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**Seeing Style Apps for the Blind
One Step for an Independent Outdoor User Journey**

**STEM and how it can consolidate classroom
inclusiveness**

Artificial Intelligence, Art & Inclusion a perspective

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Content

1. Artificial Intelligence, Art, and Inclusion: A Perspective

Mada Center

2. Accessible Kiosk as an e-Government Service: Feedback from Persons with Physical Disabilities and Visual Impairments

Mada Center

3. Smart Apps to Improve Reading, Writing, and Communication Skills for Deaf Students

Mada Center

4. STEM and How it Can Consolidate Classroom Inclusiveness

Mada Center

5. The Blue Room: How Virtual Environments Can Enhance the User Journey for People with Autism

Mada Center

6. Seeing Style Apps for the Blind: One Step for the Independent Outdoor User Journey

Mada Center

7. Mouse Control for iOS A New Era of Accessibility

Mada Center

Artificial Intelligence, Art, and Inclusion: A Perspective

Mada Center

We all must have observed that artificially intelligent (AI) systems are slowly taking over tasks previously done by humans. Many processes that are repetitive and simple have already been fully automated. In the meantime, humans continue to be superior when it comes to abstraction and creativity. However, it seems like even when it comes to creativity, we are now being challenged by our own creations. Nowadays AI is taking up the artists' role in producing unique and ultra-realistic pieces of art.

In a panel organized by Hamad Bin Khalifa University, a question was raised whether AI really can create Art? The event was organized by HBKU's College of Science and Engineering and the Translation and Interpreting Institute at the College of Humanities and Social Science. The event, which consisted of two panel discussions, hosted keynote speakers from the *Fire Station* Artist in Residence and Mada Center in Qatar. The second panel, in particular, looked into how AI is changing the persons with disabilities experience and involvement with art. The panel addressed case studies to show how AI can be utilized by people with disabilities to shape their experience and conception of contemporary art forms. Thus, identifying the challenges and opportunities AI can impose on ART perception and inclusion.

When it comes to the development of AI in the areas of inclusion, assistive technology and accessibility, the possibilities are endless. Several attempts have been done in the research sphere in deploying AI to enhance the experience of ART for people with disabilities. The Museo del Prado exhibition, in Madrid, converted 2D artwork to tactile, 3D sculptural representations of their subject. This has made it possible for blind and visually impaired people to experience and enjoy these art pieces. At QITCOM 2019, Mada Center demonstrated a live 3D printing of an art piece from the Museum of Islamic Art in Qatar to highlight the capabilities of the state-of-the-art technologies in providing an inclusive art experience. Additionally, automated audio description is another tool to support the visually impaired people's ART and Museums experience that could be explored in venues other than movie theatres.

In terms of the support of the Deaf ART experience, universities in the US, Europe, and Asia have looked into developing a sophisticated wearable vest that allows the Deaf and hearing-impaired to enjoy a completely immersive musical experience. Wearing a vest, the Deaf can now feel and, hence, enjoy the music tones. The experiments done with Deaf participants have recorded high satisfaction rates.

This rich discussion concluded with the speakers offering their perspectives on the future shape and trajectory of AI's contribution to the development and consumption of art. Researchers, artists, businesses, entrepreneurs, and media professionals are increasingly looking at how AI can be utilised to produce visual content, like advertisements, product, designs, and even paintings. These technologies have the potential to make often-complex design tasks simpler without necessarily compromising aesthetics and quality. Advances in AI will nevertheless redefine how wider society understands what constitutes art. Such debates inevitably lead to further discussions concerning ownership of the end-product and ethics of trusting machines to develop artistic content. AI provides both challenges and opportunities for the development, appreciation, and accessibility of art. **It is undoubtedly that AI is the future of improving the experience of ART and more importantly supporting inclusion.**

Accessible Kiosk as an e-Government Service: Feedback from Persons with Physical Disabilities and Visual Impairments

Mada Center

An accessible and well-designed kiosk can offer an efficient and autonomous experience for all users. From metro stations to government offices, the use of kiosk machines is widespread as a convenience and an alternative to human service. Until recently, an Automated Teller Machine (ATM) was the only form of a kiosk a person might need to use. It is now common to find public service functions completed through kiosks. As the use of kiosks grows, so does the need to ensure they are accessible and usable for all people, including those with disabilities.

