The UCL Industry Exchange Network (IXN) - Student Projects with Industry

August 18, 2021 | 1 – 2 p.m. ET

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How to Participate

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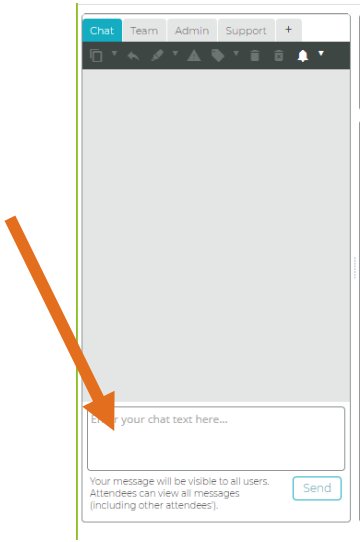

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Strengthening University-Industry Partnerships

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The UCL Industry Exchange Network (IXN)

Student Projects with Industry

Prof Dean Mohamedally
Prof Graham Roberts
Graça Carvalho
Tim Bodley-Scott

Dept. of Computer Science
University College London (UCL)
www.ucl.ac.uk/computer-science

INDUSTRY EXCHANGE NETWORK IXN

Who we are

Dean Mohamedally
Professor of Computer Science
Co-founder of IXN

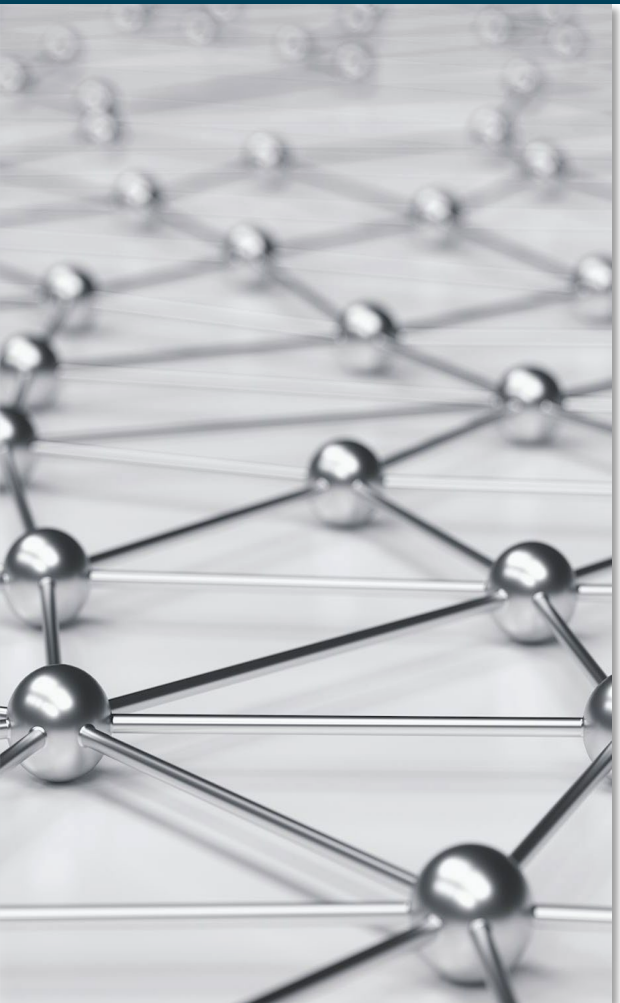
Graça Carvalho
Director of the Strategic Alliances Team

Graham Roberts
Professor of Computer Science
Co-founder of IXN

Tim Bodley-Scott
Strategic Alliances Advisor

About University College London (UCL)

- Consistently ranked in the top 10 best universities in the world. Currently 8th (QS 2022 World Rankings).
- Rated top university for research strength in the UK and #1 for Computer Science.
- Founded in 1826, first university in England to welcome students of any religion or class, and women on equal terms with men.
- Largest multi-disciplinary university in UK with over 13,000 staff and 42,000 students from 150 different countries.



What is the IXN?

An **education and teaching** methodology that:

- ❑ Enables students to take part in real-world problem solving projects with industry.
- ❑ Forms an integral part of degree programmes.
- ❑ Provides a full framework for organising and running projects.
- ❑ Works on a large scale, allowing all students to participate.
- ❑ Identifies talented students for advanced roles including research.

"There are enough problems in the world to solve, **big and small**... and **students must publish** their work to be seen."

Prof Dean Mohamedally

Why we are presenting to the UIDP membership today

- Looking forward to:
  - US Universities partnering with our UK universities network.
  - US companies looking for collaborations.
  - US companies and US universities looking for international projects.

- MOU offered for full access to our IXN teaching methodology, between Heads of Schools/Heads of Faculties and UCL Computer Science.

IXN Scope

- Started in 2011, now many cross-sector participants.
  - Operates in multiple UK universities.
  - International institutions joining.
  - Guidance published through the UK government recognised **National Framework for IXNs.**
  - Works with not-for-profits, healthcare, researchers, SMEs, public sector/government, and large companies.
  - IBM, Microsoft, NHS (UK National Health Service) have started their own IXN programmes.

