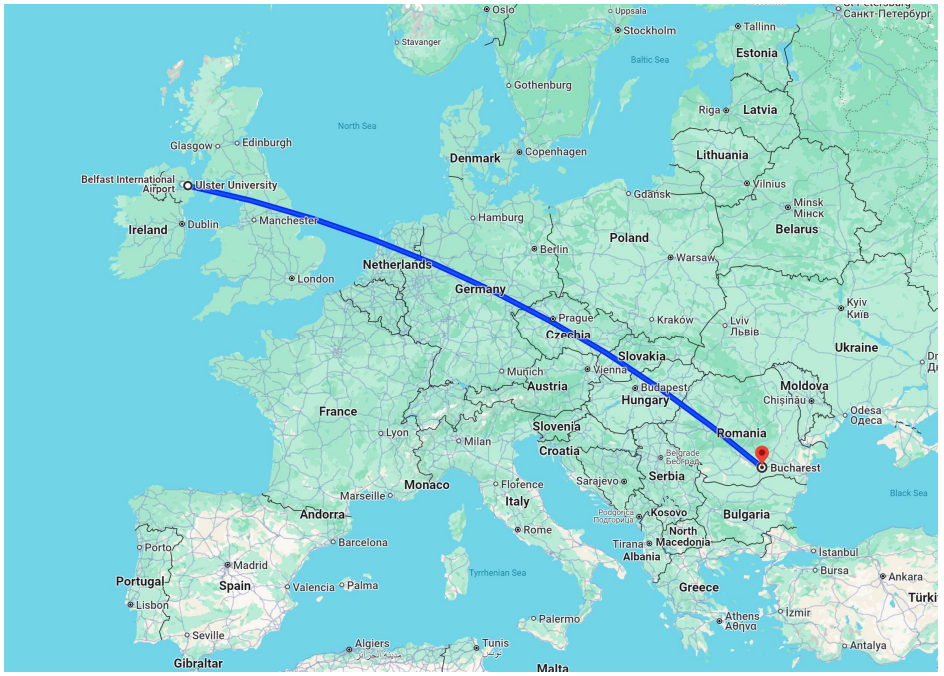
Ulster's Connected Health Innovation Centre

CHIC
Northern Ireland Connected Health Innovation Centre

Chris Nugent, Head of School of Computing
Professor of Biomedical Engineering

20th September, 2024

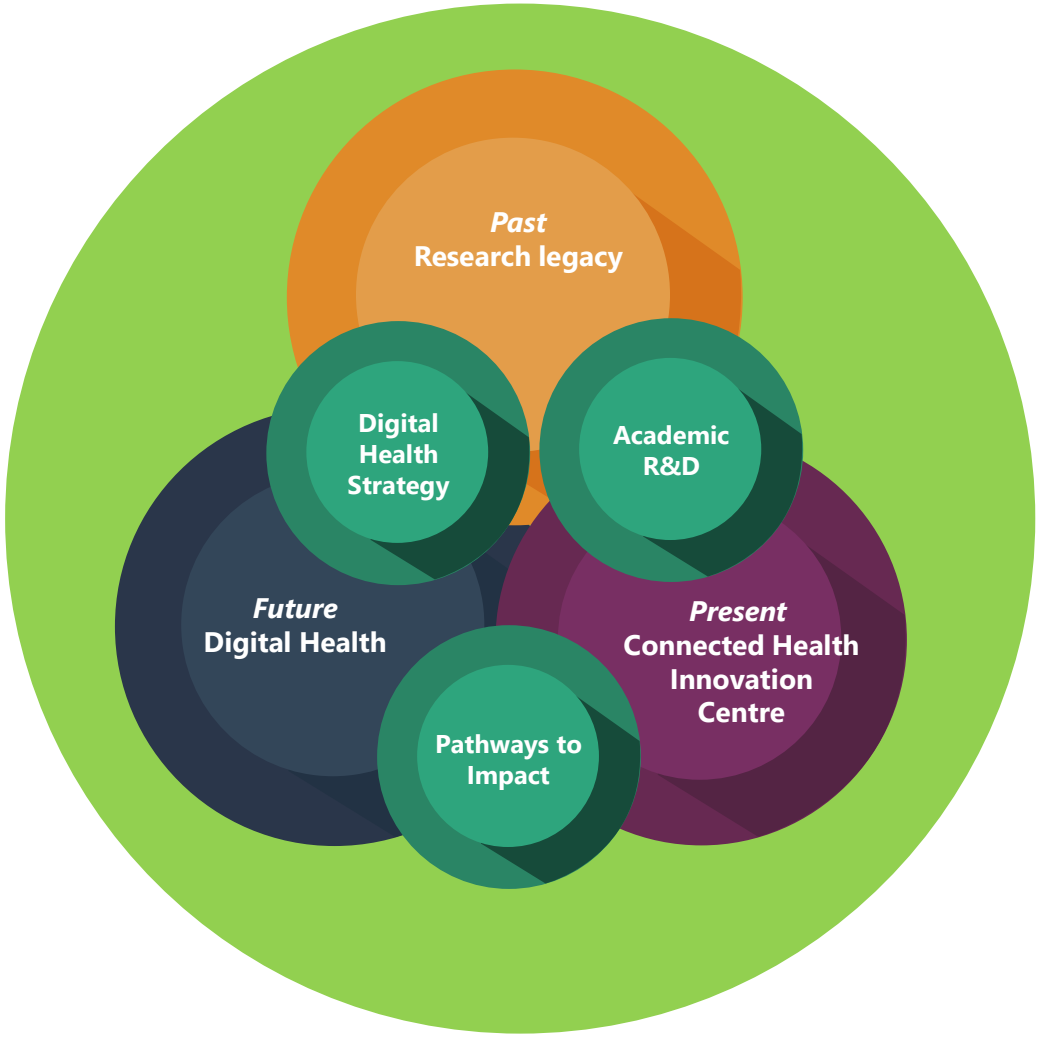
Ulster University, School of Computing



Centre for Pervasive Computing
Centre for Artificial Intelligence
Connected Health Innovation Centre
Advanced Research and Engineering Centre
BT Ireland Innovation Centre

CHIC
Northern Ireland Connected Health Innovation Centre

Ulster's strategy to Digital Health



The past – Research in Connected Health

Research Centres: Missions and Themes

Artificial Intelligence Research Centre

"Making a difference to people and society through work in artificial intelligence"

Pervasive Computing Research Centre

"Through an integrated and multidisciplinary approach advance research to support and monitor people within their home and beyond."

Solutions →

← *Problems*

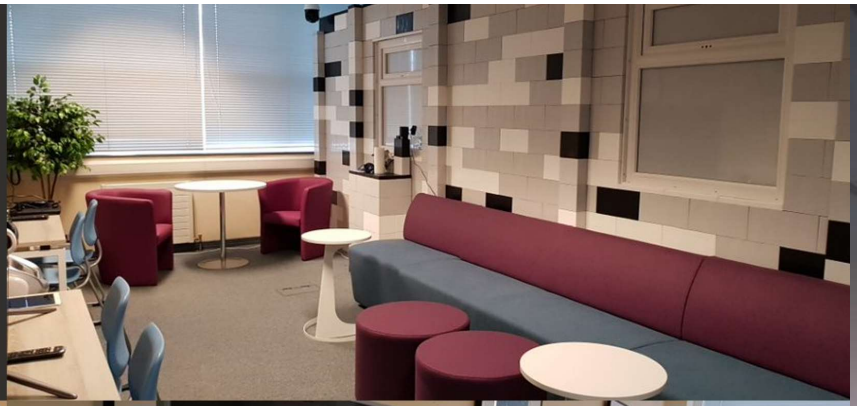
- Informatics and Systems
- Knowledge Reasoning and Decision-Making
- Learning, Modelling and Optimisation
- Ubiquitous Intelligence
- Human Activity Recognition
- Human Computer Interaction

Application Domains - Healthcare, Cyber Security, Agriculture, …….

