PROVIDING LEARNING INSPIRATION

An Internet of Things (IoT) case study

DIGITAL ISLE OF MAN

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01 CONTEXT

It’s a key objective for Digital Isle of Man to ensure that there are MORE SKILLED WORKERS AVAILABLE TO IOM BUSINESSES, and there are lots of factors to consider. The demand for digital skills is a global challenge, here in the Isle of Man the tech sector is growing rapidly and there is accelerating digital transformation in every sector and area of life. For our people to thrive in a connected economy and society, digital skills must be prioritised alongside literacy and numeracy skills as they are now a key life skill.

IoT (Internet of Things) is not only a key enabling technology but it is also a very diverse, interesting and well-paid career family which spans engineering, manufacturing, product design, telecommunications, software development, data science and much more.

Demonstrating this in a straight forward and interesting way aims to inspire the next generation and showcase real example pathways into these types of careers.

Digital Isle of Man's approach to achieve the above has been to introduce IoT applications and solutions to primary, secondary and tertiary educational settings keeping in mind the level of interest and understanding at each stage.

> **Research shows how important it is to encourage more people to consider a career in technology and inspire them from an early age, to minimise chance of narrow and gendered stereotyping to set in.**
>
> Sarah Ennett, Digital Skills Project Manager at Digital Isle of Man

02 ACTION

PRIMARY: Trial of Indoor Air Quality Monitors at Scoill Phurt le Moirrey

Milesight AM107 Device Installed in a classroom in SPLM

The initial roll out of devices to Scoill Phurt le Moirrey generated a lot of interest from the students at all ages, wanting to understand what the air quality sensors were and it became quickly apparent that they were very interested in the quality of their environment and how they can take action to improve it when levels dip.

SECONDARY: Code Club lesson plan with explore IoT kit

We invested in an Arduino Explore IoT kit, that includes sensors to measure light, pressure, humidity, temperature, gyroscope, accelerometer, passive infrared and moisture which allow for many different projects to be carried out. This has initially been given to Code Club to evaluate and test the lesson plan ideas. Once we've proved it to be working well we'll explore how we can release more funding to make the concept available to roll out further and expand to other organisations and schools that want to further develop either in lesson or extracurricular IoT learning.

Arduino's educational mission is to "empower the next generations of students to be the disruptors of the future" and is designed for educators at all levels who want to deliver relevant, fun, and creative STEAM (Science, Technology, Engineering, Art and Mathematics) lessons that enable all students to thrive. Their classroom programs include kits, bundles, and boards with project-based learning paths for individual and collaborative educational approaches.

Arduino Explore IoT kit

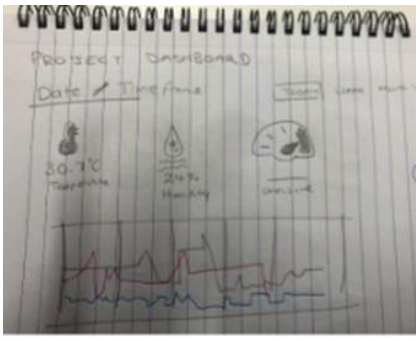
FURTHER EDUCATION: Experiential Learning Project using IoT

We worked closely with several faculty members of University College Isle of Man (known as UCM) to explore benefits of IoT more widely but also how it could potentially help students and/or researchers. Dr Alastair Robertson was instrumental in setting up a test admin account on our LoRaWAN network server, which was then successfully utilised by Computer Science degree students for their experiential learning project.

The project brief presented to the students was as follows;

- Research and develop a set of use cases or user stories to support the island both socially and economically.
- Explore the nature of technologies that may be connected to the LoRaWAN network.
- Build prototype of one or more IoT devices (e.g. temperature, pressure sensors) that would transmit data across the LoRaWAN network into a MySQL database server.
- Develop an online dashboard presenting data using good practice user experience principles.
- Apply machine learning tools (e.g. univariate forecasts, linear regression) to support project as determined via interviews.
- Prepare documentation reporting findings that the client can use to support further development of the LoRaWAN network.

This was a huge undertaking with a group of four students each expected to put in a minimum of 150 hours work over a 9 week period in Spring 2021. It was run in a very professional manner and the team demonstrated all aspects of project management from; research, requirement capture, designing user experience, database design, programming, electronics of the sensors and boards, dashboard design, through to machine learning, predictive analytics and even into understanding and improving the way the radio communications of the devices interact with the network.



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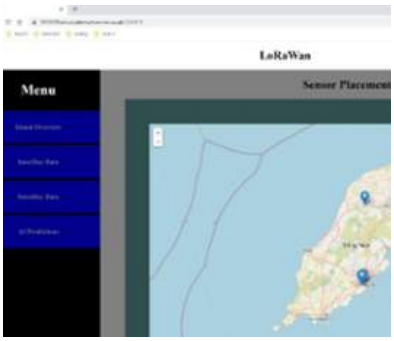

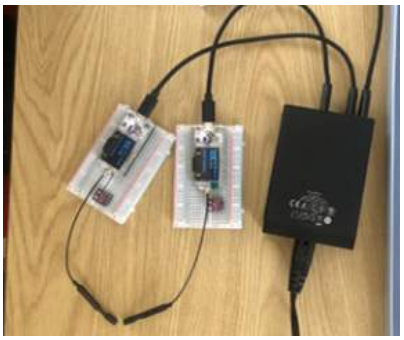

Photo Credits to Liam Denison, Stephanie Dunne, Rogelio Serrano & Samuel Venezia, from the Computer Science degree programme at UCM who took part in the IoT Experiential learning project

03 NEXT STEPS

We want to build on this and work closely with our schools and other educational organisations to continually evolve, provide inspirational materials and support where we can.

We look forward to expanding our trials to include outdoor air quality monitoring and work with the schools to include that in their curriculum, and how it relates to other Government initiatives like Active Travel and the Climate Change plan. Planning is underway to hold STEMfest 2022 later in the year where hands on exhibits will be available to inspire our primary school attendees.

We will make ourselves available to any interested school or educational organisation, so would encourage anyone who is interested in developing, sponsoring or supporting IoT educational opportunities for our Island residents, to get in touch with the Digital Isle of Man team via contact-digital@gov.im.