Assistive and Enabling Technology: Past, Present and Future

50th Anniversary Annual Lecture

Praminda Caleb-Solly
Challenges of designing assistive technology that stays useful over time

Approximately 30% of people abandon use of their assistive technology

• Difficult to adapt to the changing needs of the person
• Difficult to personalise
• Difficult to ensure ease of interacting given a range of accessibility needs
Potential for Supporting Self-management of Conditions

Addressing the impact of ageing-related impairments through intelligent interactive technologies in a collaborative and engaging manner.
Assistive Robotics Technology

Socially Assistive

Physically Assistive
A Modular Physically Assistive Robot
CHIRON - JUVA
An Ambient Assisted Living Ecosystem

Cloud-based Services for Carers, Medical Experts, Relatives, Service Providers

Wireless sensors in the physical environment

Smart Home Automation and Communication

Physically and Socially Assistive Robots

Smart devices for monitoring heart rate, breathing, balance and temperature

Ambient Displays

Smart devices for monitoring heart rate, breathing, balance and temperature
Learning Patterns of Activity

Hello,
Remember to…..
Cognitive Support
Robotic is what we become when we are bored

Praminda Caleb-Solly
Repetitive chores that suck the zest out of your bones
Dull jobs that make you echo zombie tones
Dirty cleaning tasks that make you retch and groan
Dangerous is when you feel bitter and worn
We are not seeking to replace carers,
We want to make their lives brighter and fairer.
We are trying to make tech that will free up their time,
For more hugs, gossip and walks amongst the pines.
Not bend in agony from years of scaffolding holds,
Return the joy which led them to caring for the old.
We were born into warmth, love and delight
Nurturing lies in our hearts, setting the spark within alight.
I do not believe that this should ever be replaced,
However a robotic toilet will be my saving grace.
Dignity in being able to independently wash,
Get up when I want to, get dressed and walk.
The more that I do, the fitter I’ll stay,
Being helped to use my noodle and prompted in better ways.
And when I’m too frail to turn in bed,
I know that warm arms will embrace and nestle my head.
Cause Sarah is no longer needed for Molly down the road,
She is now free to come to me, now that I have slowed.
As for Molly, her robotic walker has her scooting all over,
She is coming round later to see my book about Dover.

https://www.robotcaresystems.com/
Do I really need a chatting bot?
Should it have eyes that can spot when I’m caught up in knots?
Tina’s son Ryan is far more entertaining,
I’ve been telling him how to deal with the slugs gorging on the salad he’s growing.
But a bot that could get my stockings on, while massaging my varicosed pins and that lot,
It would be a great feature built into my future modular robotic cot.
I don’t really need a social robot to tell me I look divine, Myself and my friend Alice can do our own pep-talk fine. What I want is a physically assistive robotic aid, That helps clean windows and can wield a spade.
If it communicates with my wearable watch
To tell my doc my ticker’s losing its toc
That will do me, yes, happily ever after
Instead of just smiling inanely, help with pre-empting disaster
I’d rather we focussed on perfecting a built-in cooker bot
That can do the veg expertly while stirring the pot
If I have dementia and the bot looks like Fred
It might keep me company and won’t mind when I fret
But neither will Charlie, now that he is free,
From cleaning the bog out, that’s done by Giddel bot number 3
The world’s pretty broken if you ask me
If Sue can’t get to her lunch club, then where will we be?
Working on putting emotions in plastic bots, possibly fine …?
But there are teens and old living alone that could share time
So that’s why I’m campaigning, building the practical tools
That will keep you and me mobile, and help us put on our shoes.
What are the challenges?

- Achieving Safety and Reliability
- User Acceptance – Aesthetics and Usability
- Staying Relevant - Personalisation and Adaptation
- Sustainability of Solutions – Cost and Maintainability
- Integration with Healthcare Infrastructures
- Ownership, Liability and Ethics
Could we overcome some of the challenges/technical limitations of the existing technology if we used a human-operator?
Teleoperation for Remote support

Teleconsultation, Support with Medicine Management
Example with the Padbot Robot

Teleoperation for household tasks
Example Images of robots from: Isao Shimoyama, Tokyo University

Personal Hygiene support
Example from the I-SUPPORT Project
Also a teleoperator could be better at dealing with some unpredictable situations in the home …
An Assistive Robotics Roadmap

**REHAB**
- Robot Assisted Recovery and Rehabilitation
- Active Exoskeletons
- Home-based Therapy
- Safety monitoring

**INDEPENDENCE**
- Structured Support for Independent Living
- Task sequencing and prompting
- Personal care support
- IoT supported Intelligent agents
- Fetch and Carry in the home

**WELLBEING**
- Social Aide
- Robotics Technology enabled homes for self-cleaning, kitchen support
- Enhanced autonomy for long term functioning
- Socially intelligent Human-Robot Interaction

0 – 5 Years
3 – 7 Years
5 – 15 Years