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# IXN Project Abstracts

**The following abstracts outline the projects carried out by second year undergraduate and MSc Computer Science students during the current academic year.**

## **Assessing Service Satisfaction Using Sentiment Analysis**

**Authors:** Chakradhar Koppula, Kar Lid Chan, Lian Wang

**Partners:** NHS and Microsoft

**Partner Organisation:** NHS, Microsoft

**Technologies Used:** Azure Text Analytics, Azure Cloud Storage, TensorFlow, Keras, Python, Flask, Power BI

**Module Code:** 2019-20/COMP0016

**Abstract:** The NHS Friends and Family Test was created to understand whether the patients are happy with the service provided to them by the NHS. The form collects how likely patients are to recommend the NHS and any comments they have.
This project aims to provide a system that allows for the service feedback collected to be analysed using sentiment analysis and then visualised in Power BI to gain insights into what departments are performing well and where improvements can be made. In collaboration with the NHS and Microsoft, we have created an in-house API that gets patient feedback data from Azure cloud storage, carries out sentiment analysis on comments and writes the analysed data to a cloud-based database.
Overall the system is intended to make the analysis of patient feedback simpler and more insightful so that the NHS can identify strong and weak points in the service they provide.

**GitHub:** https://github.com/AppertaFoundation/IXN\_Patient\_Service\_Analysis\_Tool

## **Autoworld**

**Authors:** Lingzhi Xu, Eesha Irfan, Govind Balla

**Partners:** John Mcnamara

**Partner Organisation:** IBM

**Technologies Used:** C#, Unity, Watson

**Module Code:** 2019-20/COMP0016

**Abstract:** Learning business theory has become mundane and laborious. The objective is to create a game that will show learners how decisions made in the business world affect companies and apply theory to the real world through a simulation. The solution is AutoWorld, an AI entrepreneur game focusing on the autonomous car industry with the intention of making learning business theory more fun and intuitive. The game will make use of real world articles to generate realistic game events which will make the game more immersive for the player. This will be done using Watson Discovery and Tone Analyser. The level-based game will challenge players to compete against each other and grow a successful company.

**GitHub:** undefined

## **Workspace Guru**

**Authors:** Valentin Gorbunov, Yuxuan Liao, Yusen Li

**Partners:** Fergus E. Kidd

**Partner Organisation:** Avanade

**Technologies Used:** Azure, REST API

**Module Code:** 2019-20/COMP0016

**Abstract:** High employee productivity is essential to the success of a business. Employee fatigue resulting from over focusing on a task and excessive amounts of time spent searching through directories to find places or people leads to a decline in performance. Workplace Guru is a fatigue management app that integrates optimized indoor/outdoor directions to people and places in the workplace with time tracking software, that tracks how users allocate their time around the workplace and notifies its users when excessive amounts of time have been spent in place. Should the project be a success it would facilitate increased employee productivity by reducing transit times, improving employee well-being as a result of better time management and optimizing the on-boarding process.

**GitHub:** undefined

## **Chatbot for Education**

**Authors:** Daniel Lahlafi, Paul Xin, Yuer Qiu

**Partners:** Joesph Connor, RCGP

**Partner Organisation:** GOSH / NHS

**Technologies Used:** Django, BERT, HTML, CSS, Javascript, Python

**Module Code:** 2019-20/COMP0016

**Abstract:** A chat bot which can take the perform question extraction on RCGP toolkits so that GPs can quickly ask questions and get answers from the toolkits.

**GitHub:** https://github.com/daniel-lahlafi/django-syseng-backend

## **Augmented Reality Business Card System**

**Authors:** Ziheng Zhang, Zhiwei Zhang, Jiayi Chen

**Partners:** John McNamara

**Partner Organisation:** IBM

**Technologies Used:** Unity, Flutter, Node.js, Vue.js, MongoDB, C#, Azure, Vuforia, IBM Watson

**Module Code:** 2019-20/COMP0016

**Abstract:** Business cards are very common and popular in all kinds of situations. People receive and send many business cards during events like networking. However, they are not easy to manage, people tend to lose the physical cards, and it is very limited for others to extract useful information about the owner.
We have designed a mobile & web multi-platform service for people to view and share virtual business cards with AI-powered interactive 3D AR avatar. Powered by IBM Watson Assistant, users can use their natural language to ask the avatar any questions from education, business plan to personal hobbies, even creating a natural conversation. The avatar uses advanced text to speech and voice recognition to boost the experience. Anyone can register and create their own 3D avatar business card to share publicly, and users can also set specific cards to favourite for easy access.

**GitHub:** https://github.com/ibm-ar-card

## **Dance Health**

**Authors:** Jan Kolarik, Yide Fan, Alex Tcherdakoff

**Partners:** Adrian Persad

**Partner Organisation:** Arthur Murray Dance Centers / NHS

**Technologies Used:** Swift, C++, Kinect SDK, XCode, NodeJS, HTML, CSS, MongoDB

**Module Code:** 2019-20/COMP0016

**Abstract:** Dance Health is a project that aims to create software for the Apple Watch and Kinect to track health data while dancing. The goal of this project is to help students at Arthur Murray follow a health journey through dancing by giving them a detailed overview of health-related statistics.
It uses Apples’ HealthKit and sensors provided by the Apple Watch such as a gyroscope or an accelerometer. It also utilises the Kinect depth camera for skeletal tracking to evaluate health metrics such as activity level. Overall, it provides the user with an overview of basic health statistics after his or her dancing session is completed on a server where the data from both of the devices in automatically integrated.

