Digital Single Market

EU-FUNDED RESEARCH PROJECTS INTO TECHNOLOGIES FOR ACCESSIBILITY

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Digital Single Market
TECHNOLOGIES FOR ACCESSIBILITY

The degree of a society's development can be measured by looking at the extent to which it succeeds in including people with disabilities in education, employment and social activities. In an increasingly digitalised world, information and communication technologies (ICT) make our lives easier, but paradoxically they also create new challenges for people living with a disability.

Digital inclusion is the European Commission's strategy to ensure that everybody - regardless of their differing physical or cognitive abilities - can contribute to, and benefit from, the digital economy and society.

A wide variety of research and innovation actions funded by the European Commission aim to develop technologies for accessibility that enhance the functional capabilities of people with disabilities and assist them in making a more autonomous and independent use of ICT. These actions also seek to foster the adoption of new development methodologies based on the principle of 'design for all'.

In this brochure, you will find examples of EU-funded projects that address the needs of people with disabilities, in particular those with physical and cognitive impairments, and promote their integration into digital society.

TECHNOLOGY FOR PEOPLE WITH VISUAL AND HEARING IMPAIRMENTS

SUITCEYES

The objective of SUITCEYES is to improve the level of independence and participation in society of people with **deaf-blindness.** Deaf-blindness is the combination of sight and hearing impairment where the level of impairment in either of these senses is too severe to be compensated for by the other. SUITCEYES combines and develops cutting-edge technologies to create a fabric or garment that will enable wearers with deaf-blindness to sense the surrounding environment and will provide useful information to them in an unobtrusive way. The products will extend the environmental perception and spatial orientation of users, enable them to communicate more effectively and enhance their learning and engagement by integrating interactions borrowed from the area of gaming.

suitceyes.eu
@suitceyes
EU FUNDING (01/01/2018 – 31/12/2020) • € 2,359,963.00

COCOHA

Hearing loss affects an increasing proportion of our aging population. It is a handicap in the workplace, a factor in social exclusion and a cause of depression and dementia. Hearing aids, while in many respects a success story, are unreliable in noisy reverberant environments typical of everyday life, because they also amplify the noise: it may still be hard to understand your conversation partner in a noisy restaurant, or at a child's birthday party. The COCOHA project rethinks hearing aid technology, by investigating ways of letting the device enhance the sounds that the user wants to hear and suppressing the rest. To determine which sound source the user is focussing on, it measures tiny signals from the user's brain which it then uses to control the device. Based on recent scientific progress on decoding brain signals, it aims to derive a reliable command signal, possibly together with other information such as eye gaze and head orientation. The COCOHA project is addressing both the basic science and the technological issues involved in putting a workable solution on the market.

cocoha.org
EU FUNDING (01/01/2015 – 31/12/2018) • € 3,217,500.00

TECHNOLOGY FOR PEOPLE WITH VISUAL AND HEARING IMPAIRMENTS

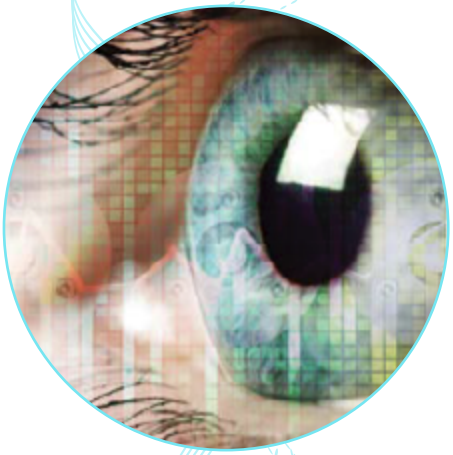
3D TUNE-IN

3D Tune-In helps people with **hearing loss** understand the features of their hearing aids and use them to the maximum extent. It also aims to raise awareness about hearing loss. This is achieved through a series of Virtual Reality applications and videogames targeting different stakeholders, from children to the elderly, and from videogame developers to hearing aid manufacturers. These applications enable users to explore, review and customise hearing aid devices for different scenarios. They also allow people with no hearing impairment to understand better how hearing loss can affect everyday activities and how a hearing aid can improve this situation. The project provides an open source toolkit which allows developers to integrate high quality 3D binaural audio together with hearing aid and hearing loss emulations. A 3D Tune-In Applications Suite has also been developed, and each application is currently being released by the companies that are taking part in the project.