Ulster University

CH:LL

Connected Health Living Lab



Research environment

26 JANUARY 2023

Kainos partners with Ulster University to open a new Artificial Intelligence Research Centre

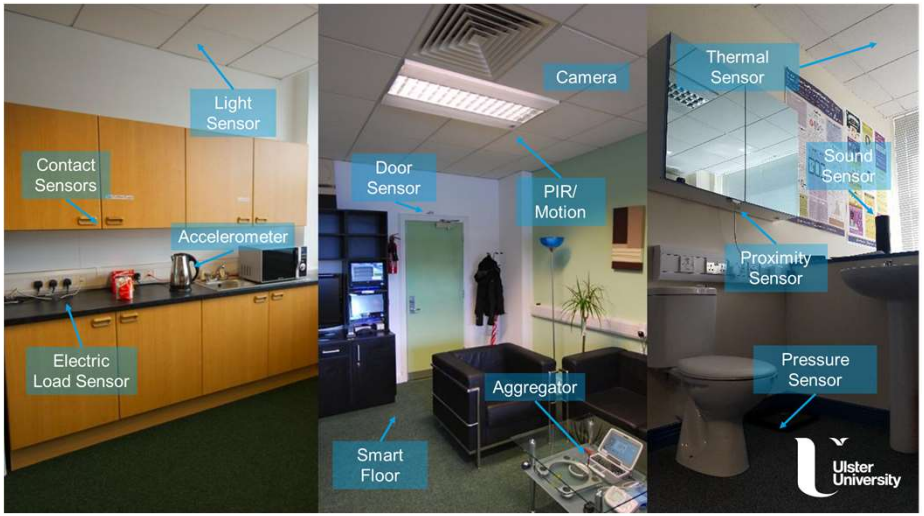
Kainos is supporting the launch of an Artificial Intelligence Research Centre at Ulster University's new Belfast campus.

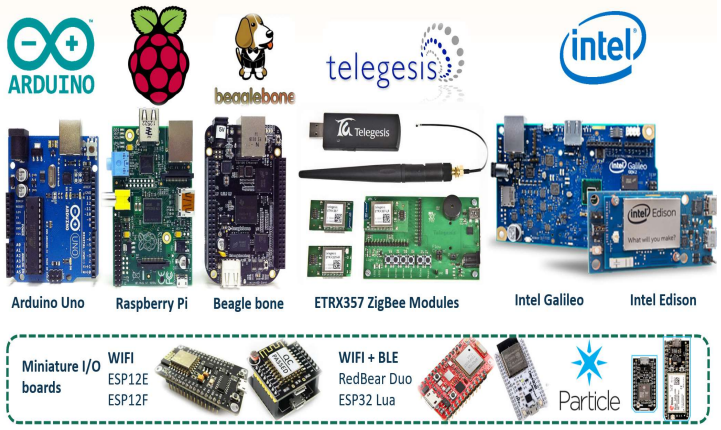
Ulster University @UlsterUni · 2h

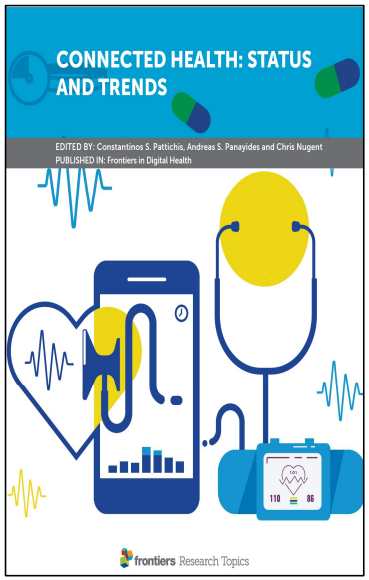
We're partnering with @KainosSoftware to launch an artificial intelligence research centre on our Belfast campus. The partnership represents a collaboration between industry experts and academia, to inspire the next generation to harness the power of AI to improve society (1/2)

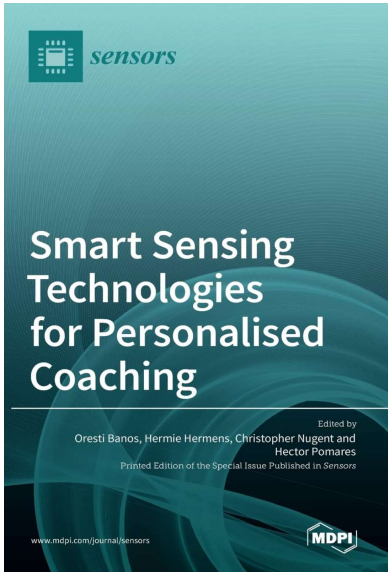
1 3 8 1,023

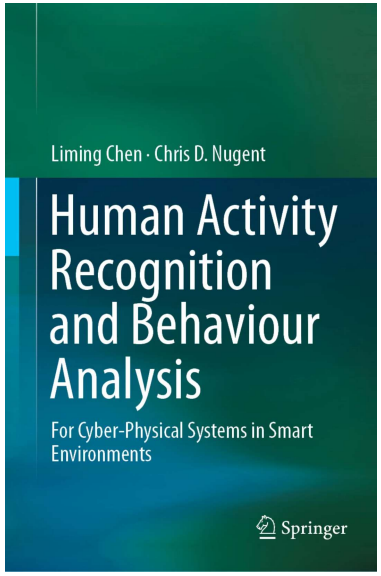
Research Labs, Platform and Devices

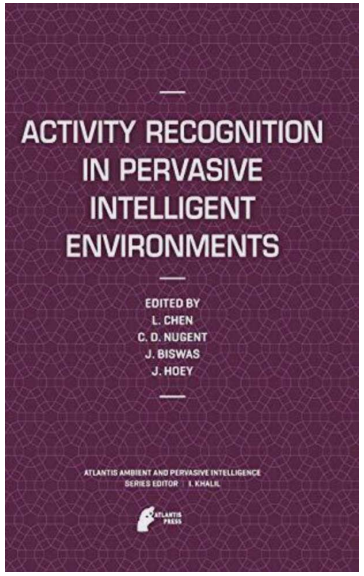


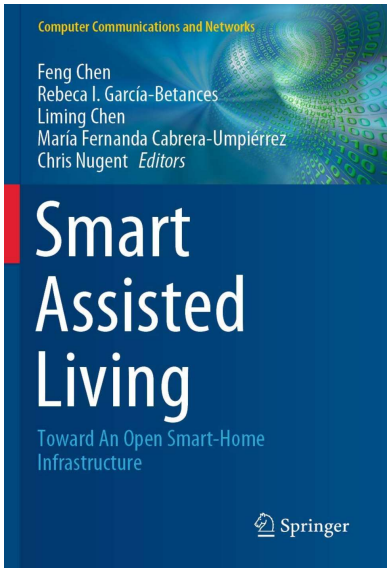


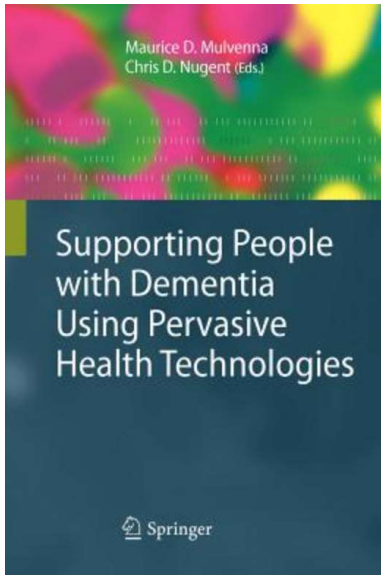

CONNECTED HEALTH: STATUS AND TRENDS
EDITED BY: Constantinos S. Pattichis, Andreas S. Panayides and Chris Nugent
PUBLISHED IN: Frontiers in Digital Health
frontiers Research Topics