**GitHub:** https://github.com/jankolarik/Dance-Health-Phase-1.git

## **X5GON-mobile**

**Authors:** Patrick Wu, Yinrui Hu

**Partners:** Sahan Bulathwela, Prof. John Shawe-Taylor

**Partner Organisation:** University College London

**Technologies Used:** Swift, Objective-C, Python, Flask

**Module Code:** 2019-20/COMP0016

**Abstract:** X5GON is an industrial leading Open Education Resource Provider. In this project, we worked with the UCL X5GON research team to deliver a mobile application that a Mobile Application that provides users with an authentic and mobile-friendly X5GON experience and learning materials catered for their needs. With this project, the X5Learn system would be able to attract more users from the mobile platform, and enable them to learn anything anywhere.

**GitHub:** https://github.com/magetron/X5GON-mobile/
(not opensource at the moment, will discuss with client)

## **Speaker Recognition Prototype - RISE2**

**Authors:** Sabina-Maria Mitroi, Ruo Chen, Jingze Xu

**Partners:** Harris Partaourides (Researcher)

**Partner Organisation:** Research Centre of Excellence in Cyprus (RISE Cyprus)

**Technologies Used:** Python, Django, HMMLearn API

**Module Code:** 2019-20/COMP0016

**Abstract:** A Telecommunication Provider company receives thousands of calls per day and needs to improve its customer service by verifying the customers in recorded calls. A part of the evaluation process is the verification of the customer which is a difficult task in the case this is not done by the call operator during the call. We came up with a speaker recognition prototype to help the call operator to identify faster the person, rather than asking the caller. Thus, the calls are recorded and saved for further evaluation by the Quality Control department of the company. The application will help the company to decrease the time needed for the evaluation process and improve its services, increase customers and revenue. The impact of this application will help both sides.

**GitHub:** Not yet for our prototype

## **Universal Controller**

**Authors:** Zhiqing Wei, Xiaowen Li, Akkaraphonphan Tai

**Partners:** Dr Barrie Mair, Mr Alan Fish

**Partner Organisation:** Apperta / NHS

**Technologies Used:** C#, WPF, MongoDB, Jaco SDK

**Module Code:** 2019-20/COMP0016

**Abstract:** Currently, there is no open-source way for people with disabilities to benefit from using the IoT (Internet of Things) devices. This project aims to produce one universal controller desktop application capable of taking feeds from multiple input devices and output to various mainstream IoT devices. Specifically, we work on adding a Jaco robotic arm, which only supports joystick as its control source, as the output device and would like to combine the Eye Gaze as an input device. Additional functionality to provide a live stream camera scene can give the users a perspective view, allowing them to see the parts occluded by the arm. The solution can help those who do not have a high level of manual dexterity to accomplish many typical tasks including drinking, picking objects up, opening doors and make their lives easier.

**GitHub:** undefined

## **Hospital Surveys - Collecting Patient Feedback**

**Authors:** Min Yen Lau, Shengtong Jiang, Bahdan Kapionkin

**Partners:** Gemma Molyneux, Daiana Bassi

**Partner Organisation:** GOSH DRIVE / NHS

**Technologies Used:** Django, React, Python, JavaScript, Heroku, PostgreSQL, Redux.

**Module Code:** 2019-20/COMP0016

**Abstract:** We believe it is crucial for child patients of Great Ormond Street Hospital to be able to provide feedback based on their experiences. Whether it be hospital facilities, the way patients are treated, or just the overall experience, feedback not only allows children to share their experiences, but can also help improve hospital services in the future.
Thus, we have developed Hospital Surveys, an online survey tool that that allows child patients to answer surveys to provide feedback anonymously. Surveys can be designed and managed by hospital staff using a web application, and delivered to patients using a progressive web app. A database stores the anonymised patient feedback, which can be exported for further analysis. Graphical visualization also help analyze survey data and patient responses.

**GitHub:** https://github.com/michaellmy/hospital-surveys-dev.git

## **Augmented Reality Avatar Receptionist**

**Authors:** Lilly Neubauer, Oliver Vickers, Dillon Lim

**Partners:** Jon McNamara, IBM

**Partner Organisation:** IBM

**Technologies Used:** Unity, C#, Azure, SQL, IBM Watson, Android

**Module Code:** 2019-20/COMP0016

**Abstract:** With advances in mobile graphics and machine learning, lifelike augmented reality avatars are becoming feasible as an alternative to a human presence in customer-facing interactions. Our project aims to create an AR receptionist, viewed through a smartphone or tablet, that can respond to standard reception tasks.

**GitHub:** undefined

## **Social / Multiplayer AR Game**

**Authors:** Lu Han, Neha Ranade, Jingtian Yuan,

**Partners:** Nadia Aziz

**Partner Organisation:** NTT Data

**Technologies Used:** Unity, Photon Engine, AR Foundation,ARCore Cloud Anchors

**Module Code:** 2019-20/COMP0016

**Abstract:** The project is to create a multiplayer game that uses Augmented Reality. The goal of the game is to help users socialize in an engaging way. Our finalized game concept involves users catching virtual popcorn within a time-limit against contending players.

**GitHub:** undefined

## **Simulator Predicting Emergency Department Busyness Using AI**

**Authors:** Ethan Wood, Noan Le Renard, Wuhao Chen

**Partners:** NHS

**Partner Organisation:** NHS and Microsoft

**Technologies Used:** Python3, TensorFlow, PostgreSQL, Flask, Node.JS, Azure

**Module Code:** 2019-20/COMP0016

**Abstract:** A generalised system to allow the modelling of any emergency department within an evaluation framework. A model can be written in Python where once uploaded it will be run against historical patient data to gain a score for its particular metric. The system automatically manages and scales models while providing a simple python object interface to patient data. One of the provided models is a machine learning algorithm of emergency department admissions, with improved accuracy over the current admission prediction system. The framework will include a graphical user interface for interacting with the models and a RESTful API to retrieve and request data.