During QITCOM 2019, Mada collaborated with DOT incorporation in presenting the first fully accessible eGovernment kiosk. The four-day long conference attracted many decision-makers, disabled users, and stakeholders to explore the vast options and features of the eGovernment kiosk. Until recent times, an accessible kiosk was considered a kiosk with an additional keypad to make it accessible or made to wheelchair accessible height. Mada presented a comprehensive set of cross-disability interface techniques or strategies kiosk that extend to a touchscreen interface, braille input, audio output, wheelchair accessible; making it accessible to people with visual, physical, and cognitive disabilities.

The solution presented is an all-in-one fully accessible eGovernment kiosk for people with functional limitations. The All-in-One Kiosk provides government services such as issuing a license or certifications without the need to go to any administrative offices. It is an electronic device for implementing an advanced administrative system suitable for the digital information age, which is installed in an administrative institution or a public place to allow civilians to receive civil complaints directly.

DOT Incorporation closely studied the two main streams of accessible kiosks while developing and providing the major fusion of solutions for people with physical and visual disabilities. In general, the accessibility concerns relating to public kiosks fall into two broad streams:

- **Kiosk environment and structure:** This includes the location of the kiosk and providing ease of access for all people, including wheelchair users, the elderly, and people with impaired vision. It also covers the physical assembly of the kiosk, such as the height, angle of the screen and keyboard, provision of headphone outputs, and in some cases assistive keyboards.
- **Screen interface:** The size and color of the text and buttons on the screen, clear identification of form inputs, the usage of language that is easy to

recognize, and provide audio alternatives for all information or functionality conveyed by images or text.

The physical structure of this kiosk and the environment in which it can be used are covered by government regulations regarding disability access to services in the built environment. Regarding the accessibility of the kiosk interface, the manufacturer has tried to stick to the limited regulations that are available such as WCAG, which appears to be a good starting point, particularly if the kiosk is providing access to online content such as government information, government services, and paid printing systems.

The following points were highlighted by various disabled users during the demo of the kiosks:

- All controls on the kiosk tactilely distinguishable
- Controls have braille and large print labels
- The height and spacing of the screen and controls appropriate for different types of users
- There is enough physical clearance around the machine for users with assistive mobility devices like a person using a wheelchair, scooter, or other mobility device has room to maneuver when approaching or leaving the machine from a side angle or front angle.
- User can receive braille and audio output (text to speech)
- Types of controls are needed to use the interface
- A physical keyboard along with a touch screen to enter text
- A person with a motor skills challenge may find it difficult to move their hand around a touch screen but may have no trouble using a trackball or touchpad pointer.
- Visual presentation of the interface can be customized like a visually impaired user can zoom in or out to change the size of the onscreen font
- The text-to-speech function activates when headphone is inserted into the jack
- The interface should always return to a default state after each user completes their tasks.

However, kiosk accessibility for the deaf and hard of hearing presents a unique problem for DOT Incorporation. To be fully compliant with the laws of accessibility, kiosks must offer equal communication access for deaf and hard of hearing individuals whose primary language is sign language. As they try to further improve the system, we hope to see these features added to support more users with diverse functional limitations.

Smart Apps to Improve Reading, Writing, and Communication Skills for Deaf Students

Mada Center

Deaf children face much trouble to read and to write. In fact, according to recent studies they use a graphical strategy to store letters and words in their brains. Despite that the textual transcription that we use is essentially designed to encode a phonological based language. Consequently, the deaf still have problems with reading even into adulthood. Many researchers' studies proved that the reading capability of deaf student is lower than that of hearing students. Conrad, who is a psychologist and researcher working with the deaf, has concluded that deaf students have a very slow learning process. According to Conrad, the reading capability of a deaf high-school graduate is similar to the reading capability of a 9-year-old hearing student.