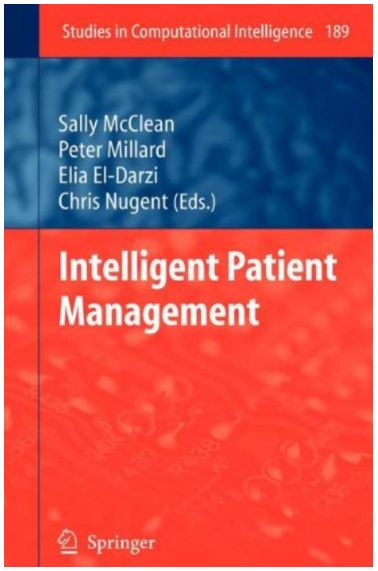

sensors
Smart Sensing Technologies for Personalised Coaching
Edited by
Oresti Banos, Hermie Hermens, Christopher Nugent and Hector Pomares
Printed Edition of the Special Issue Published in Sensors
www.mdpi.com/journal/sensors
MDPI

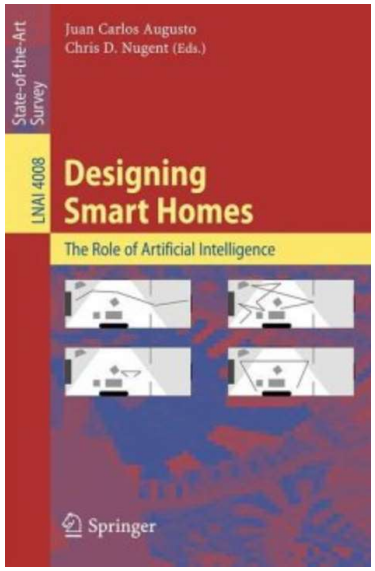

Liming Chen · Chris D. Nugent
Human Activity Recognition and Behaviour Analysis
For Cyber-Physical Systems in Smart Environments
Springer


ACTIVITY RECOGNITION IN PERVASIVE INTELLIGENT ENVIRONMENTS
EDITED BY
L. CHEN
C. D. NUGENT
J. BISWAS
J. HOEY
ATLANTIS AMBIENT AND PERVASIVE INTELLIGENCE
SERIES EDITOR I. KHALIL


Computer Communications and Networks
Feng Chen
Rebeca I. García-Betances
Liming Chen
María Fernanda Cabrera-Umpiérrez
Chris Nugent Editors
Smart Assisted Living
Toward An Open Smart-Home Infrastructure
Springer


Maurice D. Mulvenna
Chris D. Nugent (Eds.)
Supporting People with Dementia Using Pervasive Health Technologies
Springer


Studies in Computational Intelligence 189
Sally McClean
Peter Millard
Elia El-Darzi
Chris Nugent (Eds.)
Intelligent Patient Management
Springer


State-of-the-Art Survey
LNAI 4008
Juan Carlos Augusto
Chris D. Nugent (Eds.)
Designing Smart Homes
The Role of Artificial Intelligence
Springer

Research Projects

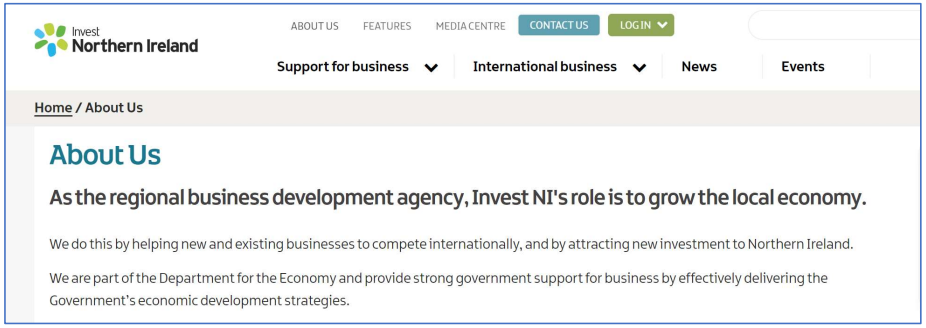

Ulster
University
The present - Beyond fundamental Research

Connected Health Innovation Centre

-CHIC was established as an Industry-led competence centre focused on collaborative research to support the connected health industry in Northern Ireland.
-Funding was provided by Northern Ireland's Regional Business Development Agency.

Emerging Focus Areas

1. **Integrated community care** – joining together existing and new technology and process.
2. **Point of Care Diagnostics** – moving diagnostics closer to the patient.
3. **Vital Sign monitors** - technology development to support vital sign identification, analysis and communication.
4. **Cloud Based Health** – use of cloud technology for health solutions.