**GitHub:** Not yet available

## **How might we use wearables to improve resource allocation in the modern workplace?**

**Authors:** Valentin Gorbunov, Yuxuan Liao, Yusen Li

**Partners:** Fergus Kidd, Chris Lloyd-Jones

**Partner Organisation:** Avanade

**Technologies Used:** JavaScript, JQuery, HTML5, CSS3, 'Tizen Advanced UI Framework' (TAU), Azure, Cosmos DB, MapBox, Leafletjs, 'Quantum GIS'(QGIS), Rasberry Pi 3

**Module Code:** 2019-20/COMP0016

**Abstract:** The Emerging Technology team at Avanade pushes the limits of technologies to help clients obtain a competitive edge through applied research. To this end, Avanade have partnered with UCL to undertake a project investigating how wearables may be used to better manage employee fatigue. Fatigue resulting from over focusing on a task and excessive amounts of time spent searching through directories to find places leads to a decline in performance. Workplace Guru is a fatigue management app that integrates optimized indoor/outdoor directions to spaces in the workplace with time tracking software, that tracks how users allocate their time around the workplace and notifies them when excessive amounts of time have been spent in place. Should the project be a success it would facilitate increased employee productivity by reducing transit times, improving employee wellbeing as a result of better time management and optimizing the onboarding process.

**GitHub:** undefined

## **Food Intelligence Services**

**Authors:** Samuel Emilolorun, Kaan Turan, Mukilan Bakeerathan

**Partners:** Richard Watkins and James Smyth

**Partner Organisation:** Ocado

**Technologies Used:** Tensorflow, Keras, sklearn, nltk, gensim

**Module Code:** 2019-20/COMP0016

**Abstract:** We were tasked with designing, testing, and evaluating models for producing recipe Embeddings in order to predict and recommend ingredients the user may want in real time, ultimately easing the user experience. It's a research project mainly aimed at finding the best methods for producing meaningful low dimensional recipe Embeddings that can be used in Neural Networks used to create food recommender systems.

**GitHub:** N/A - Private Project

## **GetMyPolicy - Transforming Service Use in hospital Interactions using Chatbot**

**Authors:** Rakshita Kumar, Rafay Mahmood Siddiqui, Chris Tan

**Partners:** NHS

**Partner Organisation:** NHS England, Microsoft

**Technologies Used:** c#, microsoft bot framework, azure data bricks, Microsoft Azure Cognitive Services, Azure SQL database, LUIS, BERT, PolyAI

**Module Code:** 2019-20/COMP0016

**Abstract:** Searching through Hospital Policies for crucial information is a common task health professionals carry out daily. With the help of the Microsoft Bot framework and Azure Cognitive Services we aim to create a Chatbot that makes the process of searching these key documents more effortless and efficient. After entering queries our bot communicates with an SQL database to show users a preview of relevant sections in the documents, ensuring the user downloads only pertinent documents. Beyond the initial task of searching we also provide additional features such as viewing the popular policies and a feedback system. In the case of supporting a larger number of documents (>10,000) we have also developed a Second Bot which carries out searches using Azure Databricks - a technology that handles large databases of documents more efficiently. Concurrently, we worked on an experimental fork of the project applying BERT and sentence embedding models to test the efficacy of deep learning to this task.

**GitHub:** https://github.com/Reton2/DocBotNHS.git
(will be made public when done)

## **Orthopaedic PROMS (Patient-record outcome measures) visualisation based on openEHR standards.**

**Authors:** Charlie Cowan, Haze Al-Johary, Menghang Hao

**Partners:** Ian McNicoll

**Partner Organisation:** Apperta Foundation / NHS

**Technologies Used:** React, Node.js, MongoDB, openEHR standard

**Module Code:** 2019-20/COMP0016

**Abstract:** There is a lack of open source, easy to use Patient Recorded Outcome Measures (PROMS) visualisation and collection software. Our project is an open platform web app that visualizes patients’ progress. This will aid doctors and public health professionals in understanding the recovery of patients, and also aid patients in understanding their own recovery. The system is built as modules that can be adapted for other applications (e.g. the graphs, the survey pulled in from operational templates, etc.).

**GitHub:** https://github.com/ihaze111/orthoPROMS/

## **IHE Course Decision Tool**

**Authors:** Sami Al Alawi, Zekun Yang, Mate Barbarics

**Partners:** Ann Blandford

**Partner Organisation:** UCL IHE

**Technologies Used:** React, Fast API, Docker, Python, MySQL, Azure, Kubernetes

**Module Code:** 2019-20/COMP0016

**Abstract:** The issue we are trying to solve is that many prospective students are unsure of what course to select within the Institute of Healthcare Engineering, due to course names sounding superficially similar, as well as having a lot of content overlap between them.
Our solution is to create a course decision tool in the form of a website in order to help students choose the best course for them. This should help improve student satisfaction and help the IHE, as the tool could help reduce the amount of course switching once students have already enrolled. To achieve this, we have gathered information using interviews and web scrapers, built our own database and API, and a React front end to display the tool.

