineering

Project Title	3-D printing of Silicon Die Warpage based on X-Ray Diffraction Imaging Data
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Programme	Mechatronic Engineering
Supervisor	patrick.mcnally@dcu.ie

The novel technique of "B-Spline X-ray Diffraction imaging" is capable of non-destructive mapping of silicon semiconductor die lattice misorientations inside fully encapsulated packages. From this technique, a series of section x-ray topographic images are obtained and aligned along a plane to map out a full profile of the die warpage of the semiconductor die. The aim of this project is to develop a solution that can automate the process of constructing the die warpage map with the topographic images. This is achieved by using the Matlab application where a software is developed to process the images and construct a 3-D surface plot of the die warpage.

Project Video	shorturl.at/bekoB
Project Area	3-D Modelling, Image/Video Processing, Software Development
Project Technology	Matlab

Project Title	3D Printing of Auxetic Materials
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Email	cian.farrell56@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	jeremiah.murphy@dcu.ie

This projects aims to design and 3D print various auxetic structures and investigate their performance under tensile loading. The structures to be tested include the two main auxetic structure types, namely re-entrant and chiral, as well as s-hynge and stacked-arrow structures.

The structures are designed using SolidWorks 3D modelling software and tensile simulation tests are first performed on them using the finite element analysis (FEA) simulation feature in SolidWorks Tensile tests are then performed on the samples using the Zwick Z005 machine. Samples are first analysed as single core structures before progressing to multicore and cylindrical arrangements. The intention is to determine which design provides the most lateral extension for a specific applied longitudinal extension.

Project Video	shorturl.at/btGKO
Project Area	Advanced Material Engineering
Project Technology	Solidworks, 3D Printing

Project Title	Analysis and Creation of a Data Modelling Tool for a Peer-to-Peer Energy Trading Project
Name	Aodhagan Watters
Email	aodhagan.watters8@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	james.carton@dcu.ie

This project is an analysis on a Peer-to-Peer Energy Selling & Sharing currently being undertaken is investigated. With global awareness of man-made climate change on the rise, industry is adapting and playing their part tackling climate change. One method is Peer-to-Peer Energy Trading of renewable and carbon-limited sources. This project, the impact and expectations of a Peer-to-Peer Energy Trading project currently being undertaken is analysed and an application for real-time monitoring of the effectiveness is created. Historical data from the site have been analysed using Matlab and a program has been developed using Matlab App Designer.

Project Video	shorturl.at/btPU6
Project Area	Data Analytics, Electric Generation, Energy Conservation, Environmental Mapping, Mechatronic Systems, Renewable Energy Technology, Software Development, Statistical Analysis, Web Application
Project Technology	Excel/VB, Matlab, REST, XML

Project Title	Automating a traditional swimming pool water treatment process
Name	Shane Cheshire
Email	shane.cheshire2@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	brian.corcoran@dcu.ie

This project involves designing a fully automated swimming pool plant room. This project aims to eliminate manual swimming pool water treatment tasks, such as chemical dosing and manual backwashing of filters. The project sets out to achieve this through automation and control. The project will also explore other areas were improvements, such as equipment sizing and selection, can be made to traditional water treatment processes. This project will use mechanical and electrical design, to automate and control the water treatment process of a 25m swimming pool.

Project Video	shorturl.at/kxCZ3
Project Area	Automation, Control Systems, Energy Conservation, Mechanical Design and Manufacture, Renewable Energy Technology, Water Treatment
Project Technology	Simulink, Autodesk Plant 3D

Project Title	Design and Build of a Remote-Controlled Underwater Sensor Platform
Name	Caoimhin Callinan
Email	caoimhin.callinan3@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	yan.delaure@dcu.ie

This project involved the design, manufacture, and testing on an underwater device which the DCU Water Institute can attach various sensors to for testing water in a large-scale tank. The project also involved the design and manufacture of a dynamic drag measurement rig to measure the drag force of underwater devices.

Project Video	shorturl.at/qwyKT
Project Area	3-D Modelling, Arduino, Mechanical Design and Manufacture, Robotics, Sensor Technology, Software Development, Vehicle Control, Wireless Technology
Project Technology	C/C++, Solidworks

Project Title	Design of a 3D Printed Horn Antenna
Name	Cathal Sheahan
Email	cathal.sheahan6@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	pascal.landais@dcu.ie

This project examines to simulate and design a 3D printed horn antenna to operate within the X-band (8-12 GHz) of the radio frequency spectrum. The shape of the horn antenna is pyramidal. A simulation is developed using MATLAB, where the antenna's gain and directivity are optimised. The designed antenna is then 3D printed and compared against a commercially available product. The antenna's performance is also compared against the simulation results.