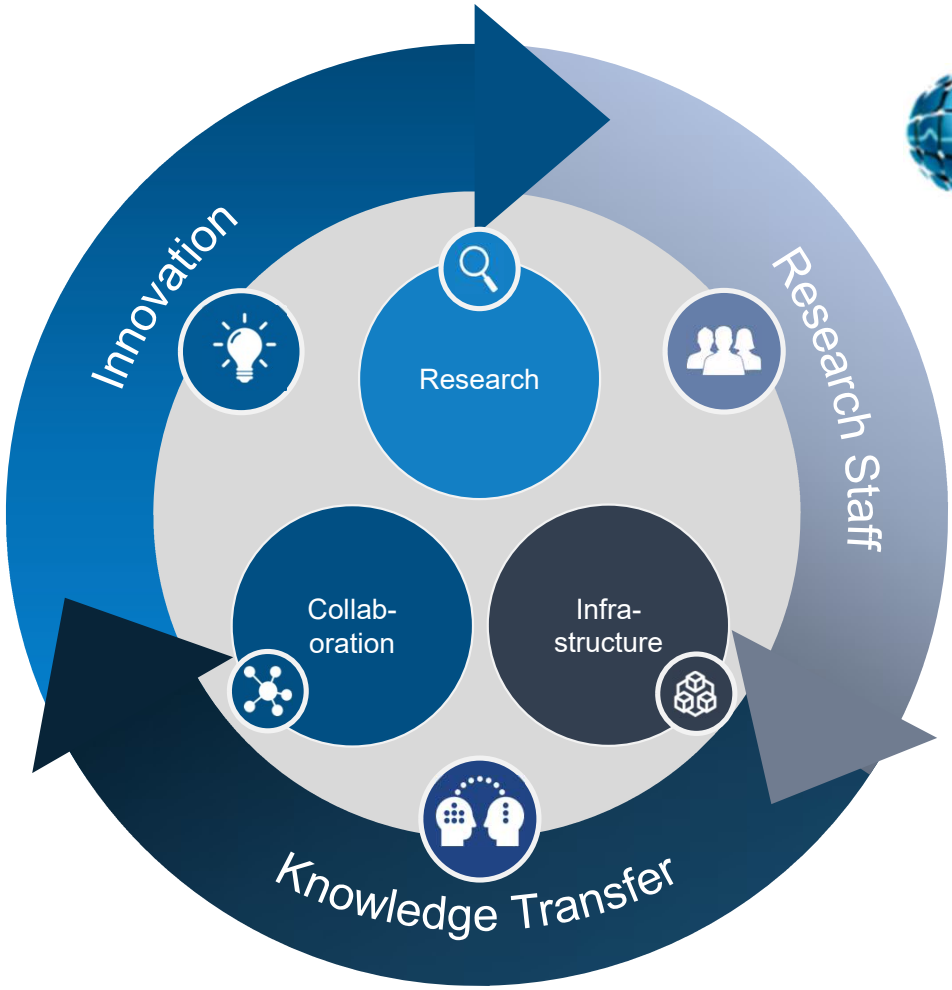


Invest Northern Ireland
Building Locally Competing Globally

CHIC
Northern Ireland Connected Health Innovation Centre

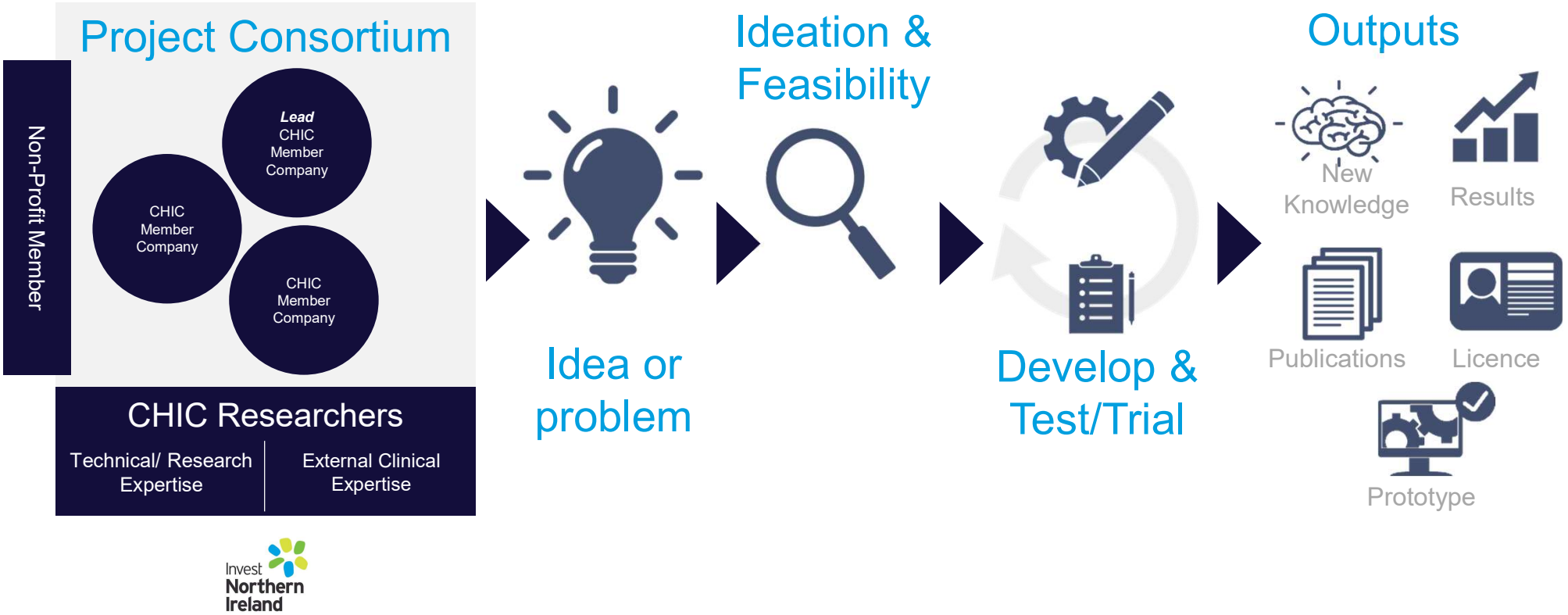
Connected Health Innovation Centre

- CHIC is focused on business led research in the area of connected health.
- The centre's unique business and research collaborative approach aligns care needs with technology providers, researchers and clinical experience.
- It is leading the way in transformational research for Connected Health.



How CHIC Works

CHIC Project Process



CHIC Member Companies

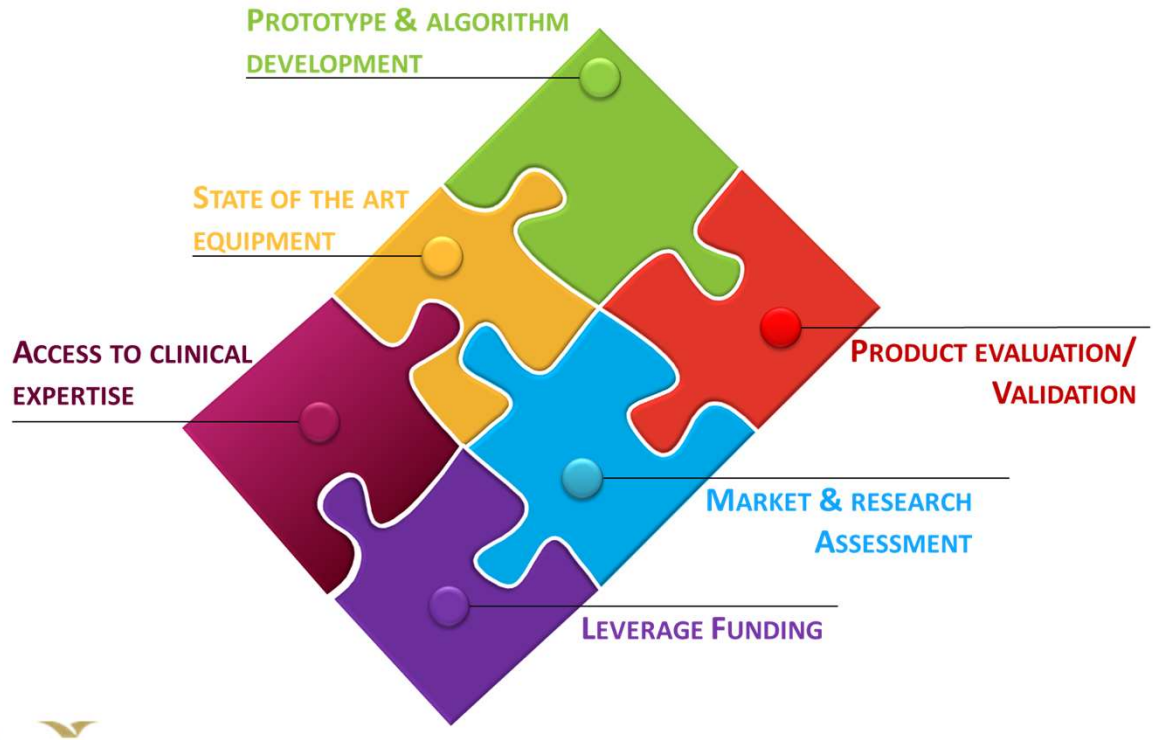
Work with local business within Northern Ireland to develop capability and competence in the area of Connected Health.