Scale

- At least 600 students each year.
  - 150+ students each year working on healthcare projects.
- Supports multiple industry project experiences.
- Enables specialisations:
  - IXN for the NHS for clinical and healthcare related projects.
  - IXN for Good.
  - IXN Innovation for Banking and Finance.

Similarities and differences to US Capstone Projects

- IXN approach reviewed in 2018 in partnership with Microsoft.
- Capstones typically aimed at final dissertation projects, potentially student defined.
- IXN aimed at early R&D industry sectors aligned to teaching resources, across all subject areas and year groups.
- Standardised processes
  - Project challenges set by joint teaching-industry review.
  - Legal contracts and obligations to students.
  - Assignment of IP.
  - Technical mentoring from the company.
  - Regularity of meetings.

Feature	Capstone	IXN
Frequency	Typically final year dissertation	Every year of study
Assessment	Often extra-curricular, not fully integrated into curriculum	Fully integrated into assessed curriculum/course syllabuses
Standardised processes	Bespoke processes	Extensive

IXN Teaching Methodology

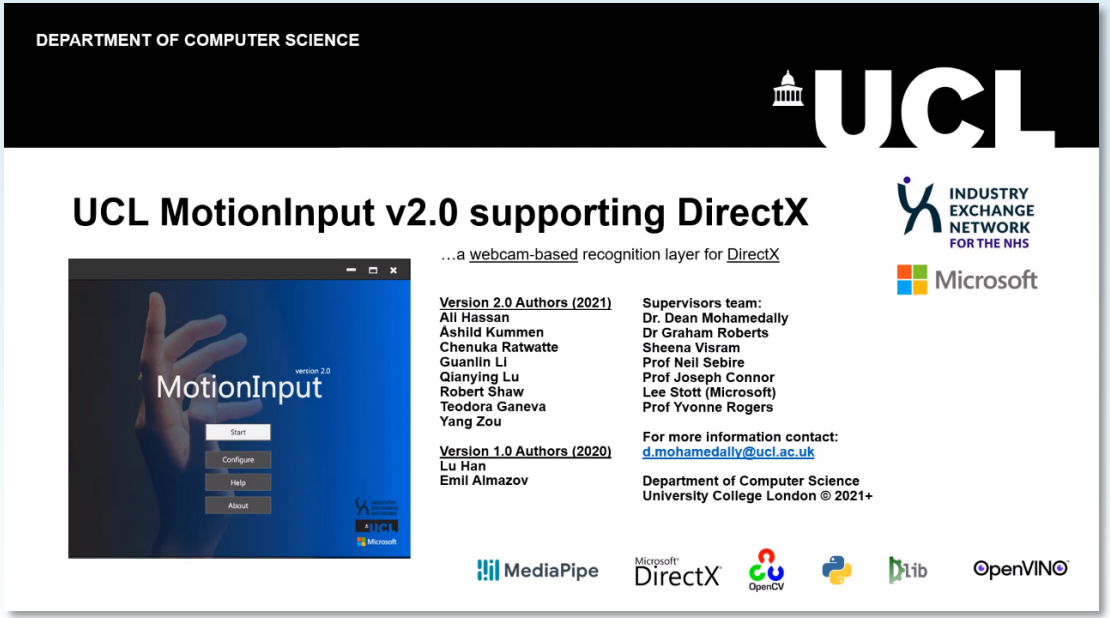
- The IXN teaching methodology provides a streamlined and inter-operable approach between universities and companies.
- It can co-exist with existing Capstone programmes or be used to develop new experimental teaching programmes.
- Opens the doors to improvements, suggestions and variations from each partnering university.

Collaborators' list gets bigger each year

- 80+ companies.
- 3 cycles per year.
- 700 students on projects this year.

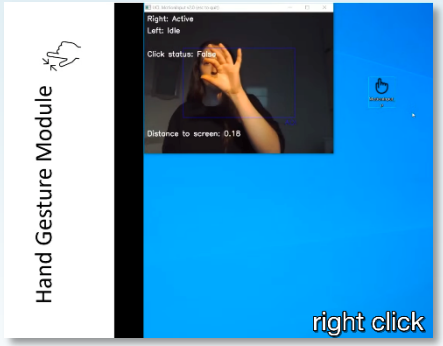
Types of Project

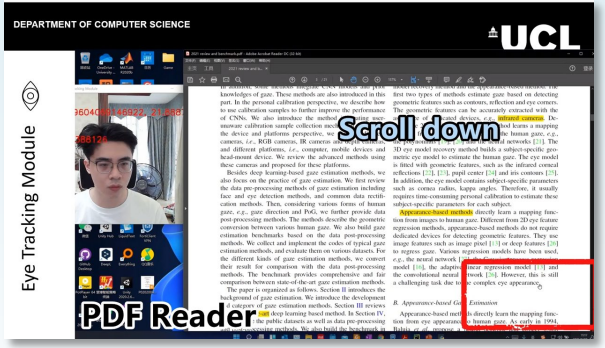
- Individual and Team projects.
- 25% UG time load, 100% PG time load (Masters).
- Regular 1-1 projects with tech firms.
- Triparty projects – technology firm + non-tech firm + students.
  - Example: major charities working with Azure and AWS via student prototypes.
- Multiple year projects – projects roll from one course to another based on prototyping needs.
  - Example: UI designs, rolling into ML and algorithms, rolling into systems integration classes.
- Potential for mutually beneficial projects across multiple universities.