3d-tune-in.eu
@3dtunein
EU FUNDING (01/05/2015 – 30/04/2018) • € 2,896,175.00

ECOMODE

Four years of research have enabled the development of an innovative technology that will revolutionize the interaction of the **visually impaired and the elderly** with mobile communication technologies. Thanks to the integration of a neuromorphic camera inspired by human vision, it is now possible to control smartphones and tablets by voice or by gesture, regardless of environmental conditions like uncontrolled lighting and background noise.



ecomode-project.eu
EU FUNDING (01/01/2015 – 31/12/2018) • € 3,798,206.50

TECHNOLOGY FOR PEOPLE WITH VISUAL AND HEARING IMPAIRMENTS

BLINDPAD

BlindPAD is a personal assistive device for **blind and visually impaired** people that puts touch-based information into the hands of users, exploiting and enhancing their residual sensory abilities. This programmable tactile display enhances the spatial working memory and the mathematical abilities of persons with sensory deficits. It also increases the capacity to find one's own position in an unknown space and the spatial knowledge in general beyond current rehabilitation protocols. It is particularly helpful for children's touch-based learning of symbolic content and for orientation and mobility skills indoors.

blindpad.eu
@blindpad
EU FUNDING (01/01/2014 – 31/05/2017) • € 1,999,999.00

ABBI

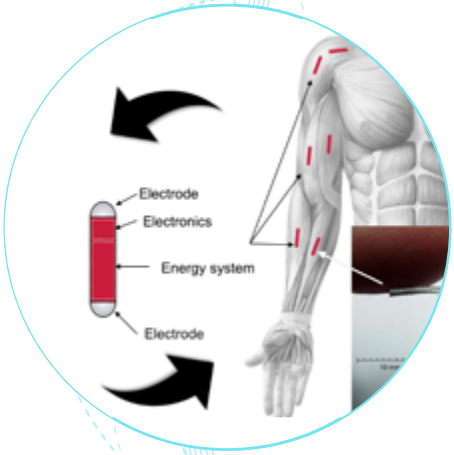
The ABBI project is developing innovative devices to improve the spatial cognition, mobility and social interaction of children and adults with visual impairments through natural audio-motor and tactile-motor associations. Based on the idea that audio feedback about body movements might help the blind to build a sense of space, the project has developed an **audio bracelet** that gathers spatial data on how and where the movement is occurring. It provides relevant information for posture control, motor coordination and spatial orientation, reducing the risk of exclusion for people with disabilities.

abbiproject.eu
@abbiproject
EU FUNDING (01/02/2014 – 31/01/2017) • € 1,849,995.00

TECHNOLOGY FOR PEOPLE WITH MOTOR IMPAIRMENTS

EXTEND

Current brain and neural interfaces still present significant constraints that prevent people with disabilities from using them to perform daily life activities. Non-invasive techniques, such as electroencephalography or electromyography, are intrinsically unidirectional and of limited capacity. Invasive technologies, such as implanted nerve electrodes or intracranial electroencephalography, allow two-way interaction and perform better but rely on complex surgical procedures. To overcome these limitations, EXTEND develops a bidirectional neural system, minimally invasive that people diagnosed with **Parkinson's disease** could use, for example, to suppress or reduce tremors. It is composed of electronic implants, inserted with a simple ambulatory injection procedure, that are innocuous unless they are energised externally by means of a textile garment. When activated, each implant collects the neuromuscular activity of the patient and transmits it to an external unit that assesses the characteristics of the tremor. Based on this analysis the implant sends, when necessary, bursts of low intensity electrical stimulation that reduce the severity of the tremor.



extend-project.eu
@extend_project
EU FUNDING (01/01/2018 – 31/12/2021) • € 2,943,811.25

