

Sense Deploy Communicate



**Connected
Environments MSc
Degree Show 2026**

16.07 Launch Event
6PM - 8PM
17.07 - 02.08 Exhibition Open
10AM - 6PM



**The Bartlett Centre for
Advanced Spatial Analysis**



Sense, Deploy, Communicate

MSc Connected Environments

Advances in digital technologies are providing us the means to sense, visualise and better understand our built and natural environments. These Connected Environments are the forefront of an emerging science, interlinking the Internet of Things (IoT), Artificial Intelligence (AI), Virtual Reality (VR) and Data Science. The MSc programme at UCL East is run as a living lab, making use of the surrounding Queen Elizabeth Olympic Park to support the development of sensing devices and platforms from concept to prototype and deployment. The MSc Connected Environments projects presented here respond to a brief to “sense, deploy and communicate”, and they address a wide range of real-world challenges, from environmental monitoring, to augmented living solutions.

The Connected Environments MSc at The Bartlett Centre for Advanced Spatial Analysis (CASA) provides you with an opportunity to build this future. This hands-on Master's course focuses on coding, prototyping, and deploying devices that sense, communicate, and analyse data from both our built and natural environments. You'll gain in-demand skills in programming, data capture, and visualisation that are essential for addressing today's pressing environmental and urban challenges.

Delivered at the UCL East campus on the Queen Elizabeth Olympic Park in Stratford, East London, the course takes full advantage of its cutting-edge facilities. Here, you'll benefit from state-of-the-art teaching labs equipped with the latest technology, a light fabrication workshop for rapid prototyping, and access to the extensive makers' workshop at the Institute of Making – a multidisciplinary hub for hands-on creation. These resources are designed to foster truly interdisciplinary collaboration. This prime location also serves as a dynamic living lab, providing unparalleled opportunities for hands-on, practice-led teaching. We are actively working with collaborators across the Olympic Park to develop a park-wide living laboratory, offering you an environment to build and deploy physical prototypes in real-world settings.

Building on CASA's expertise in the science of cities, this course goes beyond theory by structuring its learning around practical making and real-world application. You'll gain a deep understanding of the infrastructure required to instrument and analyse complex environments. Students will actively develop sensing tools, support data-driven decision-making, and engage directly with stakeholders to analyse real-world systems.

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Co-developed with industry leaders through a five-year academic research collaboration between UCL and Intel, this course provides you with an industry-relevant skillset. It directly prepares you for exciting careers in the Internet of Things (IoT), Smart Cities, Data Science, and Visualisation, equipping you to be at the forefront of shaping our future connected world.

This multidisciplinary degree is ideal for curious, creative minds from diverse backgrounds, including the Arts, Computer Science, Geography, Architecture, and Engineering. No prior programming expertise is required, but a strong enthusiasm to learn coding and engage with hands-on making to shape smarter cities and sustainable environments is essential.

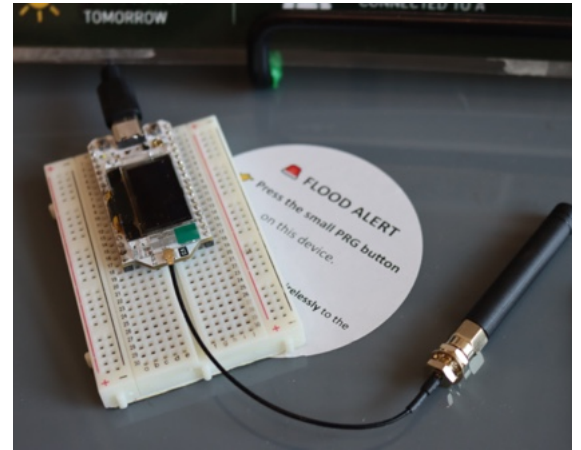
You'll master the application of Internet of Things technology in the built environment: from shaping initial ideas and gathering stakeholder requirements, through iterative prototyping and refinement, to successful deployment and influencing decision-makers. This practical, holistic approach prepares you to be at the forefront of the field, enabling you to thrive in leading technology firms, establish your own venture, or contribute to cutting-edge research in academia.

CASA is part of UCL's Bartlett Faculty of the Built Environment, ranked the world's #1 institution for Architecture and the Built Environment (QS World University Rankings 2025) and rated 'World Leading' in the latest Research Excellence Framework ([REF 2021](#)).



Season 4 students: Zihang He, Jiahua He, Wu Yitong, Ziyl Wang, Shao Xintong, Lizi Wang, Xinyi Zhang, Chaoshuo Han, Haoyu Hu, Cheng Zhong, Yidan Gao, Yifei Huang, Jiahua He, Gilang Pamungkas, Xinyuan Sun, Annie Zhu, Madina Diallo, Yuqian Lin, Yussr Osman, Tianrui Min, Qingshan Luo, Junrong Wang, Matilda Nelson, Ananya Kedlaya

Staff: Leah Lovett (Curator), Simon Gosling (Exhibition Technician), Andy Hudson-Smith (Module Leader), Duncan Wilson, Steven Gray, Valerio Signorelli, Martin De Jode, Danny Steadman, Anna Cornish, Christabel Agyepong Ankomah-Adjei (newspaper design), Habib Ayodele (newspaper design).



Smart Solar Community Totem

Madina Diallo

The Smart Solar Community Totem is a solar-powered light designed for communities in Guinea, West Africa, who often lack reliable power or internet. During the day, a solar panel charges a battery. At night, a light sensor switches the tottem on automatically. It also listens for flood warnings sent over long-range radio, no internet needed, and changes colour to signal different conditions: white for normal lighting, and a flashing blue alert if flood risk is detected. The project explores how simple, connected technology can support safety and daily life in remote communities.