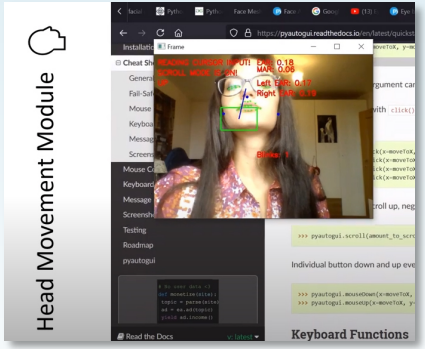


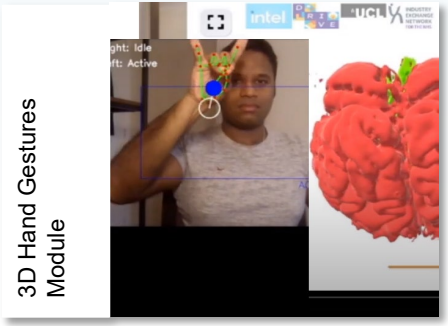
- Example 2021 Masters R&D project with a group of Computer Science students.
- UCL in-house developed project in collaboration with Microsoft and Great Ormond Street Hospital (GOSH).
- Citation: https://arxiv.org/abs/2108.04357
- Showcase Video: https://youtu.be/b9lgo4qF4nY
- Project Website: www.motioninput.com

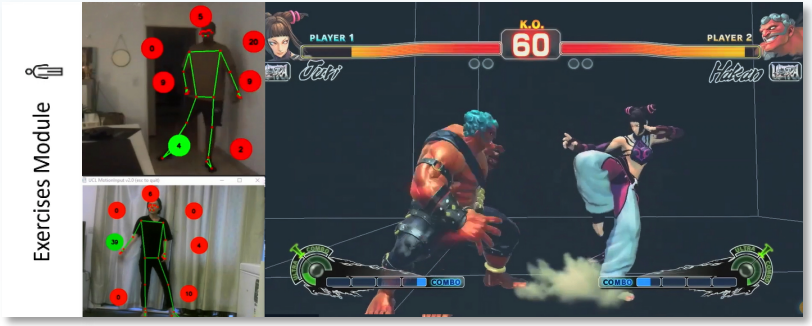
UCL Computer Science staff and students have developed new methods for controlling a computer user interface with just a webcam. This work is in collaboration with Microsoft and works with existing software applications and games.









