Department of Health & Social Care

Research and development work relating to assistive technology

2021–22

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Introduction

About this report

Section 22 of the Chronically Sick and Disabled Persons Act 1970 requires a report to be placed before Parliament each year on progress made in government-funded research relating to equipment that might increase the range of activities and independence or wellbeing of disabled people, known as assistive technology (AT).

Working with stakeholders, in 2001 the Foundation for Assistive Technology developed the following definition for AT:

> Assistive technology is any product or service designed to enable independence for disabled and older people.

This broad definition means that a wide range of products and services are eligible for inclusion in this report. As technology advances, the breadth of work covered is constantly expanding. The research covers not only specific products, but also systems, combinations of technologies, and interfaces to mainstream technology such as the internet. Furthermore, research focused on the wider neighbourhood is also eligible for inclusion in this report, which might include clinical and public health researchers working with architects and engineering, housing and urban planning experts to make improvements for disabled or older people. In addition to addressing issues associated with physical health, developments in various types of AT can also help people with mental health difficulties live more independent lives; these can often involve online and behavioural approaches rather than devices. Developments with a focus on mental health are also eligible for inclusion in this report.

For the purpose of this report, products and systems are further classified as AT if their adoption and use is under some measure of control by the disabled or older end user and there is a level of meaningful interaction by the end user with the product or system. This therefore excludes telemedicine services such as videoconferencing between a general practitioner (GP) and a hospital consultant, using equipment in the hospital and GP surgery, as these technologies are primarily used by, and operated under the control of, healthcare professionals. Neither does the report feature research on implanted technologies over which the user has no control or interaction, such as hip replacements.

This report aims to reflect research relating to a wide range of impairments and conditions, and to cover research on service provision and patterns of use as well as development and evaluation of technologies. It highlights developments in priority setting and funding for AT research and innovation and some areas of research activity. The Annex provides a

listing of government-funded AT research and development projects current from June 2021 to May 2022.

Glossary of funding body acronyms

AHRC	Arts and Humanities Research Council
DfE	Department for Education
DfT	Department for Transport
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
HCRW	Health and Care Research Wales
HEE	Health Education England
JLA	James Lind Alliance
MRC	Medical Research Council
NHSE	NHS England
NIHR	National Institute for Health and Care Research
UKRI	UK Research and Innovation

Developments in priority setting and funding

This section highlights developments in priority setting and funding for assistive technology (AT) research and innovation. It provides a few examples of government funding related to AT and any current or planned funding rounds/calls, developments of research networks that will shape the direction of new AT research, and any other planned work as a result of funding.

James Lind Alliance Priority Setting Partnerships

The James Lind Alliance (JLA) is an initiative that brings patients, carers and clinicians together in Priority Setting Partnerships (PSPs) to identify and prioritise the top 10 unanswered questions for research. The aim of this is to ensure that researchers and funders are aware of the issues that matter most to patients and clinicians. The National Institute for Health and Care Research (NIHR) funds the coordination of the JLA.

Over 120 PSPs have now been completed. During 2021–22, research priorities were agreed in a range of health conditions and settings, including community nursing, foot and ankle surgery, smell and taste disorders, myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), pernicious anaemia, and breast cancer surgery.

The Vascular Conditions PSP announced a series of research priorities in 9 different areas. One of these, in the list of priorities for amputation research, encourages researchers to answer the question ‘What are the best mobility aids following amputation?’ and may in the future lead to research on AT being funded. A PSP in childhood neurological conditions is ongoing, and this exercise may identify uncertainties related to AT when it concludes later in 2022.

Inclusive Public Activities for Information and Communication Technologies (IPACT)

Funded by the Engineering and Physical Sciences Research Council (EPSRC), a research team at the University College London Global Disability Innovation Hub aims to ensure that disabled people are included in information and communication technologies research by supporting the development of researcher–public collaborations. The project builds on the Disability Interactions (DIX) manifesto, which suggests co-creation of AT with disabled

communities as a way to promote disability inclusion in the scientific research agenda. The project plans to support inclusion of disabled people as collaborators and experts into academic research and innovation through a range of public outreach, engagement and knowledge exchange activities. These will include:

- surveys, interviews, focus groups and workshops with both non-disabled researchers and disabled people to co-design bootcamp trainings
- bootcamp training for disabled people within research
- bootcamp training for non-disabled researchers
- sharing people's lived experiences of disability and marginalisation through a documentary and podcast series

The research team also aims to establish a national disability research and innovation panel consisting of disabled people, research experts in disability innovation, and industry leaders, to support the development of future research proposals for EPSRC. Going forward, the increased involvement of disabled people in AT research that this project supports has the potential of influencing both priority setting for and the direction of new research and innovation relating to AT.

National Institute for Health and Care Research (NIHR) calls

The NIHR has a number of current and recently closed funding opportunities that may attract applications that evaluate AT. For example, the Health and Social Care Delivery Research (HSDR) Programme seeks to commission an agile research team that will conduct independent, rapid evaluations alongside promising technology-enabled innovations in health and care services that support people to use remote monitoring at home. Similarly, the Health Technology Assessment (HTA) Programme invites proposals for work which will accelerate the development of applications to the programme in the area of digital interventions and technology-enabled care. Also, invitations for research on support for unpaid and/or older carers as well as non-pharmacological interventions and strategies for fatigue management in adults with long-term health conditions may lead to projects on the development, use or evaluation of AT being funded.

EPSRC Centre for Doctoral Training in Digital Health and Care

Funded by EPSRC, a new Centre for Doctoral Training (CDT) in Digital Health and Care aims to equip researchers with the multidisciplinary skills necessary to develop digital AT. The increasing digitalisation of healthcare technologies requires researchers to work

across disciplines and develop an understanding of technologies that spans from software engineering through microelectronics, data communication, signal processing, and machine learning to visualisation. Developing healthcare technologies that are of benefit to users further requires a broad understanding of health and care, psychology, physiology, ethics, regulation, health economics and the design of clinical trials. Located at the University of Bristol, the CDT in Digital Health and Care aims to equip researchers with the necessary skills to master this multidisciplinary space. By physically co-locating a cohort of students from Engineering and Computer Sciences, and Health and Life Sciences, and working with a range of external partners, the centre intends to bridge disciplinary gaps, foster better understandings, and activate peer-to-peer learning.

The centre plans to educate students that are able to work effectively with experts from other disciplines, patients and the public in the development of connected digital technologies, such as smartphone apps, wearables and a near future of Internet of Things (IoT) devices (e.g., smart home systems) that can, among other things, support independent living and enable users to manage conditions such as dementia, Parkinson's disease and frailty. Due to the ongoing digitalisation of AT that has been brought to the fore through the COVID-19 pandemic, doctoral researchers at the centre are likely to progress research relating to AT during their studies or later in their careers.

EPSRC and NIHR partner to transform care and health at home

Following their joint research call on transforming care and health at home and enabling independence that closed in October 2021, NIHR and EPSRC announced their decision to support 14 research projects with a total of £10 million in funding. The majority of these projects will develop AT that supports healthier living and greater independence for elderly and disabled people through, for example, self-care apps, smart devices and wearables that enable older people to self-manage and improve their health at home. These include:

- an interactive technology supporting elders to build strength through everyday activities
- a smart integrated system combining wearable and nearable sensors with an affordable social robot to assess the physical and cognitive functions of older adults at risk of frailty to provide continuous tailored support
- digitally augmented occupational and physiotherapy practices that tailor movement interventions to the home environment of people living with frailty to keep them moving and reverse the condition

UKRI Industrial Strategy Challenge Fund contributes to tackling impacts of ageing

The UK Research and Innovation (UKRI) Industrial Strategy Challenge Fund (ISCF) addresses the grand societal challenges faced by UK businesses today. The fund is made up of 23 challenges that cover the 4 themes of the government's industrial strategy: clean growth, ageing society, future mobility, and artificial intelligence and data economy.

The Healthy ageing challenge supports businesses, including social enterprises, to provide the products and services that will enable people to remain active, productive, independent and socially connected across generations for as long as possible. As part of this funding, in July 2021 the Small Business Research Initiative (SBRI) launched a competition to support social enterprises in developing products and services that tackle some of the impacts of ageing. This competition was unique insofar as UKRI for the first time targeted social enterprises to ensure that funded projects are designed to create social, as well as economic, benefits. It resulted in more than 30 projects sharing nearly £3 million of funding. Projects will address issues such as physical and mental wellbeing via local and targeted activity networks involving, for example, cricket or golf, or cognitive impairment, including dementia, via therapeutic online arts and crafts classes.

Funded projects also investigate homes that are suitable for older people and encourage healthy ageing. For example, the Housing for Ageing for 2040+ project, based in Scotland, was funded through Innovate UK under this challenge. This project consists of the development of a new technological tool by INCH Architecture & Design and the Hanover Housing Association in cooperation with the University of Stirling and Iridis Digital. The tool is planned to be situated within older people's own homes to help them manage common complaints of ageing and live independently and safely at home for longer. The tool will also inform a pilot programme of building fabric improvement works to help meet net zero targets in housing, thus addressing 2 challenges at the same time.

In 2022, SBRI will continue to support social ventures through a funding competition to scale products and services that support healthy ageing. Similar to the 2021 competition, organisations can apply for a share of up to £3 million and should address 1 or more of the 7 themes of the Healthy ageing challenge, which include common complaints of ageing (impaired hearing, eyesight, mobility, deteriorating mental and physical wellbeing), designing age-friendly homes and living well with cognitive impairment.

National Network on Musculoskeletal Ageing

More years are lived with musculoskeletal disability that affect the joints, bones and muscles than any other long-term condition. Funded by the Medical Research Council (MRC), a new National Network on Musculoskeletal Ageing that aims to contribute to

maintaining mobility and independence in old age is currently being established at the University of Southampton. This represents a significant increase in musculoskeletal ageing research capacity and strategy in the UK that will contribute to delivering the government Grand Challenge mission of ensuring that people can enjoy at least 5 more years of independent living by 2035. The network plans to identify key research priorities and coordinate an ongoing programme of innovative, interdisciplinary, collaborative studies that will develop and translate findings from discovery science to clinical impact. This includes providing a platform to disseminate best practice. Further, the network intends to support early career researchers, which will maximise the longevity of current UKRI investments. By addressing conditions such as osteoporosis, sarcopenia, rheumatoid arthritis and osteoarthritis, and identifying approaches to maintain mobility in old age, the network will likely contribute to the development and evaluation of AT that enables independence for older people.

Network for Next Generation Rehabilitation Technologies

A new Rehab Technologies Network has been funded by EPSRC to support those who are disabled post-illness or trauma in living independent and fulfilling lives. Survival rates from trauma, injury and disease have increased significantly due to advances in medical technologies and have led to a rise in rehabilitation needs to improve outcomes and enable patients to live their lives as independently as possible. With technology playing an increasingly important part in rehabilitation, the new network plans to focus on the identification and development of new, advanced technologies for use in rehabilitation. Targeting musculoskeletal, cardiorespiratory, neurological and mental health conditions, the work will likely result in the development of AT such as devices, wearables or applications that older people and those who are disabled post-illness or trauma can use to improve their conditions and live as fulfilling, independent lives as possible. The Rehab Technologies Network plans to develop a world-class research community and infrastructure by bringing together researchers, healthcare providers, patient and user groups, industrial partners and supporting organisations (e.g., policy-makers, charities). To support its aims, the network will run a series of Grand Challenge Workshops and related events intended to play a central role in identifying critical areas for research, with associated funding for feasibility projects to build collaborations and drive forward innovation. It will also be connected to a new £70 million National Rehabilitation Centre (NRC) that is planned to open to patients in 2024 and will be co-located with the specialist Defence Medical Rehabilitation Centre on the Stamford Hall Rehabilitation Estate.

