

Wearable Technology and Healthy Ageing

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A bit about me

- Biomedical Engineer
- Master of Engineering (2023): Brain–Computer Interface for assistive navigation
- PhD Researcher (Aston University): Wearable & Internet of medical Things design for older adults (60+)
- Focus: Usability and Human–Computer Interaction

Project overview

Evaluating how older adults (60+) accept and use wearable and home-based smart health technologies designed to monitor wellbeing, provide assistance, and enhance safety.

Supervisors



Dr Surej Mouli



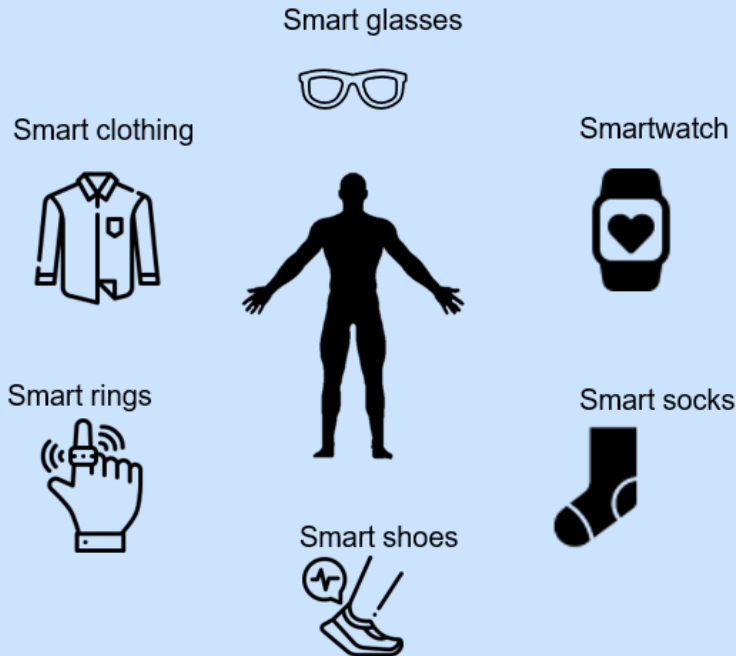
Dr Antonio Fratini

**Engineering for Health
Research Centre
(E4H)**



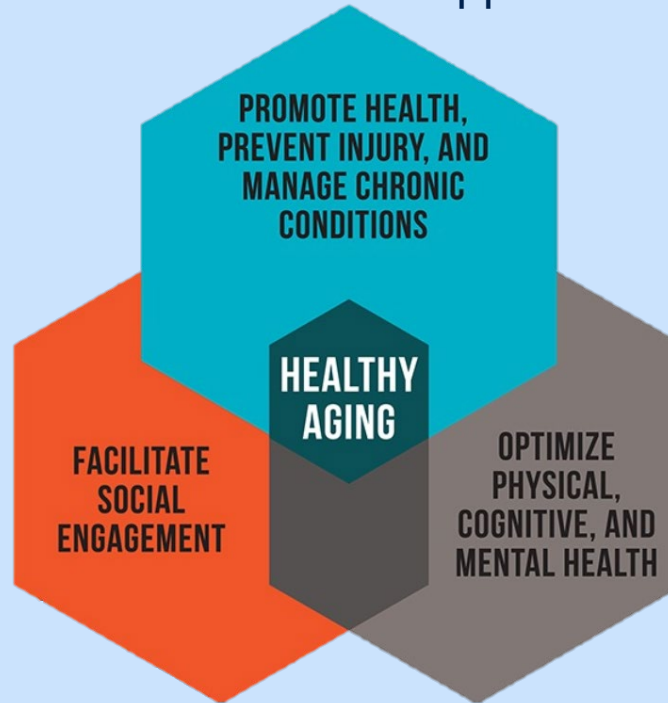
What are wearable devices?

small devices worn on the body -that keep an eye on our health



What is Healthy Ageing?

Maintaining functional abilities that support well-being in older age.



11,000,000

Aged 65+

↑ 32% by 2043



- 1 in 4 have 2 or more chronic conditions
- Older adults are living longer but in poor health

What can wearable devices do ?



