

The CHIRON project: What we did

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on behalf of the CHIRON consortium

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designability
Bath Institute of Medical Engineering

Three Sisters Care
Specialist services for people with learning disabilities

UWE Bristol
University of the West of England

br
Bristol Robotics Laboratory

Shadow
ROBOTICS

SH&BA
Smart Homes and Buildings Association

TA
Technology Applications
Research & Innovation Centre

Funded by
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The CHIRON project is developing a connected system of modular robotic components, which can be adapted to different assistive tasks. CHIRON's various components will be designed to be mixed and matched. This will enable the person using CHIRON to undertake a wide range of domestic and self-care tasks independently, which for some people could mean that their carer would then have more time to spend providing valuable social companionship.

The project will create a prototype that will lead to the development of a commercially viable product.

Review of use cases

Use Case	Functional Support
Amy: Use Case 1 – Support in the kitchen needed due to a bad back	1A: Physical support and mobility
	1B: Pick and Place objects
Amy: Use Case 2 – Problems around the home due to poor eyesight	2A: Searching and locating things
	2B: Timely reminders of hazards
	2C: Social and cognitive assistance
Samuel: Use Case 3 – Support for management of chronic and long-term conditions	3A: A Medication reminder and support
	3B: Nutrition support
Amy: Use Case 4 – Addressing reduced mobility	4A: Help with mobility
	4B: Keeping the house tidy and clean
	4C: Doing the laundry
	4D: Taking the garbage out
	4E: Bathing
Priya: Use Case 5 – Getting up and about in the morning	5A: Help with getting out of bed and going to the toilet
Manoj: Use Case 6 – Dealing independently with incontinence	6A: Help with dealing with toileting in bed
Manoj: Use Case 7 – Supporting a single carer to provide personal hygiene support	7A: Additional physical support for a formal or informal carer to provide transfer and washing assistance on their own

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Project 1 : 4a, 5a –Mobility around the house

- Modular component system
- Partial weight bearing mobility support
- Moderate technical risk

Project 2 : 4a, 5a, 7a -Help with mobility, washing in the bathroom and lifting people from floors

- Soft robotic manipulators as end-effector for Project 1 (Octopus arms)
- Washing in the bathroom, feeling safe around the house, picking up off the floor
- Scalable to versatile gripper
- High technical risk, high benefit –addresses larger population than surface. More dignified.

Project 3 : 1b, 4b –Fetch and carry, tidy house

- Mobile autonomous manipulator (based on Project 1)
- CHIRON Crate –standardised container (as an end-effector) and manipulator system
- Low technical risk –depends on defined scope.

Safety requirement and standards

1. Requirements around the use of assistive technology
eg. assistive products for persons with disability — General requirements and test methods
2. Standards relating to the design and function of robotic technology
eg. Robots and robotic devices — Safety requirements for personal care robots
3. Standards relating to personal care
eg. CQC Person centred care

Robotic systems for personal care

LOLER

CQC

The person is treated with dignity, compassion and respect

- Care is personalised
- Care is enabling
- Care is co-ordinated

Document	Description	Type
BS EN ISO 13482-2014	Robots and robotic devices — Safety requirements for personal care robots	Standard
DPC: 15 / 30296032 DC - 2015	Draft BS EN ISO 9999 Assistive products for persons with disability - Classification and terminology	DRAFT INTERNATIONAL STANDARD
BS EN 12182-2012	Assistive products for persons with disability — General requirements and test methods	Standard
BS ISO 17966-2016	Assistive products for personal hygiene that support users — Requirements and test methods	Standard
BS 8611-2016	Robots and robotic devices. Guide to the ethical design and application of robots and robotic systems	Standard
BS EN 16710-2-2016	Ergonomics methods. Part 2: A methodology for work analysis to support design	Standard
BS EN ISO 9241-210-2010	Ergonomics of human-system interaction. Human-centred design for interactive systems	Standard
DPC: 15 / 30319070 DC - 2015	Draft BS EN ISO 9241-11 Ergonomics of human-system interaction — Part 11: Usability: Definitions and concepts	DRAFT INTERNATIONAL STANDARD
BS EN 62366-1-2015	Medical devices - Part 1: Application of usability engineering to medical devices (IEC 62366-1:2015)	Standard
BS 9266-2013	Design of accessible and adaptable general needs housing – Code of practice	Standard
DPC: 15 / 30289123 DC - 2015	Draft BS ISO/IEC 25066 Systems and software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - Common industry Format for Usability - Evaluation Report	Draft International Standard
BS ISO-IEC 25063-2014	Systems and software engineering — Systems and software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for usability: Context of use description	Standard
PD ISO-TS 20282-2-2013	Usability of consumer products and products for public use Part 2: Summative test method	Technical specification