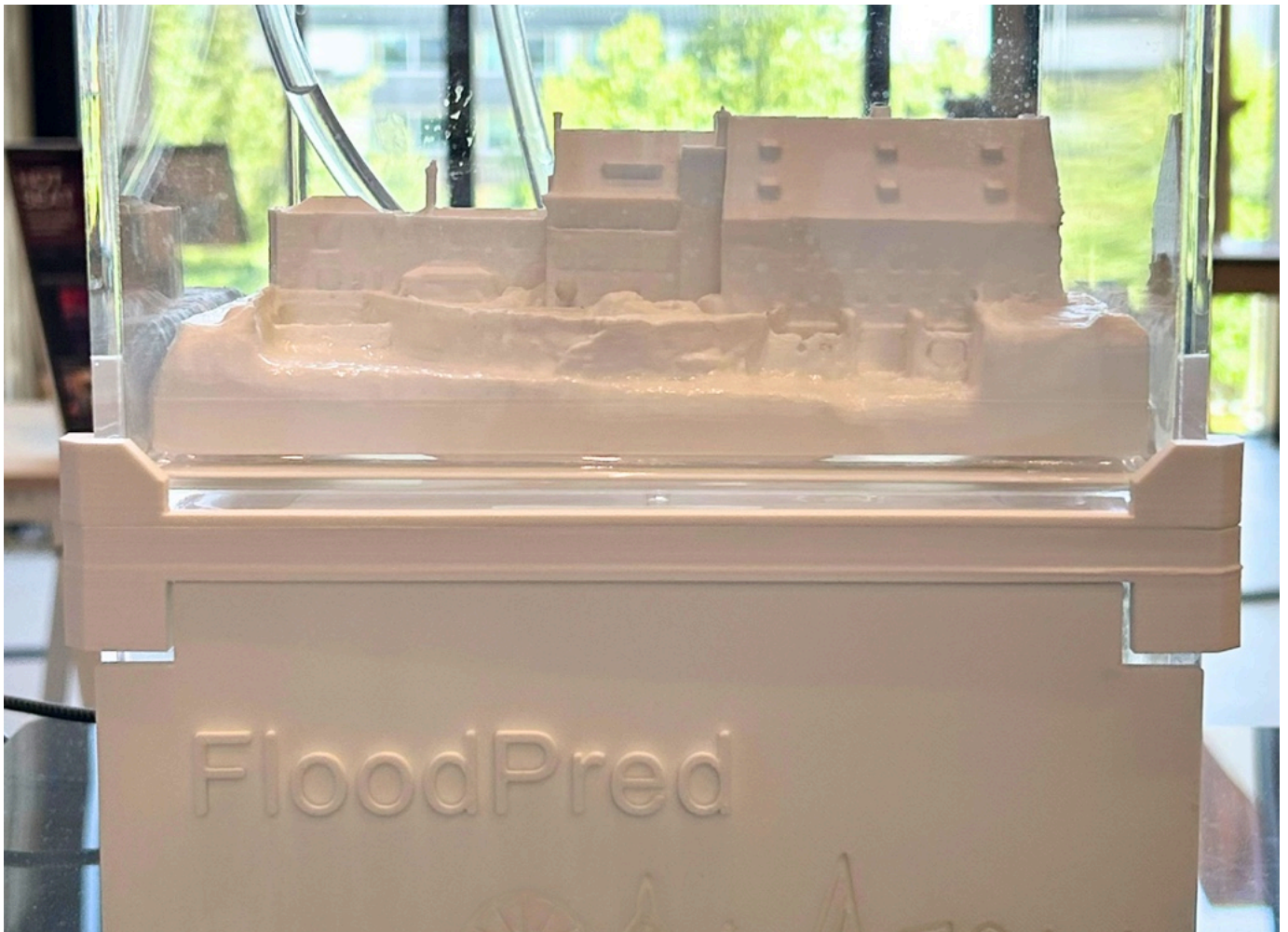
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Something Along Those Lines

Matilda Nelson

A performer carries a handheld object embedded with an ESP32 microcontroller, UWB positioning tag and an IMU sensor through a room mapped by four ultra-wideband anchors. This 3D tracked object moves through the physical space, and virtually moves through another, where it intersects and bumps into virtual walls. When it does, four servo-driven sticks respond by opening, closing and tracing the invisible spatial architecture. The object simultaneously senses the physical and the virtual, bridging a space for a collective experience of a virtual environment. Something Along Those Lines materialises the invisible boundaries of a virtual space and attempts to make a physical experience of data.



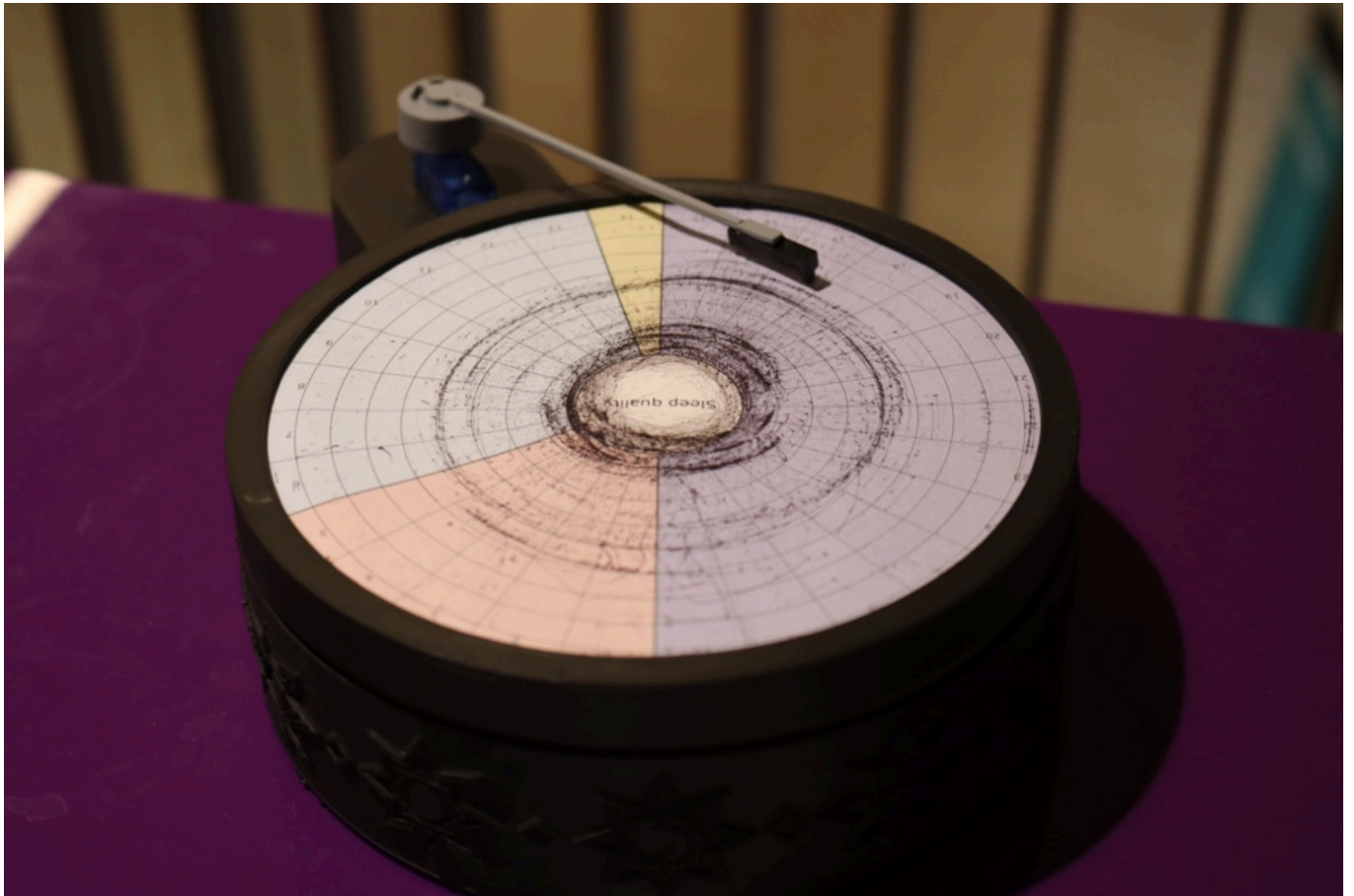
FloodPredict

Haoyu Hu

FloodPredict bridges ancient House Mill with cutting-edge artificial intelligence. The system takes in live water level and weather data, then utilizes a customized AI model to forecast floods up to 24 hours in advance. To make this invisible technology visible, the physical House Mill miniature simulates a tidal flood every two minutes. As the water rises, the gauge will tick down to the next predicted surge, while dynamic LED lights glow to show the storm's intensity.