Research current in 2021–22

This report details a wide breadth of research activity, supported by a variety of government funders and host institutions. In this section, some of the studies that seek to explore the challenges and potential solutions affecting the independence of elderly and disabled people are detailed.

Continued digitalisation enables wellbeing and independence through self-management and holistic solutions

The COVID-19 pandemic highlighted the potential of assistive technology (AT) to enable access to therapies, care and support from home. The resulting focus on digital health and care solutions continues in this year's report, with around a third of the projects including digital applications, systems or 'smart' products. While initial emphasis during the pandemic was on remote delivery of interventions and care for disabled and older people, many current projects centre thematically around self-management and rehabilitation, thus continuing the developments in priority setting and funding highlighted in the first section of this report.

A recurring theme among current projects is the ability of digital applications to enable disabled and older people to self-manage their conditions and rehabilitation in their homes. For example, physical activity can aid rehabilitation, reduce the risk of cardiovascular disease, and improve quality of life for people recovering from serious injuries or living with conditions such as rheumatoid arthritis (RA). Several projects in this report highlight, however, that these people may experience difficulties in doing exercise due to fatigue and pain, and therefore these projects focus on how digital technologies can help overcome such challenges due to their potential to support targeted exercise programmes. For example, a study funded by the NIHR plans to adapt a smartphone-based programme effective in heart disease rehabilitation to develop a personalised smartphone-based wellbeing programme for older adults living with and beyond cancer. By working closely with the intended users, the research team plans to ensure that the programme suits their needs and preferences, while at the same time overcoming the drawback of supervised activity programmes that improve health in the short term, but less so in the longer term.

Relatedly, if children and young people with injuries, disorders or disabilities are not adequately supported, their conditions may become worse and adversely affect their wellbeing and independence well into adulthood. The Health Education England (HEE) / NIHR Integrated Clinical and Practitioner Academic (ICA) Programme is currently funding

several career development awards for health and social care professionals who develop digital interventions to mitigate the consequences of such issues. For instance, a digital vocabulary intervention for child language disorder designed for use on tablets is being developed by a researcher at City, University of London who works directly with affected children, their parents and expert professionals. The project aims to improve both children's vocabulary and associated issues with concentration, independence, managing negative emotions, and other behaviours that affect wellbeing and make coping with day-to-day life difficult.

The ongoing digital transformation of healthcare also means that distinctions between products, services or applications continue to dissolve as AT is increasingly present in the form of integrated smart systems, platforms or applications that comprise devices, sensors, interfaces, mobile applications, underlying software and more. Such systems combine multiple functions, such as:

- self-management
- controlling devices
- controlling the home environment
- remote monitoring from carers, healthcare professionals or family
- enabling personalised feedback and tailoring of interventions
- easier access to support resources
- being a centralised place where information for the user, care staff and family members is stored and easily accessible

As a result, such systems not only enable elderly and disabled people to live independently, but allow for holistic approaches to improve their wellbeing. For example, 2 digital platforms aim to improve the quality of life and independence of autistic users by providing them with platforms that combine self-management with guided access to support. This includes confidence and assertiveness tools for structuring problems and prioritising actions, (local) information and strategies, one-to-one human support, and signposting or links to (organisations of) autistic people to discuss problems and socialise with for guidance and support.

Projects funded by the Economic and Social Research Council (ESRC) also explore how smart technologies, systems and holistic approaches could support independence and healthy ageing in a range of settings. For instance, researchers at the University of Sussex aim to co-develop a sustainable digital platform to enhance mobility and active ageing of older adults (>75 years) in ExtraCare supported living villages by taking a holistic

approach to understanding mobility. To achieve this, the research team plans to work with older people, their formal and informal carers, and the supported-living providers to co-develop strategies, customise solutions, and then test and evaluate them. Another project plans to develop a digital platform informed by target users to address challenges of maintaining mobility, wellbeing and quality of life for older adults in sheltered accommodation, assisted living and care homes, and for people who require outreach care. By providing simple, personalised programmes that provide structure for users, care staff and family members, the research team aims to transform these settings into ones that facilitate rather than impede active ageing.

Understanding and stimulating the brain to address declining cognitive-motor skills and other impairments

Deterioration of cognitive-motor skills is associated with advanced age but can also be caused by inherited diseases, stroke, developmental disorders or brain injury. A range of research projects in this year's report highlights how understanding the underlying neural processes and stimulating the brain indirectly or directly via techniques such as neurofeedback or external memory agents can help the people affected to halt or reverse the adverse consequences they experience. For example, a drumming training app for people with Huntington's disease (HD) takes advantage of the fact that drumming trains key abilities of concentration, planning, making movements and multi-tasking, all of which are negatively affected by HD-caused brain cell loss. By having users learn drumming patterns that gradually increase in difficulty, it is hoped that the training can strengthen connections between brain cells and thus delay the progression of the movement and thinking changes that come with HD and for which there is currently no cure.

Several projects highlight the potential of AT to enable the rehabilitation of neurodegenerative and cognitive functions at home. For example, an ESRC-funded studentship plans to identify strategies to enhance interaction between different brain areas which can reverse the slowing of movements and deficits in the selection of appropriate actions often experienced by older people. To do so, a technology termed fMRI neurofeedback that allows participants to visualise and control their own brain activity will be used. Participants will complete a task that involves planning and selection of the appropriate movement while inside a magnetic resonance imaging (MRI) scanner to allow identifying which brain connections are important for cognitive-motor performance, and consequently develop strategies to enhance brain connections that can be used even in the absence of neurofeedback.

Brain signals can also be converted into control signals to guide prosthetics or other devices that can help restore independence and improve functions important for everyday life following amputation, stroke and similar conditions. Researchers at the University of Oxford have received funding from MRC to investigate how novel brain–machine

interfaces (BMI) based on signals recorded from deep brain regions that contain rich information related to movement intention can be used to control a prosthetic hand. They also plan to employ the BMI system for neurofeedback training for patients with Parkinson's disease.

Extended accessibility and usability of prosthetics, wearables and controlling technologies

Section 22 of the Chronically Sick and Disabled Persons Act (1970) makes specific reference to equipment that might improve the indoor and outdoor mobility of disabled persons. From the projects in this year's report, it is evident that prosthetics, orthotics and technologies such as wearables continue to be a strong focus of research relating to AT, with around a quarter concerning projects in these areas. Funded research in this area outlines that such devices not only become more accessible but can also be used for a range of purposes, such as rehabilitation, and can be controlled in different ways, highlighting further possibilities for the advancement of AT.

An estimated 6.5 million people in the UK live with mobility disablement. Many of these people rely on prosthetic or orthotic services. Several projects in this report explore how technological advances in the production process can lead to more people gaining access to personalised prosthetics and other tools or devices that can help them regain mobility and live as independently and well as possible. For instance, Innovate UK funds ExpHand Prosthetics to use novel 3D printing technology for the development of lightweight and customisable upper-limb prosthetics for children that cost 90% less than existing products and can be adjusted to grow with the child. This means that children need to worry less about breaking their prostheses, and it reduces the time needed for repairs or relearning to use a new size-adjusted prosthetic every 6–12 months. As a result, disabled children can continually use their prosthesis, which likely contributes positively to their wellbeing, self-confidence and independence. In addition, Metacarpal Ltd is making use of funding by Innovate UK to develop a cheaper, quicker and more eco-friendly casting process for their hand prostheses through the use of online services where people enter their measurements and a 3D scan of the residual limb to receive a customised, well-fitting prosthetic socket. The company hopes to achieve this by partnering with the Polish distributor Glaze Prosthetics, which has developed an innovative platform called I'AM.

Utilising the growing technical possibilities of personalisation to address the lack of adequate devices for children born with congenital diseases, a research team funded by EPSRC aims to develop customisable devices for children and young adults born with physical defects. Due to the smaller size of the paediatric market compared with the adult population market, currently, clinicians often must adapt adult devices to children's bodies. The research team aims to enable children born with physical abnormalities to live as well

as possible by employing engineering methods and computer virtual reality to study the shape of defects and design new devices that can be easily tailored to individual needs.

Technological advances also allow for new ways of controlling prosthetics and other devices that mitigate impairing conditions, such as the above highlighted option to control a prosthetic hand via brain signals. The Earswitch, a novel device that allows people to control a range of devices by tensing their middle ear muscle, has been developed at the University of Bath. Notably, the middle ear muscle can be controlled by people who have lost the ability to control their other muscles, which opens new possibilities for those with severe disabilities, stroke or those with diseases such as motor neurone disease (MND) to take control of their environment, and thus become more independent.

Through a suite of NIHR-funded projects, the research team have developed the initial Earswitch technology, started to explore different ways it can be used by people to control devices, and are currently working on bringing it to the market as a low-cost, unique AT switch for both communication and control of specific applications, the home environment, and as a handsfree control for all earphones. This includes utilising the Earswitch to control upper-limb prostheses for people with neurological upper-limb weakness caused by stroke, spinal cord injuries at the neck, or other nerve damage. Unlike current prosthetics, which use a physical switch operated by the other hand to alter grip pattern, the Earswitch would allow users to use both hands at the same time. Based on this new control interface, the research team then plans to develop a functional, active, assistive support (the Earswitch FAAS-brace) that will come in the form of a waistband with an attached forearm support. The support is intended to prevent the arm weight pulling the shoulder out of joint, a common painful problem for stroke survivors that delays rehabilitation. Going forward, the Earswitch technology may have other applications that will give people with severe disease or disabilities the ability to communicate and control their environment more easily or allow them to do so for the first time. This way, it has the potential to significantly improve the wellbeing and independence of disabled people.

The section on developments in priority setting and funding highlighted the rising rehabilitation needs to help people regain and maintain their abilities, while previous reports have highlighted that better ways to support in-home mobility and training are needed as more rehabilitation occurs at home. This is especially true for older people, who are at risk of losing their independence if faced with temporary impairment after an injury or due to disability caused by, for example, osteoarthritis. In both these cases, outcomes could be reversed with rehabilitation. Several UKRI-funded projects in this report show how prosthetics, wearables and similar devices can facilitate effective, personalised training and rehabilitation programmes. For instance, an ESRC-funded team at the University of Leeds is developing an intelligent robotic knee device to support and monitor rehabilitation therapy for older people with knee osteoarthritis. This device will support rehabilitation by monitoring signals, such as load and motion, needed to develop personalised rehabilitation plans. Worn during both exercise and daily activities, the device

provides muscle support and collects real-time feedback that enables patients to manage their rehabilitation progress while allowing physiotherapists to adjust the exercise programme remotely.

While a robotic knee together with AT such as wheelchairs and crutches address lower-limb impairment, the range of options for temporarily impaired upper limbs is still limited. To improve the independence of the around 68,000 people who suffer temporary arm immobilisation due to injuries, EPSRC-funded researchers at the University of Cambridge are developing a robotic device called the Third Thumb. This device is an extra thumb prosthetic specifically designed to extend the motor abilities of an already fully functional hand. It can help alleviate temporary disability by allowing people to carry out complex daily tasks that normally require bimanual coordination with one hand. This device could support independence especially in older people, as fragility fractures of upper limbs particularly impact the rising older UK population.