ENHANCE

eNHANCE develops an eye-tracking robotic arm that assists people with **physical impairments** in reaching and grasping tasks. The device is controlled by an intelligent multimodal adaptive interface, based on an intention detection system and tailored to the specific needs of the user by using an individual behavioural model. eNHANCE helps people with physical disabilities in their daily-life activities by enhancing and training their upper extremity motor functions.

enhance-motion.eu
@enhancemotion
EU FUNDING (01/02/2015 – 31/01/2019) • € 3,916,054.75

TECHNOLOGY FOR PEOPLE WITH MOTOR IMPAIRMENTS

AIDE

The AIDE project develops a novel system that brings independence to people with **motor disabilities.** It allows moderately and severely impaired people to interact with intelligent devices assisting them in activities of daily living and entertainment. It is based on an arm exoskeleton attached to a robotised wheelchair. A sophisticated adaptive multimodal interface analyses and extracts relevant information from the residual abilities, behaviours, emotional state and intentions of the user. Combined with the analysis of the environment and context factors, artificial intelligent algorithms predict the action that the user wants to perform. The human-machine co-operative system is then designed to accommodate the specific needs of the user.

aideproject.umh.es/en
@aideproject
EU FUNDING (01/02/2015 – 31/01/2018) • € 3,409,430.75

MOREGRASP

More than half of the 330,000 individuals with **spinal cord injury** (SCI) have to cope with the loss of function of both hands, with the associated reduction in quality of life. MoreGrasp has developed a non-invasive, multimodal user interface, including a brain-computer interface, for intuitive control of a novel grasp neuroprosthesis restoring basic grasping function in individuals with high SCI. The components of the MoreGrasp neuroprosthesis, which include a wireless electroencephalogram amplifier with water-based electrodes, a forearm sleeve with integrated stimulation electrode arrays and tablet-computer based control and evaluation tools, were evaluated in a user-centred design process for autonomous home use by individuals with SCI and their caregivers.

moregrasp.eu
@moregrasp
EU FUNDING (01/03/2015 – 31/05/2018) • € 3,471,452.50

TECHNOLOGY FOR PEOPLE WITH MOTOR IMPAIRMENTS

MAMEM

MAMEM aims to integrate back into society people with **severe motor disabilities** (e.g., living with Parkinson's disease, neuromuscular disease, or a spinal cord injury) by giving them the ability to control computer interfaces using unconventional means, i.e., eye-movements and bio-signals instead of a hand-based mouse and keyboard. Helping people with severely limited movement use these novel technologies enables better communication and interaction, both at work and at play (e.g., accessing social networks). To do so, MAMEM developed GazeTheWeb, a web browser designed to be easily controlled by eye-movements. The GazeTheWeb browser allows people with motor disabilities to access the full range of web-based applications, including social networks, using only their eyes. It increases both the speed and scope of online interactions, as it automatically transforms web content into eye-movement-accessible interfaces, giving prompt access to a wider range of content and applications. In addition, the project adapted the popular computer game TETRIS to allow people with motor disabilities to play it against others using eye-movements and bio-signals. Until now, TETRIS could only be enjoyed by motor-abled players, as it depended on mouse and keyboard commands. With this new version, the player can rotate the tetrimino (the shape) with their mind and place it with their gaze, while the player's stress level, measured by a galvanic skin response device, controls the speed at which the tetrimino moves.

mamem.eu
@mamem_eu
EU FUNDING (01/05/2015 – 31/07/2018) • € 2,704,375.00

TECHNOLOGY FOR PEOPLE WITH COGNITIVE, LEARNING AND NEUROLOGICAL IMPAIRMENTS

INSENSION

INSENSION is developing a platform enabling people with **profound and multiple learning disabilities** (PMLD) to use digital services and applications. As individuals with PMLD are usually unable to use symbols to indicate their needs, they communicate through unconventional behavioural signals such as specific body movements, facial expressions or vocalizations. INSENSION employs artificial intelligence to recognize and translate these signals into meaningful 'intentions' that assistive technologies can then use to help people with PMLD executing daily life activities, such as interacting with other people or controlling basic home appliances. INSENSION improves the quality of life of people with PMLD by facilitating their self-determination.