Collaborators include:

- Technology Based
- HealthCare Based
- Voluntary and Charity Based
- Aspirations to enter market

What Can CHIC Offer

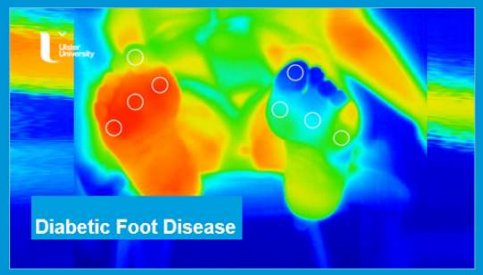
To a Company member



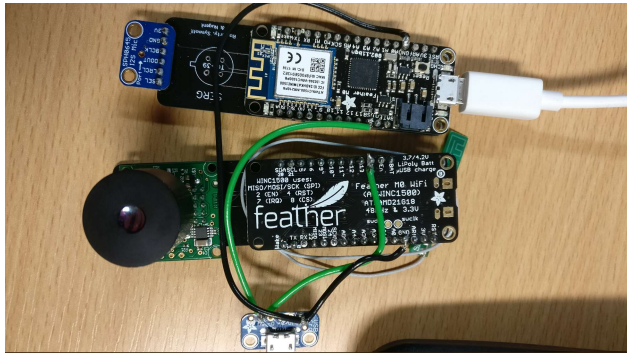
Ulster University

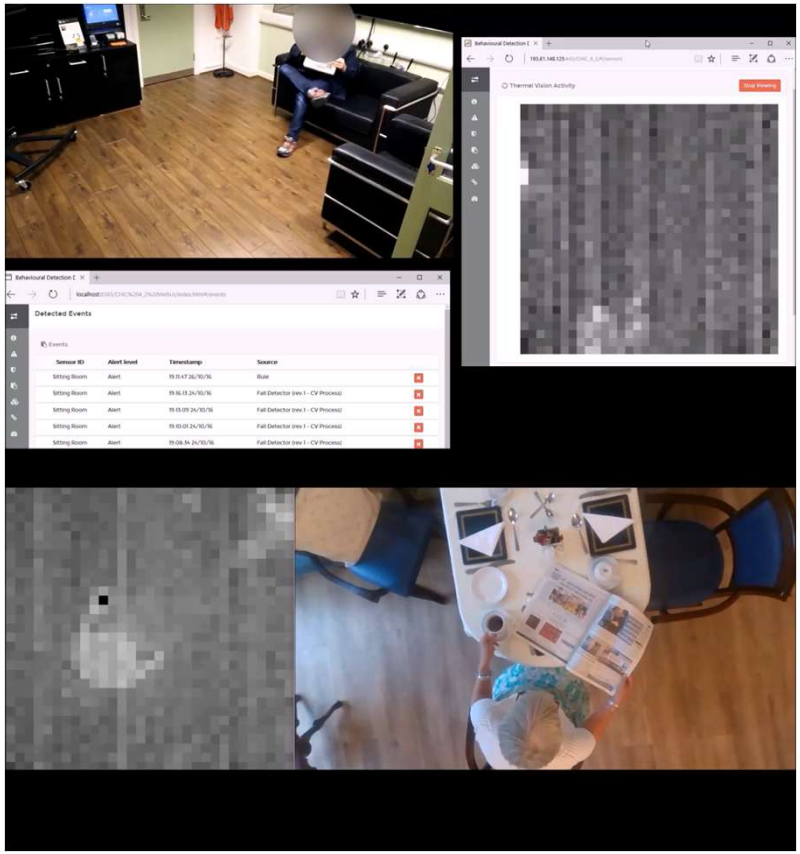
Ulster University

CHIC



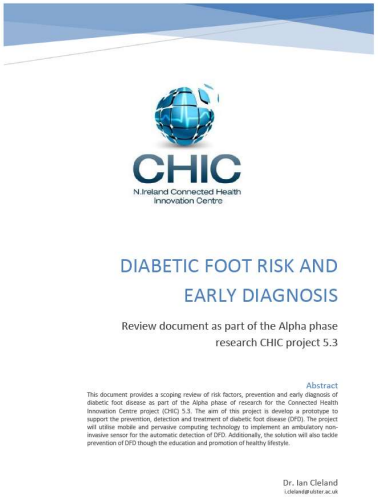
Thermal Sensing

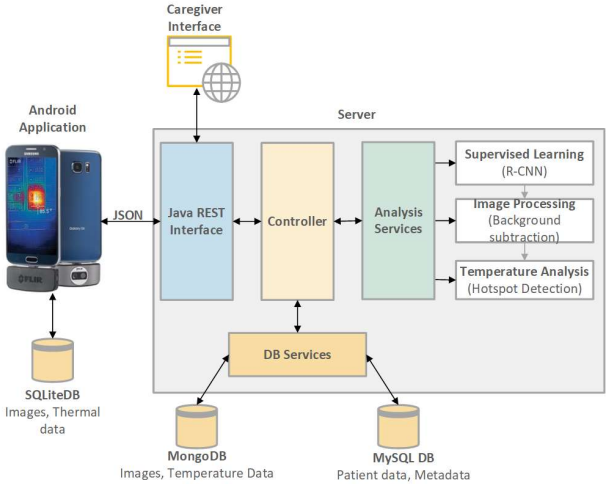


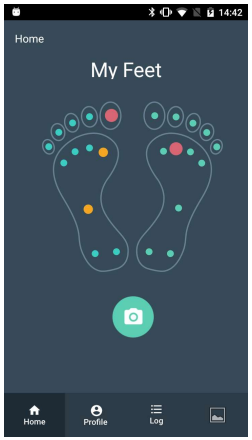


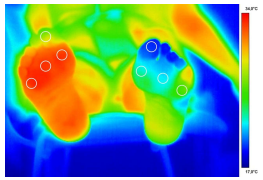
TRL 1 | TRL 2 | TRL 3 | **TRL 4** | TRL 5 | TRL 6 | TRL 7 | TRL 8 | TRL 9

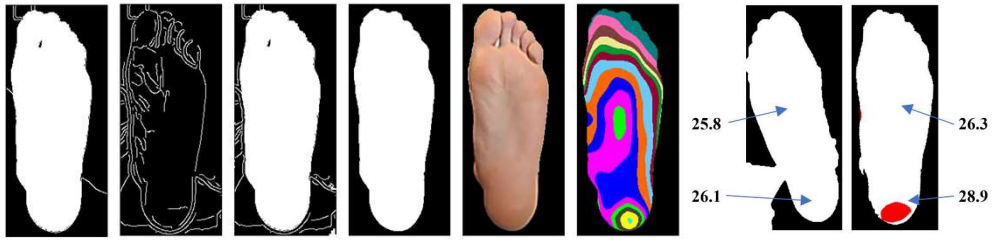
Thermal Imaging for Diabetic Foot











K-means clustering using pixel colour. | Canny edge detection. | Merged image. | Dilation, erosion and fill operations. | Clean foot RGB image. | Temperature-colour mapping.