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Lunar

Yussr Osman

Lunar explores how the menstrual cycle affects sleep quality. It uses two sensors, one bedside and one wearable to track a cycle over a 28 days. The bedside sensor (an mmWave device operating in the 30-300 GHz frequency range) tracks a user's presence. A second wearable device tracks sleep each night, as well as heart rate and energy levels. This data is subsequently translated into a physical display via a circular graph, rotating once every 28 days, for an insight into changing sleep patterns over the course of a menstrual cycle.

Movements

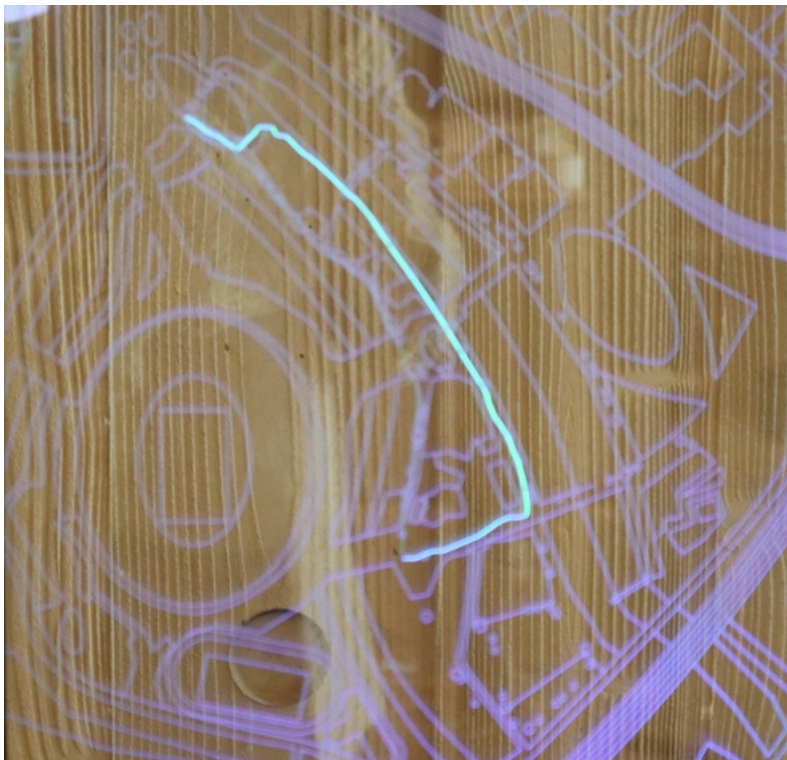
Ananya Kedlaya

What if you could see the patterns you create as you explore and experience a space?

This piece of work explores the relationship between people and their movements. An arts-led kinetic data visualisation display of how people navigate and move around in the built environment. The work is a non-invasive people presence and motion representation mapped to the exact position of them in the space where they exist. Changing how we perceive information about the spaces we build.



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The Bone-Shaker Index

Jiahua He

Meet the Bone-Shaker Index—a smart sensor that attaches to your bicycle to measure bumps, cracks, and potholes. It collects real-time vibration data to help cyclists find the smoothest route, not just the shortest. On this laser-cut map, flip the switch to compare routes: red LEDs show the traditional shortest path, while green LEDs highlight the smoother, bump-free alternative.



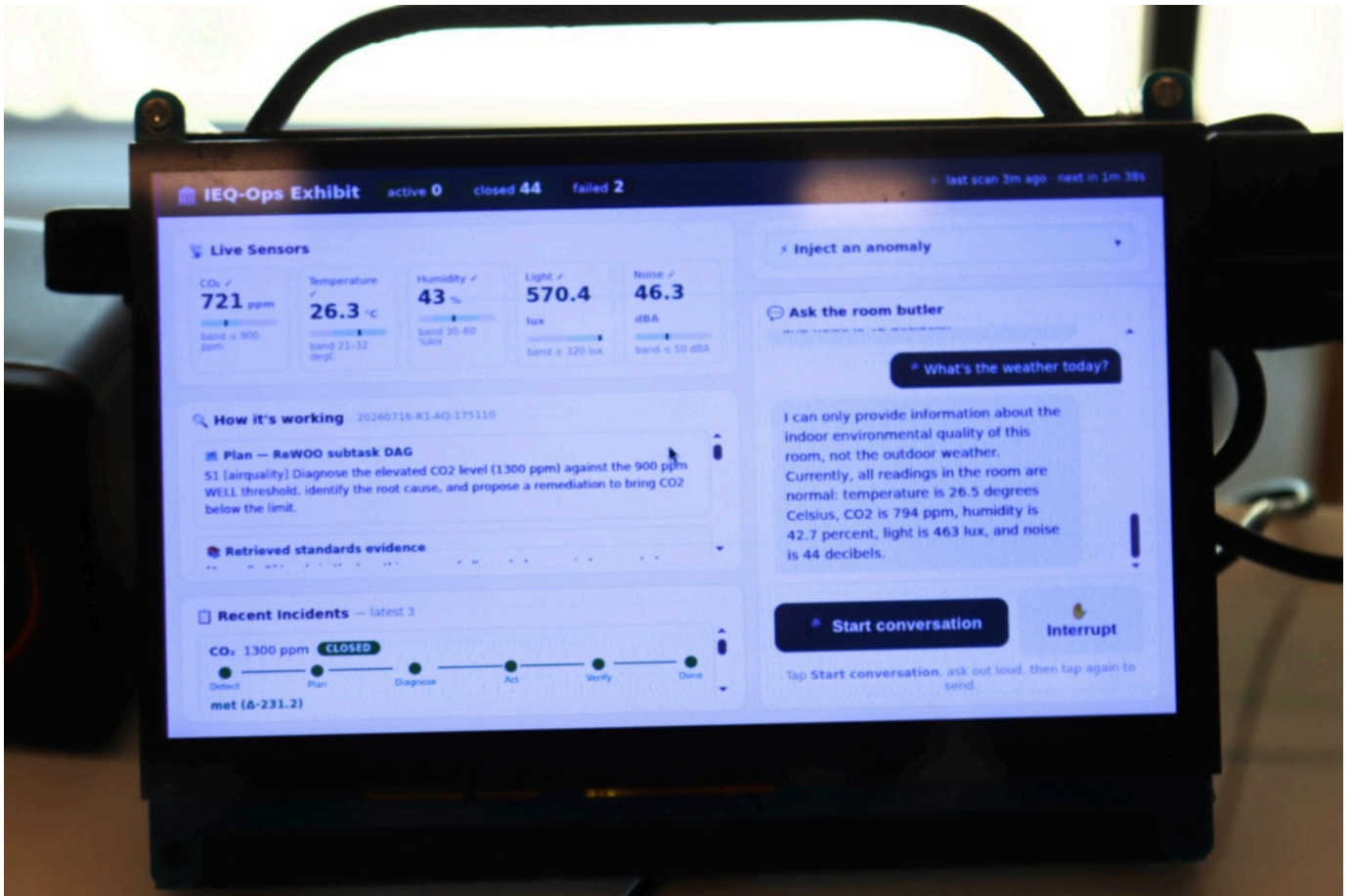


Tuneln: Talking Plants over the AM Waveband

Ziji Wang

The Tuneln planter is a talking plant pot that turns live environmental data into short spoken messages and transmits them over the airwaves to an AM Radio. Sensors measure soil moisture, temperature, humidity, light level, and the colour quality of light around the plant are all converted into spoken text. A Raspberry Pi uses this data to generate a plant-like voice, which is then transmitted through a small AM radio circuit and played from a radio receiver. Users listen to the plant speaking through radio, creating a more physical way to understand how your plant is 'feeling'.