Smart Apps technologies can enhance the classic pedagogical methods to improve the reading and writing skills for hearing impaired persons. Many Smart Apps exist in the market, however, in this paper we selected four applications that we consider useful for deaf communities.

Huawei StorySign: Learning to read is a big challenge for deaf children, especially if their teachers and parents do not know skills of sign language. Furthermore, understanding words by making a link between the graphical representation of the word, the visual gesture in sign language, and the meaning of the word is very hard for the young deaf. In order to overcome this difficulty, Huawei proposes an Android Application called StorySign. StorySign uses augmented reality to translate vocabulary of certain books using an AI approach and performed by a 3D avatar. The use of the application is not limited to deaf children, it can also be used by parents to learn sign language.

Baby Sign and Learn: The application proposes amazing videos containing sign language. Its purpose is to captivate the attention of deaf children by a cute animation in order to teach them sign language. In fact, learning with signed avatars and animations makes signing enjoyable. The application aids children to sign with colorful flashcards and a set of interactive quizzes. The application supports many sign languages: it allows the user to choose their preferred sign language.

AVA: A smart application that aims to make discussion within groups accessible by deaf persons. The application is designed to facilitate the communication between deaf and hearing people. In fact, assisting a conference, following a training or participating in a meeting with hearing persons, is a big deal for deaf people. Ava is designed to convert the speech of each member of the discussion group to text. The speech is picked up, in real time, using the phone's microphone and then, displayed on smartphones' screens with the name of the person who is talking. If a deaf person

wants to use it with a group of hearing people, they can get their friends to connect to the AVA app – then, they will see a textual transcription of the discussion on the screen of their mobile.

Despite efforts, the number and quality of smart applications that are designed for the deaf is still insufficient to cover their needs. Especially in the field of education, which fits the 4th goal of the United Nations sustainable development goals. Finally, many works should be done to improve the use of smart applications for deaf children.

STEM and How it Can Consolidate Classroom Inclusiveness

Mada Center

Theoretical and personal outlook is foundational to the application of successful classroom practices. STEM is a syllabus created based on the idea of cultivating students in four specific areas, including science, technology, engineering, and mathematics with a multidisciplinary and applied approach using a unified learning pattern.

Inclusive classroom practices promote and support the success of a diverse population of students as they navigate various, yet unbiased, paths. Inclusive education is when a student with functional limitations spends at least half of the day in the universal education classroom. In a special education classroom setting, there is stereotypically one special education instructor and several paraprofessionals in the classroom. Typically, the students with functional limitations in the classroom require specific lesson plans either by grade level or by an individual level. Usually, the special education teachers are so overwhelmed just trying to keep up with accommodations and grade-level standards, that they have little time to incorporate anything else.

As STEM educators with extensive experience as either a student and/or instructor, it is easy to feel comfortable in a science classroom or laboratory. While experiences shape perspective, one must recognize that it is unlikely that the students with functional limitation share the same comfort. The demands of rigorous STEM syllabuses, often in a physically unfamiliar space, compounded by lack of classmates or mentors who share the same background or experiences, can make students feel isolated and unable to achieve success in the classroom. Therefore, it is critical to implement micro-management, small acts to make students feel welcome so that they can focus on attacking the vagueness of active learning, rather than being distracted by feelings of insufficiency.