Track steps
and calories



Measure heart rate
and blood oxygen



Record location
and GPS



Set reminders



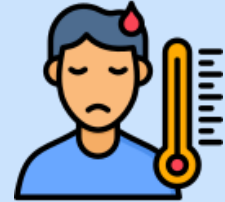
Send emergency
alerts Eg falls



Connect to smart
phone apps

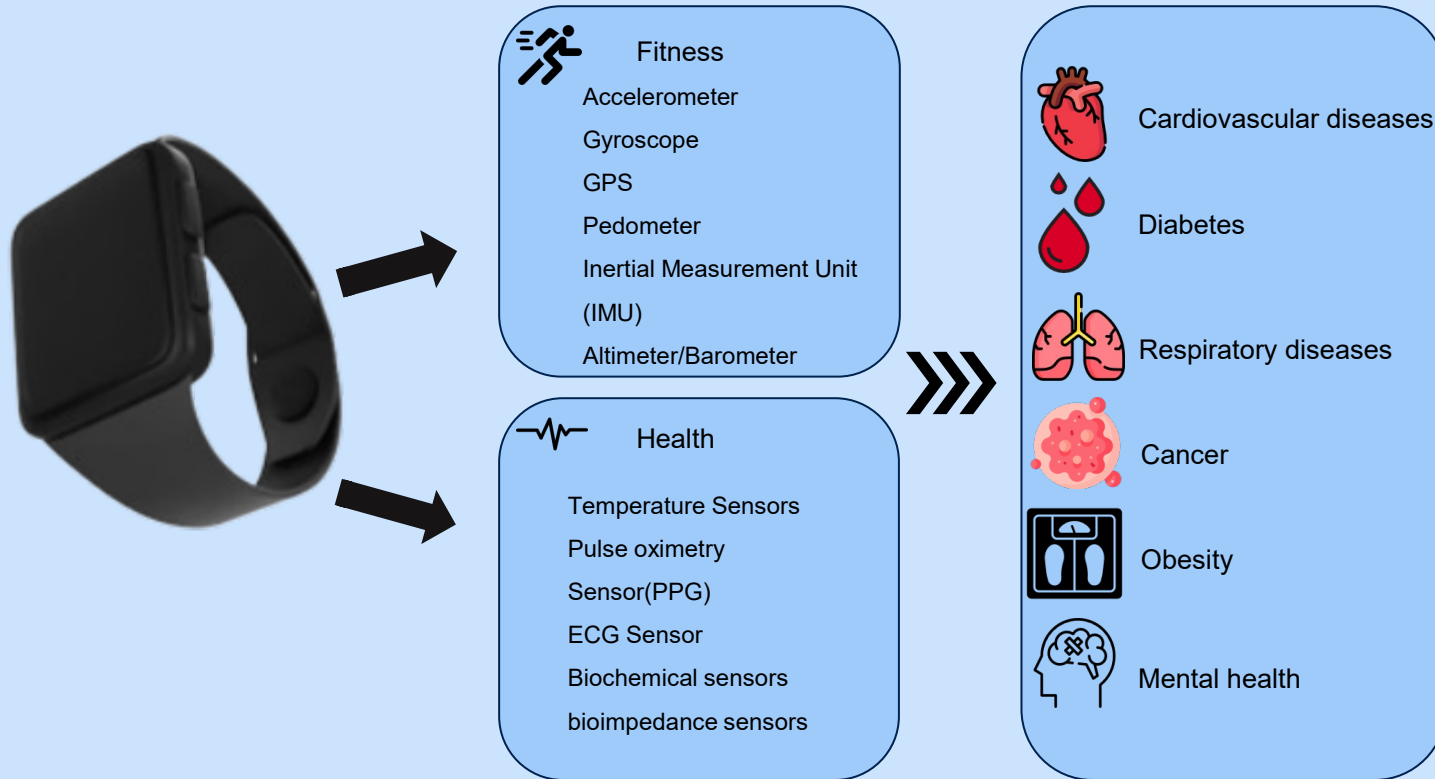


Track when and
how well you sleep



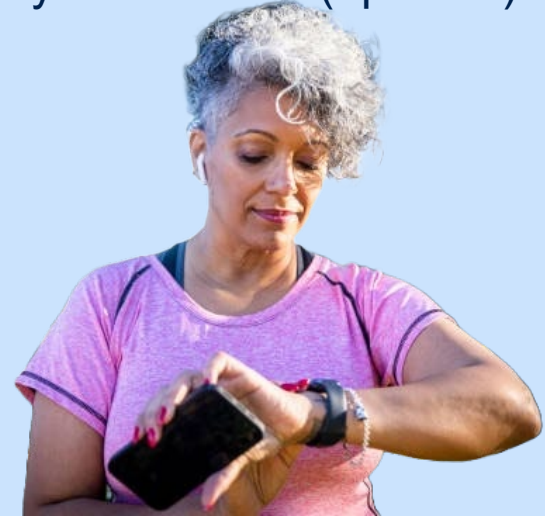
Check body
temperature

Wearables and Chronic disease Management



How Wearable Devices Fit In

- Encourage small daily habits (steps, movement, rest)
- Support self-health management - gentle nudges, not strict medical rules
- Help spot changes in routine or energy
- Can link with apps or share information with family and friends (optional)