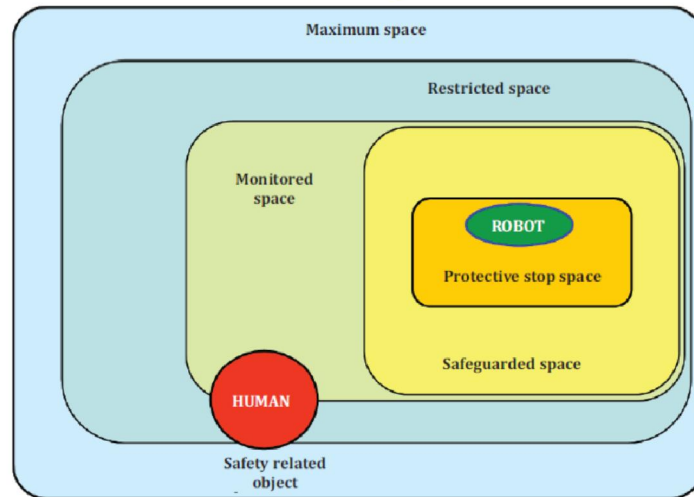


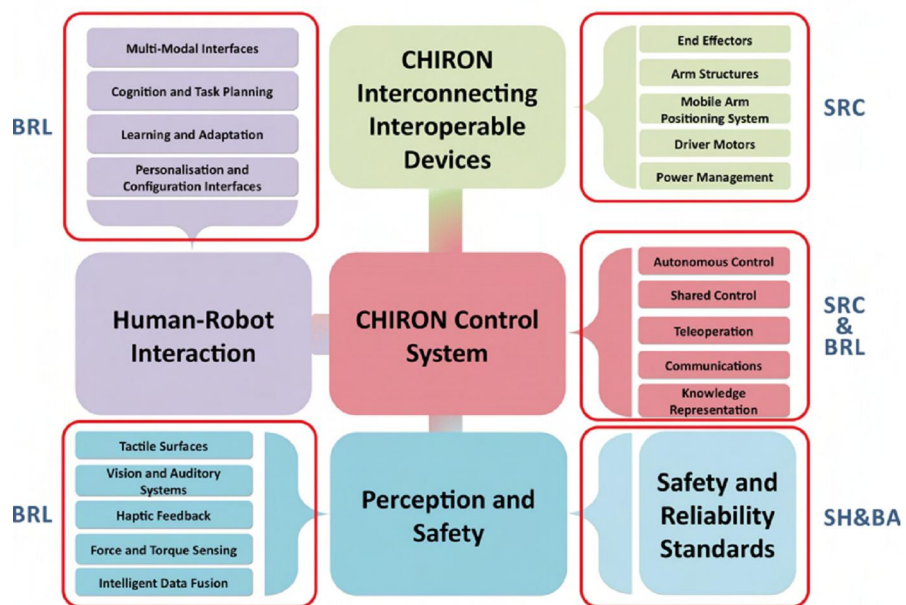
Figure B.1 — Operational spaces of an autonomous person carrier robot

EN13482-2014

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System architecture



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Installation of the ceiling hoist