**GitHub:** undefined

## **Speech Emotion Recognition: Current practices and real time applicability**

**Authors:** Bilal Ahmed Tariq, Wenhua Wei, Bang Ma

**Partners:** George Kirkos, Dr Andreas Lanitis, Harris Partaourides

**Partner Organisation:** Research Centre on Interactive Media, Smart Systems and Emerging Technologies, (RISE) - http://www.rise.org.cy/en-gb/

**Technologies Used:** C#, Python, Django, REST, JavaScript, React, Redux, Postgres, Azure Functions, Azure Blob Storage, Azure Storage Queue, Azure Web Apps, TensorFlow, Keras

**Module Code:** 2019-20/COMP0016

**Abstract:** Our aim is to research the viability and the current state-of-the-art approaches to real-time speech emotion recognition. We are also tasked with using these approaches to create a service for call centre managers to evaluate and improve the performance of call centre agents.
We are developing a web platform that allows managers to upload call recordings to the system for analysis and aggregating the results of the analysis to provide insights into the performance of individuals in the call centre.

**GitHub:** Not open source

## **Public Led Health Intelligence - Carer Android Application**

**Authors:** Swechha Kansakar, Siwat Chairattanamanokorn, Derrick Macakiage

**Partners:** Joseph Connor

**Partner Organisation:** HLP, CarefulAI

**Technologies Used:** Android Studio - Java, Web App - Node.js, Express, MYSQL,

**Module Code:** 2019-20/COMP0016

**Abstract:** We have created an android application for carers which passively monitors pedometer data (number of steps taken) and telecommunication usage (calls and text messages made), to generate a weekly wellbeing score based off regional targets. Our app monitors 2 out of the 5 ways of wellbeing, Connect and Be Active, to understand the link between these steps and the wellbeing of a carer over a period of weeks. The data collected can be shared with trusted contacts as graphs and JSON. If a user’s targets have not been met, the app will nudge them to schedule activities with a member of their care network. With permission, data in the form of local differential data is sent to persist in a nationwide database to inform public health advocates about user trends. This is visualised as an Outbound Postcode Map Visualisation.

**GitHub:** undefined

## **Eyes First games for People Severely Affected by Disabling Conditions e.g. ALS, Spinal Cord Injury**

**Authors:** Nayana Dasgupta, Farhan Mahmood, Guide Limjumroonrat

**Partners:** Jarnail Chudge, Ann Paradiso

**Partner Organisation:** Microsoft

**Technologies Used:** Unity, C#

**Module Code:** 2019-20/COMP0016

**Abstract:** Our aim was to produce a rich and unique eye-tracking game for individuals affected by severely disabling conditions. People with severely disabling conditions often retain good control of their eyes however, there is a lack of applications and games that are designed for and fully support the use of eye-tracking. Using Unity, we created ‘Of Mice and Messages’ - a fun and unique pipe based puzzle game where users read messages in an overarching storyline by moving and rotating pipes to direct the flow of water from a starting mail pipe to a finishing mail pipe. The game was designed for use with an eye tracker from the outset, with support for dwell-time based activation and follows best practices for eye-tracking interaction design. We have also created an Eye Tracking 2D package, to assist future Unity developers in creating 2D eye tracking games.

**GitHub:** undefined

## **Eyes First games for People Severely Affected by Disabling Conditions e.g. ALS, Spinal Cord Injury**

**Authors:** Nayana Dasgupta, Farhan Mahmood, Guide Limjumroonrat

**Partners:** Jarnail Chudge,
Ann Paradiso

**Partner Organisation:** Microsoft

**Technologies Used:** C#, Unity

**Module Code:** 2019-20/COMP0016

**Abstract:** Our aim was to produce a rich and unique eye-tracking game for individuals affected by severely disabling conditions. People with severely disabling conditions often retain good control of their eyes however, there is a lack of applications and games that are designed for and fully support the use of eye-tracking. Using Unity, we created ‘Of Mice and Messages’ - a fun and unique pipe based puzzle game where users read messages in an overarching storyline by moving and rotating pipes to direct the flow of water from a starting mail pipe to a finishing mail pipe. The game was designed for use with an eye tracker from the outset, with support for dwell-time based activation and follows best practices for eye-tracking interaction design. We have also created an Eye Tracking 2D package, to assist future Unity developers in creating 2D eye tracking games.

**GitHub:** undefined

## **Chatbot For Medical Development**

**Authors:** Adnan Ahmad, Rajesh Goyal

**Partners:** Dr Pritesh Mistry,
Dr Dean Mohamedally, Dr Graham Roberts

**Partner Organisation:** RCGP / NHS

**Technologies Used:** C#, Azure, Python, Microsoft Bot Framework, LUIS, Python

**Module Code:** 2019-20/COMP0016

**Abstract:** Every year, entrepreneurs in the UK are discouraged from investing in their ideas in the medical sector, because of a lack of information available on projects already under development. This information, if it does exist, is hard to find and often the opportunity cost of searching for it puts off investors completely.
Our solution, is to collate all this information into a single database and provide an intuitive chatbot interface for investors to query it with, helping them to find a gap in the market or build upon an existing idea in development.

**GitHub:** https://github.com/addybongo/Projects-Chatbot

## **ANCSSC Mapping Tool**

**Authors:** Afiq Bin Samsudin, Yangtao Ge, Ruairidh Williamson

**Partners:** Matthew Fallon

**Partner Organisation:** ANCSSC

**Technologies Used:** Java Spring Boot, MySQL, JavaScript, React, Chart JS, Azure, Mapbox

**Module Code:** 2019-20/COMP0016

**Abstract:** The project is designing a Visual Mapping Tool for the ANCSSC. The tool will use IATI data which could then be replaced later with the ANCSSC's member's data. When the tool uses IATI data it could be used by NGOs and CSOs to understand the types of projects, donors and locations. They could use this tool to understand the data and create strategies to maximise their impact. CSOs and NGOs often do not have enough time or resources to do fundraising research. Data licensing also needs to be taken into account, most of the IATI data is open to use and modify however some do not so the tool could keep track of this.