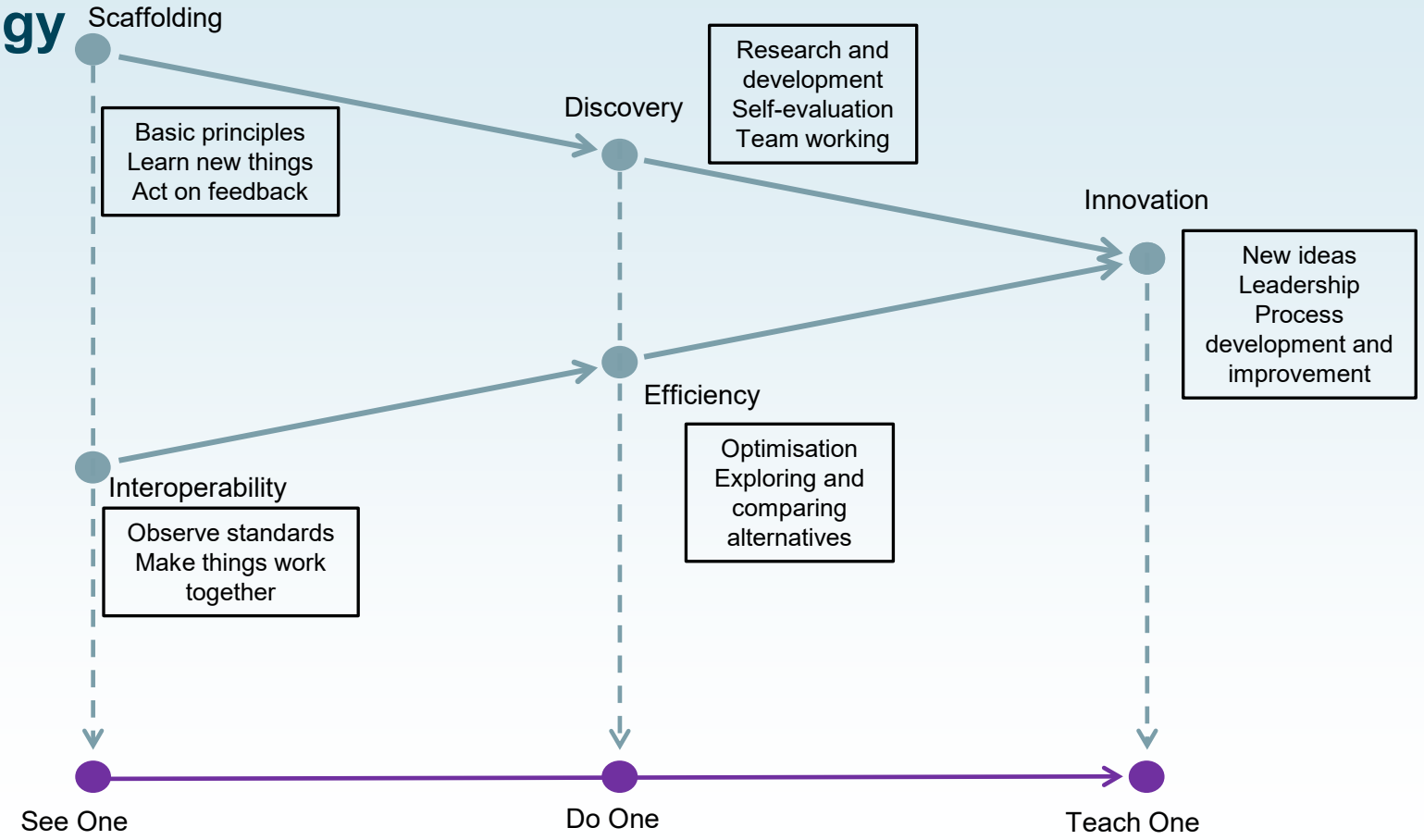


IXN Teaching Methodology and IXN Framework Agreement

- ❑ Building relationships with external organisations.
- ❑ Developing project specifications.
- ❑ Matching students to projects.
- ❑ Contractual, IP, and legal issues.
- ❑ Project timeline and stages.
- ❑ Mentors and supervision.
- ❑ Academic Assessment.
- ❑ Publishing the results.

IXN presented to British Ambassador in Paris, France
AI for the Common Good Hackathon with UNESCO

IXN Pedagogy



Ref: SDI and IEI chart: types, classifications and levels of IXN student projects (Mohamedally, Roberts, Rafiq, Visram, Fu and Cameron, 2017)

Skills

- ❑ Working with external partners
- ❑ Presentations
- ❑ Report writing
- ❑ Time/resource planning
- ❑ Leadership
- ❑ Project management
- ❑ Agile/Team working – even more important during pandemic!

James Tye Photography

Selection Process

- Students are matched to projects.
- ***Motivation Tracking of Students*** – used to find out interests and experience.
- Not just companies, 20% of projects are with not-for-profit and healthcare sectors.
- Plus public sector, new technology, research groups and start-ups.
- Equality and Diversity priorities are integrated.

IXN Approval of Projects

- ❑ Detailed discussion and planning with partners.
- ❑ Quantity of work and milestone goals identified.
- ❑ A formal agreement made between UCL and the partner.
- ❑ Ethics and data protection addressed.

IXN Rule of 4

Students must have access to:

(1) A **named technical mentor** in the **partner organisation.**

(2) Technical documentation, source code and data.

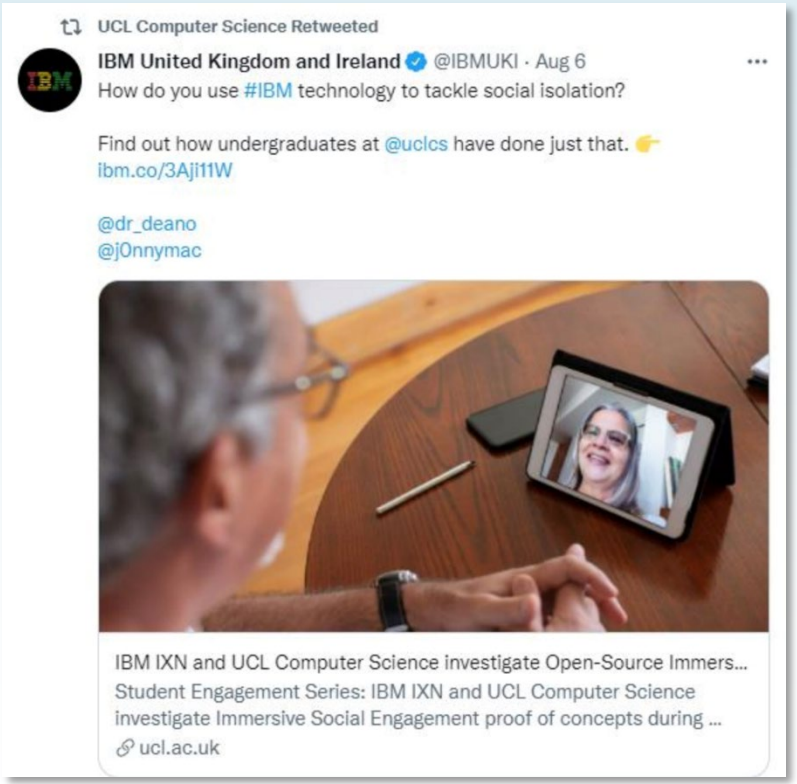
(3) Tools and software platforms under educational licence use.