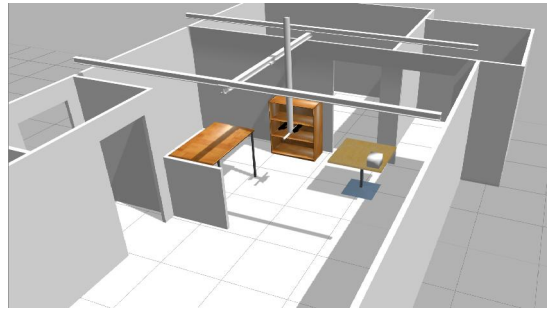
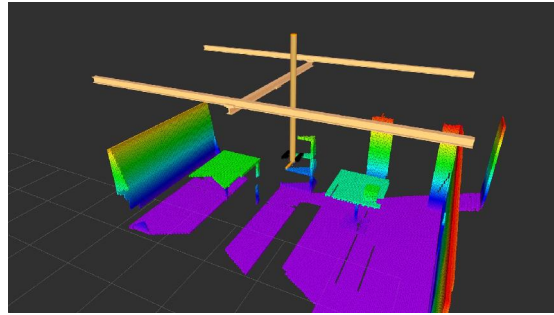
SH&BA CHIRON
Shunt Homecare and Bathing Association Care at Home Living Intelligence. Dementia Medical Needs



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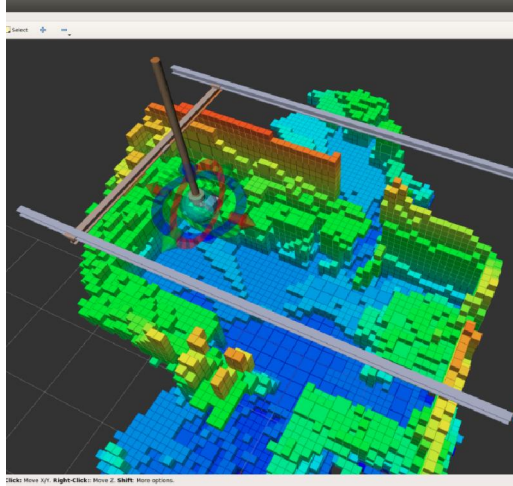
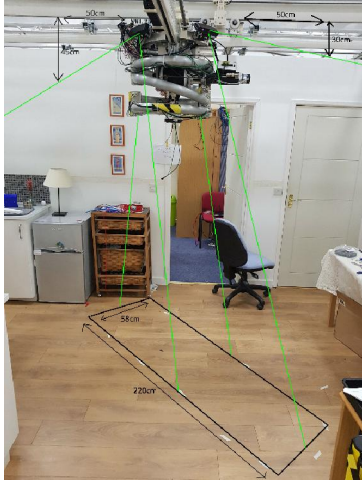
Sensing and control – simulation system



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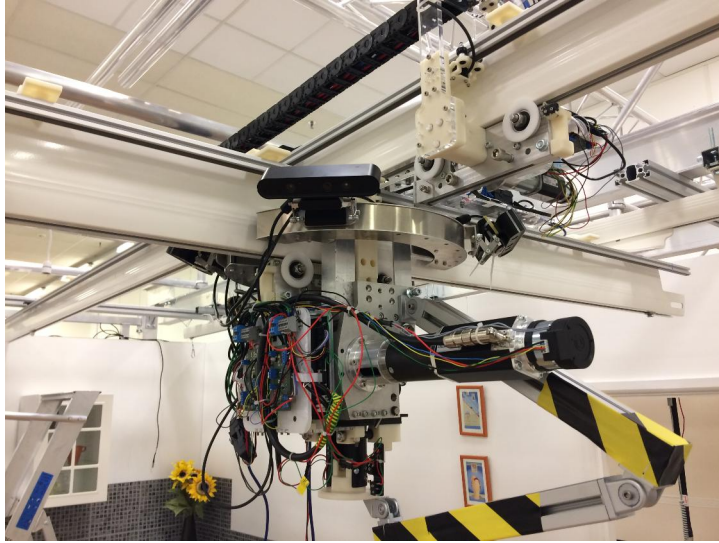
Vision and Sensing Integrating multiple cameras



