

# Nafath

Issue no. 9

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[www.mada.org.qa](http://www.mada.org.qa)

**mada**  
digital access for all

# About Mada

## digital access for all نفاذ رقمي للجميع



Mada Center is a private institution for public benefit, which was founded in 2010 as an initiative that aims at promoting digital inclusion and building a technology-based community that meets the needs of persons with disabilities (PWDs) and the elderly in Qatar.

Mada is a leader in the field of ICT accessibility and the empowerment of persons with disabilities and the elderly locally and internationally. The Center works to enable the education sector to achieve an inclusive educational system and continuous learning through ICT.

Mada Center builds strategic partnerships in the culture and community sector to empower people with disabilities and the elderly, and support their independence through ICT.

The Center works in accordance with a clear vision as the Arabic center of excellence in digital access in the world to improve ICT ecosystem to integrate PWDs and the elderly into the digital community.

### Our Vision

Enhancing ICT accessibility in Qatar and beyond.

### Our Mission

Unlock the potential of PFL's through enabling ICT accessible capabilities and platforms.

# About Nafath

Nafath aims to be a key information resource for disseminating the facts about latest trends and innovation in the field of ICT and Accessibility. It is published in English and Arabic languages on a quarterly basis and intends to be a window of information to the world, highlighting the pioneering work done in our field to meet the growing demands of ICT Accessibility and Assistive Technology products and services in Qatar and the Arab region.

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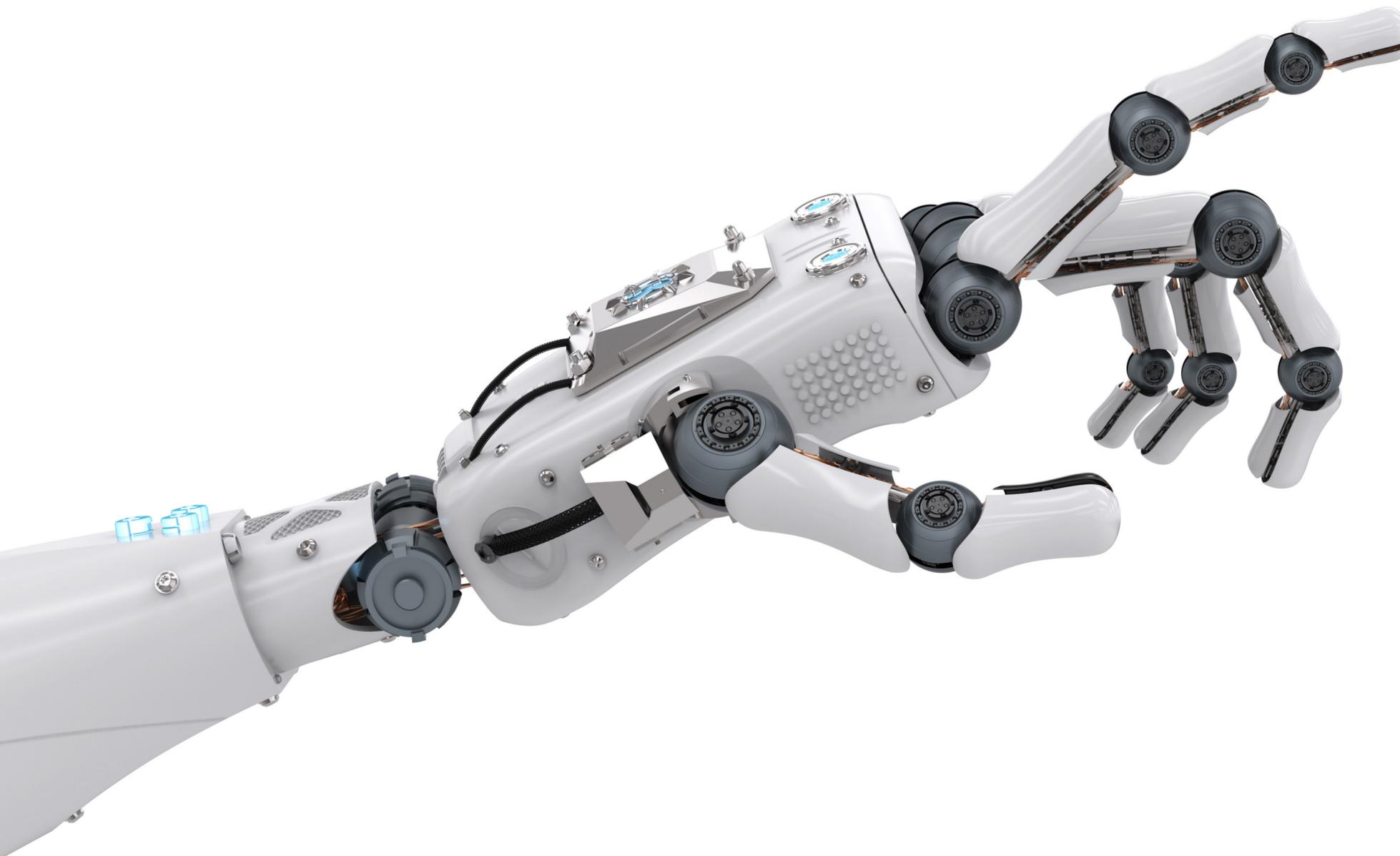
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# Use of Robots in Accessible Customer Services

Mada Center 2019 – 2021 strategy highlighted two strategic sectors to support ICT accessibility in; education and culture. The culture sector includes many sub-fields dealing with various settings including entertainment and retail. Mada Innovation Program has the task of supporting new innovations in Arabic language and always keeping an eye on the latest development and best practices in the field amongst which one might name robots and artificial intelligence solutions.

Accessible service robots are taking the spotlight as the demands for cost-effective, fast and accurate customer services are increasing over time. The introduction of professional service robots to the market that directly interact with customers have paved the way for the utilization of automated humanoid & non-humanoid systems to be an integral part of the customer service sector. The possibilities of automation in improving cost-effective, high quality, fast and accurate services within this market segment are boundless.

The customer segment of Artificial Intelligence (AI) based products has been increasing steadily over the last decade. The growing popularity of solutions like Siri, Alexa and Google Home, is not only exclusive to the regular population but also has a significant impact on people with functional limitations (PFL) as such solutions significantly contribute towards independent living by automating actions through voice commands. The proliferation of such technologies has recently extended towards developing customer service robots to perform client facing tasks. These robots come in both humanoid & non-humanoid forms and can systematize most of the primary tasks in customer service.