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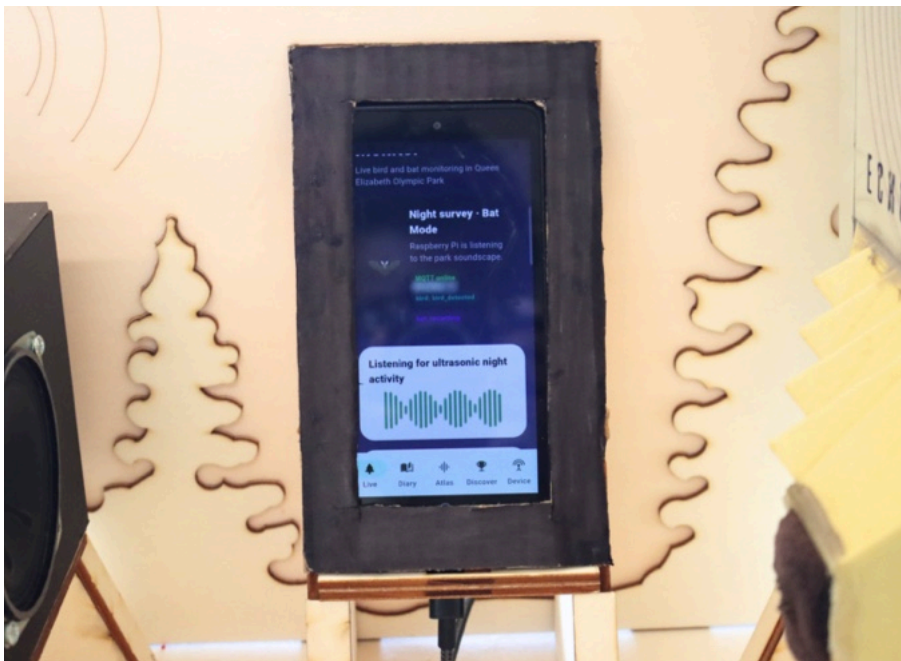


IEQ-Ops: An Autonomous Building Operations Agent

Zihang He

IEQ-Ops is an autonomous agent that runs a room. A small sensor node tracks the air quality (CO₂), temperature, humidity, light and noise. Around the clock, AI agents on a single Raspberry Pi watch these signals, diagnose problems, act, and check the result, asking a human only for risky decisions. Talk to it by voice or text and ask how the room is doing. Unlike an ordinary chatbot, it does not guess: every answer is looked up from the room's own live readings, history and past incidents.





Park Life Monitor: Interactive Bird and Bat Detection in Urban Parks

Wu Yitong

Park Life Monitor helps park visitors, researchers, and environmental educators understand local wildlife through sound. A Raspberry Pi listens to the environment, detects birds during the day and bats at night, and sends results to a Flutter app using MQTT. The app shows live animated alerts, species information, sound examples, a discovery diary, and simple charts. It addresses the problem that wildlife activity is often invisible to the public, making urban biodiversity monitoring more engaging, accessible, and easier to explain.



Emochi: A Responsive Emotional Support Plush Device

Shao Xintong

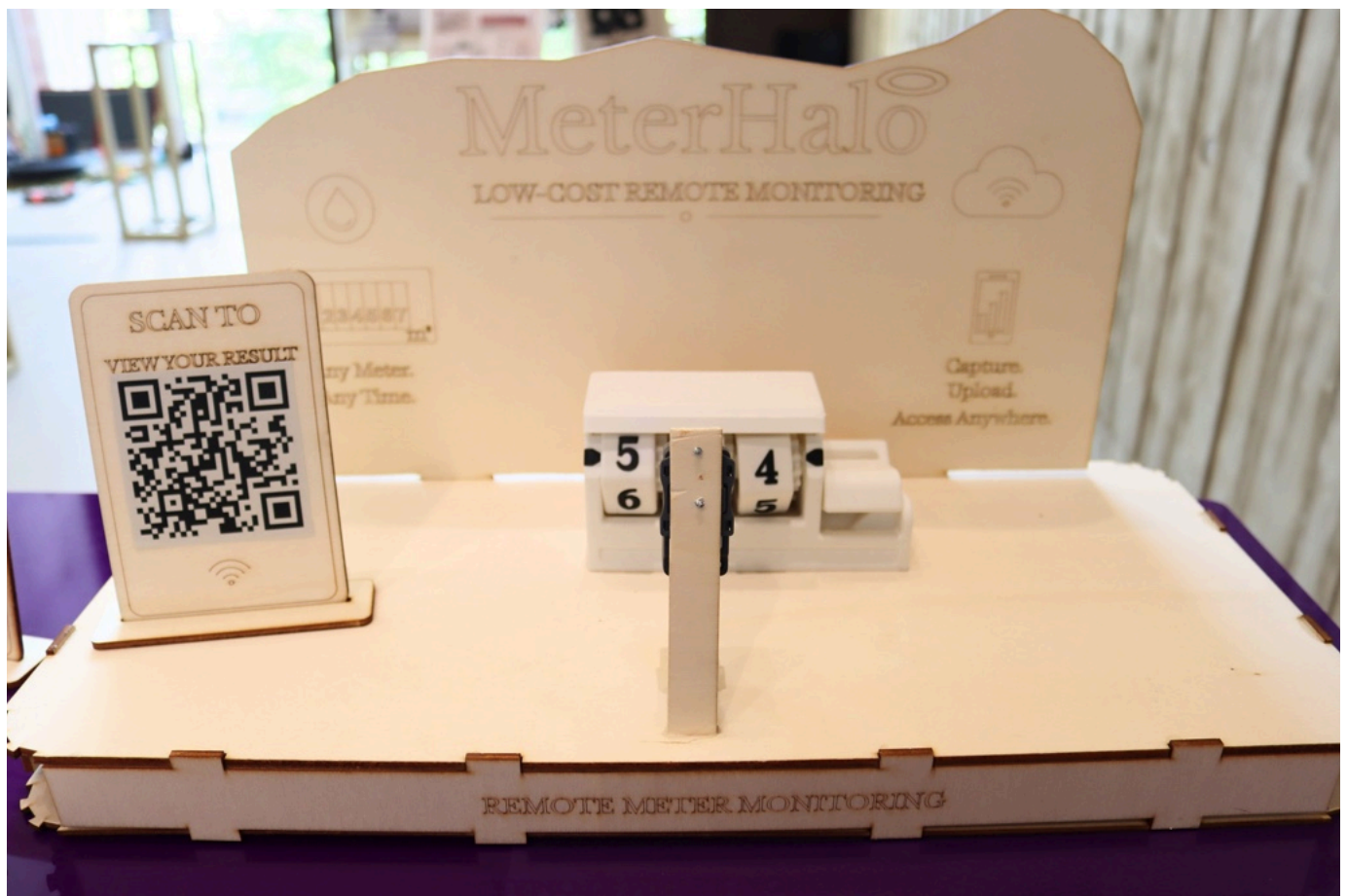
Emochi builds on a current trend in connected emotional support devices. It is a soft plush device that responds to touch, designed for quiet personal moments, such as resting, studying, or calming down after stress. When a user gently taps or strokes Emochi, it responds with a gentle vibration and sound, creating a comforting sense of companionship. Emochi also includes a breathing-guided meditation mode, where rhythmic vibration helps the user slow down, breathe steadily, and relax. Through these gentle interactions, Emochi encourages emotional self-soothing in everyday life.