What Consumer Wearables Cannot Do

- Consumer Wearables are **not medical devices**
- They cannot replace advice from your doctor or nurse
- Think of them as a helpful guide or motivator, not as a doctor on your wrist

Example:

If your watch shows your heart rate is high, it doesn't mean something is wrong.

It just means you might want to slow down, take a rest, and, if you're worried, talk to your GP.

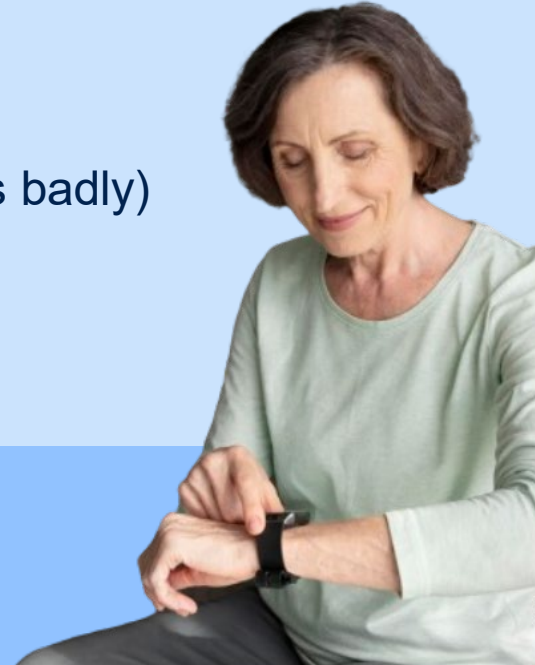
Meet Bob (73)



- Had a heart scare 6 months ago
- Doctor suggested keeping active
- Now uses a wearable device to:
 - Track **5,000 steps a day**
 - Keep an eye on his **heart rate**

Meet Mary (Age 68)

- Retired teacher, lives alone
- Sometimes forgets to drink water during the day
- Uses her wearable to:
 - Get **reminder alerts** for hydration and medication
 - Track **sleep quality** (helps her notice when she sleeps badly)



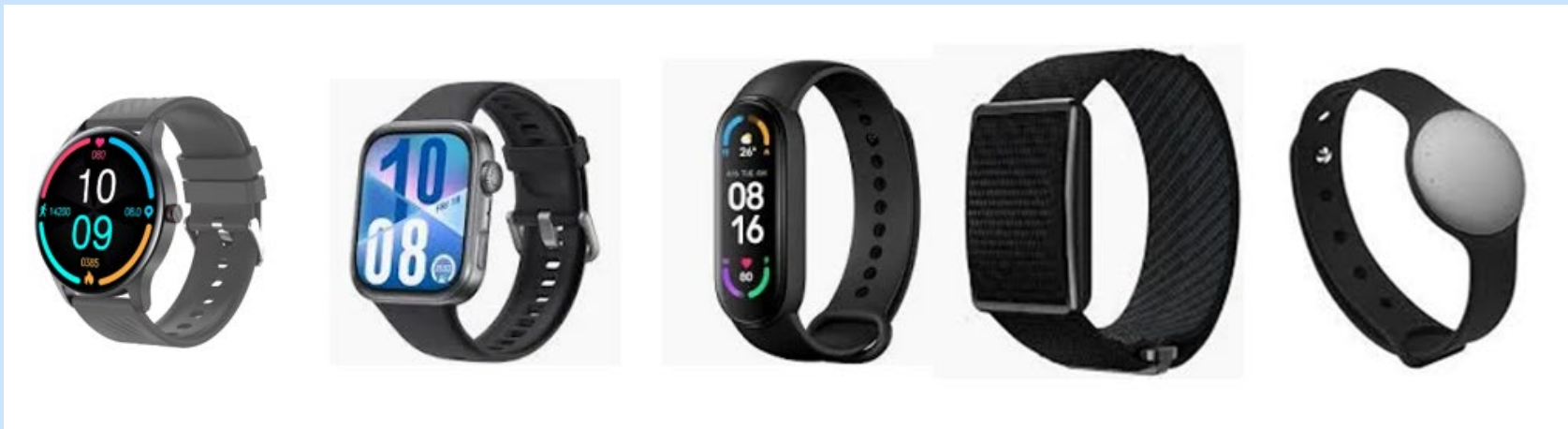
The Plot Twist

- Technology that could help is not being used
- Older adults are underutilising these technologies compared to other age groups
- The few that do , stop using them after a while.