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As the world focuses on improving the accessibility, independence and quality of the life of PFL, the role of accessible robotics and AI has been of great significance. Robot based solutions are increasingly being built to enhance PFL's customer experiences by allowing the solutions to assist in most basic tasks like assisting customers in finding an item, completing a task or directing towards a service. A robotic workforce can increase the productivity in banks, shopping malls, entertainment centres, events, airports, retail and wholesale stores, and many other places where the types of customer interactions are standardized and monotonous in nature.

The key potential areas of accessible robots offering customer services in relation to PFLs are:

### Automated Sign Language

Accessible Robots can provide automatic sign language translation which can be integrated into their system. With an artificial intelligence-based platform, this could potentially happen automatically, which would be of great benefit for people who are deaf or with hearing loss.

### Multiple Interaction Modes

The multiple modes of interactions integrated into various applications like voice, text, vision and action with synergies and coordination make the PFL interactions more flawless and humanlike, which significantly enhances the user experience.

### Automated Translation and Captioning

Robots can provide language translation services and caption for people with hearing loss. This will also break the language barrier were PFL's with different mother tongue can speak directly to the machine and can acquire an optimised service as requested.

### Image and Speech Recognition

Robots provide automatic image recognition system and alternative text to speech for people who are blind. One of the most common issues with accessibility is the lack of alternative text to speech for images, which leads to misplacement of valuable information for PFL's.

### Accessible Information

Robots could help to make information more accessible to recognize for people with reading difficulties. With a highly integrated system, it could provide information access to users while maintaining the simplicity of the information provided.

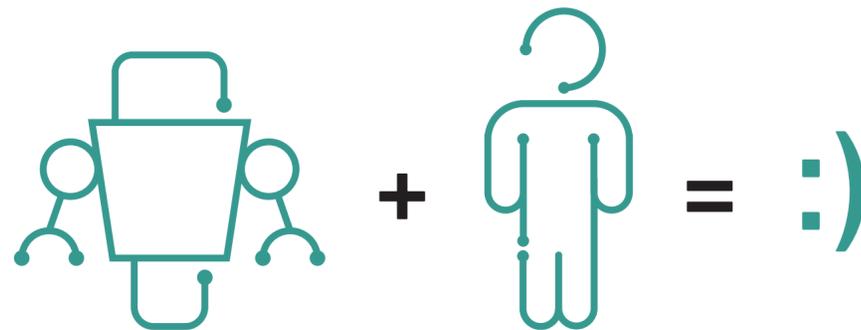
### Way Finding and Guided Navigation

Autonomous path planning with obstacle avoidance in cluttered environments will be possible with the use of robots which can provide indoor and outdoor accessibility at ease.

Customer service robots can be utilized in a variety of ways. The market is expected to progressively rise as industry alliances accelerates technological advancement with time. As their ability to interact with customers and collect data progresses, robots are expected to become an increasingly regular part of the day to day customer service process.

Since 2010, several Service robots have stood out with their excellent features such a Romeo Robot, Care O Bot4, Pepper Bot, HOVIS Genie or Honda Asimo. While each version is rolling out with improved features, it is highly noted that to make it an affordable solution for the customer service industry, the cost of these robots is yet to go down.

Although automated machine/solutions can be an intelligent, effective and efficient option, many still opt to have the human element during the customer service process and believe that instead of replacing humans with robots in the service industry, companies should focus on other technologies to support their customer service representatives in providing the best service experience for the users.



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## Mada reviews Microsoft Office 365 for Inclusive Classrooms and Curriculum

Microsoft Office 365 gives us the tools to create online learning platforms for schools that enable equal access for all students at any time.

Students receive assignments, announcements and grades online and can participate in discussions and conversations at a time and a pace that suits them. Teachers have a streamlined way to create and manage lesson plans, learning units and assignments. Assignments can be created and graded online allowing students to easily track their own grades.

Office 365 Education, includes, among others, Word, Excel, PowerPoint, OneNote, Sway, Microsoft Teams and Skype. and Minecraft: Education Edition — including the Code Builder extension — among others.

### CREATE COLLABORATIVE CLASSROOMS

Easily manage your class workflow while engaging the voice within every student.

Keep everything you need right at your fingertips with Class Notebook, Office apps, education apps, and files built into every class. Empower the student voice and choice with rich conversations, video, and fun content.

### A HUB FOR EVERY TYPE OF TEAMWORK

Transform the way your staff, teachers, and students collaborate in teams and communicate as a school. Connect in professional learning communities with built-in PLC Notebooks to continue lifelong learning. Streamline staff communication on school-wide initiatives using custom Staff Notebooks. Come together in any meeting with HD video, VoIP, and dial-in audio conferencing options.

### INCLUSIVE OF ALL STUDENTS

Online accessible formats allow student of every ability or disability to access learning and discussion no matter what their mode of access. It provides a level playing field for interaction and skill development. Student can even access course materials and assignments if off school for any reason.

### ONE PLACE FOR ORGANIZATION

The ultimate digital notebook, OneNote helps you organize class materials and easily collaborate with students and colleagues. It's free and can be used on any device. OneNote Class Notebook makes it easy to create course materials, write notes, assign homework, grade homework, or share students' work with other teachers or students' parents.



### ACCESS ANYTIME, ANYWHERE, FROM ANY DEVICE

Bring conversations, content, and apps together all from a single Office 365 Education experience. Collaborate in real time without boundaries, and without worrying about lost formatting.

### SIMPLIFY CLASS MANAGEMENT

Create classes and groups for Teams, Intune for Education, and more for free with School Data Sync.

### Equip your students for success today and tomorrow

When you use Office 365 Education in the classroom, your students learn a suite of skills and applications that employers value most. Whether it's Outlook, Word, PowerPoint, Access or OneNote, prepare students for their futures today. For group projects, students working on the same document, image, or spreadsheet can create, share, and see what changes are being made in real-time. Teachers can track what students are contributing to the project and be able to see how students interact on projects.

Teachers and school administrators can take advantage to work on administrative projects so it is also helpful with school and classroom budgets.

### CLOUD SERVICES TO CREATE A MODERN CLASSROOM

Create collaborative classrooms, connect in professional learning communities, and communicate with school staff with the power of OneDrive, Teams, Skype, and more -- all from a single experience in Office 365 Education.