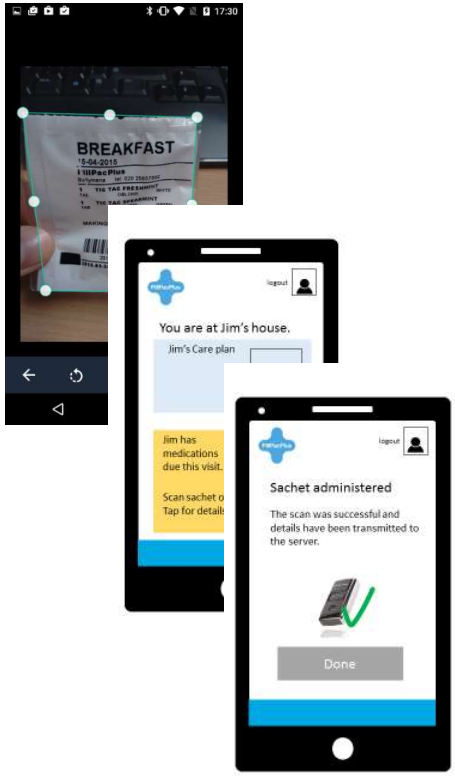
TRL 1 | TRL 2 | TRL 3 | TRL 4 | **TRL 5** | TRL 6 | TRL 7 | TRL 8 | TRL 9

Medications Management

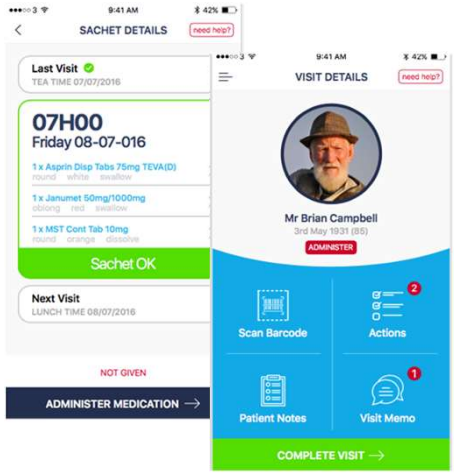
CHIC Northern Ireland Connected Health Innovation Centre

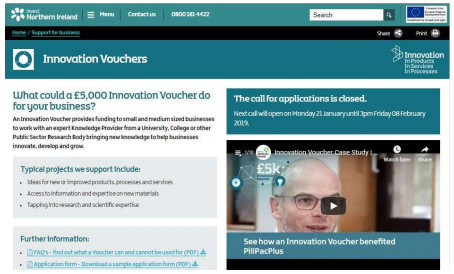
Ulster University

PillPacPlus Making Medication Simple

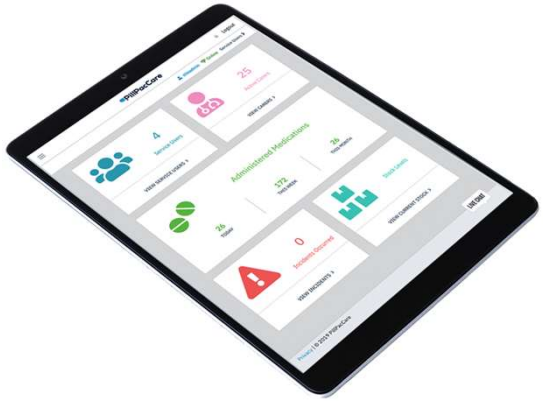


SBRI Government challenges. Ideas from business. Innovative solutions.





PillPacCare



TRL 1 | TRL 2 | TRL 3 | TRL 4 | TRL 5 | TRL 6 | TRL 7 | TRL 8 | TRL 9

Intelligent Mobility Aids

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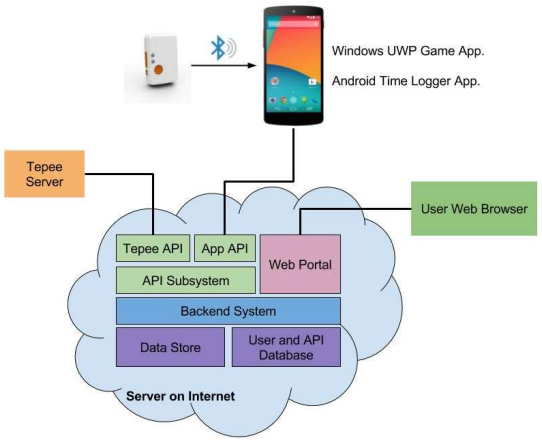
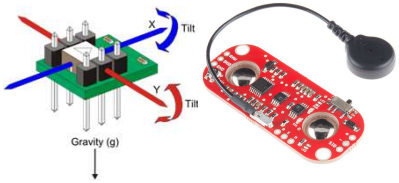
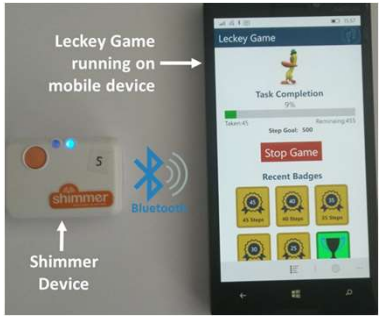
Ulster University

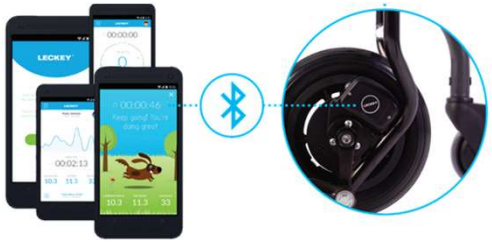
Innovate UK Knowledge Transfer Network

LECKEY









LECKEY connect

TRL 1 | TRL 2 | TRL 3 | TRL 4 | TRL 5 | TRL 6 | TRL 7 | TRL 8 | TRL 9

Connected Health Innovation Centre

Invest NI Competency Centre
Industry Focused Digital Health Innovation

CHIC has been running for
11 Years and has secured

2013 — 2024

£8m
in funding

70
Member Companies

23
Researchers

73
Projects Delivered

KEY FOCUS AREAS:

CHIC Specific Outputs

Leveraged Funding

£65m has been leveraged in research funding building on CHIC expertise.

£65m

Licenses

Company partners have made 7 license agreements to trial and market CHIC technology

9

PhDs

3 PhD's in Digital Health completed between Ulster University and Queen's University Belfast.

3

Intellectual Property

CHIC projects have generated 14 invention disclosure forms within the University of Ulster

14

Spin Outs

1 Spin out company has been created in the area of managing Diabetic foot disease.

1

Cash Contributions

Funds raised from Membership fees and 5% Project costs

£320k

Publications

CHIC Researchers have published 212 Academic publications in top-tier academic journals and conferences

212

Follow on Projects

18 Follow on projects have been secured with company and clinical partners

18

In-kind Contributions

Funds raised from Membership fees and 5% Project costs

£1.25m

Case Studies

New Product Sales

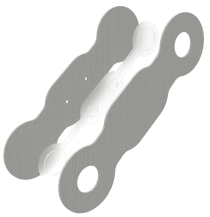
Creation of a self-management product for NI based Children's Equipment producer – **Leckey.** Currently being **sold in 22 countries** including the UK, Europe, Middle East, and new markets in Australia

New Business Model

Developed an internet-based product medication dispensation management tool for **Ballee Pharmacy** leading to 8 jobs, uptake by 150 users across 5 care homes and annual revenue in excess of **£1,200,000**.