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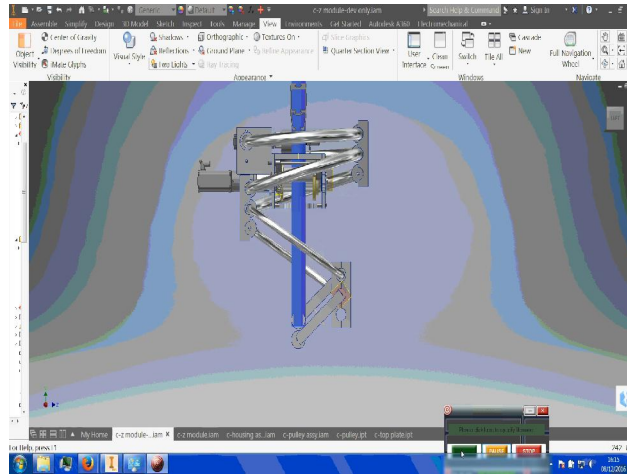
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Three axis motor drive and control, with position sensing



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Vertical Z axis using STEM Rolatube



British Patent Application No. 1719865.6

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Vertical Z axis with stabilising system



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Robotic systems for personal care

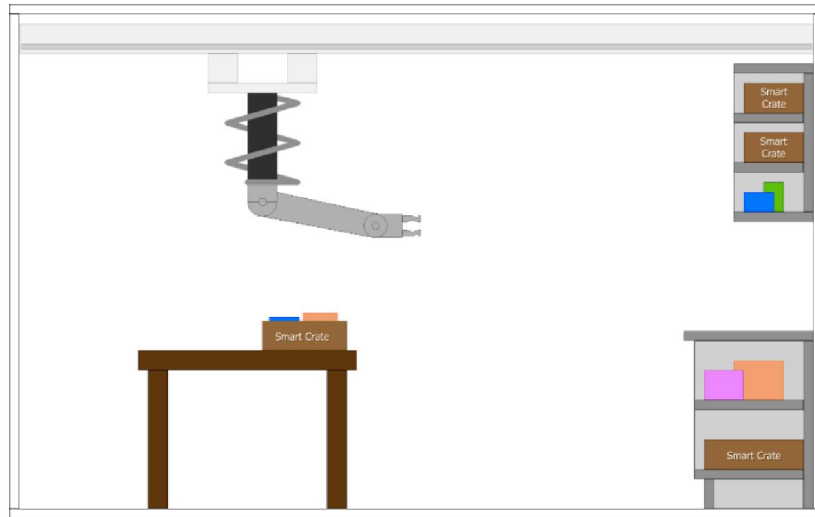
LOLER

CQC

The person is treated with dignity, compassion and respect

- Care is personalised
- Care is enabling
- Care is co-ordinated

Pick and place end effector



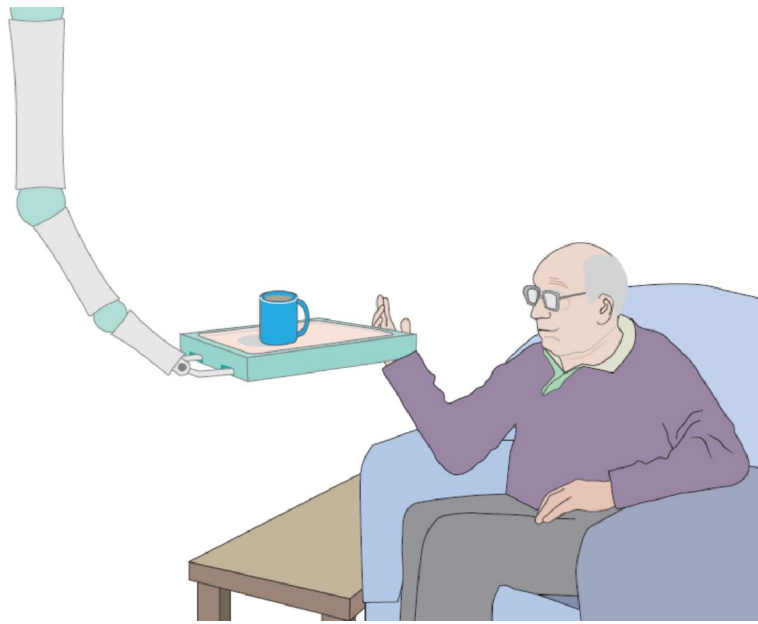
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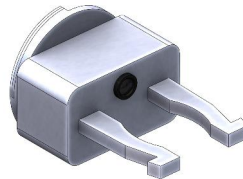