OneDrive allows you to save documents and share them with individuals or groups with a simple link. Any document you edit on Office Online; Word, PowerPoint, Excel, or OneNote can be saved to OneDrive. On a team project, everyone can upload documents to OneDrive and be notified via email of any changes being made to the documents, files, or spreadsheets for the project and which team member made the changes.

Skype is evolving in the classroom in more ways than one. Skype was originally used to connect people for video calls, but in the classroom, it's being reincarnated. Skype in the classroom is a new global teaching community, where teachers and students from across the globe can collaborate and share ideas. Students can hear guest speakers from other countries and even go on virtual field trips.

### PROFESSIONAL PRESENTATIONS

Whether it be in the classroom or in the office, Sway makes it quick and easy to create interactive reports, presentations, and interviews, and to share work with others for comments and suggestions. With Sway everyone in a group can see where everyone else is editing a project. Sway is also available online, on the iPhone, and iPad, making it a good solution for cross-platform teams. In short, Sway is a great tool that can be used by teachers or by students to bring presentations to life.

### ONLINE AND VIRTUAL LEARNING

Skype is evolving in the classroom in more ways than one. Skype was originally used to connect people for video calls, but in the classroom, it's being reincarnated. Skype in the classroom is a new global teaching community, where teachers and students from across the globe can collaborate and share ideas. Students can hear guest speakers from other countries and even go on virtual field trips.

Teachers and students can see first-hand just how different cultures can be over Skype without ever leaving their classroom. Skype can also allow students to communicate even if they don't speak the same language with Skype Translator. Skype also has a resource for teachers looking for ideas on what to teach their students with live Skype lessons. You can find hundreds of Skype lessons to share with your students or create your own.

With Office 365, a great number of tools and resources are available for teachers and students to learn, collaborate, and engage with others across the country and the world. Microsoft is constantly adding new features to OneNote, Sway, OneDrive, and Skype to make it easier to communicate and collaborate.

### ARABIC SUPPORT

Office 365 offers Arabic support for its tools. The availability of Arabic language support will contribute towards augmenting the quality of classroom support for students with disabilities by offering the wide range of features in bilingual format. Comprehensive solutions like Microsoft Office 365 serve as an essential foundation to support the educational needs of students with different abilities in Qatar and the region.

# Accessible Museums

## Virtual tours for people with physical impairment

In recent years we can use maps apps to view any location we want from the comfort of our own home. We can view our local area or plan far reaching travels, from mapping out journeys to viewing significant cultural institutes to help us prioritise and coordinate. This convenience helps us get the most out of expensive and timely trips but for those with a physical disability it goes much further. Beyond convenience these technologies open the doors of cultural institutions. They allow exploration for those with physical disability who may otherwise be limited by travel or physical access to these locations.

New 3D and VR tours provide immersive and interactive experiences allowing us to view a whole space and get a real feel for the institute as well as to get up close to individual pieces and artifacts.

From the comfort of your own home you can take a virtual tour of the approaching landscape and view interior details of the Rome Colosseum navigating your way through the old stone arches, or stroll the tree lined avenues approaching Caracalla's Baths.

You can take in the vista of Rome from a height over the Piazza Venezia or the Spanish steps controlling a full panoramic view of the city's scale and grandeur.

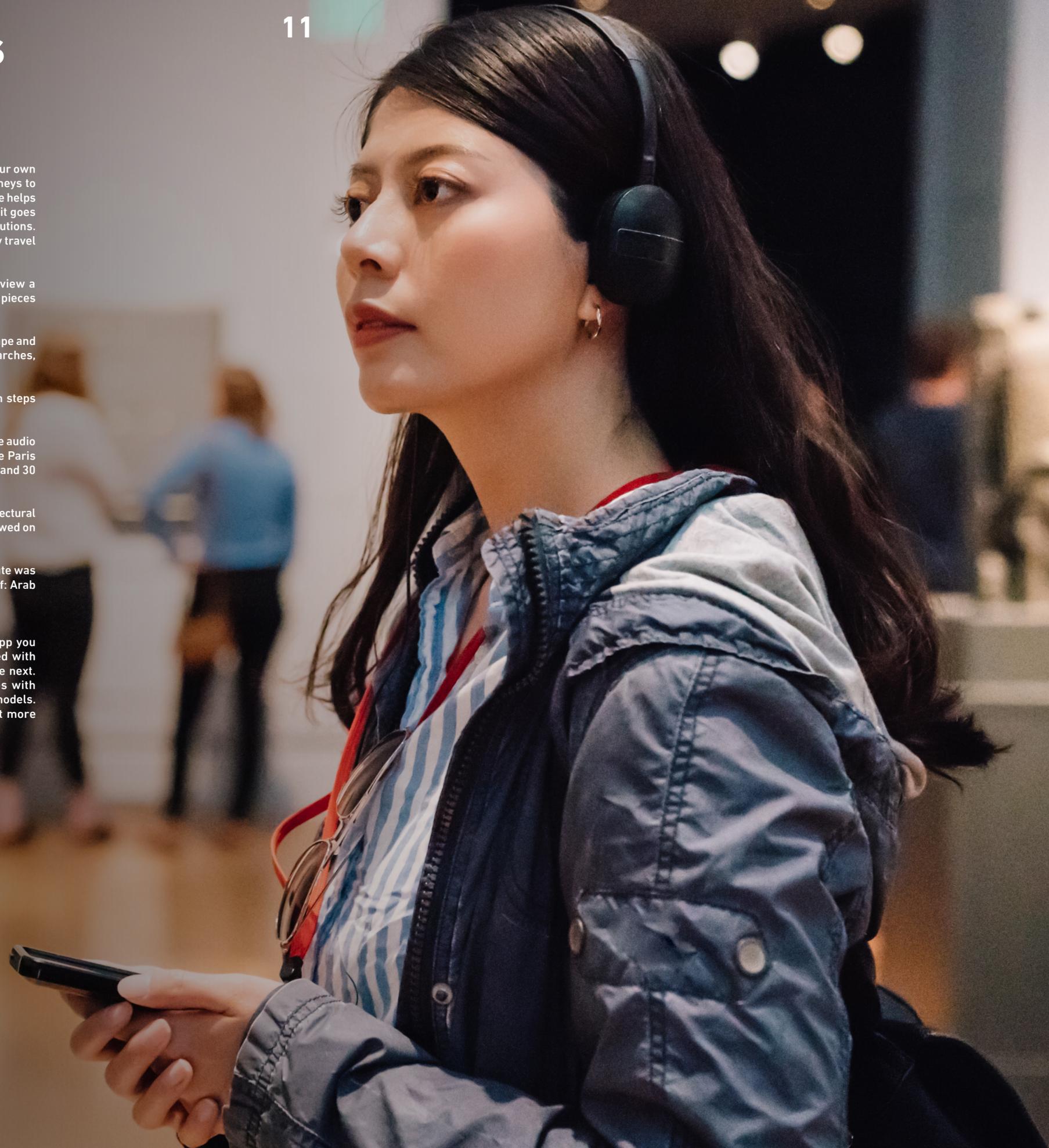
The Louvre Museum in France has a downloadable program that allows you to listen to the audio guide of the museum. By using a game console, you can take a virtual walk through the Paris gallery and enjoy more than 600 photographs of artwork, 400 images of museum rooms and 30 hours of audio commentary.