STEM education takes place in any classroom setting, but commonly in a general education tutorial room. For STEM, the students are alienated into groups, this allows the students with special needs to work on social skills with their peers. In groups, each student is assigned with one task, likewise to enable the inclusion student to learn responsibility and collaboration. In some cases, the included student is a basic learner involved with other students in a group, teachers may utilize this strategy to greatly reduce stress and anxiety of this learner for two reasons, first, the student is not always accountable for the answer and if unsure of an answer, a higher-level learner can peer mentor the inclusion student, second, the student receives content associated material that is on grade level, as well as, problem-solving skills. The only thing that matters after the design and construction of the lesson objective is the student's ability to solve the task assigned. In the special education setting, there is a very high emphasis on the individualization of the

subject matter to be able to complete a STEM lesson, whereas in inclusive settings, students with special needs are able to participate to the best of their abilities in the STEM activities, where the work is on grade level, there is problem-solving, and social development is in the best awareness of the inclusion student.

Apart from the efforts of teachers and group study methods, assistive technology also plays a vital role in combining STEM education to inclusive classrooms. There are various low tech and high-tech solutions to support the students in a different area of STEM education. Electronic books, talking calculators, CCTV magnifiers, screen readers, FM systems, and word prediction software are few solutions that can aid this.

Accessibility is a celebration of diversity and a crucial aspect of warranting students' involvement in the learning process. Access to information, awareness, STEM education curriculum, learning materials, assistive devices, and the necessary support services can help students with functional limitations in learning at par with their non-disabled peers in the same classroom breaking down all barriers which prevent them from having equal access to quality education.

The Blue Room: How Virtual Environments Can Enhance the User Journey for People with Autism

Mada Center

According to Autism Speaks, an internationally recognized advocacy and research organization based in the United States, “Autism, or autism spectrum disorder (ASD), refers to a broad range of conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication.”

Image Caption: These images from the Blue Room showcase virtual bus ride and supermarket scenarios to help people with Autism improve their real life user journeys. (Image credit: Third Eye NeuroTech and Newcastle University; <https://www.eurekaalert.org/multimedia/pub/192948.php>)

In addition to affecting a child’s learning and development, social and communication skills, many children living with Autism also have fears or phobias, which can be very distressing but are often overlooked. The latter poses a specific challenge for children with Autism who are about to embark on distressing user journeys; such as air travel or attending a sporting event at a large stadium, both of which can be very overwhelming to the senses.

This also applies to adults on the ASD spectrum.

Herein comes the potential of Virtual Reality (VR) to improve the ability of both children and adults with ASD to navigate real life situations that might seem distressful. Through the creation of these virtual environments, people with ASD can carefully navigate and explore settings in a controlled manner that is free of phobia inducing triggers.

An example of this has been developed by the University of Newcastle, in the United Kingdom, where specialists at the University partnered with a technology firm to create the “Blue Room”, which offers people with Autism a personalized 360-degree environment involving the fear which may debilitate the person with autism in real life.

Within this virtual environment, which requires no goggles, the user can comfortably investigate various scenarios working with a therapist using iPad controls but remain in full control of the situation.

Upon entering the Blue Room, the user with Autism embarks on the virtual experience alongside a psychologist. They sit together in a small room, which is

composed of four walls that have a VR animation projected upon them. Once the projection begins, the subject is immersed into a 360-degree interactive setting, without the need for VR goggles, a task that most children with Autism do not feel comfortable with.

The psychologists subsequently guide the subjects with Autism using an iPad which controls the VR experience on the screen. In specific, the user with Autism is taken through distressful experiences while different coping experiences, such as breathing exercises, are deployed.

This entire experience is monitored by parents and others from the subject's wider social network to observe what kind of coping strategies are working, and which are not. The experience is then adjusted in terms of complexity and noise so that simulations become more realistic as the subject gains more confidence, until the simulation matches a real-life scenario.

Initial clinical studies from the Blue Room have been very positive with a wider study about to take place.

This pioneering initiative is set to be the norm in the future because it enables people with Autism to learn how to manage their fears in a real-life setting, knowing that imagining difficult scenarios can be quite difficult.

Seeing Style Apps for the Blind: One Step for the Independent Outdoor User Journey

Mada Center

What is Seeing Style Apps for the Blind?