The Living Workshop

Lizi Wang

Fabrication labs are full of activity, yet much of it remains invisible. Machines run constantly, jobs come and go, but it is rarely clear what is actually happening across the space at any given moment. This project makes that activity visible and actionable. By collecting real-time data from 3D printers across UCL's fabrication labs, it builds a digital twin, represented through a physical model and interactive dashboard, revealing machine status while analysing usage patterns to help staff and students predict demand, streamline scheduling, and optimise shared equipment.



MeterHalo

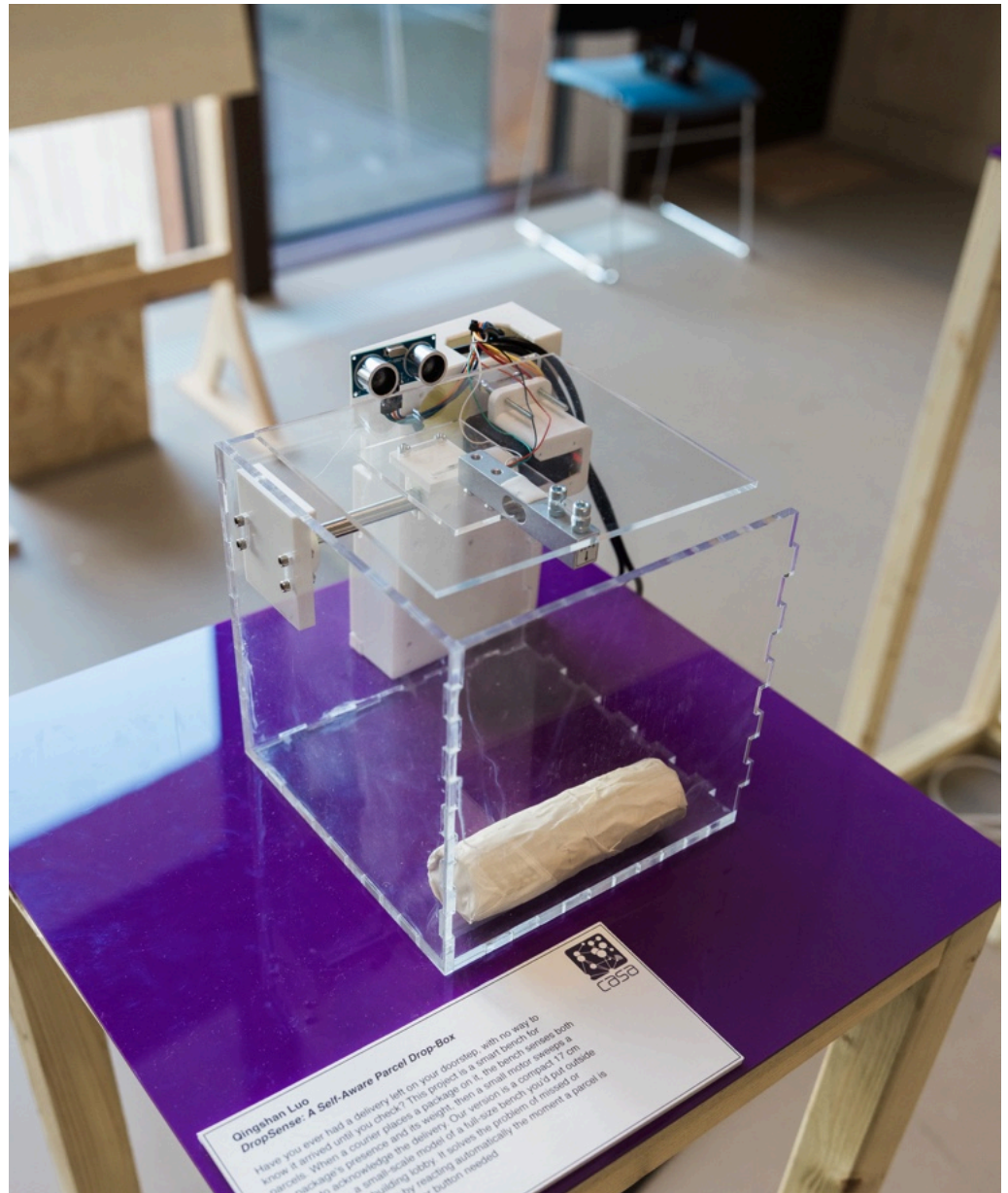
Yifei Huang

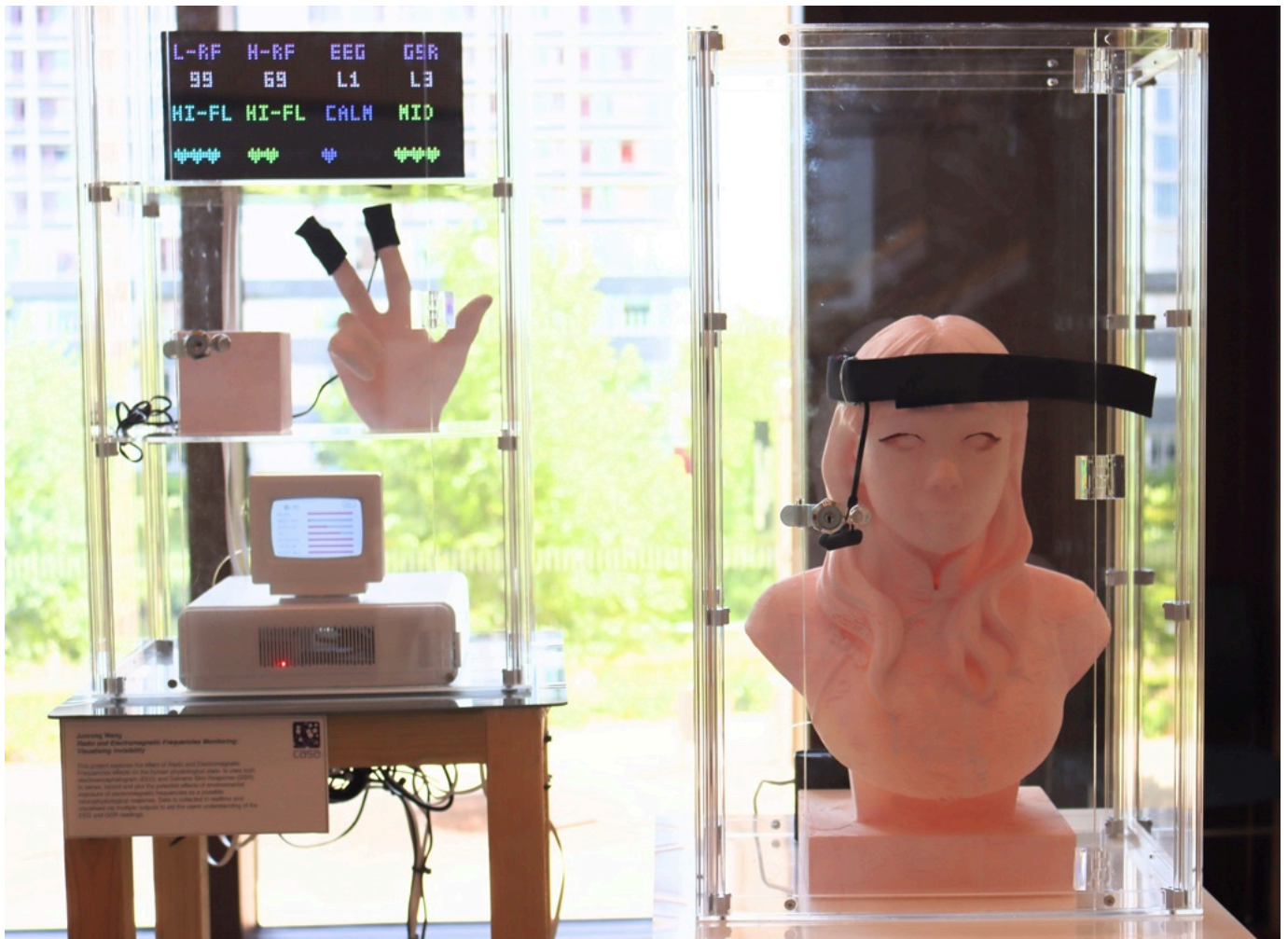
MeterHalo is a low-cost system for reading meter-style displays remotely. In this exhibition, you can press the Lucky 777 machine to generate a number, and an M5Stack camera will capture the result. By scanning the QR code, you can open the website on your phone and view the detected reading linked to the interaction. The project explores how a simple, non-invasive camera device could be used to monitor legacy water meters without replacing the original infrastructure.

DropSense: A Self-Aware Parcel Drop-Box