The Met 360° project enables viewers to virtually visit and view the art collections and architectural features of the Metropolitan Museum NY, this award winning series of 6 videos can be viewed on your smart phone, computer or tablet or with a VR headset for a fuller immersive view.

Want to stick closer to home? One of the earliest museums to join Google Cultural Institute was the Museum of Islamic Art in Doha. You can take a virtual visit to the gallery or to Mathaf: Arab Museum of Modern Art.

### What if your choice of museum or gallery is not available virtually?

The technology now is such that with a good quality 360° camera, a tripod and an app you can shoot 360° panoramic footage of any space. Photos can be uploaded and edited with software which will allow you to piece together scenes and transition from one to the next. There are also organizations which provide this service to museums and galleries with packages to meet most budgets from basic 360° images to metatags and 3D object models. These innovative developments make the past and present world of culture and art more accessible for people with physical limitations.



# Can Innovation be inclusive? A view from Qatar



**As a researcher, I have always enjoyed developing new technologies especially when it comes to supporting people with disabilities. Over the years, our group at the College of Science and Engineering at Hamad Bin Khalifa University has invented, experimented and developed a number of new technologies that enabled accessibility and supported people with disabilities in a number of ways. In this article, I would like to shed the light on two promising research projects:**

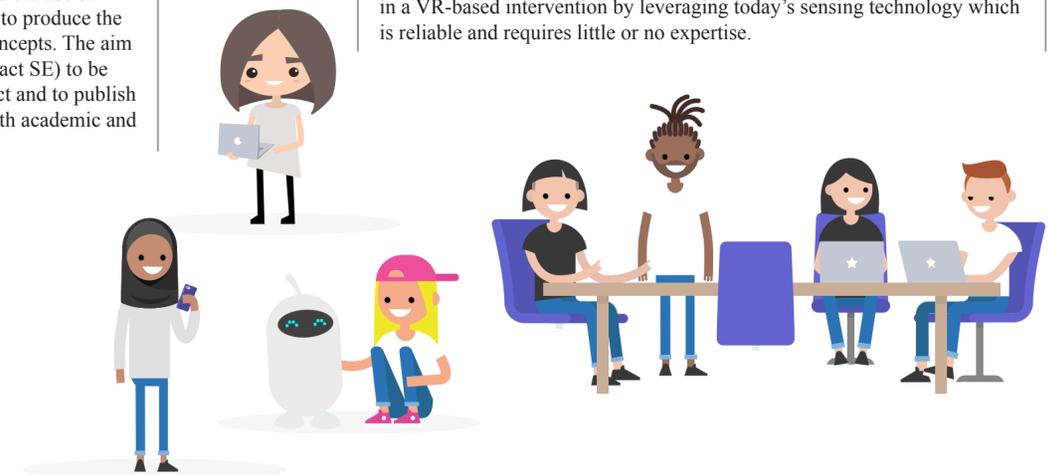
Dr. Dena A. Al Thani  
College of Science and Engineering  
Hamad Bin Khalifa University



## Interact SE A Search Engine for the Blind

The Internet is the main source of information nowadays, we use search engines numerous times a day. Blind users access the web using a screen reader. There are a number of research evidence, stating that blind web searchers tend to spend more than double the time sighted web searcher spend on a search results page. This, in turn, affects their performance and inclusion. Therefore, we aim to provide different and alternative ways to represent the search results to facilitate the search process, enhance their experience and support their efficacy,

The work in this project leads to the design of an interactive tool (Interact SE) that represents an overview of the search results page using audio components. The tool has been evaluated by blind users in cooperation with Mada Centre and Qatar Social and Cultural Center for the Blind. The end result of this study is a functional prototype that summarizes the search results, where the main ideas are identified as concepts and represented to the users first. The user then has the ability to dig to more information and explore more search results in details. We have adopted the use of Formal Concept Analysis (FCA), to produce the outcome of the summarization concepts. The aim is to allow the final product (Interact SE) to be released as an open-source product and to publish the outcome of our research in both academic and practitioner communities.



## Detecting and Monitoring Attention in Children with Autism Spectrum Disorder During Learning

Autism Spectrum Disorder (ASD) is a neurodevelopment disorder characterized by a deficit in social communication and repetitive pattern of behavior. They are also known with exhibiting an unusual pattern of attentional behaviors such as difficulty in shifting attention, inability to pay attention to over or under stimulated audiovisual stimuli and pay little or no attention to social stimuli. The prevalence of this disorder is relatively high and there has not been any known cure for it. Hence, a series of educational and behavioral interventions have been developed by leveraging existing technologies to support their attention deficits which invariably supports their social communication and academic skills.

These interventions work differently for the children with ASD as some may require over-stimulating effect and others prefer the opposite. Therefore, it is imperative to detect and monitor the attention level of these children in real time during a learning intervention to identify which intervention suits them while learning. This will create the opportunity of changing attentional cues as required by each child. Studies have identified sustained attention out of other types of attention as a critical element in learning intervention and maintaining the level of sustained attention varies across different technologies used and learning environments such as Computer Based Intervention (CBI), Human-Robot Intervention (HRI) and Virtual Reality (VR) and Normal Classroom Setting. The aim of this study is to design and develop an assistive technology to monitor the level of attention of children with ASD during learning in a VR-based environment due its possibility of mimicking real-life scenario such as road crossing or shopping that is safe for children with ASD as well as providing a uniform class scenario across the participants.