Along with the growth of technology, the smartphone industry has continued to deliver amazing innovation and provide the best features which would be useful for its customers. In addition, the industry has also seen these circumstances as a great opportunity to invent something that benefits any type of customer.

The latest innovation has arrived along with how smartphones have opened the entryway to a universe of potentials, far beyond what we could have envisioned years prior. While smartphones are regularly used to speak with others, stay aware of social media life, and perform only some easy tasks, nowadays, smartphones have established certain innovations with a purpose to enable accessibility and usefulness to the blind and the visually impaired. With the assistance of a smartphone, tablet, or smartwatch, the blind people now have the capability to virtually “see” and, subsequently, gain self-independence.

How can AI enhance the Quality of Recognition?

Artificial Intelligence or AI seems like it does not want to be left behind in this context. Optical Character Recognition or OCR devices are experiencing a calm revolution as goal-oriented software suppliers have combined OCR with AI. As a result, data catching software is concurrently catching data and understanding the content. In simple words, this is defined as the fact that AI devices have the capability to check for failures autonomous of a human-user giving streamlined issue management.

Most pictures captured with customary sensors require preprocessing, as they might be misfocused or comprise an excessive amount of noise. Filtering as well as edge detection are two of the greatest widely recognized techniques that can be utilized for both preprocessing and handling digital images. The ways that AI enhance the quality of recognition are mentioned below:

- **Filtering** is utilized for improving and altering the image information. With the assistance of various filters, you can accentuate or diminish certain highlights in a picture, diminish picture clamor, etc.
- **Edge detection** is utilized for picture division along with the extraction of data. By identifying breaks in brilliance, this strategy finds important edges of the objects in prepared pictures.

Seeing Style Apps

Nowadays, there are many seeing style apps that have launched and are available for the blind and visually impaired individuals. The reason is individuals with visual impairments also have a right to take part in consuming the latest technology. Thus, these apps have increased their independence and allowed them to stop relying on the help of others in their daily activities. Some famous seeing styles apps that available these days are:

- **Microsoft Seeing AI**

This app is designed specifically for the blind and individuals with weak vision, this project attaches the supremacy of AI technology with a purpose to make it easier for in the user to recognize people, objects, text, color, and currency.

Actually, Microsoft Seeing AI is a research project that conveys the supremacy of the cloud along with AI to provide an intelligent app which is intended to help the user perform daily activities. All they need to do is point the phone's camera, choose a channel, and then listen to a description by AI, which has recognized things around them.

Furthermore, Seeing AI can speak brief text detected by the camera in the real time, offer audio direction to capture a printed page, and recognize, as well as describe, the text with its original configuring.

- **Envision AI**

As its name suggests, Envision utilizes the support of Artificial Intelligence to recognize people and objects in the surrounding area. This helps the blind and weak vision individuals since this app is also able to recognize scenes and environments. By applying carefully curated sets of data, exceedingly progressive AI, and supported by cultured engineering, this application allows human imaginative insight to be accurately amplified and directed.

- **Google Lookout**

Google Lookout also uses the support of AI to identify people and objects via the smartphone's camera. Furthermore, this app has the capability to read text that appears in signs and labels, scan barcodes, as well as recognize some currencies.

Mouse Control for iOS A New Era of Accessibility

Mada Center

During Apple's latest launch of iOS 13, the name given to the operating system used on iPhones and iPads, little was mentioned of Mouse Control. The new feature was buried amongst a slew of new upgrades that the technology manufacturer found to be more significant, despite the tremendous impact that Mouse Control would have on the lives of People with Disabilities (PWDs) to use touch screen devices.