Supporting uptake and spread of assistive technology

This section provides information on issues related to the implementation of assistive technology (AT), as well as information about projects and networks that support the uptake and spread of AT.

Digital implementation of AT

A recurring theme of the first 2 sections of this report is the continued digitalisation of AT. This theme also emerges from projects and developments that support the uptake and spread of AT, in 2 ways:

- implementing AT digitally
- challenges of implementing digital technologies

Online assessments to identify suitable equipment

To ensure the uptake and spread of AT by disabled and older people, it is essential that supporting information and advice on how to choose the right equipment is provided. Occupational therapy (OT) assessments in the home of the elderly or disabled person can provide such advice and identify equipment and adaptation needs. Such assessments can, however, be costly in terms of time and resources, which limits their availability. The charity Disabled Living has developed a new way of undertaking their OT home assessments through videoconferencing methods and an app. These enable the occupational therapist to view all rooms in the house to capture risks, demonstrate equipment, and ensure that equipment or adaptations are installed correctly. Working closely with clients and their families, this new ‘Real Time Assessment Tool’ enables online assessments that focus on the needs of the service user. This enables elderly and disabled people to, for example, return to their home more rapidly after hospital stays, which contributes positively to health and wellbeing while reducing costs and care needs. The organisation has now received SBRI funding as part of the Healthy Ageing Challenge to further develop the tool and ensure that:

- OT assessments can be carried out quickly and effectively
- data can be shared with housing associations so that adaptations and AT can be put in place swiftly

Online AT training for staff

Another key component of supporting the uptake and spread of AT is adequate training for those working with older and disabled people to increase their awareness and understanding of available AT. Five online training units that address this need have been developed as part of the recently completed ADAPT (Assistive Devices for empowering disAbled People through robotic Technologies) project. The aims of the training include:

- providing knowledge to healthcare professionals on a range of AT, their uses, and related issues
- enabling healthcare professionals to develop the skills necessary to make use of the constantly evolving AT landscape

The training is suitable for both those who already work with AT and those who have not yet done so. In the UK, these units are available via Canterbury Christchurch University, which was partner to the international ADAPT project that was co-financed by the European Regional Development Fund within the framework of the Interreg France (Channel) England Programme.

National Institute for Health and Care Excellence (NICE) supports digital health technology developers with implementation of their AT into the NHS

Ensuring the market availability of AT and its implementation in the NHS are further important aspects of making sure that it can be employed to the advantage of the elderly or disabled. To address the challenges that developers of digital health technologies may encounter as part of these processes, over the past 3 years NICE has worked in partnership with Innovate UK and the University of Manchester to support 16 such developers. This Digital Health Technology Catalyst – a £35 million fund run as part of the Medicines Manufacturing Challenge and managed by UKRI – was created to help grow the digital health sector. The NICE scientific advice team developed individual support packages to demystify some of the challenges around evidence requirements and adoption within the NHS and to help optimise development strategies. The work also informed updates to the second edition of the NICE Evidence Standards Framework for Digital Health Technologies and fed directly into the NICE Office for Digital Health, which coordinates all of NICE's work in the field of digital health.

Smart glasses improve life quality for the visually impaired and people with other conditions and illnesses

This section highlights 2 examples of how public funding supports exploration and implementation of smart eyewear technologies, from early development to patient benefit.

First, several public funders have contributed to taking wearable technology that provides real-time facial muscle information from first development to possible NHS adoption while enabling the exploration of different applications for this technology. Originally developed by NIHR-funded researchers at Nottingham Trent University for facial paralysis rehabilitation and taken forward by Emteq with funding from NIHR and UKRI, the OCOsense technology consists of sensor-enabled smart glasses. These glasses measure physical movements and facial expressions through muscle-sensing and machine learning technology. The measurements enable analysing the person's emotions, which in turn can support monitoring, self-management and personalised care across a range of conditions. As part of the Digital Health Technology Catalyst, NICE and Innovate UK supported Emteq to further develop their wearable technology and helped identify:

- where the technology could sit within the care pathway for major depression
- which tier of the NICE Evidence Standards Framework for Digital Health Technologies the technology would sit within to determine the evidence that would be needed for the glasses to be used by the NHS

Learnings in these areas helped Emteq to plan future studies and secure further funding, such as an NIHR award to establish proof of concept for OCOsense as a clinical monitoring tool. This example highlights how several public sector funders and organisations cooperate to support the implementation of AT into the care pathway so that it benefits disabled people.

Second, smart glasses that significantly improve vision for people with central vision loss have become available with the support of NIHR funding. Around 360,000 people in the UK are blind or partially sighted, which can lead to a loss of quality of life and independence. With support from the NIHR Invention for Innovation (i4i) Programme, researchers at the University of Oxford developed a low-cost visual aid that uses a person's remaining sight to provide information about their immediate environment. Through novel software solutions, this technology also can be of benefit to people with central vision loss, such as age-related macular degeneration. The technology was taken forward by the spinout company OXSIGHT, which successfully launched ONYX glasses in October 2021. ONYX has been very well received by patients who tested the device during clinical trials, with many participants asking to take the prototype home with them to use when being out, in low-lit environments or reading. This case shows how public

research funding can make a positive difference by improving disabled people's independence and quality of life through affordable AT.

Implementing AT to support children's learning and communication

Communication and learning aids can significantly improve the independence and quality of life of children with special needs. Such AT is, however, not always employed despite being available nor is it used to its full potential. This section highlights projects that support the uptake and spread of education and communication technologies for children.

The Department for Education (DfE) supports the uptake of education technology

An AT study and a pilot training programme for mainstream schools improve teachers' awareness and understanding of available technologies as well as their confidence in utilising them to support students during their assessments and learning.

A rapid literature review (2020) on the use of AT and its impact on students with special educational needs and disabilities (SEND), which was commissioned by the DfE to inform activities related to its Education Technology (EdTech) Strategy (2019), found strong evidence for the use of alternative and augmentative communication (AAC) systems. Such systems are known to improve the independence, educational outcomes and quality of life of SEND students. However, the review also highlighted that AT currently remains underutilised in the educational sector. In addition, the Education Technology (EdTech) Survey: 2020 to 2021 and the parliamentary report Lessons from Lockdown: What we learned about Education Technology in 2020 showed that these issues became more apparent during the COVID-19 pandemic, when many children with SEND experienced considerable difficulties related to the accessibility of online learning management systems, materials and appropriate AT. Having previously allocated £10 million in funding to support its EdTech Strategy, the DfE has now commissioned 2 projects supporting the uptake of AT for SEND in schools.

First, from January to June 2021, the Office of Qualifications and Examinations Regulation (Ofqual) undertook a qualitative study to foster greater understanding of how AT is being used in practice for assessment. Students, teachers and special education needs coordinators took part in a series of interviews and focus groups where they shared their experiences on the use of AT for assessment. Five broad themes emerged from this study:

- reasonable adjustments are usually bespoke to the student

- examination question papers could be more compatible with AT
- schools may not always be fully aware of how AT may be used for assessment
- AT often has an impact on the experience of undertaking assessment
- AT removes barriers to assessment but sometimes also changes how it is accessed

Second, in response to the findings of the EdTech Survey: 2020 to 2021 on the challenges of supporting learners with special educational needs, the DfE conducted an AT training pilot for 79 schools from January 2022 to March 2022. The programme focused on training school staff in identifying and implementing appropriate AT for students with SEND in mainstream schools. These schools received 7 live online training sessions and were asked to complete intersession tasks and access learning resources in their own time. As a result of this pilot, a publicly available resource bank was created and an independent process evaluation conducted. The evaluation found that the training programme was overall well received, with most participating teachers feeling that the training had completely or mostly met their needs. Teachers found content that focused on the AT available – particularly free technology – the most useful as it improved their awareness and understanding of available technologies as well as their confidence in utilising them to support students in their learning.

Freely available decision-making tool supports families and practitioners in choosing communication systems for children

Innovative research into the provision of communication aids for non-speaking children created new recommendations for children, their families, educators and health professionals that improve the way aid is provided. Communication aids can significantly improve the quality of life for children who cannot speak or whose speech is difficult to understand. Around 1 in 200 children in the UK need support from augmentative and alternative communication (AAC) systems to hold conversations or convey their thoughts and feelings. Professionals and affected families have, however, historically often felt ill-equipped to make informed judgements due to scarce research evidence and children's varying needs, resulting in up to half of all children's aids being abandoned.

To address these issues, a team of AAC specialists from Manchester Metropolitan University, the University of Leeds and Barnsley AT Service investigated the decision-making processes around provision and uptake of AAC with funding from the NIHR HSDR Programme from 2016–19. Based on a literature review, survey and interviews, the project team showed that decision-making around communication aids is a complex and

individualised process and went on to develop the first evidence-based model of AAC decision-making in the UK.

By making the resulting recommendations freely available and translating them into both an I-ASC decision-making guidance tool and bespoke resources for families and practitioners, the project has since directly supported and improved the uptake and spread of AT. The team also offers workshops and webinars on putting the I-ASC tool into practice, which helps to spread evidence-informed AAC decision-making across the UK. For example, the team worked alongside the charity Communication Matters to deliver a study day as well as a webinar hosted by Call Scotland, which helps children and young people overcome disability and barriers to learning. The tool has also been implemented in speech and language degree programmes in Ireland, Norway and the UK. This results in coming generations of practitioners being able to make evidence-informed choices about AAC provision to children. The team is also driving forward policy change through its involvement with the All-Party Parliamentary Group for Assistive Technology (APPGAT).

The project's impact on service delivery and development has been recognised through a national AAC research award by Communication Matters in 2019 and continues to improve the quality of life and independence of many children who use AAC aids.

Department for Transport (DfT): technologies for accessible travel across the UK

AT that improves travel for disabled people is in the process of being implemented across the UK as a result of the DfT's Accessibility-Technology Research and Innovation Grants (A-TRIG) Programme. Launched in November 2020, this programme supports the 2018 Inclusive Transport Strategy (ITS) ambition that disabled people should have the same access to transport as non-disabled people, and be able to travel confidently, easily and without extra cost. It resulted in 5 small and medium-sized innovators receiving nearly £600,000 to trial new technology ideas that could improve transport accessibility.

Funded projects include:

- virtual reality (VR) simulations of rail stations that improve disabled people's confidence to use the rail network with a safe, highly realistic VR experience
- a system for improved passenger assistance for disabled people at rail stations that integrates a journey planning app with video calling to a call centre that enables centre staff to identify where a disabled passenger is and to guide/assist them as necessary

- passenger navigation systems for multiple modes of transport that enable effective wayfinding through highly accurate positioning and real-time information

- an improved system for communication between disabled passengers and airport staff to provide a more efficient, more reliable experience for airport passengers needing assistance

As a direct result of the TRIG-A programme, all organisations are now in the process of implementing their technologies or have received investments that enable further development. For example, Briteyellow has entered contract negotiations with several train operating companies for its passenger navigation system; the Ostrum platform might be implemented at Luton, Heathrow and Gatwick airports; and the You.Smart.Thing. system to improve the 'whole journey' experience for disabled passengers on multiple modes of transport is being deployed by the Rugby League World Cup, Coventry City of Culture, Transport for Scotland, and Tameside Borough Council, among others.