We have been able to identify from existing studies on VR-based interventions to have majorly focused on subjective measures as compared to objective methods in detecting and monitoring sustained attention in children with ASD. Although the subjective measures have been successful in determining the level of attention, it requires vast experience in autism domain and it is time-consuming. Hence, we intend to apply objective measures in detecting and monitoring the attention of children with ASD in a VR-based intervention by leveraging today's sensing technology which is reliable and requires little or no expertise.

As part of the Mada Innovation Program, Mada Center partnered with Seedstars to promote Arabic Assistive Technology solutions with the ultimate goal of supporting accessibility startups in Qatar and the Middle East to enable Person with Functional Limitations (PFLs) and improve their lives. Seedstars and Mada share a common vision to support innovation by working with the distinguished entrepreneurs in the field and offering them funding and subject matter expertise to make their solutions a marketable reality impacting the end users.

The collaboration involved Mada being the ICT Accessibility Partner for the Seedstars MENA 2018 event and awarding the Mada-Seedstars Best Arabic AT Startup competition winner.

The Seedstars MENA's platform combined with Mada Innovation Program reached vast range of innovators and entrepreneurs who were looking for support and resources to make their assistive technology solutions market ready. This collaboration was done through the Competitions stream of the Mada Innovation Program. This stream aims to collaborate with global competitions by incorporating Arabic Accessibility and Assistive Technology category in their existing mainstream competition platform.

The awards attracted 48 applicants from 13 countries in the Middle East and North Africa. Three were selected to be in the final round of the competition to present their solutions in the event. A 10,000 USD prize was awarded to Bonocle, a digital access solution design for the blind and visually impaired.

#### What is Bonocle?

Current market research suggests that accessibility products targeted towards the visually impaired are unattainable due to their extremely high prices and their lack of compatibility with different file formats. Bonocle is the first of its kind assistive technology that utilizes one braille cell which refreshes as the device is moved across a surface allowing it to read continuous text. This eliminates the limitations surrounding the presence of limited number of braille cells in such devices and allows pricing the Bonocle at an extremely competitive price point making it affordable to different markets that were not previously available. It also allows Bonocle to be small in size and very portable. The innovative form factor of Bonocle provides the user with utmost portability allowing the visually impaired individual to use his device while on the move or comfortably sitting in a public location.

Moreover, Bonocle utilizes currently existing devices that are well developed, allowing the user access to a much wider range of content and features rather than developing a fully built device that will limit the individuals access to the content currently digitally available. The application programming interface (API) will also allow full integration with the device enabling the user to access all the features of the device being used along with Bonocle. The possibility of the device to integrate with existing platforms allows vast possibilities in terms of extending the product functionalities. The API also supports integration with OCR technology letting the user to read print content.

Bonocle combines hardware and software solutions to provide an innovative product that allows the visually impaired community barrier-free access to a broad array of digital content. It is a handheld/semi wearable device that incorporates a braille cell positioned

## BONOCLE

### The next-gen AT Device for the Visually Impaired

## MADA-Seedstars AT award winner



under the fingertip of the user when held or worn. The product is able to communicate with various electronic devices (e.g. smartphones, tablets, laptops or personal computers) and display the contents of the device in braille on the incorporated braille cell, providing the user with unprecedented access to the digital content available.

#### Bonocle's Main Features

Bonocle can operate in three different ways: Firstly, the device can incorporate a capacitive surface at the tip which enables it to hover over a touch screen allowing the device to detect the location of the tip and send the contents of the screen to the braille cell.

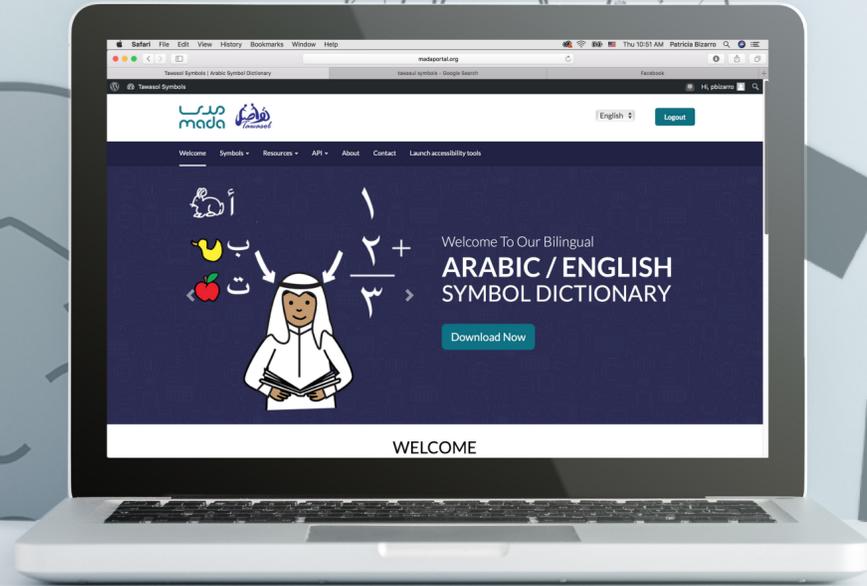
Secondly, the contents source device can be automatically chronologically sent to the Bonocle allowing the user to seamlessly read the contents being displayed without exerting any effort. Finally, the device utilizes a sensor that enables

it to be moved on any surface (e.g. workplace desk or restaurant table) while it detects the movement and sends the contents displayed on the user's electronic device by moving his hand on top of the horizontal surface.

#### The Impact of Bonocle

Bonocle has the potential to integrate the visually impaired and blind community into the society by offering them unhindered digital access to the world. The solution can be integrated seamlessly in tourist attractions, airport, hotels, stadiums and public transportation, to act as a guide and source of information to the visually impaired and blind individuals without blocking any of their senses or limiting their social interaction and thus providing a full immersive experience.

The lower price point, usability, portability and functionalities, positions Bonocle to reach a broader range of the market. Mada innovation program supports the use of Bonocle as it fully supports Arabic allowing the user to access Arabic digital content. This will greatly widen the ecosystem of available Arabic assistive technologies in Qatar and the region. Ultimately, the product can be a vital contributor towards the Education sector by facilitating the use of braille in classroom and improving braille literacy in the region and worldwide.