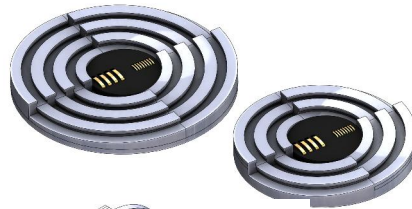
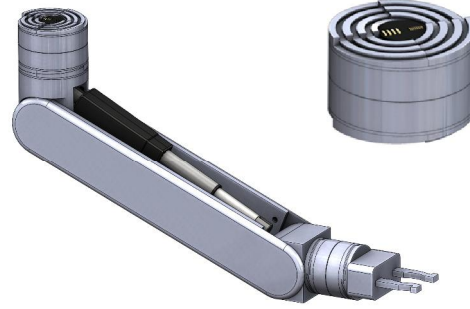
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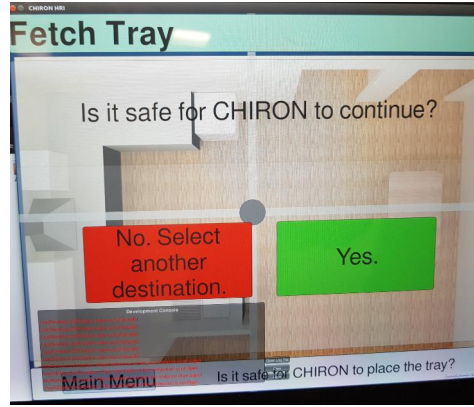
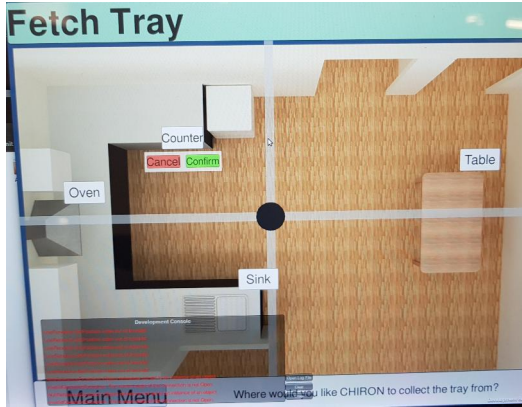
Pick and place end effector

- Shoulder
- Arm
- Modular connector
- Gripper



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Pick and place touch screen user interface



State of the art – sit to stand product

Sara 3000

- OVERVIEW
- FEATURES & BENEFITS
- SPECIFICATIONS
- DOWNLOADS
- CONTACT

- PRODUCTS
- PATIENT TRANSFER SOLUTIONS
- STANDING & RAISING AIDS

Sara Flex

Designed to make every-day transfer and care tasks



Specifications

Residents/patients in care environments gain important physical and psychological benefits when their mobility is maintained. And choosing the right mechanical aid for a resident/patient is crucial for maintaining mobility.