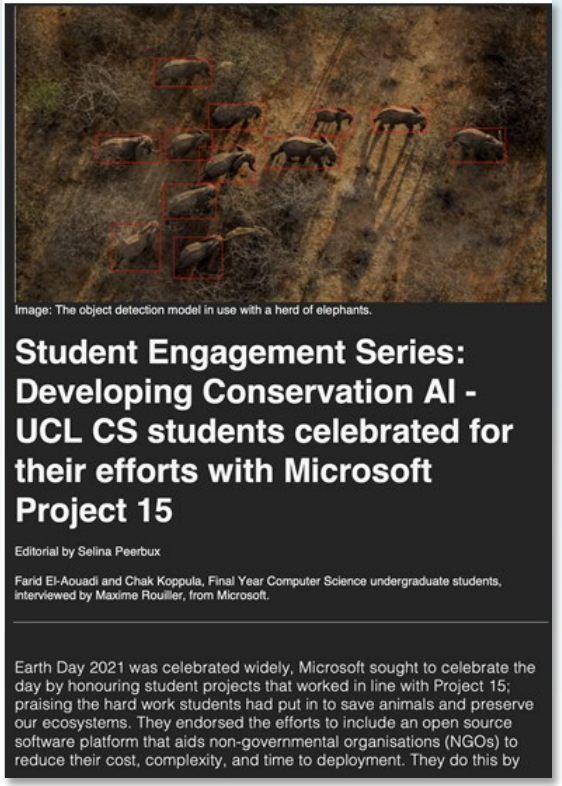
(4) Additional **specialist technical support** if needed.

Our 2021-2022 project based learning themes

- ❑Machine Learning
- ❑Cloud Apps
- ❑Data mining/analysis/visualisation
- ❑Graphics – image processing
- ❑Graphics – AR/VR
- ❑Healthcare systems
- ❑Education
- ❑Work and process flows
- ❑Use of APIs and architecture design
- ❑Encryption/Security
- ❑Systems Integration
- ❑Testing
- ❑Requirements Engineering
- ❑Re-Engineering of legacy systems

Recent Projects





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UCL and IBM collaborate to develop education programmes that bring new skills to the next generation

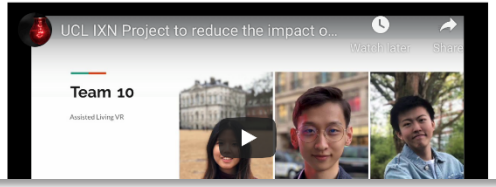
UCL students develop projects using Watson Technologies on IBM Cloud to address challenges posed by COVID -19

London 7th April 2020 - UCL, UCL's Industry Exchange Network (UCL IXN) and IBM have collaborated to create the IBM Industry Exchange Network (IBM IXN). This international educational collaboration will develop a new experimental program that enables students in the UK and beyond to work on proof of concept research and development projects utilising IBM technologies such as IBM Cloud, IoT, and AI with real world organisations and clients

As schools and universities switch to online teaching methods to face the unparalleled challenges of COVID-19, the IBM IXN program lends itself well to supporting a new way of learning. Where mentoring and other programs would have traditionally taken place in-person, the online IBM Acclaim tutorials are now being utilised, so that students can gain mentoring and upskill in AI and Cloud all online. Moreover, the IBM Academic Initiative (ibm.com/academic) also offers university students free access to IBM technology, to enable students to get 'hands on' with the technology and develop projects as part of their course. By following this methodology, a student does not need to go to class to learn - all they need is an internet connection and their laptop or device.

Having been a long-term partner of the UCL IXN education programme for almost a decade, this new IBM IXN initiative will allow IBM technologies to reach a number of universities in the UK on high visibility project requirements including industry partners.

One of the latest UCL IXN proof of concept that uses IBM Watson Assistant and Watson Speech services is a customised, immersive social experience to help the users, such as the elderly, feel less socially isolated. This proof of concept is especially timely given the current strict rules on social interactions that have been put into place amid the COVID-19 pandemic, where the general population, including the elderly, may grow increasingly socially isolated. This Proof of concept runs on a range of devices from entry level iOS and android tablets to Oculus VR systems.



Microsoft University College London IXN Project Resourcium

By Lee Stott (HE/HIM)
Published Mar 31 2021 06:12 AM 1,061 Views

University College London project Resourcium

Guest blog by the IXN Resourcim team:

Hemil Shah - https://www.linkedin.com/in/hemil-shah-58747b161/
Louis De Wardt - https://www.linkedin.com/in/louis-d-a3a351124/
Pritika Shah – https://github.com/pritsspritss

Project Introduction

To start off with, our project is aimed at students which centralises resources for them on a single portal. It also includes data collection on student sentiments and areas that they need additional help on so that the teaching and learning teams as well as course reps can see what help can be provided to students. The aim of the application is to provide as much help as possible to the students via the surfacing of resources and a Question & Answer bot.

What was the problem?

The University College London academic team, emphasized how universities had no real way of viewing/measuring student engagement due to the current situation of COVID. The University places a strong emphasis on using a SharePoint site as the means of data storage as well as a dashboard on the SharePoint site to view this data for analysis. The University wanted the student IXN project team, to find ways in which students can be supported in their education and beyond via the provisioning of resources. According to our Universities admin team, this was an issue that many universities faced, hence we had to make the system design as generic as possible and become a open sourced scaffolded project for any institution across the globe to reimplement and build upon.