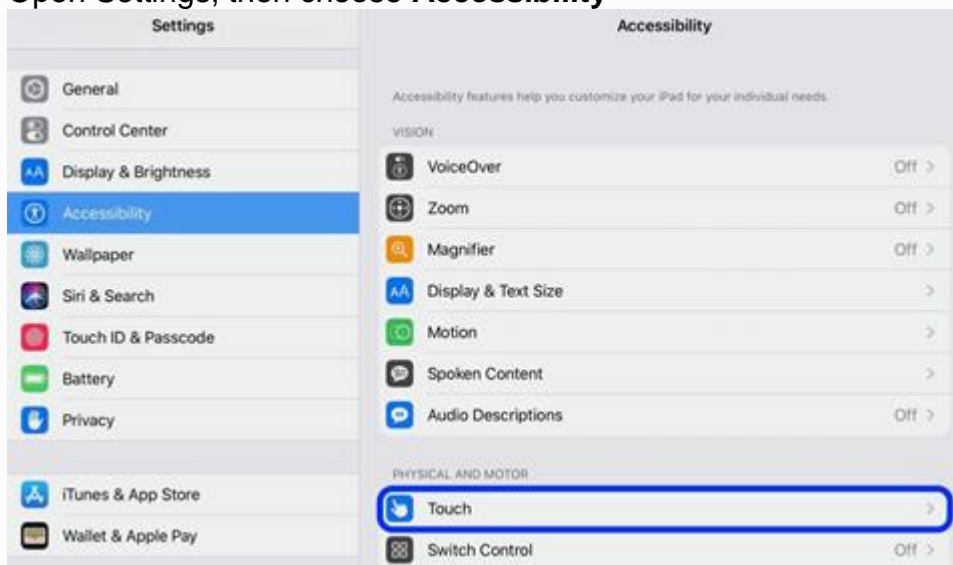
From Apple's perspective, the introduction of Mouse Control came as part of a concerted effort to position iPads and iPhones as viable replacements for desktops and laptops; an option that has become tangible with the increase of processing power and functionality of the mobile devices. For PWDs, the integration of Mouse Control functionality came after considerable lobbying of Apple to make this feature available on their mobile devices so that people with physical disabilities can use the devices with more freedom.

Unlike Apple, Android devices have supported full mouse control functionality as a built-in feature for many years, making devices that use the Google operating system a go to choose for people with fine motor skill difficulties. By activating Mouse Support functionality through iOS Assistive Touch, Apple's centralized accessibility features button, users can connect any Bluetooth mouse to replace the need for touch as a means of navigating the device.

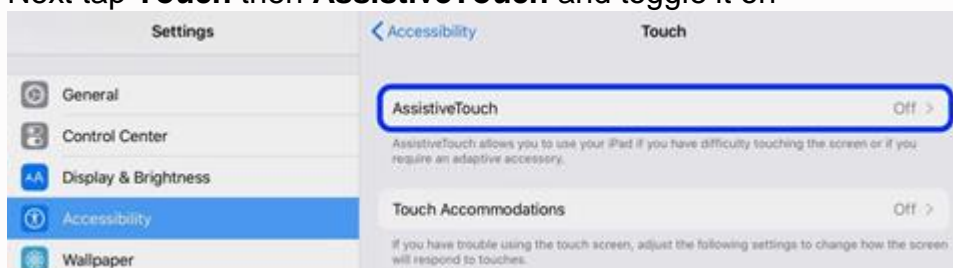
As with all accessibility features, they are beneficial to all, and not just to PWDs. The Mouse Support feature makes use of iPads and iPhones easier for everybody. It's no different from someone using the Magnifier to zoom in on a finely printed restaurant menu or using Type to Siri in order to quietly give commands in a messages-like environment. Accessible design is a good design that benefits everyone.