By facilitating the development of new products and services that significantly support and improve access to travel for disabled people, the DfT has supported the uptake and spread of AT that enables independence for disabled transport users.

TIDAL N+ network aims to transform the delivery of AT

A new interdisciplinary network aims to transform the implementation of AT by tackling some of the research challenges around how they are delivered. Funded by EPSRC, University College London (UCL) and Strathclyde, Salford and Loughborough Universities are collaborating to build an interdisciplinary network consisting of:

- researchers from multiple disciplines

- AT users

- entrepreneurs, innovation experts and manufacturers

- clinical and social care professionals

- commissioners

The network, hosted by UCL, is called TIDAL N+, which stands for 'Transformative Innovation in the Delivery of Assisted Living products and services'. It aims to co-create novel and equitable solutions that improve AT and thus enhance quality of life for its users, their families and carers. The network plans to achieve its aims by identifying and tackling new research challenges that will help to transform AT through 4 workstreams:

- map the regulatory innovation landscape, including analysis of barriers, drivers and case studies of successful translation of EPSRC-funded research

- develop and sustain an inclusive TIDAL N+ community, including an annual symposium and doctoral colloquium

- coordinate, inspire and support research leading to the development of technologies and services that harness advances in design, digital manufacturing and data analysis techniques (initially, 3 research themes will be advanced by funding up to 8 research projects with up to £65,000 each; projects for each funding call will be developed and selected via agenda-setting and team-building workshops and supported via an industry mentor and industry placements)

- education and dissemination activities that will include developing policy notes based on the work in the other workstreams, engagement with local innovators, colleges and schools through hackathons, and themed live events, while making use of existing networks for communication and dissemination established as part of the Global Disability Innovation Hub and AT2030 Programme at UCL

Annex: Listing of assistive technology research and development activity 2021–22

Note: When compiling the data for the 2021–22 report, each funding organisation was provided with a definition of assistive technology (AT) and a set of inclusion and exclusion criteria building on work previously undertaken by the Foundation for Assistive Technology (see the Appendix for more information). Each funding organisation that contributed to the report was responsible for the identification and submission of projects to be included. The report was coordinated and produced by NIHR.

2021–22 assistive technology research and development activity

Project title, contact	Summary	Organisation, duration and funding
The Development of Data Driven Design for Wheelchair Seats University of the West of England	The Centre for Fine Print Research (CFPR) at the University of the West of England (UWE) offers a 3-year full-time doctoral studentship that will undertake research into data-driven design and fabrication of low-cost, patient-specific wheelchair seating for use in developing countries.	AHRC Jan 19 – Dec 21 Studentship
Virtual Reality Simulation for Robotic Wheelchair Assistive Technologies University of Kent	This research project focuses on a virtual reality (VR) simulation for robotic wheelchair AT to help wheelchair users practise navigating their chair in a safe manner prior to being exposed to real-life hazards by providing training in VR.	EPSRC Sep 20 – Sep 23 Studentship
Neuro prosthetics upper limb amputees University of Southampton	This study aims to explore arm and hand functions based on real-time outputs from a range of sensors that will help underpin advanced prosthetic/orthotic device designs to enable patients to carry out basic activities.	EPSRC Oct 20 – Sep 24 Studentship
Development of Soft	This research focuses on soft	EPSRC

Project title, contact	Summary	Organisation, duration and funding
Robotic Prosthesis Heriot-Watt University	robotics with flexible sensors to help prosthetics feel more like their biological counterpart. A soft robotic prosthetic arm will be produced as a result.	Sep 20 – Aug 24 Studentship
Sensory Foot Orthotics for balance and movement enhancement University of Salford	This research explores the use of sensory foot orthotics for balance and movement enhancement for the vulnerable and frail who are at risk of accidents.	EPSRC Oct 20 – Sep 24 Studentship
Using artificial intelligence to develop joint attention in blind children University of Bristol	This research focuses on the use of artificial intelligence (AI) to support the development of social skills of visually impaired and blind children by creating visual agent technology that helps them to develop awareness and understanding of spatial-social relationships.	EPSRC Oct 20 – Sep 24 Studentship
Mobile Health Technology for Patients Suffering with Anxiety and Chronic Musculoskeletal Pain Queen Mary, University of London	The aim of this studentship is to develop a mobile health application that enables patients with chronic musculoskeletal pain to reduce their pain and improve their quality of life through managing their anxiety.	EPSRC Jan 20 – Dec 22 Studentship
Sensorimotor Learning for Control of Prosthetic Limbs Newcastle University Transferred to the University of Edinburgh	Insight gained through in-vivo experiments, exploratory studies involving able-bodied volunteers and pre-clinical work with people with limb loss will inform the design of novel algorithms to enable seamless control of prosthetic hands. The research will culminate with a unifying theory for learning to control prosthetic hands that will be tested in an NHS-approved, pre-clinical trial.	EPSRC Feb 18 – Aug 20 £1,028,682 Sept 20 – Jan 23
Fit-for-purpose, affordable body-powered prostheses	This project will bring together an experienced team from across the UK, Uganda and Jordan to create	EPSRC Feb 18 – Jan 22

Project title, contact	Summary	Organisation, duration and funding
University of Salford	a new body-powered prosthesis that is optimised for adoption by low- and middle-income countries' (LMIC) prosthetic services and acceptable to LMIC users. This will include establishing methods of fabrication, fitting and evaluation of the prostheses which are appropriate to LMICs.	£1,412,730
A hub for device personalisation in the treatment of congenital diseases University College London	This project will drive the development of bespoke devices and tailored therapies for children and young adults born with physical defects. Engineering methods and computer VR will be used to study the shape of the patient defects and design new devices that can be easily tailored to individual needs.	EPSRC Apr 16 – Mar 22 £1,002,828
Osteoarthritis Technology NetworkPlus (OATech+): a multidisciplinary approach to the prevention and treatment of osteoarthritis Cardiff University	A network of academics, clinicians and industry representatives is looking to provide high-level evidence of the efficacy and safety of medical devices relating to musculoskeletal disorders and osteoarthritis through clinical studies and with a high degree of user involvement.	EPSRC Sept 16 – Dec 22 £968,485
A Robot training buddy for adults with Autism Spectrum Disorder (ASD) University of Glasgow Heriot-Watt University	Funded by the EPSRC, the Socially Competent Robots (SoCoRo) project aims to develop a socially competent robot training buddy that will help adults with ASD to deal better with social signals in work-related scenarios.	EPSRC Jan 17 – Sep 21 £355,563 Nov 16 – Jun 21 £711, 763
EPSRC Centre for Doctoral Training in Prosthetics & Orthotics	The EPSRC Centre for Doctoral Training in Prosthetics and Orthotics (P&O) has been established to address the	EPSRC Apr 19 – Sept 27

Project title, contact	Summary	Organisation, duration and funding
University of Salford	national, and global, shortage of suitably skilled engineers and scientists to become future innovators in P&O technologies. The centre will support a minimum of 58 doctoral students whose studies will enable them to become leaders of the future.	£5,526,315
REST: Reconfigurable lower limb Exoskeleton for effective Stroke Treatment in residential settings University of Leeds Transferred to King's College London	The long-term goal of this project is to develop a nationwide robot-assisted home-based rehabilitation programme for stroke patients, which builds upon the technology and the experimental evidence originating from this proposal.	EPSRC Apr 19 – Mar 22 £1,065,414 Apr 19 – Mar 23 £412,534
FREEHAB: accessible, comfortable and adaptable wearable rehabilitation and assist devices University of Bristol	The FREEHAB Healthcare Impact Partnership will develop soft wearable rehabilitative devices to assist in the rehabilitation around age-related musculoskeletal and neurological conditions.	EPSRC Nov 19 – Oct 22 £1,181,154
Personalised approach to restoration of arm function in people with high-level tetraplegia Transferred from Keele University to University of Aberdeen	This project aims to develop efficient methods for personalising AT to restore arm function in people with high-level spinal cord injury. Using a combination of electrical stimulation and mobile arm supports, the project will use computational models specific to the individual's functional limitations to produce patient-specific interventions.	EPSRC Oct 19 – Feb 22 £268,665
Using artificial intelligence to share control of a powered-wheelchair between a wheelchair user and an intelligent sensor system	Research will focus on the novel use of sensors and inventing new shared control systems and AI to impact the lives of both current and potential powered-wheelchair users significantly and positively.	EPSRC Dec 18 – Apr 22 £465,562

Project title, contact	Summary	Organisation, duration and funding
University of Portsmouth		
Environment and Listener Optimised Speech Processing for Hearing Enhancement in Real Situations (ELO-SPHERES) University College London Imperial College London	VR simulations of complex listening environments and audio-visual tests will be developed to assess the abilities of listeners. These tests will investigate how the abilities of hearing-impaired listeners vary with their degree of impairment and the complexity of the environment.	EPSRC Oct 19 – Sept 22 £554,976 £587,008
Challenges to Revolutionise Hearing Device Processing Cardiff University University of Sheffield University of Nottingham University of Salford	These 4 individual studies will run a series of signal processing competitions (challenges) that will deal with increasingly difficult scenarios of hearing speech in noise. The data and tools will form a test bed to allow other researchers to develop their own algorithms for hearing aid processing in different listening scenarios that will improve algorithms for hearing aid processing.	EPSRC Nov 19 – Sept 24 £287,990 Jan 20 – Dec 24 £371,114 Nov 19 – Oct 24 £251,509 Nov 19 – Oct 24 £287,990
A sensorimotor PROsthesis for the upper LIMB (PROLIMB) University College London University Hospital Coventry NHS Trust	The research team aim to model, design, fabricate and validate an affordable body-powered prosthetic fingertip digit with integrated mechanical haptic feedback.	EPSRC Jan 21 – Dec 23 £425,311 Apr 21 – Mar 24 £164,728
Automatic Posture and Balance Support for Supernumerary Robotic Limbs	The research team will study how the ergonomics of supernumerary limbs for material handling can be improved through additional back and balance support. The	EPSRC Jan 21 – Dec 23 £373,312

Project title, contact	Summary	Organisation, duration and funding
Queen Mary, University of London	implementation will be based on creating and using innovative mechatronic technologies and posture assessment and data processing methods.	
COG-MHEAR: Towards cognitively-inspired 5G-IoT enabled, multi-modal Hearing Aids Edinburgh Napier University	This research team aims to completely rethink the way hearing aids are designed, drawing on the cognitive principles of normal hearing by creating multi-modal 'audio-visual' aids that not only amplify sounds but contextually use simultaneously collected information from a range of sensors to improve speech intelligibility.	EPSRC Mar 21 – Feb 25 £3,259,000
Agent-based Memory Prosthesis to Encourage Reminiscing (AMPER) Heriot-Watt University	AMPER will apply user-centred design with Alzheimer's disease (AD) individuals and their carers to create a human-like autobiographical memory model agent. This will perform a carer-assisted intervention for personalised reminiscence, telling stories and bringing to the surface memories residing in the still viable regions of the brain. The aim is a meaningful technology that is accessible as well as responsive to an individual's changing needs and experiences.	EPSRC Mar 22 – Feb 26 £449,446
EMERGENCE: Tackling Frailty – Facilitating the Emergence of Healthcare Robots from Labs into Service University of Nottingham	The EMERGENCE network aims to create a sustainable ecosystem of researchers, businesses, end users, health and social care commissioners and practitioners, policy-makers and regulatory bodies to build knowledge and capability needed to enable healthcare robots to support people living with frailty in the community.	EPSRC Feb 22 – Jan 25 £708,125