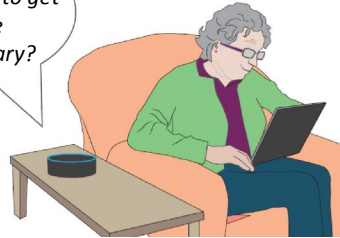
<http://www.arjohuntleigh.co.uk/products/patient-transfer-solutions/standing-raising-aids/sara-3000/specifications/>

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Sit to Stand

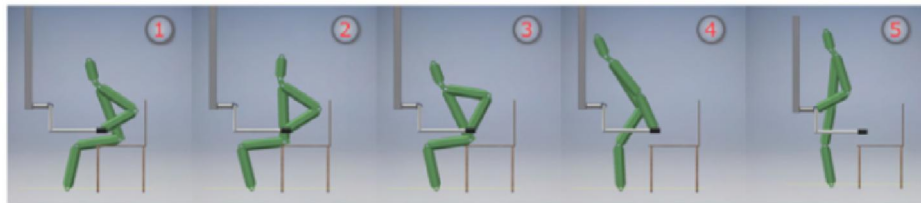
Would you like some help to get over to the kitchen Mary?



One, two, three, stand.



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Engage

Shuffle forwards

Push with hands

Push with legs

Stand & reach for handles

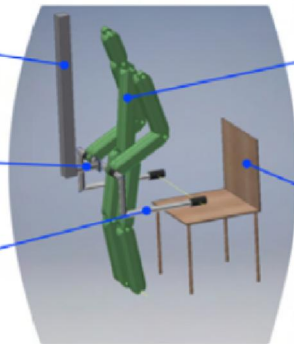
Experiment Support Frame

Force Sensor

Sit To Stand Frame

User

Chair



STS prototype end effector



CHIRON – the engineers

SH&BA CHIRON
Smart Homes and Buildings Association Care at Home using Intelligent Robotics, Dementia Medical Robots

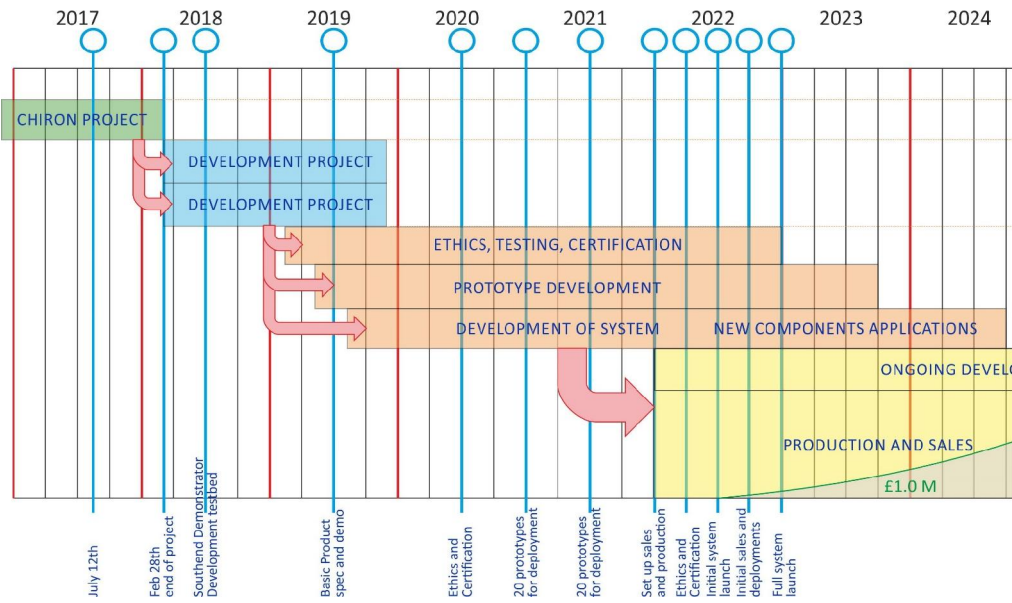


and Advisory Board

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CHIRON Engineering development



Future development

Confirmation x Human Centered Technol... x +

https://chiron.org.uk CHIRON robotics

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Care at Home using Intelligent Robotic Omni-functional Nodes
Human Centered Technology

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