# Tawasol Symbols to Support Communication and their Impact on Students with Learning Disabilities

## Augmentative and Alternative Communication (AAC)

Individuals with profound speech and language difficulties rely on Augmentative and Alternative Communication (AAC) systems to supplement or replace existing speech in order to effectively communicate with others. AAC is a collective term that refers to alternative communication methods that replace speech or writing for those with impairments in delivery and comprehension of spoken or written language.

Previously, the use of AAC in Qatar and the Arab region has been challenging as the education sectors are mainly supported by English speaking educationalists using AAC symbols developed by and designed for the USA and European users. These symbols often tend to have different cultural and contextual representations when presented within the local Arab society. Additional challenges towards using westernized symbols sets within the region involve therapist and teachers being from a different language and cultural background compared to the AAC users. Furthermore, Arabic language is spoken



differently when communicating in formal Arabic and colloquial Arabic. All such factors related to the need to effectively communicate within a society with varying verbal communication languages/styles, along with different interpretation of visual symbols on a cultural and contextual level had raised the need to develop an AAC symbol set to cater for the concern population.

To address this challenge, in 2013, Mada Center had embarked on a project to develop an AAC symbol-set called «Tawasol» that focused on Qatari Arabic language. The project was launched in collaboration with University of South Hampton and under funding from Qatar National Research Fund (QNRF). The Tawasol Symbol Set is designed to be suitable for bilingual (English and Arabic) use, along with consideration towards vocabulary and symbols that are culturally and contextually appropriate for the local society. Currently, the Tawasol symbol set contains more than 600 words in its vocabulary. A dedicated online platform has been developed to make the Tawasol symbols available for teachers, therapists, parents, and developers. The platform allows users and relevant professionals to download the symbol set for use within their environment (e.g. home, school, etc.) along with the associated training resources to utilize it.

## Application Programming Interface (API)

The Tawasol Symbols online platform is further extended to offer an API for developers to be able to integrate the symbol set into any applications being developed. The API for Tawasol is a set of subroutine definitions, protocols, and tools for building application software. In general terms, it is a set of clearly defined methods of communication between various software components. The API can be used to develop new AAC Apps using Tawasol symbols for android and iOS.

The API is the first of its kind tool to allow developers to create Arabic AAC apps for the region. This will support the integration of Tawasol Symbols in existing and new AAC apps. It is intended to eventually expand the range of available Arabic AAC solutions for users in the region and lead towards enhancing the Arabic Assistive Technology and Accessibility ecosystem.

## Tawasol AAC App

To maximize the impact on Arabic AAC users in Qatar and the region, Mada has introduced the first fully functional Arabic AAC app using the Tawasol Symbols. The Tawasol AAC App is one of the innovative solutions supported by Mada through the Mada Innovation Program. It has been developed by following the international guidelines governing AAC methods, as well as transforming speech models into alternative and enhanced communication by following the principles of verbal behavior and the analysis of applied behavior.

The current English AAC solutions doesn't not provide the cultural contexts nor the language necessary for the Arabic-speaking Qatari community. Tawasol Symbols provide a great opportunity for non-verbal communication that is culturally appropriate to the Qatari and Arabic user. Merging these symbols into a single application enhances the ability of non-verbal people to communicate with others. Tawasol App aims to use Tawasol Symbols for improving communication skills for people and children with communication or reading and writing difficulties.

This application is designed to be highly customizable so that teachers and families of AAC users can modify it to meet the communication needs of the users at home, at school or elsewhere. Providing a comprehensive Arab communication tool, the AAC users will be able to engage in society by talking to others and expressing themselves. By enabling them to communicate, people with disabilities can get better opportunities to communicate, learn, work and live independently. Moreover, and as part of Mada's commitment to improve the educational landscape for persons with disabilities, a nationwide competition was lately organized in Qatar to encourage the development of new educational resources using Tawasol Symbol. The event involved teachers from various schools to participate in creating educational resources for their students using the symbol set. Using the Arabic language to provide a technical solution consisting of appropriate words and symbols will facilitate and improve the lives of people who are unable to communicate in English. In addition, the expressive language resulting from this application can be understood by family members, relatives, the school and the community who speak the Arabic language.

# Technologies for the Deaf and Hard of Hearing



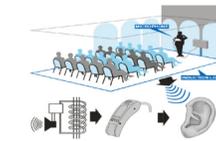
Those who are deaf or hard of hearing often have several limitations in their daily lives in accessing technology. It is difficult for the deaf or hard of hearing community to communicate and perceive information compared to hearing people.



In order to receive and communicate information, people with hearing difficulties often rely on visual and tactile devices. The use of assistive technology provides this community with various solutions to their problems by providing higher sound (for people with hearing difficulties), tactile feedback, visual information and improved access to technology.

Assistive technology for the deaf either amplifies the sounds around the person or amplifies a specific sound that interests the person, or it provides an alternative way for accessing the information via vision or vibration. These technologies can be divided into 3 main categories:

1. Technologies that improve hearing.
2. Technologies that alert the individual.
3. Technologies for communication.



**1 Hearing Technologies**  
Hearing Assistive Technologies are the types of technologies that amplifies the sound around the person with a hearing difficulty. Hearing aids may have a telecoil to receive electromagnetic signals. When a person switches his hearing aid to a telecoil by pressing a button on the hearing aid, he or she can hear any signal transmitted via an induction loop, and they can be categorized further into:

**a. Assistive listening devices**

These includes induction loops that are used in public places like theaters, classrooms, meeting room, etc. For example, there are several venues that are looped, meaning that there is a large wire surrounding an area of seats that is connected to the sound system of that venue. So as long as the person with the hearing aid is seated inside the loop and the hearing aid is switched to the telecoil program, he or she will be able to hear the broadcasted signal clearly and comfortably. The person with hearing difficulty may also purchase a loop system to work with his television at home.