insension.eu
EU FUNDING (01/01/2018 – 31/12/2020) • € 2,255,875.00

EASY READING

Independent access to websites is often difficult or impossible for people with **cognitive disabilities**. Easy Reading is a software that supports cognitive accessibility of web content. It enables people with cognitive disabilities to better read, understand and use websites through functionalities such us adjustment of the layout and structure of web pages, explanation/annotation of web content with symbols, videos or pictures and automatic modification of web content, for example, by translating into plain language or easy2read. The guiding inclusive principle of Easy Reading is to keep the user as much as possible at the original content and to give support only when the user needs or wants it. People with cognitive disabilities learn to cope with original content by selecting the support needed or through tracking methods, e.g. eye tracking, which automatically identify if and where a user needs support on a website. Easy Reading stores interaction preferences in a profile to better adapt web content to personal needs. In the Easy Reading project, people with cognitive disabilities and software engineers work together using an innovative inclusive research and development methodology.

easyreading.eu
EU FUNDING (01/01/2018 – 30/06/2020) • € 1,992,063.00

TECHNOLOGY FOR PEOPLE WITH COGNITIVE, LEARNING AND NEUROLOGICAL IMPAIRMENTS

GABLE

The main objective of GABLE project is to launch a social platform of personalized games to improve the living conditions of people with **cerebral palsy.** Focussing on enhancing motor skills and visual-motor coordination, the project offers mechanisms to control the games that caregivers can adequately personalize for each patient. The platform also allows monitoring of the progress made. The project places special emphasis on the social features of the platform, which offer parents, caregivers and patients the possibility to interact in a common environment. The games are conceived using multiplayer technologies that encourage groups of people with cerebral palsy to play together and with others.

projectgable.eu
@projectgable
EU FUNDING (01/11/2016 – 31/10/2019) • € 997,767.50

DE-ENIGMA

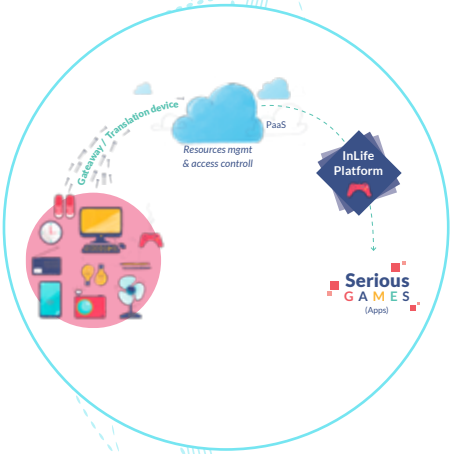
Interpersonal interactions can be mystifying for **autistic children.** The goal of DE-ENIGMA is to explore how a robot assistant can help an autistic child learning with a human adult therapist or teacher. The social skills of autistic children can benefit from new styles of emotion-learning games with a robot. The robot helps the child to recognise and name facial expressions and even to pair up a certain facial expression with the feelings they experience. Researchers and the autism community can benefit from inquiry into whether and why robots can help autistic children. DE-ENIGMA is testing these frequently quoted basic claims. The added value of the project is that it provides a new robot system for schools catering for children with autism to be used as a teaching aid. State-of-the-art audio, video and movement recognition software are incorporated into the system to track the interest of the child in the lesson material presented and to ensure the child is not becoming upset by the session.

de-enigma.eu
@deenigma_eu
EU FUNDING (01/02/2016 – 31/07/2019) • € 3,904,187.75

TECHNOLOGY FOR PEOPLE WITH COGNITIVE, LEARNING AND NEUROLOGICAL IMPAIRMENTS

INLIFE

InLife transforms everyday activities into innovative educational games that stimulate the **development of positive behaviours.** For instance, one of the InLife games (for tablets and smartphones) teaches children the value of recycling: sensors are used to automatically detect when children use the recycling bin; the more they recycle the more a virtual iceberg grows, and higher rewards are given within this game. The InLife Platform fosters the creation of new applications that easily link to smart sensors, capture events and reward users for their actions or behaviour, depending on the educational goals set. Educators are able to gamify the learning process, while students and trainees are better motivated to learn in practice. The possibilities are endless –teaching employees to sustain a better work practice, motivating children to do their homework, maintain their hygiene or clean up their room, supporting children with special needs to increase their autonomy and social skills, etc.