**GitHub:** https://github.com/UCL-COMP0016-Team37

## **Meaningful Conversation Tagging**

**Authors:** Vincent Leong, Ali Ghariani, Tiancheng Jiang

**Partners:** Joseph Conner

**Partner Organisation:** CarefulAI / NHS

**Technologies Used:** NodeJS, Electron, IBM Watson

**Module Code:** 2019-20/COMP0016

**Abstract:** In many fields of healthcare, transferring conversations between individuals into data could be very useful. Looking at the resulting database record, we could analyse the conversation for different purposes such as saying if the conversation is good or bad. Speeding up the transfer from audio to data could make a huge impact on the health system.

**GitHub:** undefined

## **Avant-Garde**

**Authors:** Eduardo Battistini, Choi Lam Wong, Nian Ran

**Partners:** Jarnail Chudge, Ann Paradiso

**Partner Organisation:** Microsoft

**Technologies Used:** UWP, C#, XAML, Tobii EyeTracker 4C

**Module Code:** 2019-20/COMP0016

**Abstract:** Avant-Garde is a hands-free painting application that enables users to create free compositions or mandalas, utilising eye-tracking technology as the unique source of input. It aims to open new creative channels through uplifting, visual experiences for users with limited movement, such as patients of motor-neuron diseases. Implementing an intuitive drawing mechanism and a UI carefully tailored for eye-tracking, Avant-Garde allows for the smooth creation of designs that are intricate and exciting.

**GitHub:** https://github.com/astromarx/avantgarde

## **Blue- A Virtual Lab Assistant**

**Authors:** Joanne Wong, Rikaz Rameez

**Partners:** Mr Praveen Selvaraj

**Partner Organisation:** NTTDATA UK

**Technologies Used:** C#, Python, Azure, C++, Unity, Alexa Voice Service, FAST API, Alexa Skills Kit

**Module Code:** 2019-20/COMP0016

**Abstract:** Our project is to build a lab assistant for visitors and lab users. The assistant should be able to carry out natural conversation with users, communicate with IoT devices and display information about the company in the form of speech or video. The assistant should have a 3D avatar with natural animations and a face-tracking feature to constantly face the user.
Using Amazon’s Alexa which has advanced NLP capabilities and IoT device connectivity as our backend. Our solution was to build on top of Alexa’s existing functionalities by adding customized skills using Alexa Skills.
Frontend wise, we have a 3D -humanoid model, with natural animations and face-tracking functionalities using a camera. The backend utilizes the Alexa voice service SDK to run Alexa (along with skills) locally on a machine and utilizes a custom keyword detection engine. Using a web socket, real-time communication between the frontend and the backend is established.

**GitHub:** undefined

## **ArchiLens**

**Authors:** Yi Luk Goh, Steve Lim Zi Lian, Ben Ismaili

**Partners:** Fergus E. Kidd, Chris Lloyd-Jones

**Partner Organisation:** Avanade

**Technologies Used:** C#, Unity, Nethereum, Azure Blockchain Service, Azure Blob Storage, Solidity, Ethereum, Truffle, React.JS, Node.JS, Metamask, Infura

**Module Code:** 2019-20/COMP0016

**Abstract:** Record keeping in the construction industry could vary depending on the project and client. This could result in a huge paper trail as well as accountability and transparency issues.
Our project aims to solve this problem by providing a central authoritative source of information, which will increase:
1. The transparency and the accountability of the parties involved
2. Allowing us to link digital models to real world items
3. Reduce the paper trail in the industry.
We achieve this through the immutability and authoritative storage offered by blockchain.
Our research has found that the current market offers database management software for record keeping. However, our project allows for immutability and the ability to visualise the AR model of the construction.
An example of where our project would have been useful is the Grenfell Tower incident. Where there were lots of accountability issues and people didn’t know who to blame.

**GitHub:** undefined

## **Intel Holowindow**

**Authors:** Joel Morgan, Sibghah Khan

**Partners:** Great Ormand Street Hospital, Intel

**Partner Organisation:** Great Ormond Street Hospital, Intel

**Technologies Used:** C#, Unity, DICOM, CT-Scan

**Module Code:** 2019-20/COMP0016

**Abstract:** Aim: To develop a bedside over-the-body viewing window that renders 3D holograms as an holographic registration overlay to the patient.
Problem: Traditional 2D imaging limits the ability to manipulate and interact with the imaging data. Review of this data is usually takes place away from the patient bedside.
IXN-DRIVE are looking to develop an early stage prototype of a bedside 3D image generator to efficiently render DICOM imaging data into high quality holograms that can be used to educate and interact with patients and a wider healthcare team at the patient’s bedside. The project will explore DICOM formats for CT, MRI and Ultrasound, and examine both skeletal registration as well as soft tissue muscle and internal organs registration.

**GitHub:** undefined

## **Assisted Living VR**

**Authors:** Eunice Chandra, Chi Xue, Se Jin Park

**Partners:** John McNamara

**Partner Organisation:** IBM / NHS

**Technologies Used:** Oculus, IBM Watson, Unity, Photon

**Module Code:** 2019-20/COMP0016

**Abstract:** This project is aimed to simulate soothing VR scenes where users can connect to their family members and friends without having to physically move locations. This will aid with potential loneliness and isolation arising from separation.