Project title, contact	Summary	Organisation, duration and funding
Assistive Robotic Hand Augmentation during temporary immobilisation University of Cambridge	There is currently no AT for temporary upper-limb immobilisation. A supernumerary robotic device called the Third Thumb, designed to extend the motor abilities of an already fully functional hand, will be tested through this research. This device allows people to carry out complex daily tasks that normally require bimanual coordination.	EPSRC Jun 22 – May 25 £485,662
EnhanceMusic: Machine Learning Challenges to Revolutionise Music Listening for People with Hearing Loss University of Salford	Music is important to health and wellbeing, but for people with hearing loss high frequencies disappear, which makes it difficult to pick out lyrics or hear barely audible notes. This project aims to develop new approaches for mixing and processing music for people with hearing loss.	EPSRC Jun 22 – Dec 26 £1,319,160
Transforming hearing aids through large-scale electrophysiology and deep learning University College London	This project is proposing to collect a large-scale database of neural activity required to fully develop a working prototype of a new hearing aid algorithm based on deep neural networks and to demonstrate its efficacy for people with hearing loss.	EPSRC Mar 22 – Feb 25 £840,503
Sustainable Care: connecting people and systems University of Sheffield	This programme concentrates on the care needs of adults living at home with chronic health problems or disabilities and seeks sustainable solutions to the UK's contemporary 'crisis of care'. This includes assessing the potential of emerging technologies to enhance care system sustainability models and exploring how care technologies can be integrated to support working carers, ensuring wellbeing outcomes across caring networks.	ESRC Nov 17 – Aug 21 £2,156,865

Project title, contact	Summary	Organisation, duration and funding
Training intervention for SLTs to improve collaborative working with families of pre-school children with augmentative and alternative comm. tools University College London	This study will develop a new conceptual model of collaborative practice from which a novel intervention for speech and language therapists (SLTs) will be designed. This will enhance collaboration between SLTs and parents of children with complex neurodisabilities who would benefit from augmentative and alternative communication (AAC) interventions.	ESRC Sept 21 – Sept 24 Studentship
Brain Plasticity in Later Life: Improving cognitive-motor function University of Glasgow	In this project, a PhD student will employ state-of-the-art technology that allows participants to visualise and control their own brain activity, termed fMRI neurofeedback. While completing a planning and movement selection task inside an MRI scanner, participants will attempt to enhance the interaction between different brain areas. After this intervention, the student will test for improvements on a variety of other behavioural tasks, to identify behavioural strategies that can potentially be used at home.	ESRC Oct 21 – Oct 24 Studentship
Making Reading Real University College London	This project has found a way to manipulate the text displayed in a reader device to compensate for brain damage and enable reading for patients that have reading difficulties following stroke or neurodegenerative conditions. This project aims to transform browser-based and app-based prototypes, making them universally available and free of charge across all operating systems and web browsers, in any language, with customised settings to suit the type and severity of neurological	ESRC Aug 21 – Aug 22 £50,336

Project title, contact	Summary	Organisation, duration and funding
	impairment.	
Development of an intelligent robotic knee device to support and monitor rehabilitation therapy for the ageing population with knee osteoarthritis University of Leeds	Knee osteoarthritis is a leading cause of chronic pain and disability in older people. This project will develop a knee device to support and monitor rehabilitation and provide scientific evidence for clinicians to evaluate the rehabilitation progress for their patients. This will ensure that patients get the best rehabilitation treatment, which will relieve pain, improve overall physical knee function and prevent disability.	ESRC Aug 21 – Nov 22 £50,295
Development of the WESTERN plan for supporting active ageing in retirement and care facilities University of Bath	This research aims to address the problem of maintaining mobility, wellbeing, and quality of life in older adults in sheltered accommodation, assisted living and care homes, and people who require outreach care. The WESTERN (Walking, Exercise Snacking, Tai-chi, Edification, Relationships, Nutrition) plan will provide a target-user informed digital platform for integration of behaviour change techniques.	ESRC Aug 21 – Aug 22 £46,971
Co-developing a sustainable, meaningful, digital platform to enhance mobility and active ageing of community dwelling older adults (>75 years) University of Sussex	The project aims to show that working closely with older people in a range of contexts and sites across the country within one organisation (ExtraCare) can deliver a minimum mobility dataset on a digital platform.	ESRC Aug 21 – Aug 22 £50,387
Improving Quality of Life for Older Autistic People University of Glasgow	This project aims to improve quality of life for older autistic people who find themselves in forced dependence or being disadvantaged at work. It involves the development of an app that	ESRC Aug 21 – Dec 22 £50,404

Project title, contact	Summary	Organisation, duration and funding
	provides (local) information and strategies, signposts and/or provides confidence and assertiveness tools, and mind mapping and other tools for structuring problems and prioritising actions. It will also provide links to (organisations of) autistic people to discuss problems and socialise with and local advocates for guidance and support.	
Preventing avoidable blindness through smart home-monitoring of vision City, University of London	This project has developed Eyecatcher – the world's first validated vision test for glaucoma home-monitoring – and is working on making this readily available for patients, in a sustainable, cost-effective way.	ESRC Aug 21 – Aug 22 £50,014
A longitudinal investigation of new 'Smart Speaker' personal assistants to improve independence and wellbeing in social care settings Cardiff University	Can new 'smart speaker' technologies, such as the Amazon Echo, improve wellbeing, independence and safety in social care? This fellowship will investigate this question for people with learning disabilities living in supported accommodation and older adults living in sheltered accommodation.	HCRW Feb 20 – Feb 24 £331,479
Development and feasibility randomised controlled pilot study of HD-DRUM – a novel motor sequence training app for people with Huntington's disease Cardiff University	This project aims to develop and test a new movement and rhythm training tool that people with Huntington's disease (HD) can access at home using drumming sequences that gradually increase in difficulty.	HCRW Jan 22 – Sept 26 £917,217
A randomised controlled trial assessing the effectiveness of hearing aids (intervention	The aim of the research study is to provide information on whether hearing aids help people with both tinnitus and mild hearing loss to	HCRW Dec 20 – Nov 22

Project title, contact	Summary	Organisation, duration and funding
setting) compared to hearing aids (placebo setting) in reducing tinnitus for adults with mild hearing loss	manage their tinnitus more effectively. This knowledge is important to offer the best care for this group of patients.	£222,808
Stroke in young adults: The influence of an outdoor-walking rehabilitation programme on walking performance and quality of life Manchester Metropolitan University	This research project aims to improve and promote physical activity participation in the outdoors and use outdoor walking as a form of long-term rehabilitation for young adults who have had a stroke. This project will measure how fast a young adult who has had a stroke walks, how much energy they use to walk and how their joints move when walking.	Welsh Government Apr 20 – Mar 22
Myndr Peer-to-Peer mental health support system Myndr Ltd	This research will focus on the further development of an AI-based mental health peer-to-peer support platform for company leaders and their employees. The anonymous support platform is designed to help sufferers of common mental health problems to seek help and support from others who have experienced similar symptoms and conditions via an app with actionable steps and content.	Innovate UK Apr 20 – Sept 21 £303,155
iHearBetter – a revolutionizing assistive listening device for hearing-impaired individuals AudioTelligence Ltd	This project will focus on the development of a new device to improve the way that people with hearing impairment hear when there is background noise. AudioTelligence have already developed technology that can separate out several different sound sources in noisy environments. Further development includes an easy-to-use device that can take these different sound sources and work out which of them a person wants	Innovate UK Jun 20 – Feb 22 £394,163

Project title, contact	Summary	Organisation, duration and funding
	to listen to, based on cues such as eye movements or head turns.	
Remote Monitoring of Elderly, Vulnerable, and Enhancing their Mobility, through Adaptive Intelligent Clothing (Single Platform Wearable) for Care Homes, Assisted Living and Personal Health: R&D, Expanded Testing and Product-Market Engagement Decorte Future Industries Ltd	These projects seek to develop a low-cost washable, intelligent shirt to be worn by care home residents that gathers, sends and remotely analyses biometric data. It includes an early warning system and distress detection. At the same time, the embedded hardware enhances the wearer's mobility and quality of life by allowing them to control surrounding devices with voice, gesture and touch through their clothing. Designed originally in the context of defence, in response to COVID-19 the company aims to rapidly produce a basic version of its wearable platform for the care sector, to help combat the effect of the virus.	Innovate UK Oct 20 – Jun 21 £169,740
Developing, Implementing, and Verifying the Integrity of an Indoor Navigation System for Visually Impaired People WeWALK Ltd	This project will address the technical/safety challenges that have prevented widespread uptake of beacons for indoor navigation by developing a novel integrity-monitoring layer (providing safety-critical functionality) and usability framework that detects the beacons signals directly with the WeWALK smart cane to provide high-accuracy, turn-by-turn indoor audio-based navigation.	Innovate UK Oct 20 – Mar 22 £386,103
eHomeCare: Sustainable Tele-Home monitoring for healthy independent living of vulnerable groups Perseptive Ltd	eHomeCare aims to provide a smart telecare solution using novel indoor positioning analysis to grade frailty remotely and monitor its development over time. Evidence shows that exercise can reduce and reverse frailty. The information is also used to guide an integrated	Innovate UK Oct 20 – Sept 21 £157,058

Project title, contact	Summary	Organisation, duration and funding
	remote physiotherapy application via real-time feedback and personalised adjustment. By doing so, the system allows both improved self-care, remote care and better care planning through timely interventions.	
Inclusive Design of Personal Electric Vehicles to protect against COVID-19 Centaur Robotics Ltd	COVID-19 disproportionately affects wheelchair users. Centaur's personal electric vehicle (PEV) facilitates dignified, independent living but, more importantly, can better protect users from disease transmission by being height adjustable, having less manual handling, being easier to clean and helping enforce social distancing through collision avoidance and visual/audible/haptic cues.	Innovate UK Oct 20 – Jun 21 £174,982
Development of an immediate, post-surgery, upper-limb prosthesis: Wound soft, self-fittable and enabling critical rehabilitation and physiotherapy to start earlier for better healthcare outcomes Koalaa Ltd	Amputees typically wait over 6 months for first access to prosthesis use and rehabilitation. Koalaa aims to develop the world's first post-surgery prosthesis in the form of a soft, flexible device that can be fitted at home or via telemedicine within 24 hours of an operation.	Innovate UK Oct 20 – Jun 21 £141,428
Accessible navigation and associated opportunities Ghobi Ltd	This research focuses on the development of a data processing platform to facilitate navigation in the built environment (e.g., buildings, parks, green spaces, neighbourhoods), especially by wheelchair users.	Innovate UK Nov 20 – Jul 21 £99,995
AI-based Assistive & Passive Technology for non-Invasive Elderly care (ADAPTIVE)	miiCare Ltd aims to develop a non-wearable assisted living healthcare solution that utilises AI-based machine learning to learn about the acoustic characteristics	Innovate UK Nov 20 – Apr 22 £394, 543