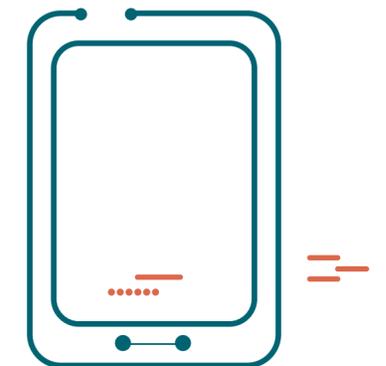
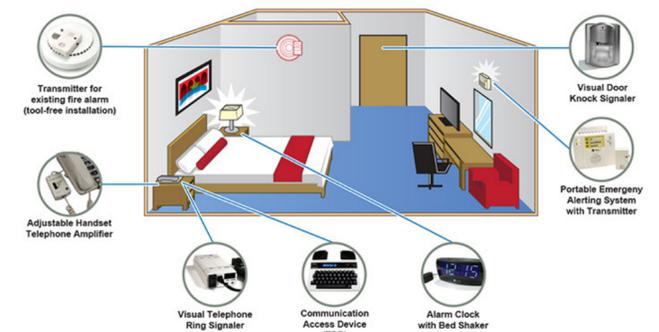
**b. Personal amplifiers**

Hearing aids provide great benefits in many environments, but sometimes the person will be in an environment where hearing aids cannot solve all the hearing problems. Situations where there is a lot of background noise or situations in which the person has to hear across a large distance can be difficult for some even with hearing aids. Personal listening systems are useful in these situations to help the person hear the entire intended signal without the majority of the background music.

Personal listening systems can be used with the hearing aids by using a remote or neck loop system that communicates with the hearing aid directly, or without the hearing aids using headphones. Personal listening systems involve the speaker wearing a microphone that will the transmit his or her voice to the hearing aid user with minimum interference.

**2 Alerting Technologies**  
Alert systems can be used to notify you or your deaf child when action is needed. If someone rings the doorbell or if a smoke alarm has been activated for example, alert systems can be used to notify you. Depending on your preference, notifications range from flashing lights, vibration, or auditory.

Popular notification events may include phone or video call alerts, doorbell, baby cry, weather, smoke detectors and carbon monoxide alarms. Most of the mainstream mobile phones nowadays have built in alerting systems for deaf and hard of hearing people, and there are some applications on the app store that work with mobile phones and record some popular voice around the person and an alarm will be activated when that sound is detected. In addition to mobile phones, there are also smart watches and bracelets that are used by people with hearing loss as alerting devices.



### 3 Communication support technologies

The improvement of technology has eased the way people communicate, and for the deaf community, technology helped them communicate with each other and with hearing people. Following are some technologies used for communication by deaf and hard of hearing people:



#### a. Video Relay Services

Video Relay (VRS) or Video Remote Interpretation (VRI) is a type of video telecommunication service that uses communication devices such as webcams or videophones to provide sign language and/or voice interpretation services.

In many cases, it may take some time to get an interpreter and they may not be available immediately. On the spot, the VRI will be providing an interpreter. The VRI has two parties, the deaf / hard hearing person who uses the VRI, and the on - screen interpreter.

The interpreter can be on a computer screen, videophone, web camera. The interpreter will use the audio while someone is speaking and the person is interpreting sign language to the deaf person, and then if the deaf / hard of hearing wants to say something they will sign to the interpreter and the interpreter will use his / her voice to relay the message.



#### b. Real-Time Text

Real-time text (RTT) transmits text that can be immediately read by the reader even before the sentence is finished. This is one of the ways the Deaf community uses to communicate. RTT enables the other person (receiver) to read the message immediately without waiting for the message to be written. The speaker will speak on an ongoing basis without interruptions and pauses. For a continuous conversation, the Deaf community uses RTT. TDD devices, sometimes called TTY devices, are commonly used for RTT via a regular phone call. Text over IP (ToIP) is a type of RTT that uses IP networks natively.

#### c. Sign language robots and bots

There are couple of robots and bots in the market that make communication with deaf people easier. Some Robots and Bots were developed specially to teach children sign language. There are some bots which are used on websites or apps to communicate text messages by converting them into sign language using a library stored locally or on the cloud. One example is "Bu hamad" a Qatari real-time sign language interpreter avatar.



"Mada" supports leading Arab technology initiatives to develop solutions that serve people with hearing impairments. Individuals with hearing impairments demand for technological solutions that support Arabic sign language. One of these solutions is the 3D technology called "Avatar", which was used to develop the virtual character "Bu Hamad" with the support of Mada Center.



# Types of Innovative Technologies to enhance the Lives of the Elderly

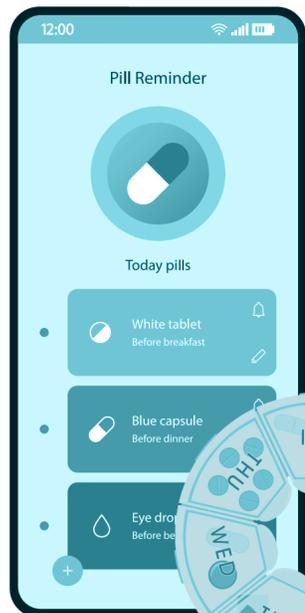
Mada center has launched many initiatives to improve the life, environment and independence of the elderly through ICT accessibility. These initiatives include introducing the «Independent living Guide» and @TWASEL training program for the elderly in cooperation with Ehsan and GRSIA. Mada understands that the world's population undergoes a continuous aging process. The aging population is facing major health problems such as chronic illnesses, disabilities, physical and moral impairments. The need for innovation in elderly care is permanent as technology and medicine develop rapidly with time as well as human nature and habits.

There have been several technological advancements for the wellness of aging community. From simple applications to keep track of their appointments to robotic structure to support them in mobility.

# 1

There have been several applications that help organizing taking medications at set times that can be coordinated at any time during the morning, afternoon, or evening. The increasing popularity of tablets and smart phones means it is a rarity to find a person without one elderly people. This sort of apps helps the user to organize their prescription schedule with greater ease and will ensure that patients will have a daily reminder to take their daily medications without missing out on it. Apps like Medi Safe, Tab Time, Med Minder, Pill Pack, E-pill are the most user friendly according to the users' reviews.