New IP and Projects

Developed a Home reader for Fertility Testing kits for **CIGA Healthcare** leading to new product IP, and company forecast sales in excess of **£5,000,000** within 5yrs.

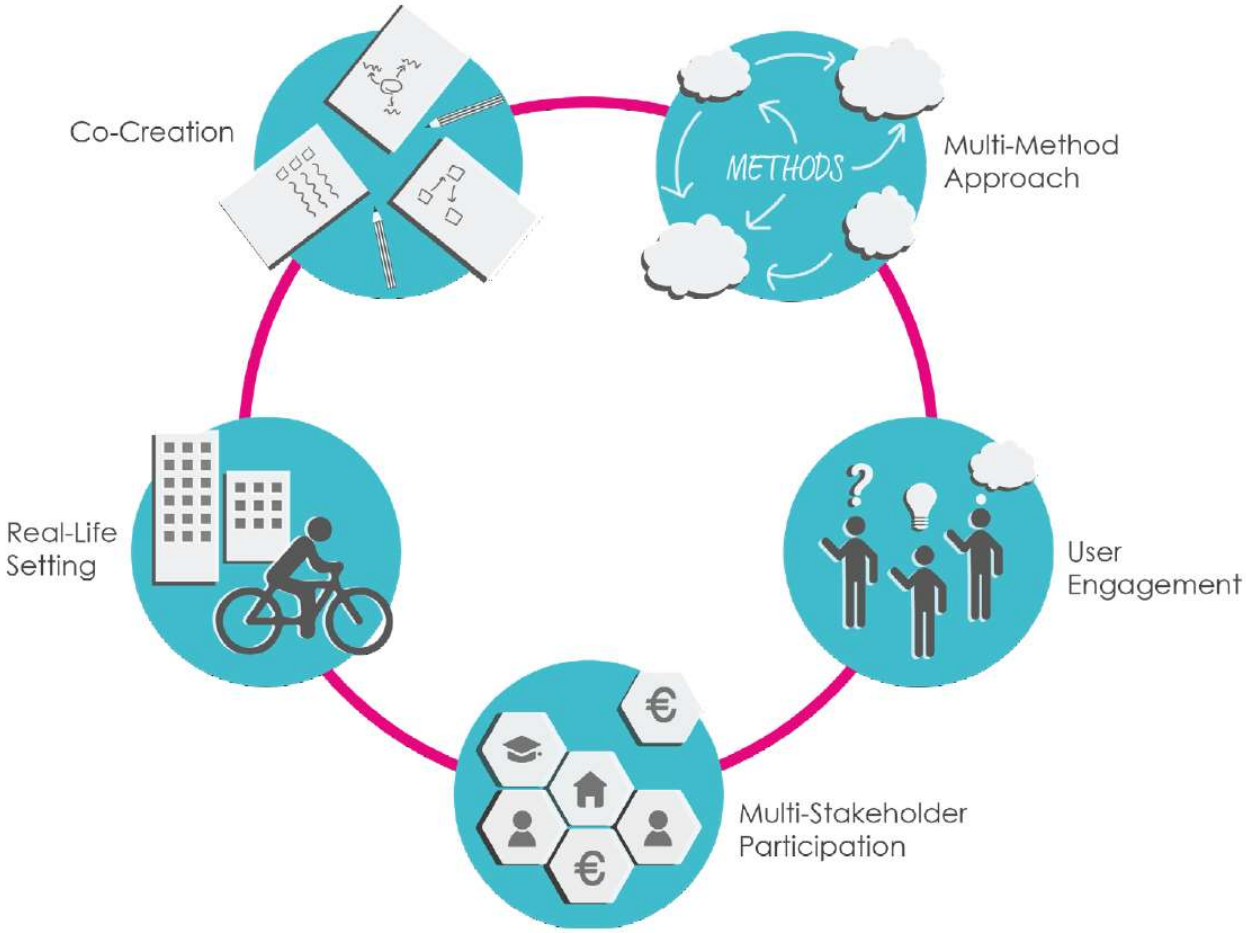


The future of Digital Health at Ulster

Connected Health Living Lab (CH:LL)

Connected Health Living Lab

- The Living Lab provides infrastructure to facilitate a **user-centered**, open innovation 2.0 ecosystem.
- Integrating **research and innovation** within a Public-Private-People partnership delivered through an iterative experiential design process.
- Access to **state-of-the-art technology** to assess usability and interaction with innovative technologies.
- A dedicated environment to record **user behaviours** with new **Connected Health solutions.**



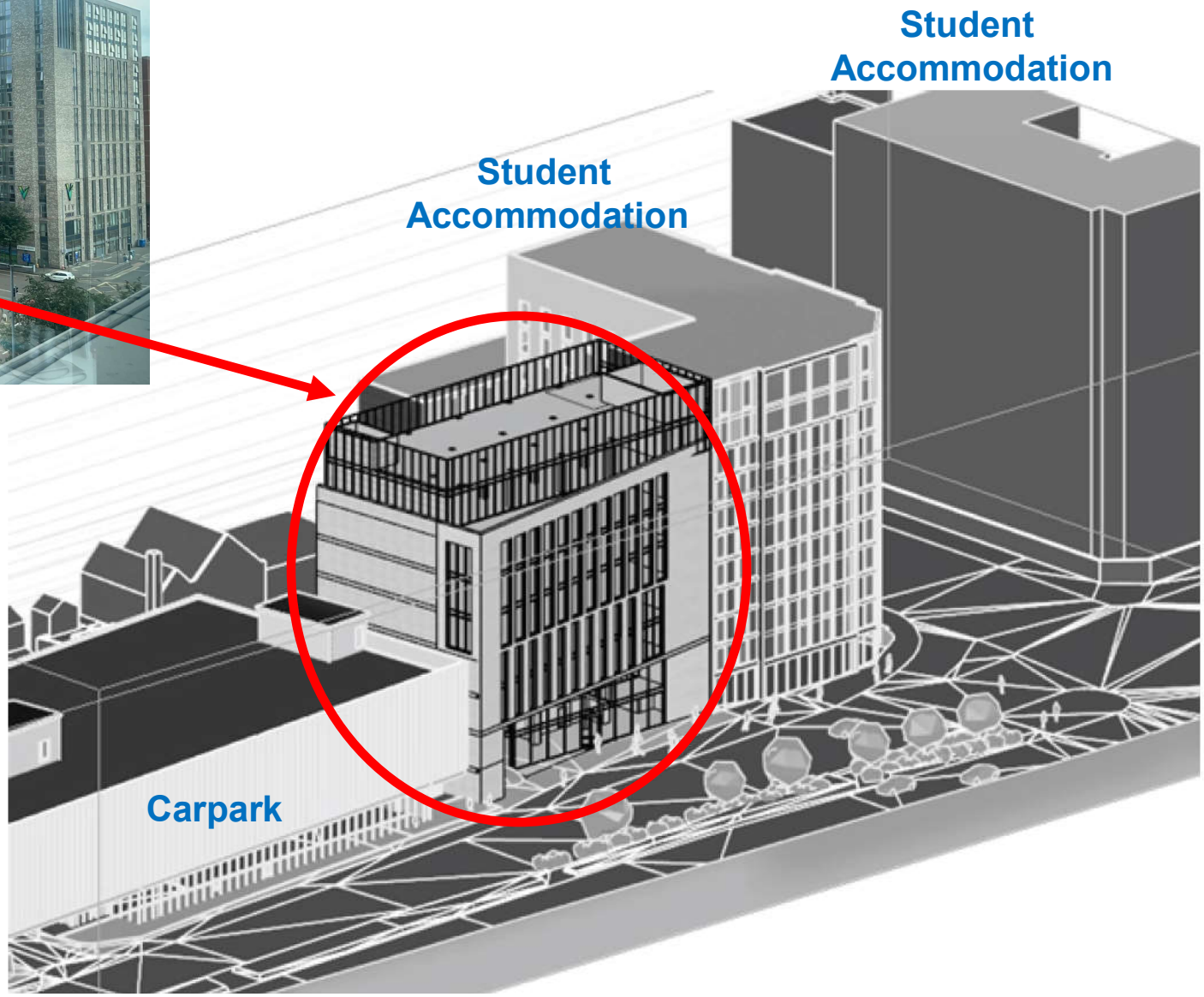

Ulster University
City Deal
DIGITAL HEALTH TECHNOLOGY HUB
An open innovation ecosystem with living labs putting user centric design at the heart of digital medical technology development.