Project title, contact	Summary	Organisation, duration and funding
miiCare Ltd	of people's footsteps to predict the likelihood of falls, changes in postures, or the progression of cognitive issues. This will enable preventative measures to be taken early and prevent escalation, allowing people living with dementia (PLWD) to remain in the comfortable, safe environment of their own homes.	
Path Feel – a smart AI insole for personalisation of care in chronic conditions and the elderly Walk With Path Ltd	This project will develop and commercialise a smart insole, Path Feel. The insole responds to pressure applied and provides vibrational feedback to the user to help them 'feel the floor' and achieve balance in real time. Embedded sensors gather data on walking that is used for diagnostics, personalised medicine and remote patient monitoring. This device aims to decrease instability and falls caused by reduced sensation in the feet that people with chronic conditions and the elderly often have.	Innovate UK Mar 21 – Mar 22 £50,000
AI-controlled adaptive fitting device for prosthetics and wearable technologies Unhindr Ltd	Inflexible prosthetic sockets don't change shape as the wearer's stump changes shape over the day, which can lead to wounds, ulcers and ultimately decreased mobility. To address this issue, a research team at Unhindr and their collaborators are currently doing further research and clinical development of Roliner, a sleeve-like device that is worn on the stump. Roliner will help amputees walk for longer, reducing muscle loss and the number of clinic appointments for fitting adjustments and treatment of socket-induced wounds.	Innovate UK Apr 21 – Sept 22 £392,625

Project title, contact	Summary	Organisation, duration and funding
Blackwood Neighbourhoods for Independent Living Blackwood Homes & Care	This multidisciplinary project includes design of accessible houses that feature home automation and health monitoring as well as a tablet device app that supports residents through information and services. It also provides a digital community and learning environment that allows for health self-management through goal-setting, progress-tracking and interacting with others in a gamified environment.	Innovate UK Apr 21 – Mar 24 £5,912,251
The Glider Buckingham Healthcare Ltd	The research team will accelerate product development of a transfer assistance aid to improve users' access to toileting facilities: 'The Glider', improving independence, mobility and dignity for elderly, disabled and bariatric users.	Innovate UK May 21 – Oct 22 £279,315
Wireless Assistive Listening Solution – Bluetooth LE Audio Ampetronic Ltd	This project will develop the fundamental technologies, devices and infrastructure for a new audio distribution system for public hearing assistance. It will use new technologies for direct-to-hearing aid communication, also allowing simultaneous participation on future smart devices. The new hearing assistance platform will focus on dramatically improving adoption of hearing assistance and widen access to its benefits.	Innovate UK May 21 – Nov 21 £209,755
Supported Fall Prevention Exergaming, Helping Over-65s Improve Standing Strength and Balance and the NHS Reduce Costs Exyo Design Ltd	The research team intends to address the issue of a lack of effective therapy solutions for fall prevention. They are developing a standing/balance rehabilitation aid that facilitates remote supervision and gamified therapy.	Innovate UK May 21 – Oct 22 £248,756

Project title, contact	Summary	Organisation, duration and funding
Female-specific Urinary Catheter to reduce Catheter-Associated UTIs and improve quality of life Ingenion Medical Ltd	This project is solving a significant unmet need with its affordable and reliable urinary catheter designed specifically for the female anatomy that will help reduce infections and allow users to lead more physically active lives. The solution will also save the NHS money and resources, such as nursing care and bed days.	Innovate UK Jan 22 – Mar 23 £194,261
ToneUP – An Intelligent Bodysuit For Real-time Motion Capture And Assistance To Aid Prevention And Rehabilitation In Healthcare And Sporting Contexts Tonus Tech Ltd	Tonus Tech Ltd is developing a bodysuit with embedded sensors that tracks the movement of users' joints and assesses the quality of movement, encouraging people to improve their mobility through regular vigorous exercise routines. Users' activity can be monitored in real time through a wireless app that presents a 'digital twin' avatar of their movements, while intelligent machine learning models identify specific movement patterns to improve the movement quality for the user.	Innovate UK Feb 22 – Jan 23 £206,588
Investigating the Enabling Impact of the WeWALK Accessible Smartphone and Hardware-Based Mobility Application on the Functional Performance of Elderly People WeWALK Ltd	The WeWALK smartphone application is designed to be an accessible navigation and exploration solution for visually impaired users, providing reliable turn-by-turn walking and public transport navigation. The application uses both visual and auditory instructions, has a full screen reader compatibility and low vision colour filters and text sizes. Together with the WeWALK smart cane, users can access all these features through voice and simple touch gestures, reducing complexity when on the go.	Innovate UK Mar 22 – Nov 22 £49,910
Housing for ageing for	This project aims to develop a	Innovate UK

Project title, contact	Summary	Organisation, duration and funding
2040+ Inch Architecture & Design	dual functionality tool that enables social housing landlords to manage their assets more effectively and empowers their customers to live independently with the support of ambient assistive technologies (AATs) and digitally accessible services.	 Mar 22 – Feb 24 £147,985
ExpHand Prosthetics ExpHand Prosthetics Ltd	The ExpHand design is an adjustable, lightweight and customisable prosthetic for children that grows with the child, encouraging them to use their prostheses, increasing self-confidence and independence. This project will finalise product development to ensure the ExpHand is ready for manufacture, obtain the necessary certification for UK and EU sales and undergo additional user testing to verify product–market fit.	Innovate UK Mar 22 – Feb 23 £50,000
Updating body-powered Upper-Limb Prostheses Metacarpal Ltd	Metacarpal Ltd will be testing the manufacture methods of their innovative new prosthetic hand that is entirely body-powered with the help of Glaze Prosthetics, based in Poland. Glaze Prosthetics have developed an innovative platform called I'AM, which brings much of the prosthetics services online. By evaluating their project, Metacarpal Ltd will be able to find more information on the preferences of prosthesis users to feed into the design process and ensure the 2 companies can work together in the future.	Innovate UK Jan 22 – Mar 22 £7,373
Real Time Assessment Tool for Assistive Technology	This project will be testing the feasibility of the 'Real Time Assessment Tool' to ensure that occupational therapy (OT)	Innovate UK Mar 22 – Dec 22

Project title, contact	Summary	Organisation, duration and funding
Disabled Living	assessments can be carried out more effectively through a virtual assessment tool. This will enable the sharing of this data with housing associations so that adaptations and AT can be put in place, allowing the individual to return home more rapidly, reducing hospital stays, cost and anxiety for everyone involved.	£49,016
Sensory system abnormalities in childhood dystonia / dystonic cerebral palsy – are sensory networks modulated by Deep Brain Stimulation? King's College London	This study's aim is to compare changes in sensorimotor cortex electroencephalogram (EEG) activity in relation to a sensory or sensorimotor task in children with different types of dystonia and to investigate whether such changes relate to deep brain stimulation outcome.	MRC Nov 16 – Feb 22 £417,823
Brain Machine Interfaces based on Subcortical LFP Signals for Neuroprosthetic Control and Neurofeedback Therapy University of Oxford	This work will establish the foundations for novel brain–machine interfaces based on signals recorded from deep brain regions that contain rich information related to movement intention. The new framework will be used to control a prosthetic hand with graded gripping force, to provide neurofeedback training to reduce symptoms in Parkinson's disease, and to study the role of basal ganglia in the control and learning of movements.	MRC Aug 17 – Oct 22 £506,448
Auditory scene analysis (ASA) in acoustic and electric hearing University of Cambridge	This research team will use a combination of behavioural and electrophysiological techniques to study the neural basis of ASA in normal-hearing listeners and investigate its modulation by cognitive processes such as attention and language processing. They also plan to investigate why it is impaired by	MRC Jul 17 – Mar 22 £321,000

Project title, contact	Summary	Organisation, duration and funding
	cochlear implant (CI) patients, and develop methods for improving auditory scene analysis and other aspects of hearing by CI users.	
Adaptive processing of spoken language University of Cambridge	This project aims to use behavioural experiments, functional brain imaging and brain stimulation to understand the neural mechanisms that are critical for understanding spoken language and allow healthy adult listeners adjust to and learn from encounters with different forms of language.	MRC Jul 17 – Mar 22 £305,000
Multi-modal cue integration for auditory spatial location by normal-hearing and hearing-impaired listeners University of Nottingham	This research will use cutting-edge auditory experiments to answer 2 key questions. First, how does the auditory system join the multiple cues to location in complex, dynamic, multi-sound, audio-visual listening situations? Second, how does hearing impairment and aided listening affect this? Insights gained may help build understanding on how spatial hearing works in real, everyday listening, and inform how future hearing aids might be designed to improve spatial hearing.	MRC Apr 18 – Sep 22 £1,456,854
Understanding and alleviating hearing disability: the contribution of natural behaviours University of Nottingham	It is becoming increasingly recognised that for hearing aids to be more helpful, they must adapt to the moment-to-moment changes in situation that are part of people's everyday life. Furthermore, the clinical prescribing of hearing aids needs to take greater account of each patient's individual lifestyle and activity patterns. This project aims to provide new knowledge and insights that can form the basis of future improved hearing aid	MRC Apr 18 – Sep 22 £2,883,896

Project title, contact	Summary	Organisation, duration and funding
	technology and prescribing.	
A patient-centred device to improve hearing aid satisfaction University of Manchester	This studentship is focused on hearing aid satisfaction. The overall aim of the project is to develop software that accurately predicts perceived audio quality, as well as the reason/processing stage that caused the loss. It will do so by examining a broadcasted audio chain in a controlled listening environment in depth, from signal capture on the microphone, through its processing to the listening experiences.	MRC Jan 18 – Jun 22 Studentship
Robotics to enhance independence & safety for dementia patients in the home Imperial College London	This project aims to exploit the potential of AI to improve dementia care through the development of a family of robotic devices that can engage people living with dementia, helping improve safety in the home and enhancing quality of life. Once triggered, such robots will engage with the individual and act to reduce risks by directing them to address the hazard. Robots will also support the deployment of automated support tools.	MRC Apr 19 – Apr 25 £34,946
Restoring the sense of sound: deep-learning based compensation strategies for the electro-neural transmission of sound by cochlear implants University of Cambridge	Compromised speech perception in noisy environments is a major problem for cochlear implant (CI) users and can have a negative impact on their quality of life and mental health. By combining computational models simulating auditory nerve response with machine-learning algorithms trained to reduce interfering noise, this project will contribute to a better understanding of the transmission of sound by CIs and help to overcome the communication challenges that	MRC Jun 20 – Jun 25 £1,037,336

Project title, contact	Summary	Organisation, duration and funding
	users face in their daily lives, with the ultimate gain of improving cochlear implant use.	
Cortical determinants of human auditory cognition Newcastle University	The project aims to develop new hearing tests that provide improved predictions on how well people can understand speech-in-noise in the real world by testing their ability to group together and retain sounds that have a complex structure and separate these from a noisy background. The project will measure brain activity that allows them to separate mixtures of sounds like speech in noise. This will provide other measures (in addition to the new listening tests) of the success of interventions like hearing aids, cochlear implants, or hearing training.	MRC Dec 20 – Dec 25 £2,212,332
Upper Limb Telerehabilitation Using Brain-Controlled Functional Electrical Stimulation University of Sheffield	This project aims to develop a brain-controlled functional electrical stimulation (BCI-FES) device that can be used at home by stroke patients. It uses techniques like machine learning to make the device quick and simple to set up, easy to use and effective. This study also aims to investigate if it is a feasible and acceptable intervention for post-stroke rehabilitation.	MRC May 22 – Sept 22
The use of assistive technologies for assessment Ofqual	The Office of Qualifications and Examinations Regulation (Ofqual) carried out a qualitative study to gain greater understanding of how AT is being deployed in practice for assessment. Students, teachers and special education needs coordinators were asked to describe the AT that they or their students used for assessment, whether they encountered any	DfE Jan 20 – June 21