Qingshan Luo

Have you ever had a delivery left on your doorstep, with no way to know it arrived until you check? This project is a smart bench for parcels. When a courier places a package on it, the bench senses both the package's presence and its weight, then a small motor sweeps a paddle to acknowledge the delivery. Our version is a compact 17 cm prototype — a small-scale model of a full-size bench you'd put outside a home or in a building lobby. It solves the problem of missed or uncertain deliveries by reacting automatically the moment a parcel is dropped off — no app or button needed





Radio and Electromagnetic Frequencies Monitoring: Visualising Invisibility

Junrong Wang

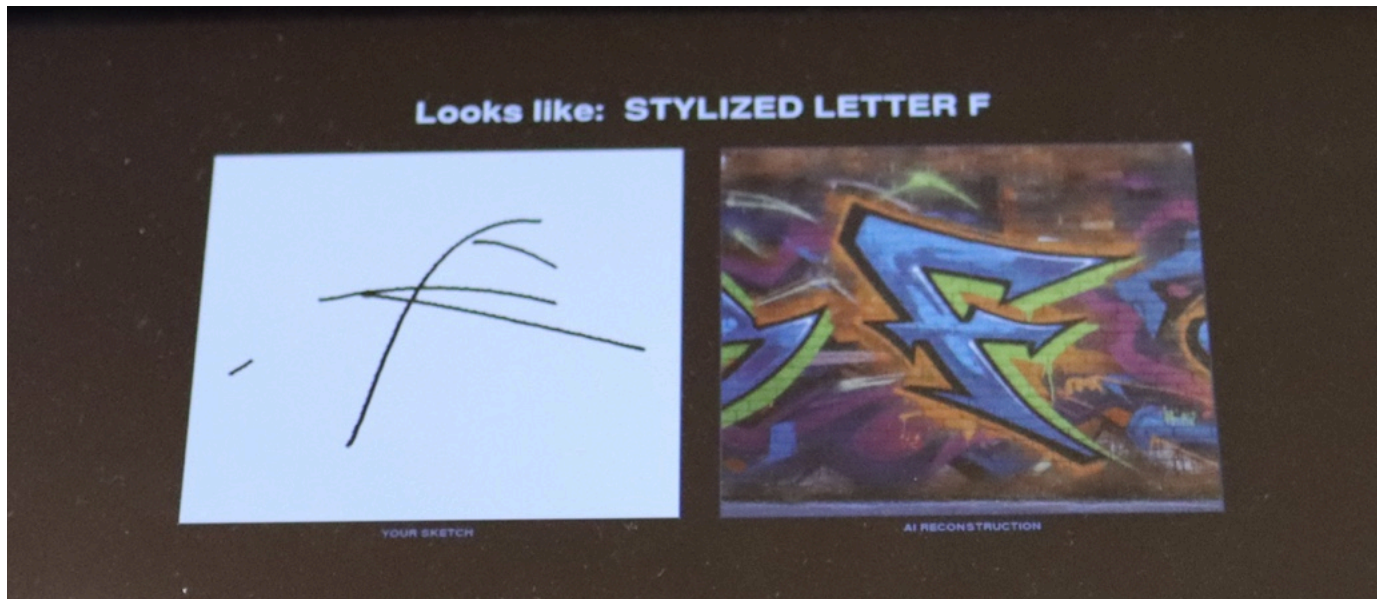
This project explores the effect of Radio and Electromagnetic Frequencies effects on the human physiological state. It uses both electroencephalogram (EEG) and Galvanic Skin Response (GSR) to sense, record and plot the potential effects of environmental exposure of electromagnetic frequencies as a possible neurophysiological response. Data is collected in realtime and visualised via multiple outputs to aid the users understanding of the EEG and GSR readings.