## Pill Reminder and Medication Tracker and digital Pillboxes

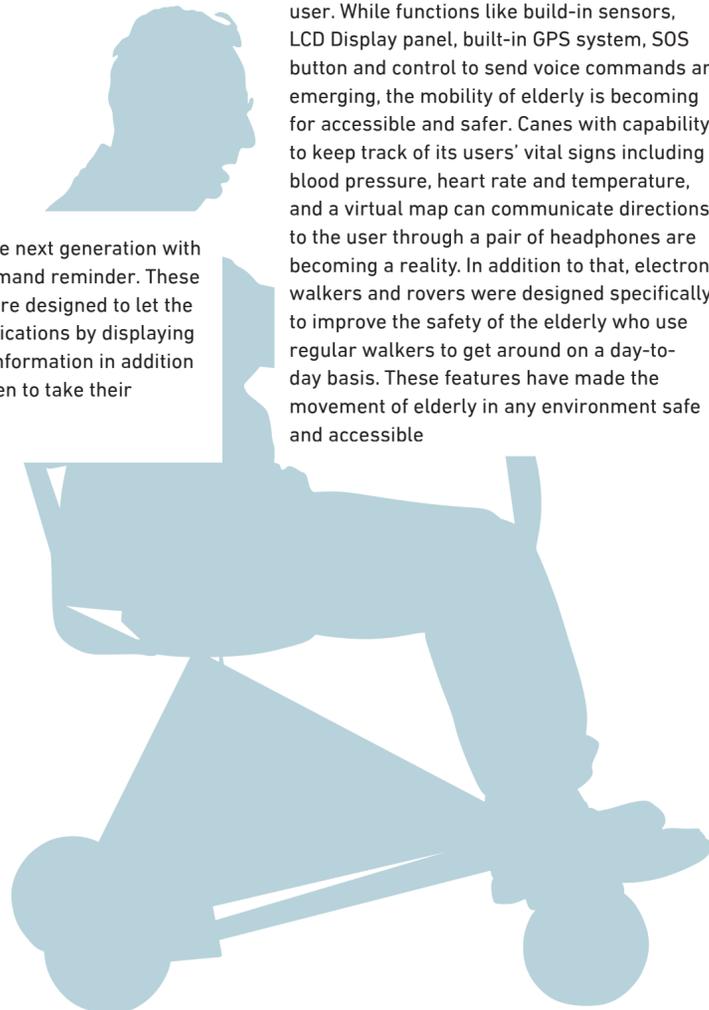


Digital Pillboxes are the next generation with alarms and voice command reminder. These tech-savvy pill boxes are designed to let the seniors take their medications by displaying both personal health information in addition to reminding them when to take their medication.

# 2

## Mobility Aids

The technology evolving around mobility needs of the elderly has also evolved with it. The walking stick has been a reliable prosthesis for thousands of years. Today we have walking sticks with ergonomic shape ideal for one's hand to grasp it comfortably, even when the weight of the upper body is applied while having self-stabilizing technology in case of any hand slips from the user. There are sticks with the grip, a tiny screen and an audio jack, allowing the cane to communicate with its user. While functions like built-in sensors, LCD Display panel, built-in GPS system, SOS button and control to send voice commands are emerging, the mobility of elderly is becoming for accessible and safer. Canes with capability to keep track of its users' vital signs including blood pressure, heart rate and temperature, and a virtual map can communicate directions to the user through a pair of headphones are becoming a reality. In addition to that, electronic walkers and rovers were designed specifically to improve the safety of the elderly who use regular walkers to get around on a day-to-day basis. These features have made the movement of elderly in any environment safe and accessible



# 3

Smart watches, Digital cuffs, Airbag Hip belts are the few wearables from many that stand out with their neat designs and innovative features to support the life of the elderly. Wearable safety devices can inspire greater confidence in the elderly and their families as they will allow them get more active. A wearable device is better than a mobile phone because it's less likely to get lost and are always designed to be with the user. Features like fall detection, heart rate monitor, ECG monitor, two-way communications make it easy for both user and support staff of the elderly. As far as safety is concerned, most safety wearables still require a caregiver to track the person wearing them and to be available in case of emergency.

## Electronic Wearables

# 5

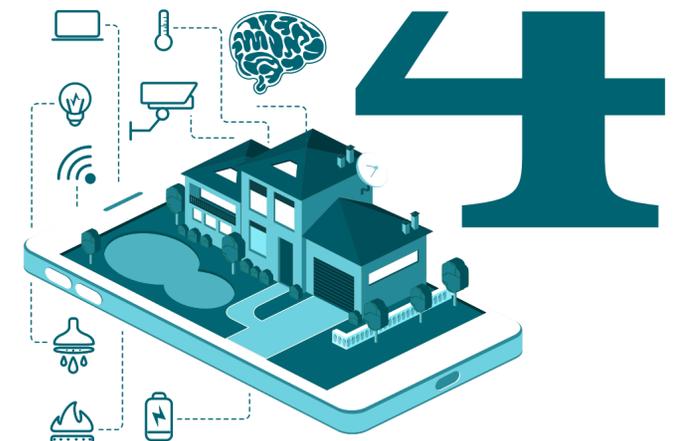
An era where everything or service is replaced by robots, Eldercare was also put into the fast stirring change while integrating robots in the life of the elderly. Artificial Intelligence is advancing with smarter and more efficient robots. To respond to the crisis, robots are beginning to assist older adults in nursing homes, hospitals and at home. Emotion sensing robots are playing major role in assisting the elderly physically and mentally in day to day life tasks. Robots can even respond to joy, sadness, anger or surprise for the user. Plenty of obstacles may hinder a rapid proliferation of elder care robots such as high costs, safety issues and doubts about how useful they are or how user friendly they can be. Developers have already focused their efforts on producing simple robotic devices that help frail users to get out of their bed and into a wheelchair, or that can ease senior citizens into bathtubs.

New innovations are surfacing around the world every day to improve the quality of life of the elderly. Some of these technological innovations are already available to some, others will be in the markets in months, and some in few years, if at all. We don't know what the future will look like, but all signs tell us that new technologies make life easier, safer, and better for seniors, that is if tech companies can find the sweet spot between what seniors need and what they're comfortable using. Learning about technology for the first time can be frustrating for the seniors. A calm, cool behavior can go a long way towards making the learning journey less frustrating for inquisitive older learners.

## Elder-care robots

## Smart Home Assist

When it comes to building a safer and digitally accessible environment for an elderly person in the house, smart homes play a major role. A smart home is a home outfitted with devices that can be controlled over an internet connection on one's desktop, tablet, or smartphone. There are hundreds of devices on the markets that can make up a smart home system. From smart thermostats to Wi-Fi enabled lighting system, smart technology is revolutionizing homes. Basic elements can now be automated or controlled by a smartphone or by voice command while sitting anywhere in the house. Even though smart homes are getting popular, it has not been widely adopted by the elderly community due to the lack of knowledge about technology.



# 4