Project title, contact	Summary	Organisation, duration and funding
	barriers to using it, and how they felt the use of AT had impacted on their experience of assessment and their performance.	
Assistive technology training pilot nasen and Microlink	This small, sector-led training pilot tested the merits of AT training with a view to potentially including it in a future wider training offer for students with special educational needs and disabilities (SEND).	DfE Jan 22 – Mar 22
Individually randomised controlled multi-centre trial to determine the clinical and cost effectiveness of a home-based exercise intervention for older people with frailty as extended rehabilitation following acute illness or injury, including embedded process evaluation Bradford Teaching Hospitals NHS Foundation Trust	Frail older people who are admitted to hospital for acute illness are often frailer when they are discharged, which can mean that they are no longer able to perform daily tasks at home or live independently. The HOPE programme offers older people with frailty a 12-week physiotherapist-delivered exercise programme at home, involving 5 home visits and 7 telephone sessions, as well as a complementary manual.	NIHR Mar 17 – June 23 £2,387,728
Investigating the effectiveness and cost effectiveness of using FITNET to treat paediatric CFS/ME in the UK University of Bristol	FITNET is an internet-based treatment for children with chronic fatigue syndrome (CFS) or myalgic encephalomyelitis (ME). It provides cognitive behavioural therapy through interactive sessions that children receive at home. Children are also required to complete homework relating to the sessions. Children and their parents are supported by cognitive behavioural therapists.	NIHR May 16 – May 22 £1,026,403
An Assistive Powered Wheelchair: Stage 2 Trial – Powered Wheelchair User	Powered wheelchair users can find driving safely and confidently a challenge, particularly in crowded spaces, in narrow	European Commission Mar 21 – Aug 21

Project title, contact	Summary	Organisation, duration and funding
Evaluation of an Obstacle Alerting System. A non-interventional study Clinical Research Network Kent, Surrey and Sussex Part of EDUCAT	corridors or when reversing. This can result in the user being more hesitant to use their wheelchair and may limit their mobility and independence. The goal of this study is to assist the powered wheelchair user, by monitoring joystick movement and providing sensors and display screens, to drive more safely and confidently, thus enhancing their independence and quality of life.	
Improving the Wellbeing of people with Opioid Treated Chronic pain: I-WOTCH University of Warwick	This research seeks to test the effect of the I-WOTCH intervention, which consists of supportive self-management and information/advice about coming off opioid drugs, on how well people can get on with normal activities (e.g., work, family and social life), and opioid use, compared with usual care.	NIHR Sep 16 – Jul 21 £1,631,593
The Project About Loneliness and Social networks (PALS) study University of Southampton	This research will evaluate the acceptability, effectiveness and cost-effectiveness of implementing the GENIE intervention to reduce loneliness and unwanted social isolation of adults within a community setting.	NIHR Mar 18 – Aug 22 £1,157,358
Immersive virtual reality to transform the lives of patients with psychosis Oxford Health NHS Foundation Trust	VR therapy involves wearing a headset and interacting with computer-generated people. Uniquely in VR therapy, this study will use a virtual coach that guides the user through their thoughts, feelings and responses in social situations. People with psychosis and NHS staff will work together to develop the VR therapy to ensure the best user experience. A further consultation process will produce a guide to using VR in NHS psychosis services.	NIHR Jun 18 – Nov 21 £4,209,119

Project title, contact	Summary	Organisation, duration and funding
Enhancing the quality of psychological interventions delivered by telephone (EQUITy) Greater Manchester Mental Health NHS Foundation Trust	This project will focus on improving the way that psychological interventions are delivered over the telephone to ensure that people get the care they need. Improving Access to Psychological Therapies (IAPT) data will be explored to understand which groups of people have the greatest difficulties with telephone-delivered treatments. Patients and professionals will be consulted, and the knowledge gained from these approaches will be used to develop an intervention to help services improve the quality of telephone treatments.	NIHR Apr 18 – May 24 £2,524,745
Feasibility of a randomised controlled trial to examine the effectiveness of auditory-cognitive training to improve hearing aid users' speech perception outcomes, compared with hearing aids alone Nottingham University Hospitals NHS Trust	This research builds on previous work, which has shown that computer games designed to help people practise listening to speech can improve cognition and listening abilities for people with hearing loss and hearing aid users. These games, termed auditory training, could help patients better understand speech in noise and thus improve communication, which can improve quality of life. This feasibility study will explore whether a large trial could work to understand the benefits of these games to patients.	NIHR Apr 18 – Oct 21 £249,414
Autism Spectrum Social Stories In Schools Trial 2 (ASSSIST2): A randomised controlled trial and economic evaluation of a Social Stories intervention to address the social and emotional health of children with ASD in	This pragmatic cluster randomised controlled trial aims to examine the effectiveness and cost-effectiveness of social stories for children with autism spectrum disorder (ASD) and challenging behaviour. This design was drawn from the successful health technology assessment feasibility study (ASSSIST).	NIHR Jun 18 – Jun 22 £1,081,529

Project title, contact	Summary	Organisation, duration and funding
primary schools Leeds and York Partnership NHS Foundation Trust		
Development and feasibility of a behavioural intervention to improve the beneficial use of hearing technology for adults with hearing loss University of Nottingham	This project will identify how individuals' behaviours are linked to their use of hearing technologies and will use this knowledge to develop an online tool to improve the use of hearing technologies.	NIHR Oct 18 – Jul 23 £593,402
Virtual Reality Supported Therapy for the Negative Symptoms of Psychosis King's College London	This research aims to introduce a therapy designed to reduce negative symptoms and improve the recovery prospect of people with schizophrenia. The proposed therapy will be a VR environment where participants will be able to experience and practise everyday life activities. (e.g., talking to a total stranger or cooking a meal).	NIHR Mar 19 – Oct 21 £204,500
Use of ICT by carers of people living with dementia London School of Economics and Political Science	This study aims to provide evidence on patterns of information and communication technology (ICT) use by unpaid adult carers of people living with dementia; evaluate the effects of using ICT services on the health and wellbeing of carers; and develop an evaluation instrument to aid local authorities to assess new technologies to ensure that they meet the needs of carers.	NIHR Sept 20 – Nov 22 £267,055
Bathing adaptations in the homes of older adults: A randomised controlled trial, economic evaluation and process evaluation (BATH-OUT-2)	This study aims to establish whether the provision of walk-in showers is effective in improving or maintaining older people's health, safety, quality of life, and ability to manage their personal care, and if so, if quicker provision	NIHR Dec 20 – July 23 £971,518

Project title, contact	Summary	Organisation, duration and funding
University of Newcastle	is more effective.	
A randomised controlled trial and feasibility study of the effects of an e-health intervention 'iSupport' for reducing distress of dementia carers, especially in the ongoing pandemic of COVID-19 Bangor University	This project is looking at whether carer distress is significantly reduced in participants who have access to the iSupport e-health intervention, an online learning and support programme for dementia carers. It will also explore the potential costs and benefits of iSupport and the feasibility of adapting iSupport for young carers.	NIHR Jan 21 – Dec 23 £1,462,406
Earswitch: a new human:computer interface for augmentative and alternative communication Earswitch Ltd	The Earswitch is a novel device that allows people to control a range of other devices, such as keyboards, by tensing their middle ear muscle. By allowing people to control communication devices, it can help people with motor neurone disease (MND) or cerebral palsy communicate more easily or for the first time. The project will initially develop the Earswitch to help people communicate, and will then progress the technology to help people control other technologies and devices.	NIHR Feb 21 – Jan 22 £149,995
Hands free-control of upper arm prostheses using The Earswitch, and translation to functional, active, assistive support (The Earswitch FAAS-brace) for upper-limb weakness post-stroke, cervical spinal cord injury and neuropathies Earswitch Ltd	This 2-stage project has 2 aims: 1. Utilising the Earswitch to provide handsfree control of upper-limb prostheses (i.e., robotic arms) for people with neurological upper-limb weakness caused by stroke, spinal cord injuries at the neck, or other nerve damage. Unlike current prosthetics, which use a physical switch operated by the other hand to alter grip pattern, the Earswitch would allow users to use both hands at the same time. 2. Based on this new control	NIHR Mar 22 – Sept 22 £69,870

Project title, contact	Summary	Organisation, duration and funding
	interface, the research team then plans to develop a functional, active, assistive support (the Earswitch FAAS-brace) that will come in the form of a waistband with an attached forearm support. Hand movements are driven by cables passing from the waistband, via the elbow, to a cable-driven assistive glove. The support is intended to prevent the arm weight pulling the shoulder out of joint, a common painful problem for stroke survivors that delays rehabilitation.	
The Earswitch: NIHR i4i PDA: taking proof-of-concept via co-design and objective technical/ user validation to a user ready assistive technology switch, incorporating wider health and care innovative sensor applications Earswitch Ltd	This project aims to manufacture the Earswitch device into an earphone that is comfortable to wear, accurate (i.e., does not get triggered accidentally by head movements/eating, etc.) and allows users to control communication devices such as computers and keyboards. Learning from user testing, the project aims to develop and produce a final Earswitch, suitable to use at home, that is useful for people, well designed, reliable and provides value for money.	NIHR Apr 22 – Mar 24 £1,449,793
Closed-Loop Electronic Stimulation (ES) – Mechanomyogram Sensor (MMG) System for Passive Tremor Suppression Treatment Serg Technologies Ltd	This project aims to develop and clinically test a simple wearable armband that senses and suppresses tremor by delivering tiny electrical stimulation (ES), which is not felt by the wearer, to the forearm or wrist. The armband may be worn indefinitely, thus offering the potential for constant tremor suppression. The team has already developed constituent elements of the system and proven their ability to sense and suppress tremor. This study has the potential to replace and/or	NIHR Mar 21 – Feb 23 £995,564

Project title, contact	Summary	Organisation, duration and funding
	complement current tremor treatment, eliminate side effects, and improve quality of life for a very large patient population.	
Revolutionary sensor for detecting faecal incontinence Oxford Optronix Ltd	The research team has developed a unique technology that can reliably detect when a person has passed a stool in an incontinence pad. It uses an optical sensor to detect small quantities of fluorescence light produced by the bacteria present in faeces. The device alerts a nursing station or caregiver's mobile phone. This project plans to refine their existing prototype sensor and develop a thin, flexible and reusable wearable monitor with wireless connectivity and develop a wireless recharging platform for continuous battery operation of the wearable monitor over several days.	NIHR Mar 21 – Feb 22 £149,238
E-PLAYS-2 (Enhancing Pragmatic Language skills for Young children with Social communication impairment) trial; evaluation of a computerised intervention to promote communicative development and collaborative skills in children University of Bedfordshire	E-PLAYS-2 is a computer game played by children in pairs. This project will follow up 504 child participants to find out whether E-PLAYS delivered by teaching assistants in schools is effective and whether it is good value for money.	NIHR Sept 21 – Aug 25 £1,461,791
Textile electrode cuff to enable FES-assisted walking for users with upper limb impairments	Functional electrical stimulation (FES) devices apply electrical impulses to stimulate the muscles that lift the foot using surface electrodes placed around the	NIHR Mar 22 0 Feb 23 £149,892