**GitHub:** undefined

## **Open Banking Data Analytics**

**Authors:** Yuheng Wang, Raghib Mirza, Lib Kai Pneh

**Partners:** Jannen Vamadeva, Praveen Selvaraj

**Partner Organisation:** NTT Data

**Technologies Used:** Azure, MarkLogic, Python, Django

**Module Code:** 2019-20/COMP0016

**Abstract:** We were tasked to produce an Open Banking Web App. It reads data from Open Banking Api and stores processed data in NoSQL database for faster data extraction. This app allows users to connect multiple bank accounts including current accounts and credit cards and view their financial data with ease. It also seeks to provide deeper insights on the user's finances and visualisations for easier interpretation of data. With these insights, the app will also give some tips on saving money.

**GitHub:** undefined

## **Virtual Reality Meeting Environment**

**Authors:** Jieyou Xu, Yingming Luo, Wenxin Wang

**Partners:** John McNamara

**Partner Organisation:** IBM

**Technologies Used:** C#, Unity, Rust (actix-web, serde, PostgreSQL), JavaScript

**Module Code:** 2019-20/COMP0016

**Abstract:** Users are dissatisfied with existing VR Meeting platforms due to lack of engagement, participation, and unreliable cameras. We devise a VR meeting platform emulating a physical meeting environment supporting real-time rendering and communication, allowing participants to see the presenter as well as each other. We target inexpensive VR equipment for inclusiveness.

**GitHub:** https://github.com/jieyouxu/VRME-Server-Rust, https://github.com/zcabwxw/loginPage, https://github.com/1109LLL/Meeting\_model

## **A cloud solution for analysing patterns in NGO projects**

**Authors:** Rachel Mattoo, Yansong Liu, Mark Anson

**Partners:** Dr. Husna Ahmad, Dr. Hana Al Banna, Ines Belliard

**Partner Organisation:** ANCSSC

**Technologies Used:** Python, Azure, Microsoft Cognitive Services, Computer Vision API, ALBERT

**Module Code:** 2019-20/COMP0016

**Abstract:** The aim of our project is to build a database based on annual NGO reports. This involves data extraction from PDFs, which are in an image format, and storing this data in a database hosted on the Azure cloud. This project is a first step towards synthetic data generation in the future, to produce a general model which can be used to meet the UN’s sustainable development goals.
As part of our project, we are also collaborating with a master’s year team, who are developing a web app for the ANCSSC, by creating a backend in Azure to store their data. This database is a first step towards providing actionable data and predictions to the ANCSSC regarding the progress and efficiency of NGOs operating in the south.

**GitHub:** https://github.com/LiuYYSS/reportQuery.git

## **Mobility, Hearing & Vision Impairments Assessment Tool**

**Authors:** Nadhirah Rafidz, Jingting Yan, Tianyi Wang

**Partners:** Dr Cathy Holloway, Dorothy Boggs

**Partner Organisation:** Global Disability Innovation Hub, London School of Hygiene and Tropical Medicine

**Technologies Used:** Python, Java, Django, Android Studio, MySQL, SQLite, Azure

**Module Code:** 2019-20/COMP0016

**Abstract:** Our project consists of an Android mobile app and a website. Our mobile app allows medical officers to assess a participant’s mobility, hearing and vision impairment and update participant’s assessment status in real-time. It is able to work offline and connect to our website server when Internet is available to upload and download participants’ data. The participant responses are then visualised by our project’s website. The website also has supporting features such as a questionnaire builder, a dashboard showing a registered participant’s assessment status and administration. We utilised Django’s Authentication System to control the access rights and the system’s MySQL Database is served on an Azure Server to securely store the collected data on the cloud. The goal of this project is to accelerate medical diagnoses and innovation by helping both the medical professionals and healthcare officials conduct their assessments and research in a more convenient, efficient and automated way.

**GitHub:** GitHub link for the website: https://github.com/nadhirahrafidz/System-Engineering-Website.git
GitHub link for the mobile app: https://github.com/JingtingYan/Mobile-App.git

## **CarerCare – Data Anonymisation with IOS**

**Authors:** Xiaofeng Paul Lin, Lishen Chen, Karunya Selvaratnam

**Partners:** Joseph Connor

**Partner Organisation:** CarefulAI / NHS

**Technologies Used:** Swift (X-Code), Macs and iPhones, Linode Server

**Module Code:** 2019-20/COMP0016

**Abstract:** Currently in the UK, one in ten people are carers, a number that is on the rise. Three in five people will be carers at some point in their lives. Unfortunately, as carers, it is easy to neglect to spend the time and energy to connect with their core social network or engage in the minimum recommended physical activity to support their mental wellbeing. They need a support system that not only helps them but also provides an easy way to re-engage with their core social network and live an active life.
That’s where CarerCare can help. This will actively encourage them to engage with 2 of the NHS’s 5 Ways to Mental Wellbeing. With the carer’s permission, this app can also anonymize their wellbeing with Local Differential Privacy and use the data to better inform the NHS about the general wellbeing of the different Postcode map areas in UK.