Centre for Digital Healthcare Technology

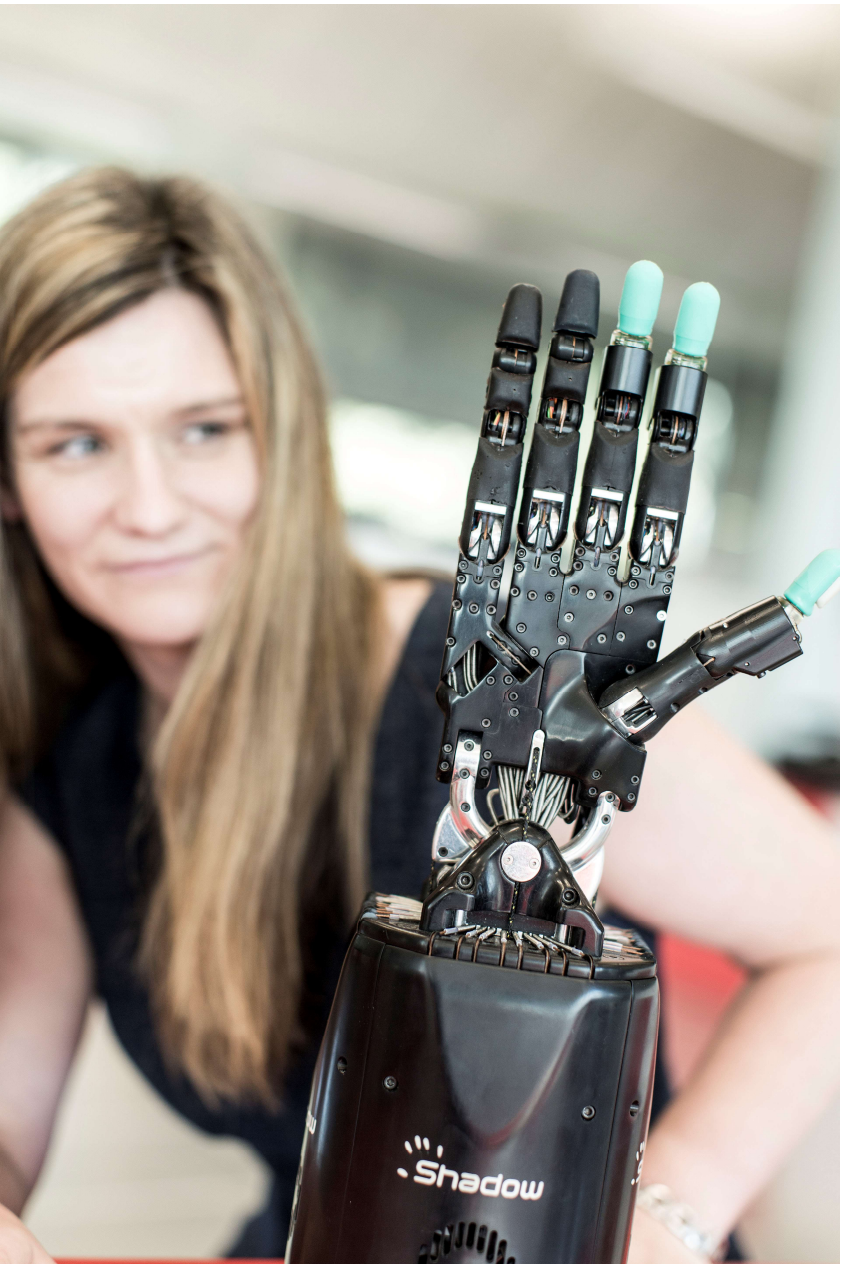
- £43M project (part of the UK government £1B City Deal Programme)
- CDHT will be a central pillar to engaging with Industry in Digital Health Sector
- CDHT will establish a MedTech Innovation cluster, open innovation for new ideas with Industry at its core
- Enhanced capability and world class space / innovation accelerator for academia, industry and clinicians to come together to innovate and boost the productivity

The Centre for Digital Healthcare Technology

- Create an **enhanced capability** and **world class** space / innovation accelerator
- Combining **academia**, **industry** and **clinicians** to innovate and boost the productivity of the healthcare technology sector in Northern Ireland.
- For the first time it will bring together internationally leading **Computing** (AI to IOT), **Engineering** (Health Tech) and **Biotechnology** (Molecular Diagnostics)
- Focused on many of the world's key challenges including **rising healthcare costs and healthy ageing**.
- 5000 m2 of R&D facilities, living lab space and incubation space.
- Offering top class facilities, access to expertise, equipment.
- Opportunities for both local and international companies and researchers to become involved.



Centre for
Digital Healthcare
Technology



MSc Digital Health

Ulster University

Artificial Intelligence in Digital Health

Digital Health Technology

Research Methods in Digital Health

Medical Device Development

Digital Transformation

Data Science and Machine Learning

Masters Project

12 months Industrial Placement

Summary – Strategy in Digital Health

Ulster University

Fundamental Research

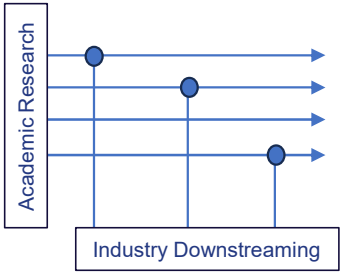
Engage with government, health service and Regional Development Agency

Invest Northern Ireland

Conduct industry led research underpinned with multi disciplinary academic disciplines

CHIC
Northern Ireland Connected Health Innovation Centre

Develop down streaming pathway to convert research to product



Change model to deliver at scale, drive innovation and upskill community

Centre for Digital Healthcare Technology

Ulster University MSc Digital Health

Summary

Digital health solutions should be industry driven underpinned by multidisciplinary research.

Having alignment with industry, health services and government has been pivotal.

Define pathways to impact to ensure ROI.

UCAmI 2024

16th International Conference on Ubiquitous Computing and Ambient Intelligence

November 27th to November 29th, 2024 - Ulster University - Belfast (Nothern Ireland, United Kingdom)

Start


Ulster
University


CHIC
Northern Ireland Connected
Health Innovation Centre


Invest
Northern
Ireland


European
Commission
Horizon 2020
European Union funding
for Research & Innovation


HSC
Public Health
Agency
Research and Development


Department for the
Economy
www.economy-ni.gov.uk


3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

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Questions?

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