Project title, contact	Summary	Organisation, duration and funding
Etexsense Ltd	knee. This project has developed a textile electrode cuff that is easy to set up and use even with hand function limitation. The aim of the project is to refine the product with 3 patient groups (Parkinson's disease, stroke, multiple sclerosis) and healthcare professionals and conduct a clinical study to demonstrate the device's performance in assisted walking and improved usability.	
Evaluating remote delivery of Cognitive Remediation for people severe mental health conditions South London and Maudsley NHS Foundation Trust	This project will expand on previous work by evaluating therapist-supported remote cognitive remediation (CR) – using the same therapy format but delivered entirely using remote digital platforms using video meetings and remote monitoring of a service user's laptop. The project will develop procedures and training for therapist-supported remote CR delivery and test their acceptability, ease of use and feasibility.	NIHR Nov 21 – Nov 22 £104,319
Teaching early reading skills to adults with intellectual disabilities (READ-IT) using a support worker/family carer mediated on-line reading programme – a feasibility study University of Warwick	This project has developed a reading programme called 'Teaching early reading skills to adults with intellectual disabilities (READ-IT)'. With READ-IT, adults with learning difficulties will take part in an online reading programme with additional support from their support workers or family carers and will use a guide that they will help the research team produce.	NIHR Sept 19 Jan 22 £282,360
Adapting a smartphone-based rehabilitation programme for older adults living with and beyond cancer: a development study using	The purpose of this mixed-methods intervention development study is to adapt an existing, feasible, smartphone-based cardiac rehabilitation programme (REMOTE-CR) for	NIHR April 22 – Sept 23 £149,259

Project title, contact	Summary	Organisation, duration and funding
Intervention Mapping Hull University Teaching Hospitals NHS Trust	older adults living with and beyond cancer (LWBC). This study will deliver a co-adapted smartphone-based wellbeing programme for older adults LWBC ready for feasibility testing.	
Better outcomes for patients living with motor neuron disease University of Sheffield	This project will develop and evaluate a low-burden evidence-based personalised care pathway for people living with motor neurone disease (MND) to support decision-making, the timely delivery of care interventions to improve quality of life and survival, and increased participation in clinical trials.	NIHR Dec 21 – Nov 26 £1,995,176
MovIng to Support Sustained Improvement of Outcomes iN Rheumatoid Arthritis – MISSION-RA University of Birmingham	Harnessing advances in health data science, this project will design the first tailored digital behaviour change intervention to support people with rheumatoid arthritis (RA) to help increase their overall volume of physical activity. The intervention will consist of a mobile health (mHealth) app and linked commercial activity tracker.	NIHR Oct 21 – Sept 26 £995,008
Improving the evaluation of mental health digital health interventions in randomised controlled trials by understanding and incorporating user engagement Imperial College of Science, Technology and Medicine	This project will address outstanding clinically important questions regarding how to define engagement with digital health interventions and the impact to outcomes in the trial analysis, an important issue raised by patients involved in project development. Beyond this, it provides essential methodology for trialists to evaluate other mental health digital health interventions, leading to better guidance and helping patients to make informed treatment choices.	NIHR Oct 21 – Mar 23 £368,262
A new urinary catheter to improve bladder	The study is a first-in-human study of the ‘Flume’ bladder	NIHR

Project title, contact	Summary	Organisation, duration and funding
drainage: first-in-human testing of the Flume catheter North Bristol NHS Trust	catheter. The Flume catheter is a new type of indwelling catheter (a catheter that is left in place continuously) and is designed to prevent many of the risks associated with the current long-term indwelling catheters available on the market. The design of the Flume catheter aims to reduce irritation of the bladder, reduce infection rates and improve bladder drainage.	Feb 22 – Oct 22 £149,864
Hearing health information from primary care data: how to capture hearing aid uptake Manchester University NHS Foundation Trust	To help improve uptake of hearing aids, this project will develop and test a new method to help people more easily access hearing aids. Involving online hearing assessment, this project will look into a reliable way of measuring who gets hearing aids from the NHS, with an aim to promote better communication between general practices and hearing aid services.	NIHR Sept 21 – Sept 22 £121,320
Virtual Reality Prosthetics Training System: Clinic and Home Use phase Sheffield Teaching Hospitals NHS Foundation Trust	This project aims to improve the current NHS training for patients with a new myo-electric prosthetic arm. Patients will test the new VR training system at home during the 2–3 weeks it takes for their prosthetic to arrive. The project will assess participants' ability to use the arm in VR, when they receive the real prosthetic arm, and 3 months later. The system will collect data during the training sessions to record the degree of progress.	NIHR Oct 17 – Dec 22 £445,339
A novel interactive training device to improve walking Ability and quality of life for Children with CErebral Palsy Trial (ACCEPT	An interactive trainer, similar to a cross-trainer, which will be based either at home, in a local school or physiotherapy department, will allow children with cerebral palsy to do therapy by playing	HEE/NIHR Jun 18 – Jun 23 £355,899.00

Project title, contact	Summary	Organisation, duration and funding
study): A multi-centred feasibility RCT with an embedded qualitative study University of Plymouth	motivating computer games, using their leg movement. The device supports the child in a standing position, while they work on improving standing posture, balance, strength and mobility in a fun and motivating way. This project will test the feasibility of undertaking a Randomised Controlled Trial (RCT) of the interactive trainer.	
A Feasibility Study of High Intensity Interval Training (HIIT) to Reduce Cardiometabolic Disease Risks in Individuals with Acute Spinal Cord Injury Salisbury NHS Foundation Trust	This research tests a new exercise programme that can be started in hospital by people who have recently suffered a spinal cord injury to provide the right skills so they can carry on their exercises when they are back at home.	NIHR Dec 20 – Feb 23 £250,000
Digital Interventions in Neurorehabilitation (DINR): Gotcha! University College London	The main aim of this project is to test the clinical efficacy of 2 novel, web-based, rehabilitation applications that were designed in phase 1 of this study. iTALKbetter will provide an app-based therapy for people with naming difficulties caused by stroke (naming app for a wide variety of common words and phrases), while Gotcha! will be for patients with dementia (who have difficulty naming people they know well). These 2 digital neuro interventions will provide the opportunity for the necessary increased rehabilitation that helps people recover lost function.	NIHR July 21 – Nov 22
Development of a digital health intervention to support parents of children with Traumatic Brain Injury to deliver physiotherapy	The aim of this research is to develop a purpose-built digital product (including a website and smartphone app) to support parents to deliver a physiotherapy programme once their child	HEE/NIHR July 21 – June 24 £296,292

Project title, contact	Summary	Organisation, duration and funding
Cambridge University Hospitals NHS Foundation Trust	returns home from hospital following a traumatic brain injury.	
Exploring language, behaviour and wellbeing outcomes of a user co-designed digital vocabulary intervention for child language disorder City, University of London	This project will work directly with children who struggle with language and aspects of behaviour together, their parents and expert professionals to jointly develop and test a vocabulary intervention designed for use on tablets.	HEE/NIHR Jun 19 – Jun 23 £376,578
Developing an intervention to reduce sedentary behaviour in non-ambulant young people with long-term disabilities Birmingham Community Healthcare NHS Foundation Trust	The aim of this study is to help young people with long-term disabilities, who are unable to walk, to spend less time being sedentary. This will be achieved by developing a digital intervention (software) for mobile phones or computers to support them with reducing sedentary behaviour.	HEE/NIHR Jun 19 – Jun 22 £349,512
Homonymous Hemianopia in Childhood Great Ormond Street Hospital for Children NHS Foundation Trust	The aim of this study is to understand better homonymous hemianopia (HH) in childhood and to evaluate the use of prisms on glasses for children with HH. Prisms on glasses for adults with HH have been shown to be effective, but there is little evidence to support any sort of intervention in children. This study will first look at the clinical characteristics of childhood HH, its impact on affected children's and young people's visual function and visual-related quality of life. Then it will evaluate the use of prisms on glasses to help (re)habilitation of children with HH to hopefully inform current clinical practice.	HEE/NIHR Jul 20 – Jul 24 £251,747

Project title, contact	Summary	Organisation, duration and funding
Scaling a digital support system to reduce workforce pressure Brain in Hand Ltd	Brain in Hand (BIH) is a digital self-management support system used mainly by people who are autistic with learning difficulties and mental health challenges. The system provides a unique combination of one-to-one human support and digital self-management technology accessed on a smartphone or other device that enables users to access help whenever and wherever it's needed. BIH is now increasing access to its services through advancing the product's capabilities, enhancing functionality, usability and the overall experience to users and service providers. It also aims to demonstrate the system's effectiveness in meeting needs in autism services.	NHSE Oct 20 – Oct 21 £99,486
Social AI empowering families for elderly support in the home Upstream Health Ltd	Upstream Health Ltd has developed a solution called Bridgit™. Bridgit provides a unique ecosystem of products that support patients to take the actions needed to keep themselves well, reassure family members that all is okay and enable stretched care teams to provide focused, earlier interventions. Bridgit uses Microsoft's AI capability and cloud services, along with new hardware devices (home hub and watch) specifically designed for accessibility by an elderly population, supporting them to stay well for longer in the places they want to be.	NHSE Oct 20 – Oct 21 £582,417

Appendix: Definition of assistive technology

Assistive technology (AT) is defined as any product or service designed to enable independence for disabled and older people.

The setting is any public setting where the user is interacting with the technology, and the user has a disability or is older.

Inclusion criteria

A product or service is considered to be an AT if it:

- is a technology or service that enables independence in people with disabilities or elderly people
- is used in any setting except clinical settings
- is a device to support hygiene (for example, drying devices such as a ‘carer dryer’ or others including a shower chair)
- allows self-management or is a device allowing for social cohesion for older people or people with disabilities
- is population-based or involves major infrastructure where the technology or service is for disabled or older people (for instance tactile pavement surfaces)
- is a technology or service that benefits people who are caring for people with disabilities or older people (thereby giving indirect benefits to the person, such as delaying a move to a care home).

Exclusion criteria

A product or service is not considered to be an AT if:

- it is for use in clinical settings
- its purpose is self-management of a chronic condition (such as diabetes)
- the practitioner is using the technology (such as in healthcare)

- it is population-based or involves major infrastructure (such as street design, housing or transport) where the technology or service is not primarily for people with disabilities or older people (even though they may benefit – the scope is too large)
- it is a medical device dwelling inside or under the skin that has been surgically inserted

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Examples of AT

- apps
- assistive technology
- balance technology
- bathing adaptation
- brain stimulation
- communication aid
- communication therapy
- computer game
- computer therapy
- computerised cognitive behavioural therapy (CBT)
- digital reasoning
- electrical stimulation
- electronic magnifiers

- environmental assessment
- exercise programme
- gaming environment
- hearing aid
- heel cast
- humanoid robot
- internet-based treatment
- iPad
- Lego-based therapy
- mandibular devices
- mobile sensor
- neck collar
- night positioning equipment
- one-session therapy
- orthosis
- ostomy pouch
- rehabilitation device
- robot-assisted training
- self-management programme
- sensor integration therapy
- shared decision-making
- short messaging service (SMS)
- shower chair

- socio-technical solutions
- standing frame
- step highlights
- support mattress
- symbol communication aid
- telehealth
- urinary catheter
- video feedback
- virtual reality (VR) environment

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