**GitHub:** https://github.com/Paul11100/AlertApp

## **Avant-garde**

**Authors:** Choi Lam Wong, Eduardo Battistini, Nian Ran

**Partners:** Ann Paradiso, Jarnail Chudge

**Partner Organisation:** Microsoft

**Technologies Used:** C#, XAML

**Module Code:** 2019-20/COMP0016

**Abstract:** Avant-garde is a painting application that uses eye-tracker as input device. User can easily create interesting patterns using eye-tracker. On top of that, other supporting functions such as save, load, undo and redo are also implemented

**GitHub:** https://github.com/astromarx/avantgarde

## **AMS Dance Competition (Phase 1)**

**Authors:** Muna Aghamelu, James Zhong, John Backwell

**Partners:** Adrian Persad

**Partner Organisation:** Arthur Murray Dance Studios

**Technologies Used:** C#, Azure, Unity

**Module Code:** 2019-20/COMP0016

**Abstract:** The problem statement was to identify the hardware and spatial requirements and limitations rigging a space with suitable sensors. With the goal of creating a fully 3D rendering of multiple participants dancing at once and will support playback from every angle. The system should be fair and reliable, and ideally support partner based dancing.
Our solution is a Web Application, made with Unity, that takes skeletal data recorded using a Kinect v2 depth sensor and produces a 3D rendering that can be viewed and playbacked from multiple angles. We have also moved onto Phase 2 which involves algorithmic comparisons, and working out ways to produce a likeness score between an 'ideal' dance and a recorded dance.

**GitHub:** https://github.com/munakaghamelu/AMS-KinectSensorDance

## **AR/VR fitness rehabilitation gaming**

**Authors:** Hue Yap Nam, Lee Jae Yong, Demetris Kouppas

**Partners:** Jon McNamara

**Partner Organisation:** IBM

**Technologies Used:** C#, Unity, VIRZoom

**Module Code:** 2019-20/COMP0016

**Abstract:** A VR tank battle game that aims towards rehabilitation and fitness. It can be controlled with a VIRZoom bike.
The player pedals to move forward and use the headset to turn the tank around. The player uses the buttons on the bike to shoot. The goal is to destroy all targets in the level. Different terrains affect pedaling difficulty.

**GitHub:** undefined

## **IMG CARE**

**Authors:** Don Charles Lambert, Xiaoqi Tan, Bainuo Chen

**Partners:** Mr. Ghassan Alusi

**Partner Organisation:** GOSH Drive / NHS

**Technologies Used:** JavaScript (React Native, Node.js), Java, Python, HTML, CSS, Javascript

**Module Code:** 2019-20/COMP0016

**Abstract:** ImgCare is a medical drawing and image processing web application. The application is able to render, convert and store dicom images into more widely used file formats. DICOM is the standard for communication and management of medical imaging information. The standard is widely used by the NHS, being adopted by doctors and dentists in hospitals throughout the country. ImgCare’s primary function, however, is medical drawings. The application provides the ability for medical professionals to draw tumours over templates of organs which are then classified into stages of cancer through machine learning. The Medic Draw mobile application goes hand-in-hand with ImgCare allowing the user to create medical drawings which can be processed through ImgCare.

**GitHub:** https://github.com/DonCharlesLambert/DeanCare
https://github.com/DonCharlesLambert/Medic-Draw

## **Intelligent Excursions**

**Authors:** Zahra Essa, Ping Liu, Jingyi Zhang

**Partners:** John McNamara

**Partner Organisation:** IBM

**Technologies Used:** Python, Flask, IBM Natural Language Processor API, IBM Tone Analyser API, HTML, CSS, JavaScript

**Module Code:** 2019-20/COMP0016

**Abstract:** Intelligent Excursions is an application which generates personalized holiday recommendations based on a user’s interests, requirements and 5 keywords. The user should be presented with a description of the location, links to hotels and flights within the user’s budget as well as information about the location that’s being suggested to them.

**GitHub:** https://github.com/zahraessa/QuickTrips-public

## **Open-sourcing Moodle with Virtual Reality and Situated 360 Video training**

**Authors:** Andrei Lazar, Emil Almazov, Yaoning Yang

**Partners:** Chris Lloyd-Jones, Fergus Kidd

**Partner Organisation:** Avanade / NHS

**Technologies Used:** C#, Unity, Azure, Oculus Quest, Javascript, HTML, CSS

**Module Code:** 2019-20/COMP0016

**Abstract:** We believe that the best way to learn any skill is through situational learning but there are just not enough educational resources that use this technique. We wanted to make something that had situated learning at its core and could be used by anyone in the world.
We have, therefore, created an open-source platform where certain users can upload 360 videos that can be viewed by other users in Virtual Reality (using a VR Headset). This will allow people to learn complicated topics such as brain surgery most effectively by being completely immersed in the environments where these topics would occur in real life, such as a surgery room.

**GitHub:** https://github.com/AndreiL26/360VideoPlayer.git

## **Meaningful Conversation Transfer**

**Authors:** Leong Vincent Wai U, Tiancheng Jiang, Ali Ghariani

**Partners:** Joseph Connor

**Partner Organisation:** CarefulAI / NHS

**Technologies Used:** IBM Watson

**Module Code:** 2019-20/COMP0016

**Abstract:** Separate desktop application to process conversation files where it would extract key information regarding the conversation. Extracted key information would be important in deciding whether recorded conversation consists of an meaningful conversation. Such conversation would also require to have its sensitive and confidential contents stripped and the extracted information must not contain any trace of the original confidential contents spoken in the recording. Has to be able to handle large amounts of audio recording to produce large amount of information, which would be useful in deciding whether it consists of meaningful conversation in the first place. Utilises Speech-To-Text to extract the information. Also contains convenience features such as options tweaking of the extraction process and also file confirmation.