Project Video	shorturl.at/bwxE7
Project Area	3-D Modelling, Telecommunications, Wireless Technology
Project Technology	Matlab, Solidworks, RF

Project Title	Design, Build and Analyse a sodium Alginate purification reactor
Name	Caolan Leech
Email	caolan.leech2@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	owen.clarkin@dcu.ie

A time consuming and demanding process exists for Purifying Sodium Alginate (brown seaweed) in DCU. This project explores different areas to fully automate the process, therefore, significantly reducing the workload, creating repeatable results and improving productivity. Developments for future work and ideas are also included. All work done is at laboratory scale for any student to replicate.

Project Video	shorturl.at/akAW7
Project Area	Arduino, Automation
Project Technology	C/C++, Excel/VB, Solidworks

Project Title	Development of a Cyber-Physcial System for Environmental Control
Name	Michael Gordon
Email	michael.gordon6@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	stephen.daniels@dcu.ie

This project investigates a Cyber-Physical System for environmental control. It is focused on a horticultural environment. This system incorporates sensors, on board processors, and actuators to control a growing environment autonomously, while an interactive web-app allows users to manually adjust the actuators. Also, a deep learning model was trained to detect plant disease. The user is updated of the plant's status daily. This is achieved using two Raspberry Pi single board computers. One wirelessly connects with an environment monitoring device and adjusts the actuators, the other deploys the plant disease detection with a camera module.

Project Video	shorturl.at/lV267
Project Area	Artificial Intelligence, Automation, Computer Vision, Internet of Things, Mechatronic Systems, RaspberryPi, Sensor Data, Sensor Technology, Web Application
Project Technology	HTML5, JavaScript, Python, Keras, Tensorflow

Project Title	Instrumentation of an Electric Bike
Name	Cathal O'Hara
Email	cathal.ohara22@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	barry.mcmullin@dcu.ie

Instrumentation of an Electric Bike. What does this mean? In its simplest terms it means that an array of useful and informative information about the electric bike one is using to be displayed in a real-time and in an easily accessible manner to the user. The aim of this project was to develop a means to gather and display this information and the best way to achieve this was through the use of a set of smart circuitry, an Arduino Uno and a smart phone.

Project Video	No video available for this projectEoin Woodword
Project Area	Android, Arduino, Information Retrieval, Mechatronic Systems, Mobile App, Power Electronics
Project Technology	C/C++, Java, Solidworks

Project Title	LiFi Communication with the aid of an Arduino
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Programme	Mechatronic Engineering
Supervisor	prince.anandarajah@dcu.ie

LiFi is a wireless communication medium that functions by using near-visible frequency waves such as Infra-red or visible light to transmit information as well as light. This project explores the use of an LED-based emitter board and Photodiode receiver board, both of which are compatible with Arduino. The transmission rate and board capabilities are also explored with the use of the Arduino IDE. Error detection and correction methods are studied to aid in stable transmission.

Project Video	shorturl.at/ruH17
Project Area	Arduino, Digital Signal Processing, Optical Communications, Sensor Technology, Telecommunications, Wireless Technology
Project Technology	C/C++, Arduino IDE, Target3001!, LTspice

Project Title	Pallet Sensor
Name	Andrew Ross
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Programme	Mechatronic Engineering
Supervisor	harold.esmonde@dcu.ie

This project designs and builds a 3D vision sensor system to aid a forklift operator in positioning a forklift in front of a pallet. The Xbox 360 Kinect was used as the sensor. A program was developed which presents a graphically generated birds eye view of the scene with the pallet's location clearly marked. This allows the operator to easily judge the alignment of the forklift with the pallet and make necessary adjustments if needed. The system was developed to be ultimately integrated into a fully autonomous vehicle.

Project Video	shorturl.at/cklIU
Project Area	Computer Vision, Mechatronic Systems
Project Technology	.NET, C#, XML

Project Title	Self Balancing Robot
Name	Oisin Pegman
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Programme	Mechatronic Engineering
Supervisor	harold.esmonde@dcu.ie

This project involves the development of software used to control a two-wheeled inverted pendulum self-balancing robot. The purpose of this project is to create a demonstration of control theory for use during DCU open days. A Raspberry Pi is used to run a program which reads sensor values from a breakout board in order to maintain the balance of the robot. This project involves mechanical design and manufacture, system modelling and controller implementation through software development.

Project Video	shorturl.at/cnzFR
Project Area	Control Systems, Mechatronic Systems, RaspberryPi, Software Development
Project Technology	Java, Solidworks

Project Title	Self-driving Car Prototype using Computer Vision
Name	Seán Walshe
Email	sean.walshe222@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	paul.whelan@dcu.ie

Use of computer vision/ image analysis to guide a small Raspberry Pi -controlled car around a track.