SOTA - The Storytelling Robot

Team 11 | Daniel Savu, Ibrahim Emara, Chaojie Ling

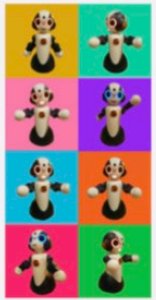
NTT DATA

UCL

ABSTRACT

SOTA is a robot developed by NTT Data with the aim to provide an assistant or a companion. Our team customised it by giving it the ability to tell interactive stories, suited for young children. The idea behind the project originates in a piece of research that shows that there is a considerable "word gap" between children coming from different backgrounds, children coming from high-income families hearing up to 30 million more words than children from lower class. Given the plasticity of the brain in the early stages of development, it is crucial for kids to hear as many words and ideas as possible. This project is to be used in further research as a tool for gathering data, in order to gain more insight into how children acquire a language and develop social skills.

CONVERSATION POSES



REQUIREMENTS

- ✓Implement conversation function, build the flow of the story
- ✓Implement NLP, detect the meaning of the response
- ✓Adjust robot's volume and pitch to simulating children's attention while telling stories
- ✓Move SOTA's hands while telling a story
- ✓Implement dictionary function
- ✓Easily add or remove old stories
- ✓Log user response in a database

1 of 1

FEATURES

Natural Language Processing
By using **IBM Watson Conversation**, we were able to extract meaning from the user's speech and match it to available path choices in the stories

Speech-to-Text
We convert user speech into text for later processing using **Google Speech API**

Text-to-Speech
With the help of **IBM** speech which is striking voice inflexions and ton

Robot Gestures
A carefully chosen set feels friendly and pers

Dictionary Searc
Upon not knowing a wo its meaning and the rob **Oxford Dictionaries API**

Choose your sto
Besides having multipl multiple stories availab bored

User reply loggi
For the purpose of rese in a **MySQL database** fo

HITOE SLEEP

NTT DATA

Great Ormond Street Hospital for Children NHS

Team 29
Abhinath Kumar
Mariam Abbas
Vijeykannen Vijayaratnam

WIRELESS SOLUTION FOR CHILDREN'S SLEEP STUDIES - POWERED BY HITOE

Sleep studies using polysomnography tend to be uncomfortable for child patients. Our team is providing a Proof-Of-Concept implementation of NTT Data's 'hitoe' smart t-shirt system for use as a wireless sensor suite in sleep studies at Great Ormond Street Hospital's (GOSH) Respiratory Sleep Clinic. We will be modifying the existing 'hitoe' Android app to store data in the cloud. A physician can then view this data in real time through a web portal. Our project will pave the way for future development of the 'hitoe' as a viable replacement for polysomnography in sleep studies, providing a more comfortable and potentially more reliable source of sleep data for physicians.

KEY FEATURES

Real-Time Data Storage
Data from the Hitoe is stored in the cloud

Real-Time Data Display
Viewed in real time from our web portal from anywhere in the world

100% Wireless
Patients only need to put on the t-shirt. More comfortable sleep experience for patients and less data loss for doctors

Simultaneous Studies
Multiple 'Hitoe' shirts can be connected to the system and viewed at the same time

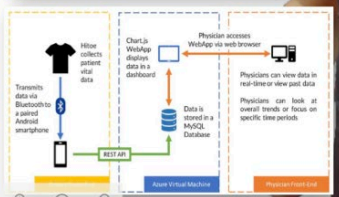
KEY TECHNOLOGIES

Hitoe Smart T-Shirt
Measures patient ECG, Heart rate and posture

Android Application
View data in real-time through Bluetooth and stream to cloud

Cloud Database
Patient vitals and personal information stored

Web Dashboard
Chart.js WebApp displays data from database in real time



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UCL

2017 Graduates

"Often, theory and practice aren't fully aligned and learning a programming language doesn't necessarily make one an expert in coding. The projects I had to work on certainly filled in that gap, allowing me to understand *and* apply concepts.

I've learnt a lot about dealing with stakeholders, developing with the client needs in mind, and handling changing requirements and priorities. This is something that not many people I've spoken with from other universities had the opportunity to learn about, and I certainly think is was incredibly useful for my career."

Iuliana-Elena Parasca,
Google, Software Engineer

"The IXN final summer project presented me with an opportunity to truly dive in the deep end with exciting technology, which was brand-new to me. As it was an independent project, it became critical to get good at reading documentation, understanding the fundamentals, and effectively problem-solving.

The project was fast-paced, and my application had a number of challenging deliverables. The experience of developing a successful HoloLens application taught me so much technically, but also built confidence in what I was capable of. This contributed to my fundamental understanding of CS & Software Engineering, and these skills have stood the test of time - they continue to be relevant in my current engineering role."

Rachel Slater,
Microsoft Redmond, Software Engineer

Testimonials from IXN students

"*By working on an IXN project, I had the chance to work with a real client and get valuable experience from the given opportunity.*"

Sabina-Maria Mitroi, President She++ Society

"*Being involved directly with industry gave me a deeper insight into the workflows and expectations of software engineers in a commercial environment.*"

Rohan Kopparapu, Software Engineer, Bank of America Merrill Lynch

"*Writing real software for a real-world client was a good way to teach writing maintainable, readable, well-documented code that was intended for future use. It also taught the importance of good testing practices.*"

Mark Menezes, Software Engineering, Cisco

Testimonials from Industry

“Working with UCL IXN helps our employee experience, allowing our colleagues to contribute to a broader community and support engaging projects. It also acts as a recruitment pipeline – with our strong focus on early talent – from internships to supporting schools and universities.”