Hot Seat: A Privacy-Friendly Thermal Workstation Monitor

Yewei Bian

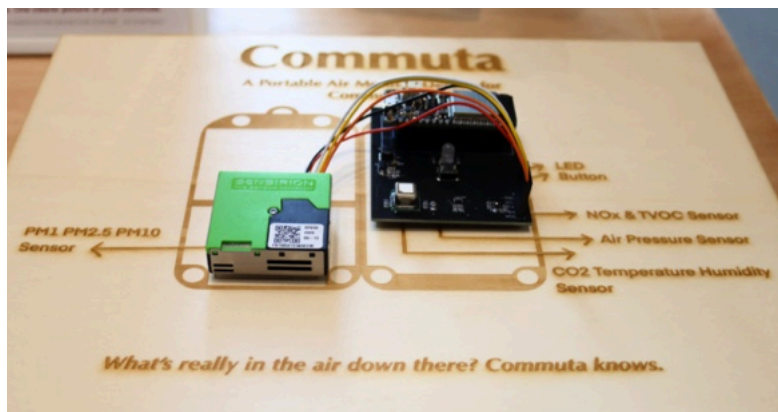
Hot Seat is a privacy-friendly system that shows whether a shared workstation is free, occupied, or recently used without relying on a normal camera. The main lab device is installed at a soldering workstation in One Pool Street Lab 107, using a thermal sensor, a small machine-learning model, and safety rules to monitor body heat and warm tools. The live dashboard displays the current workstation state, thermal image, recent activity, and safety status. For the exhibition, a simplified interactive version lets visitors sit at a demo desk and watch the system respond in real time.



Airdraw

Xinyuan Sun

Air Draw is interactive installation that allows people to draw pictures in the air. Users move their hand above an electrical near-field 3D sensor, sketching and saving, one element at a time. Once complete an AI brings everything together into a finished picture, interpreting the shapes drawn into a unique work of art. It's designed for public spaces like exhibitions, giving anyone a chance to create a piece of 'hand drawn' art work.



Portable Air Quality Monitor for London Underground

Annie Zhu

A portable air quality monitor, small enough to clip onto a bag, designed for people who travel on the London Underground. Some underground platforms have poor ventilation, dust and fine particles build up in the air, becoming potentially hazardous for long term exposure. This device measures the air around you as you travel and sends the data to a companion app, building up a picture of air quality across your daily commute. By making this invisible pollution more visible, people can better understand what they're breathing and make more informed choices about their journeys.



Spatial AR Dashboard for Research Lab IoT

[Yuqian Lin](#)

In a research lab, devices such as 3D printers and sensors stream live data over MQTT, but this data often remains inaccessible. Spatial AR Dashboard for Research Lab IoT brings data back to the place where it is created. The project uses a VR headset and controller to select a device in the environment. The headset captures an image for a vision model to recognise the device, then retrieves its live MQTT telemetry and anchors a floating dashboard beside it. Once anchored, the dashboard remains linked to the device as the user moves around. Scan the QR code, point your phone at the devices, and spatial panels will appear above them with live readings. Tap the panel buttons to control the smart light in real time.

Solar-Powered LoRaWAN Air Quality Sensing System

Tianrui Min

My project is a solar-powered LoRaWAN air quality sensing system for outdoor urban monitoring. A sensor node measures PM2.5 and PM10, temperature, humidity and air pressure, then sends the readings through LoRaWAN, a long-range, low-power wireless network. This allows the device to work outdoors without Wi-Fi or mains power. A second part of the system is an e-ink display node, which receives and presents the data in an easy-to-read format. The screen shows current air conditions and selected historical readings, helping people understand how the local environment changes over time.

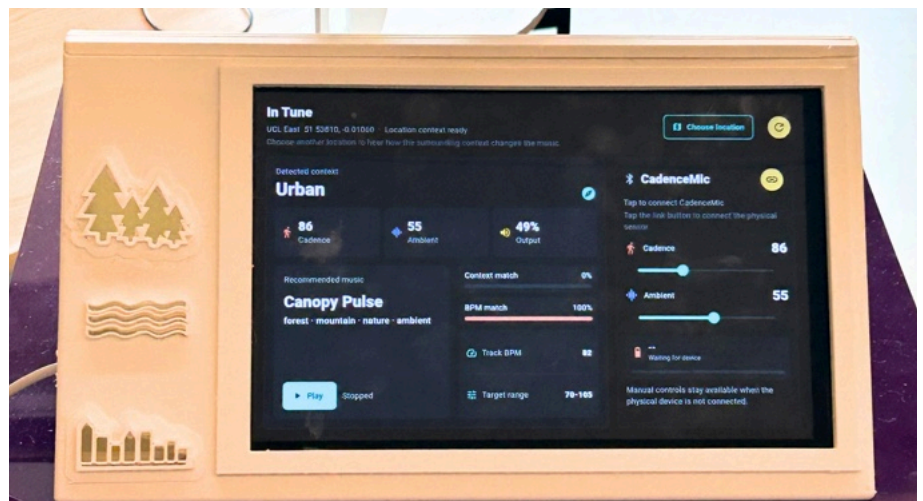




In Tune (Context-Aware Adaptive Music System)

Xinyi Zhang

Music can shape the way we experience exercise, but a fixed playlist cannot respond to changing surroundings or movement. In Tune explores how people, places, and music can work together by first understanding which environments different pieces of music best suit. It then uses GPS to recognise the runner's surroundings and a wearable device to monitor running rhythm and ambient sound. By bringing these together, the system matches music to the environment, adjusts its tempo to suit the runner's pace, and balances its volume with the surrounding sound to create a responsive and personalised soundtrack for outdoor exercise.



Connected Spine

Chaoshuo Han

Connected Spine is a wearable posture-reminder device. It is made up of several small sensor nodes worn on the head, chest, and lower back, which sense changes in a person's sitting posture. When the system detects that one area has moved beyond a set range, the device gives a gentle vibration to prompt the wearer to adjust. It is intended for people who study, work, attend online classes, or sit for long periods, helping them notice poor posture early rather than after their neck or back already feels uncomfortable.



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MyEMG: Real-time Muscle Activation Monitor

Cheng Zhong

MyEMG is a low-cost wearable device that measures muscle activation in real time. It uses an EMG sensor to capture muscle signals and sends the data wirelessly to a mobile app. The app shows muscle effort as a clear 0–100% activation level and can also display the raw signal. This project helps users understand how strongly their muscles are working during exercise or movement training. People interact with it by wearing the sensor, recalibrating it, and watching their muscle activity live on the app