inlife-h2020.eu
@inlife_project
EU FUNDING (01/11/2016 – 31/10/2018) • € 1,002,400.00

MATHISIS

MaTHiSiS is centred on exciting new software that promotes a new way of thinking about education and training. It intends to provide high support for students increasing their engagement while learning, providing extra motivation and helping students with **learning difficulties**. MaTHiSiS works on tablets, phones, interactive whiteboards and personal computers – and even robots! Teachers and trainers can design their courses in the form of graphs where they attach the learning content with various difficulty levels. MaTHiSiS is able to provide each of their learners with a personalized learning path matched to their individual skills and needs, based on their individual profile and their previous learning achievement. MaTHiSiS monitors the progress of the students and automatically adapts - via artificial intelligence features - as they interact with the system to suit their emotions and their abilities.

mathisis-project.eu
@mathisisproject
EU FUNDING (01/01/2016 – 31/12/2018) • € 6,531,895.00

TECHNOLOGY FOR PEOPLE WITH COGNITIVE, LEARNING AND NEUROLOGICAL IMPAIRMENTS

ABLE TO INCLUDE

The ABLE TO INCLUDE solution improves the quality of life of people with **intellectual or developmental disabilities** (IDD) and similar conditions such as people affected by dementia or any kind of cognitive impairment. To achieve this, the project integrates a set of existing technologies to create a context-aware accessibility layer that understands the surroundings of people with IDD and helps them to interact with the information society. The project focuses on the most important areas that a person needs to live independently and find fulfilment as an individual: to socialize online, to travel independently and be able to work. The key technologies used in the project are a text and content simplifier, a pictogram-to-text, text-to-pictogram and pictogram-pictogram translation tool, and the text-to-speech functionalities.

able-to-include.com
@ableto include
EU FUNDING (01/03/2014 – 31/03/2017) • € 1,570,000.00

FOCUSLOCUS

Attention Deficit and Hyperactivity Disorder (ADHD) affects 7% of the population and causes behavioural problems, learning limitations and social exclusion. The FocusLocus project aims at providing an innovative treatment method to assist children to overcome ADHD symptoms with the help of REEFOCUS, a digital game system developed within the project based on cognitive science and information technology research. Through an engaging gaming experience, REEFOCUS has been used to train and improve cognitive skills that are affected by ADHD. REEFOCUS offers personalised treatment by targeting diagnosed deficits of each child and by adapting the training methods to match the child's progress in the game. REEFOCUS actively involves parents, psychologists and special needs educators, allowing them to remotely monitor the progress of each child and adjust the treatment programme accordingly. The REEFOCUS solution aspires to be an efficient and cost-effective alternative in ADHD treatment without the undesirable side-effects of currently established approaches (e.g. medication).

focuslocus.eu
@FocusLocusADHD
EU FUNDING (01/11/2016 – 31/01/2019) • € 999,562.50

TECHNOLOGY FOR PEOPLE WITH COGNITIVE, LEARNING AND NEUROLOGICAL IMPAIRMENTS

POSEIDON

The POSEIDON project provides personalised and smart technology solutions that increase the quality of life and independence of people with **Down syndrome.** Managing time, destinations and distances is challenging for persons with Down syndrome. Helping them being more autonomous is essential for their integration in society. Considering the abilities and characteristics of users with Down syndrome, POSEIDON developed a navigation service with specific help and assistance functionalities, a calendar service with additional reminders and instructions, and two apps, one for assistance in shopping and another for training how to handle money. The POSEIDON system runs on Android smartphones and tablets and provides a wide range of personalisation features.