Chris Lloyd-Jones Emerging Technology, Product and Engineering Lead at Avanade

"The UCL IXN programme, developed by Dr Dean Mohamedally and Dr Graham Roberts, has been a fundamental part of transforming how we engage with universities. It provides a structured framework that supports both simple and effective collaborations with faculty to generate spectacular outcomes. Most particularly, the UCL IXN program provides the means to spark the creation of hugely inventive technology proofs of concept that inspire industry to innovate. At the same time, students are supported in developing cutting edge technology skills in an industry environment, creating the technology leaders of tomorrow."

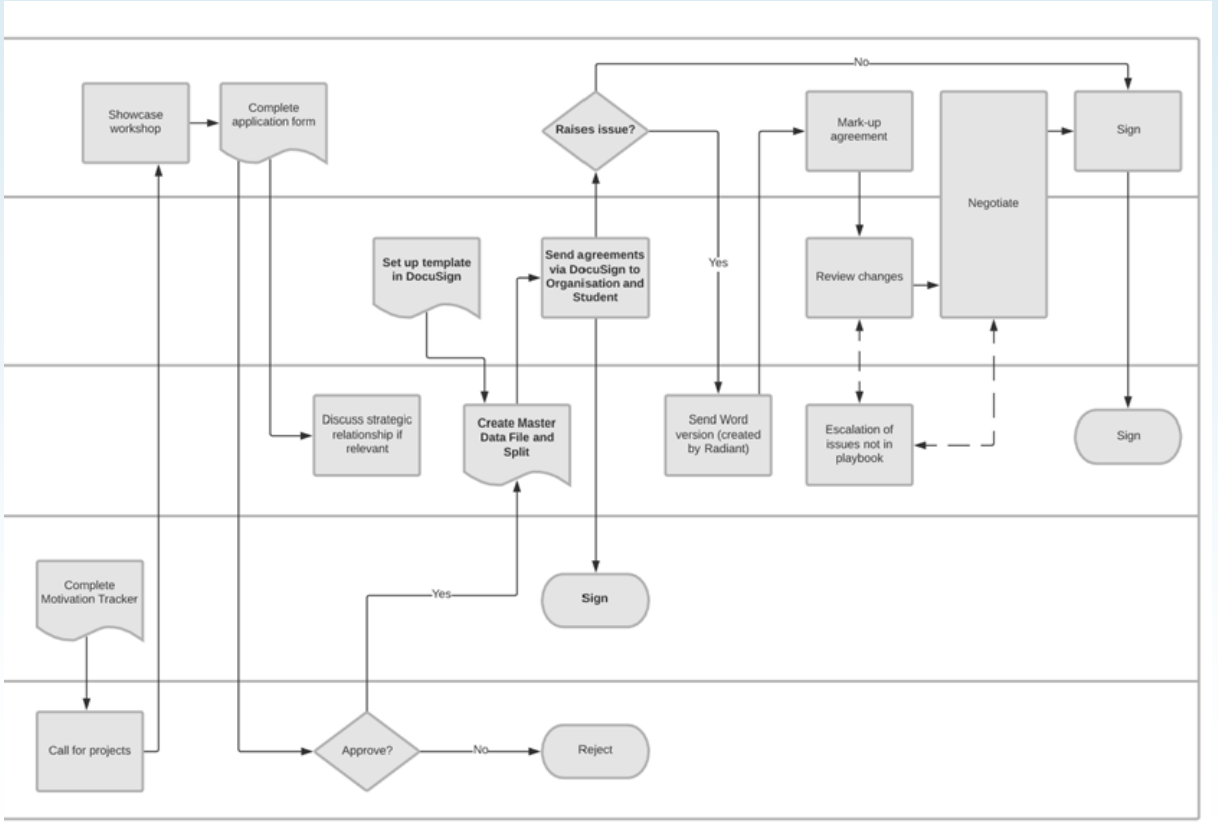
John McNamara, IBM Master Inventor and UK University Programs Lead

"We really love working with the UCL IXN programme because it's the best of its kind. It is unique in the academic-industrial outreach space. It allows us to work practically with students without worrying about intellectual property rights and it's structured in a really easy to use way. It's helped us generate ideas for projects that we are taking forward."