Different Shapes and Designs

Wearables come in many styles



Shapes and screen types

Different shapes and designs



Different materials and fastening techniques

Different shapes and designs



Different devices for different wear locations

Project aim

To identify and evaluate approaches for improving usability of IoMT technologies thereby enhancing adoption and maximising their potential benefits among older adults

Making wearable technology work for older adults

Usability

- How well a system, product, or service can be used by its intended users to achieve objectives in an effective, efficient, and satisfactory manner

Acceptance

- Willingness and ability of individuals to adopt and use new technologies



Research Findings



- **50** Factors influencing adoption / acceptance

Categorised into 4 groups

- Physiological and health variables
- Psychosocial determinants
- Cognitive and Technological Aptitude
- Technological attributes

- **36** Usability challenges

Categorised into 8 groups

- Physical interaction and accessibility challenges
- Visual Challenges
- Cognitive Challenges
- Sensory and Feedback Limitations
- Technical challenges
- Privacy and Security Concerns
- Motivation and relevance
- Support and troubleshooting challenges

Common Struggles

- Small buttons, hard straps, charging issues
- Small texts and icons
- Menus too complex, hard to remember how to use
- Difficult to hear notification alerts
- Difficult to set up
- Worries about sharing personal data
- Doesn't match daily life or goals
- Unclear instructions



Why Motivation Matters

- Wearing a device only works if it feels useful.
- People want to see immediate benefits, not just numbers.
- Lack of visible results makes it easy to stop wearing it.
- Wearables need to connect to daily comfort and routines (not just fitness).
- Motivation grows when the device makes life easier right now.

Towards a solution

Survey → Co-design → Implement → Test → Better usability



Surveys



Co-design workshops with older adults

What if your smartwatch could also help at home?