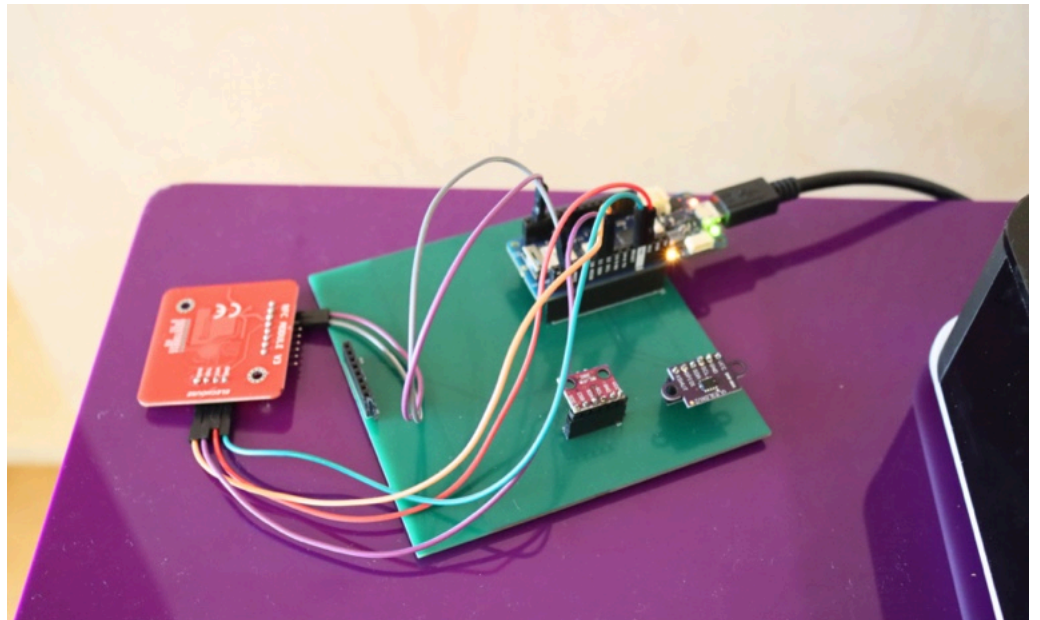




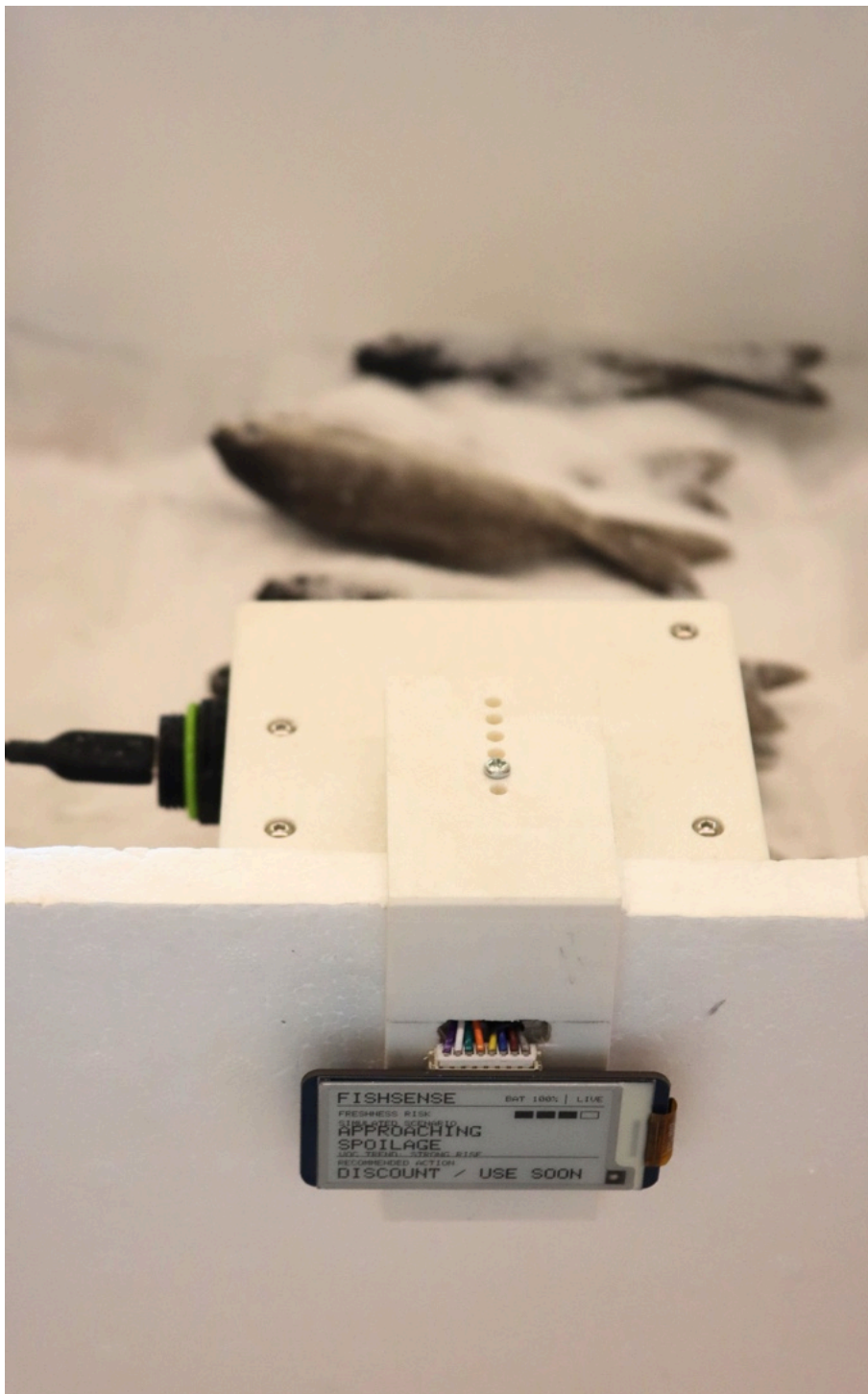
The Holographic Librarian

Yidan Gao

The Holographic Librarian is a small interactive installation that greets readers with a glowing, floating figure. To begin, simply say "Hello, librarian" — then tell it what you enjoy, such as space, history or romance, and it speaks back, suggesting a book and a film to match your mood and the room around you. You can also place a book nearby and it will recognise it. Everything runs offline, with no internet and no cameras recording you. Designed for libraries, bookshops and study spaces.



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FishSense: Spotting Fish Spoilage Before You Can Smell It

Gilang Pamungkas

Have you ever wondered if the fish you're buying is still fresh—and safe to eat? As fish begins to spoil, it releases tiny amounts of gas long before you can smell it. FishSense is a small sensor that sits inside a chilled fish box during transport and storage. It continuously "sniffs" these gases and monitors the temperature and humidity around the fish—the conditions that decide how quickly it spoils. Designed to be reusable across many shipments, it gives an early, objective picture of freshness, helping suppliers and shops reduce food waste and keep unsafe fish off the shelf.



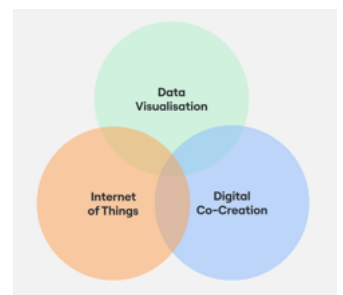
MSc Connected Environments

Our built environment can serve as an efficient means of living both culturally and ecologically, while our natural environment sustains life through complex ecosystems. Understanding and optimizing these systems is crucial, and digital technologies offer tools for observation and insight. Our research on Connected Environments focuses on three core ideas:

Data Visualization: The graphical representation of information and data. By using visual elements like graphs, maps and 3D models, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Internet of Things (IoT): Connecting the everyday objects we use, like security cameras and smart speakers, to each other and to us through the internet. This connectivity allows them to work together, automating tasks, simplifying our lives, and helping us save time and energy.

Digital Co-Creation: A collaborative process where multiple stakeholders (users, customers, employees, partners) collectively contribute to the development or improvement of a digital product, service, or experience. This often involves online platforms and tools that facilitate shared ideation, design and feedback.



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