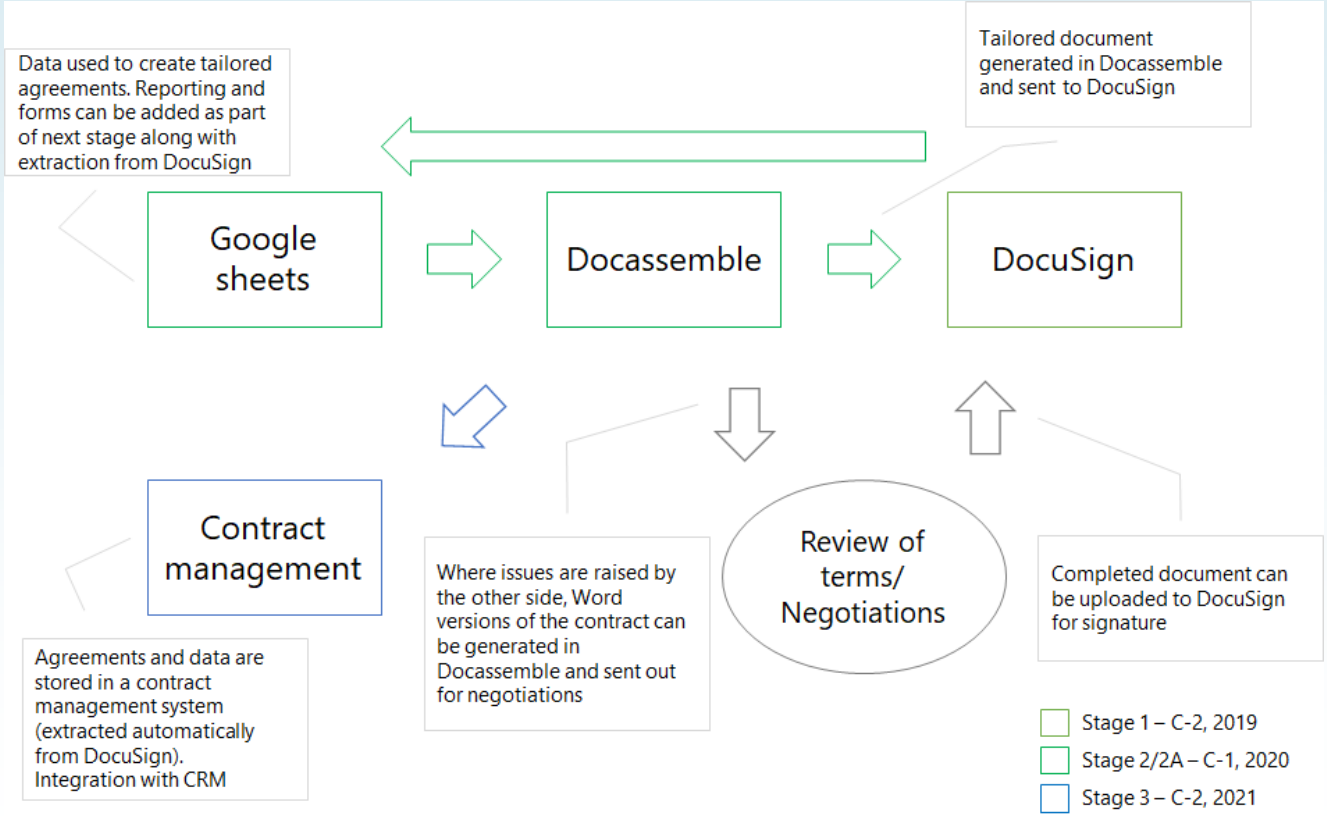
Tom Winstanley CTO & Head of New Ventures at NTT DATA UK

Operationalising IXN

- IP issues – assignment letters, generally only involve student NOT staff IP which is dealt with differently.
- Contracting – use of DocuSign to enable scaling, provides protection mechanism to enable freedom of operation.
- Funding – IXN administrative costs including legals funded by department.



Technology Support



Building Strategic Alliances

- ❑ Benefits for industry, university and student (triple win!)
- ❑ Lessons learned – start small, mutual learning process then scale. Need alignment of vision and goals, capacity to scale fast.
- ❑ Examples of translation from projects into sponsored research.

IXN Triple Win

Student	Company	University
Industry learning & experience	Improves talent pipeline; pre-hiring visibility	Increases industry engagement and knowledge transfer
Improves employability	Low cost, low risk, early-stage R&D tech pipeline opportunity	Improves student engagement and strengthens brand

Thank You. Any Questions?

For further information see:
https://www.ucl.ac.uk/computer-science/
Email: ucl.ixn@ucl.ac.uk

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INDUSTRY EXCHANGE NETWORK IXN

Q&A

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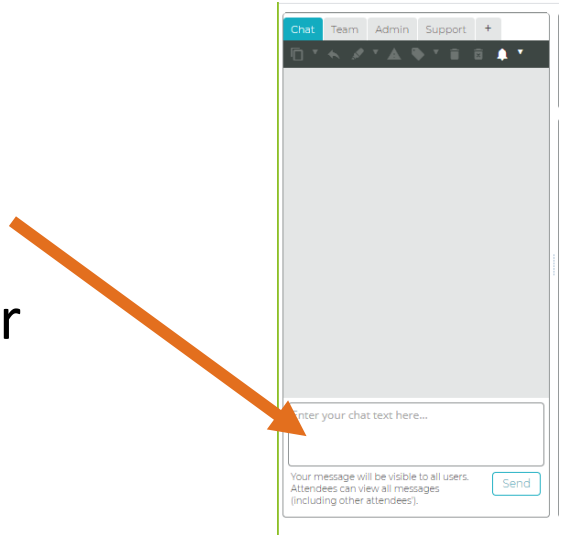

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NSF Engineering Research Visioning Alliance

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- NSF-funded, five-year initiative

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