**GitHub:** undefined

## **Educational Tile Based Game**

**Authors:** Alexandru-Vlad Niculae, Sami Baguneid, Kefan Wang

**Partners:** Jon McNamara

**Partner Organisation:** IBM

**Technologies Used:** Azure, MongoDB, IBM Watson, C#, Python

**Module Code:** 2019-20/COMP0016

**Abstract:** In partnership with IBM, we have been building an educational tile-based game set in outer space. It is alike to Sid Meirs Civilisation V in its turn-based approach. With similarities to No Man’s Sky due to its space empire-building gameplay. Upon entering the game, you are given a home planet and a spaceship. From there you explore the universe around you, obtaining items to further your civilisation, and conquering planets, by either finding uninhabited planets or battling enemies. Battling enemies and unlocking items is done via the completion of mini-quizzes. These quizzes scale in difficulty in relation to the challenge at hand.

**GitHub:** undefined

## **Charlie The Smart Bear**

**Authors:** Karolina Skrivankova, Khwaja Muzib, Duncheng Wu

**Partners:** John McNamara

**Partner Organisation:** IBM

**Technologies Used:** Python, NLP, Speech to text, Text to speech, Vue, Nuxt

**Module Code:** 2019-20/COMP0016

**Abstract:** According to University of Michigan survey, roughly half of all children are afraid of going to doctors, with stranger phobia being one of the most cited reasons. This leads to delayed or cancelled appointments and may be detrimental to the patient’s health and wellbeing. The solution our IBM client suggested was replacing the object of fear (doctor) by an object familiar to all children – a teddy bear.
The teddy bear is able to lead a generic conversation, inquire about patient’s wellbeing and let her pinpoint the location of her ailment using an array of pressure sensors. A clinician can then access the gathered data in unison with the patient’s profile and medical history.
We’re hoping that using a smart teddy bear in practice could lead to better diagnostic capabilities and diminish the effect fear of doctors has on the wellbeing of patients.

**GitHub:** undefined

## **Virtual Reality for the Clinical Skills Assessment**

**Authors:** Céleste Manenc, Sara Schitelea, Brandon Tan

**Partners:** Dr Atia Rafiq (NHS GP), Pritesh Mistry, Royal College of General Practitioners

**Partner Organisation:** undefined

**Technologies Used:** Unity, C#, Blender

**Module Code:** 2019-20/COMP0016

**Abstract:** Throughout this academic year, we have worked on a Virtual Reality simulation of the Clinical Skills Assessment to help General Practitioners in training prepare for this examination. As the Royal College of General Practitioners in London is the only location where the exam may be taken throughout the UK, this makes it particularly important that we give as many doctors as possible the opportunity to eliminate exam day stress by introducing them to their examination environment as early as possible. We have managed to recreate a virtual replica of a CSA examination room and build a patient-like avatar for any candidate to practice with. This platform, we hope, can then be readapted for other purposes in the future such as job interview preparation or sales training. To accomplish this, we used Unity along with Natural Language Processing and IBM Watson.

**GitHub:** undefined

## **Speeding up MHRA, NICE, and NHSD Software Compliance**

**Authors:** Ryan Wei Yue Chuah, To Eun Kim, Xinyao Zhao

**Partners:** Joseph Connor

**Partner Organisation:** RCGP / CarefulAI / NHS

**Technologies Used:** Dialogflow, Python, Node.js, React.js

**Module Code:** 2019-20/COMP0016

**Abstract:** One of the Royal College of General Practitioners’ interests lie in encouraging digital innovation. Currently, the Medicines and Healthcare products Regulatory Agency (MHRA), the National Institute for Health and Care Excellence (NICE), and NHS Digital (NHSD) software compliance will add 6-18 months onto the time to market of each innovation from May 2018, as all software will need to be Class II compliant (i.e. independently assessed).
In this project, it is hoped that a form of automated educational assistant can be devised to speed up compliance as an 18 month delay in cash flow is a barrier to investment in digital health technology.

**GitHub:** https://github.com/ryanchuah/chatbot-builder-from-tree, https://github.com/ryanchuah/compliance-client, https://github.com/ryanchuah/compliance-backend

## **VR Self-Driving Car**

**Authors:** Xuyou Cheng,
Yifang Zhang,
Abir Bhushan

**Partners:** NTT Data

**Partner Organisation:** NTT DATA

**Technologies Used:** C#, Unity, Oculus Quest

**Module Code:** 2019-20/COMP0016

**Abstract:** This is a VR project created by Unity that utilize the lastest Oculus Quest hand tracking api.
The main features of the VR enviornment includes:
1. Hand interactable hologram UI.
2. Car navigation system.
3. Gesture Controller ultilizing Oculus hand tracking api.

**GitHub:** https://github.com/yoyouC/VR-Self-Driving-Car

## **Large Scale Implementation of a Machine Learning Pipeline**

**Authors:** Nicolas Ford, Yalman Ahadi, Paul Lorthongpaisarn

**Partners:** Ferran Gonzalez Hernandez

**Partner Organisation:** GOSH / NHS

**Technologies Used:** pyspark, Databricks, Azure, python, blob storage, Azure webapps, Fastapi

**Module Code:** 2019-20/COMP0016

**Abstract:** Our client has developed a prototype machine learning pipeline which currently only works on a computer locally. For our project, we will take this pipeline and modularise, optimise and test it to ensure robustness before putting it on a server. The end result should be usable in production. To manage the pipeline in an easy way, we will also build a user-friendly control panel.

**GitHub:** https://github.com/nicford/Pubmed-Pipeline