poseidon-project.org
EU FUNDING (01/11/2013 – 31/12/2016) • € 3,000,000.00

ACCESSIBLE INFORMATION AND COMMUNICATION TECHNOLOGY

PROSPERITY4ALL

Not long ago one could live without using to digital products and online services. Nowadays these are essential for education, employment and commerce and are increasingly required for travel, health, safety, daily living and social activities. Yet some people encounter **technological barriers** that prevent them from using interactive interfaces and consult online information or simply find technology too complicated and struggle to accomplish simple tasks. Prosperity4All aims to reverse this situation by facilitating the development of technologies that assist people with disabilities or limited digital skills in the use of digital products and services.
To accomplish this objective, Prosperity4All provides an infrastructure that relies upon two interconnected components: the Unified Listing and the Developer Space.
The Unified Listing is an online catalogue of assistive technologies and accessible features in mainstream products. Through it, users to request new functionalities or accessibility solutions and developers can distribute and commercialise their products.
The Developer Space is a collaborative platform with technical resources and guidance to help developers designing solutions for accessibility. It is also a place for users to contribute with ideas and provide feedback to the developers.

prosperity4all.eu
@p4allnews
EU FUNDING (01/02/2014 – 31/01/2018) • € 7,700,000.00

WADCHER

WADcher develops a platform and a set of tools for **accessibility evaluation, monitoring and reporting.** It also implements standardised application programming interfaces that can be used by existing development environments and content management systems to build accessible websites and applications. The Decision Support Environment designed by WADcher aggregates the findings of automatic evaluations and supports, where necessary, additional manual testing. The project also develops observatory tools for monitoring accessibility in the long term including precise reporting functionalities. The platform is customised to different profiles such as policy makers, web commissioners, accessibility experts, web developers and end users.

wadcher.eu
EU FUNDING (01/01/2018 – 31/12/2020) • € 1,957,011.25

ACCESSIBLE INFORMATION AND COMMUNICATION TECHNOLOGY

WAI-GUIDE

WAI-Guide builds on and extends the efforts of the World Wide Web Consortium (W3C) on **web accessibility education and training,** accessibility support for web content authoring tools and emerging web technologies. Specifically, WAI-Guide aims to develop open curricula on web accessibility to support scalable accessibility training and to leverage the quality of existing programs. It will also result in industry-specific guidance on authoring tools accessibility and will address gaps in accessibility support in technologies, such as immersive environments and the Web of Things (WoT). The work is carried out within the W3C and through its open process, to ensure rigorous vetting and broad consensus. All project resources are provided using royalty-free licensing, as W3C resources, to help ensure long-term impact and sustainability beyond the lifetime of the project.

w3.org/WAI/about/projects/wai-guide
EU FUNDING (01/01/2019 – 31/12/2021) • € 1,499,742.00

WAI-TOOLS

The WAI-Tools project brings together key partners from industry, government, and research, to develop authoritative resources on **accessibility conformance testing** (ACT). The work is carried out within the W3C and through its open process, to ensure rigorous vetting and broad consensus. It includes the development of ACT Rules that transparently document consistent testing procedures for the W3C Web Content Accessibility Guidelines (WCAG), which is the internationally recognized standard for web accessibility. It also includes the development of open source implementations, as well as real-world demonstrators using existing large-scale monitoring observatories of the Portuguese and Norwegian governments. All project resources are provided using royalty-free licensing, most of which as W3C resources, to help ensure long-term impact and sustainability beyond the lifetime of the project.

w3.org/WAI/about/projects/wai-tools
EU FUNDING (01/11/2017 – 31/10/2020) • € 1,999,812.00

ACCESSIBLE INFORMATION AND COMMUNICATION TECHNOLOGY

WAI-DEV

The WAI-DEV project develops strategies to support the production of **inclusive ICT components and services.** It builds upon the recent technical and policy advancements in accessibility and on the crosscutting benefits of accessibility for everyone regardless of age, gender, software, hardware, connectivity, language, literacy, digital skills, social and economic situations, and physical and mental abilities. It demonstrates the potential economic value of accessible solutions and presents a showcase of good practices in inclusive design. It thereby facilitates more mainstream market adoption of accessible and inclusive design-for-all practices throughout the production chain, and supports the implementation of accessibility policies set by the European Commission and EU Member States. All project resources are provided using royalty-free licensing, as W3C resources, to help ensure long-term impact beyond the lifetime of the project.

w3.org/wai/dev
EU FUNDING (01/04/2014 – 31/03/2016) • € 499,000.00

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