Smart curtains

Kettle

Smart door

Lamp

Fan

Smart speaker

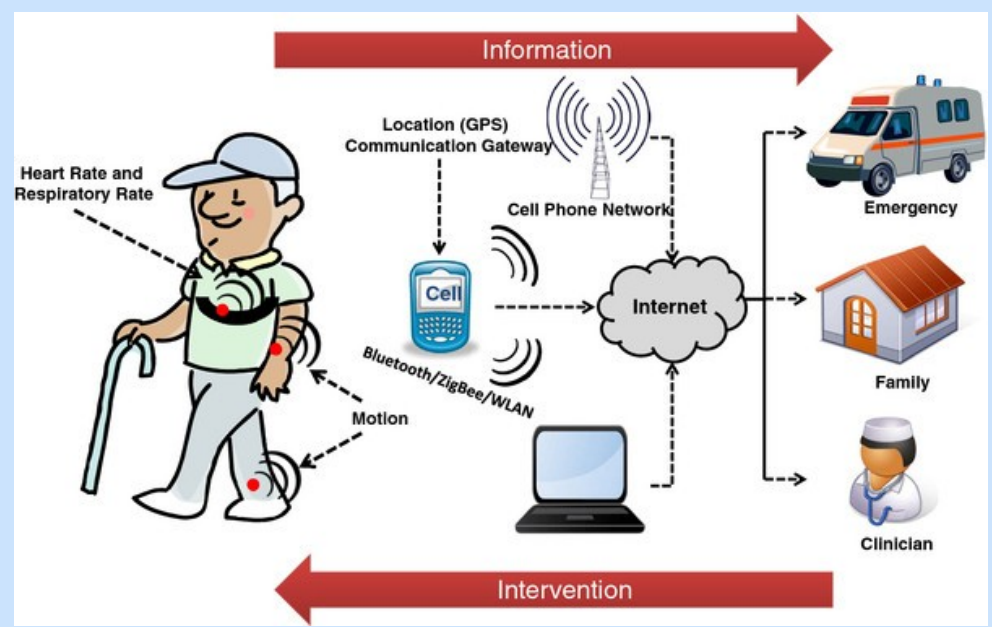
Wearable device



Wearables and Ageing in Place

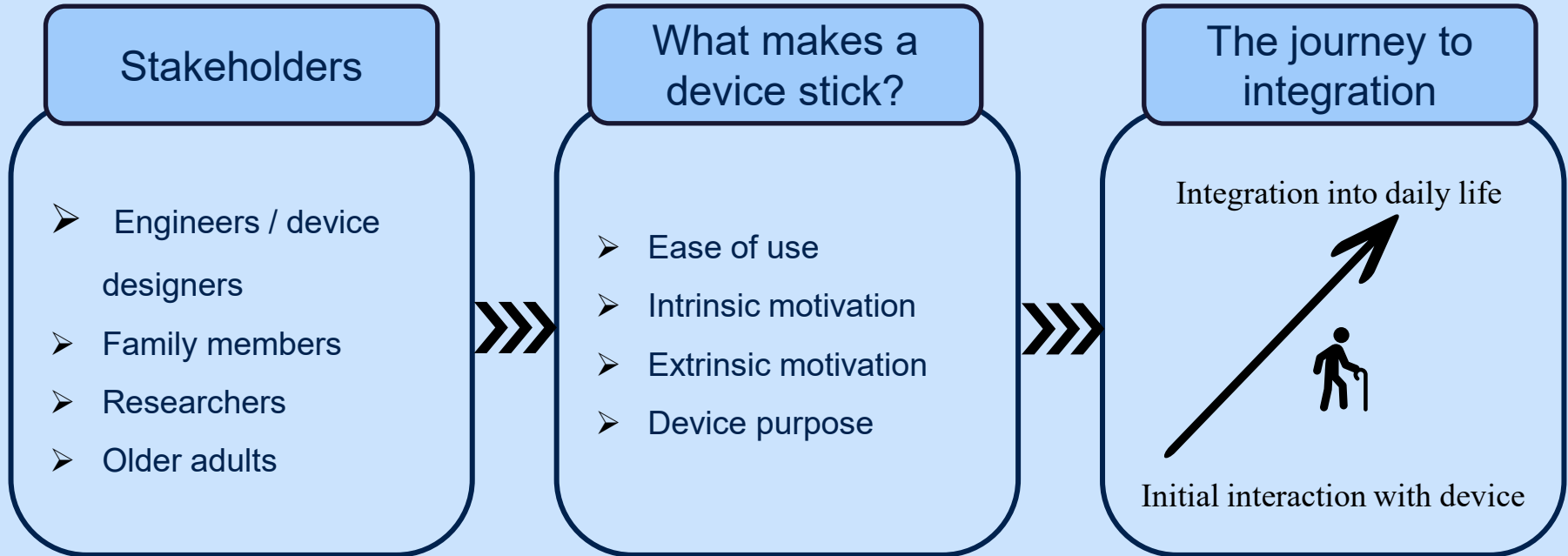
- **Ageing in place** means staying safe, healthy, and independent in your own home
- Wearables can support this by:
 - Detecting falls or unusual movement patterns
 - Sending alerts to family or carers if needed
 - Reminding you about medication or hydration
 - Tracking activity, sleep, and heart health
- Combined with **smart home devices** (lights, sensors, voice assistants), they create a supportive environment

The future of healthcare



- Healthcare is becoming more **personalised, predictive, and connected**
- **Wearables** will track health trends and share useful data with doctors
- **Smart homes and sensors** will help detect risks early and support care at home
- **Remote monitoring** will reduce hospital visits and support recovery
- **Human-centred design** will ensure technology stays inclusive and respectful

Responsible design : The Path Forward





Economic
and Social
Research Council

Wearable Technology for Older Adults: Try It, Test It, Talk About It



**Location : The Warehouse
Birmingham Friends of the Earth
environmental community hub
54-57 Allison St, Birmingham B5 5TH**

**Date : 05/11/2025
Time: 10:00 am to 14:00pm**



Surveys you can take part in:

Survey 1: understanding intention to use wearable devices - <https://forms.office.com/e/8eAqd1afpZ>

Survey 2: perceptions and experience with wearable devices - <https://forms.office.com/e/qMBJduPVs4>

Survey 3: usability challenges - <https://forms.office.com/e/XKPQPhvjmk>

THANK YOU !!



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