Project Video	shorturl.at/ghrzF
Project Area	Computer Vision, Image/Video Processing, RaspberryPi
Project Technology	Python

Project Title	Smart Device for Neuromotor Clinical Assessment
Name	Jade O'Connor
Email	jade.oconnor98@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	conor.mcardle@dcu.ie

This project involves the design, construction and testing of an electronic version of the standard Purdue Peg Board used in clinical motor-response test. It involved the mechanical interfacing to resistive touchscreens for robust and reliable sensing of peg insertion. Precise motor movement data was captured, using Arduino IDE and analysed and visualised through Procressing IDE and Matlab, in order to enhance the standard Purdue pegboard test and create more consistent data sets.

Project Video	shorturl.at/knoF8
Project Area	Arduino, Embedded Systems, Information Retrieval, Mechatronic Systems, Sensor Data, Sensor Technology
Project Technology	C/C++, Excel/VB, Matlab, Solidworks

Project Title	System design and simulation of a 160hp hybrid diesel-electric power train for a light aircraft
Name	Ian Molloy
Email	ian.molloy2@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	noel.murphy@dcu.ie

This project investigates the potential benefits of diesel-electric hybrid technology in light-aircraft by the construction and testing of a scaled model.

Project Video	shorturl.at/pvzEZ
Project Area	Control Systems, Electric Generation, Energy Conservation, Mechanical Design and Manufacture, Mechatronic Systems, Motion Analysis, Power Electronics
Project Technology	Solidworks

Project Title	The Analysis and Simulation of Energy Harvesters
Name	Eoin Woodward
Email	eoin.woodward3@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	marissa.condon@dcu.ie

Energy harvesters take unused energy from the environment and converts it to electrical energy. Energy harvesters can be used for applications requiring low levels of power, including biomedical devices and micro/nano sensors. This project examines an acoustic energy harvester. Acoustic energy harvesters use sound vibrations to produce power using piezoelectric materials. The energy harvester's linear and nonlinear behaviour will be examined to enable accurate design of systems that employ them and maximise the energy produced.

Project Video	shorturl.at/jnGV0
Project Area	Circuit Modeling, Energy Conservation, Mechatronic Systems, Renewable Energy Technology, Simulation
Project Technology	Matlab

Project Title	Under-water remotely operated robotic frame
Name	Caroline O'Sullivan
Email	caroline.osullivan84@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	yan.delaure@dcu.ie

This project is to design and manufacture an under-water remotely operated robotic frame. The project aim is to design a robotic frame that can be used to perform fluid interaction studies and gain a better understanding of water movements and the reaction of water against different materials. This project is based around Solidworks and fluid mechanics. It is based off an original system which, is manually operated. An automated system is designed and based on fluid mechanics relationships and theories.

Project Video	shorturl.at/cnCH3
Project Area	3-D Modelling, Arduino, Automation, Fluid Mechanics, Mechanical Design and Manufacture
Project Technology	C/C++, Solidworks

Project Title	VERA – Valeo Engineer Remote Assistant
Name	Dáire Curran
Email	daire.curran25@mail.dcu.ie
Programme	Mechatronic Engineering
Supervisor	harold.esmonde@dcu.ie

In a competitive market place, automotive companies must use efficient data collection and testing methods to reduce product lead time to market. This project focused on these areas by building an offline speech recognition tool to be used for assisting in the development and testing of autonomous driving technologies. This involved tagging data capture with descriptive labels, the logging of test results, and computer networking.

Project Video	shorturl.at/GINO4
Project Area	RaspberryPi, Software Development, Speech Recognition
Project Technology	Digital Signal Processing, Python, Solidworks

School of Electronic Engineering

Study Abroad Projects

Project Title	2D to 3D body pose estimation with Deep Learning for Sign Language
Name	Pol Pérez Granero
Email	pol.perezgranero3@mail.dcu.ie
Programme	Study Abroad Projects
Supervisor	kevin.mcguinness@dcu.ie

This project aims at creating a tool that is capable of predicting 3D keypoint coordinates from 2D keypoint coordinates, since 2D ones can be easily extracted using OpenPose, from sign language interpreters in order to complete the 3D pose annotation of the How2Sign dataset. The proposed design is based on a Deep Learning architecture, known for working well in sequence-to-sequence tasks: Long Short-Term Memory network. This work shows how good are LSTM-based solutions for this tasks and gives insight on how to further improve the acceptable results obtained.

Project Video	shorturl.at/btQU7
Project Area	Artificial Intelligence, Computer Vision, Image/Video Processing
Project Technology	Python

Project Title	Deep Steganography
Name	Cristina Puntí Alvarez
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Programme	Study Abroad Projects
Supervisor	kevin.mcguinness@dcu.ie

This thesis explores the use of deep learning in media forensics. A hidding system has been created to hide information in images. The system designed is able to create, from an image and a message, a new image. This new image looks exactly the same as the original but has the message hidden in it. In addition, the system is able to recover the message afterwards with great success. Several neural networks have been studied to develop the encoder-decoder design.

Project Video	shorturl.at/dDIJW
Project Area	Artificial Intelligence, Computer Vision, Cryptography, Image/Video Processing, Telecommunications
Project Technology	Python

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