iPadOS 13: How to use a mouse with your iPad

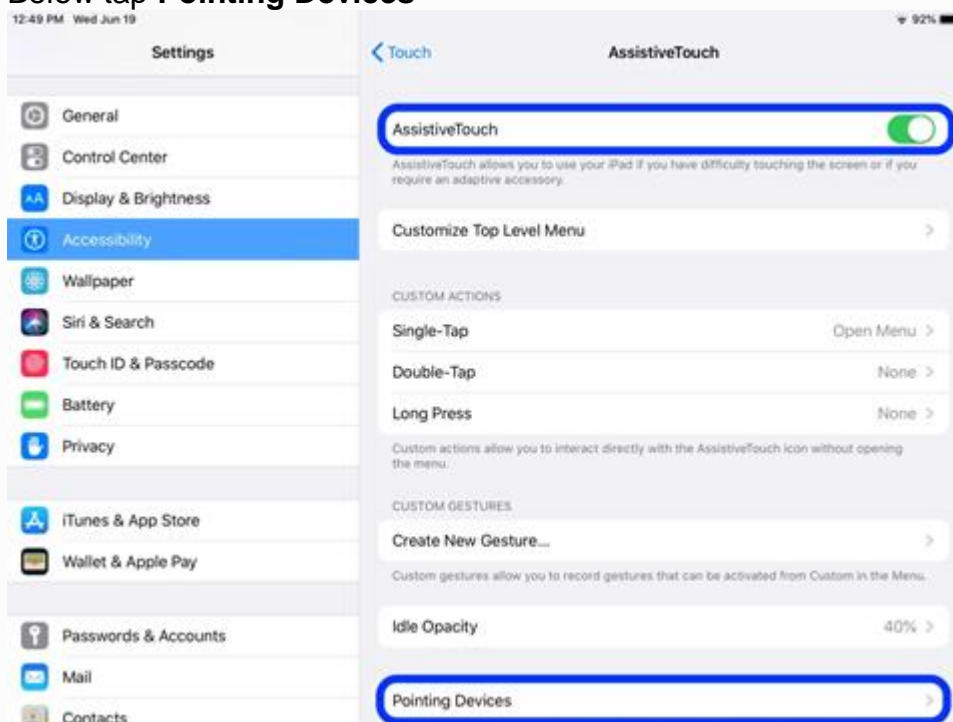
- Open Settings, then choose **Accessibility**



- Next tap **Touch** then **AssistiveTouch** and toggle it on



- Below tap **Pointing Devices**



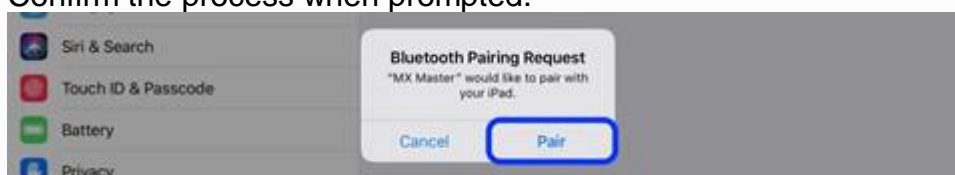
- Make sure your Bluetooth mouse is turned on and is discoverable. Tap **Bluetooth Devices...** to start the pairing process.



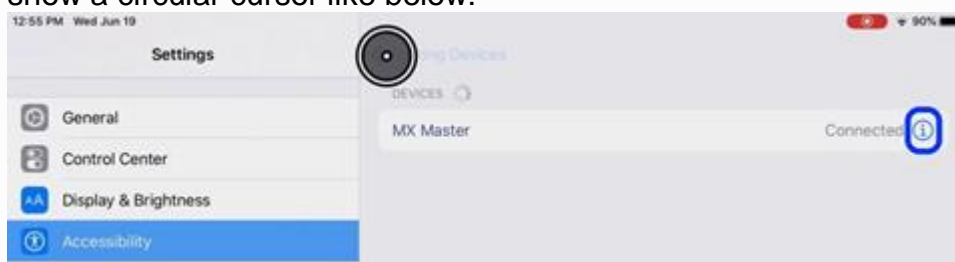
- Tap your mouse when it appears in settings.



- Confirm the process when prompted.



- When Assistive Touch is turned on and a mouse is paired, your iPad will show a circular cursor like below:



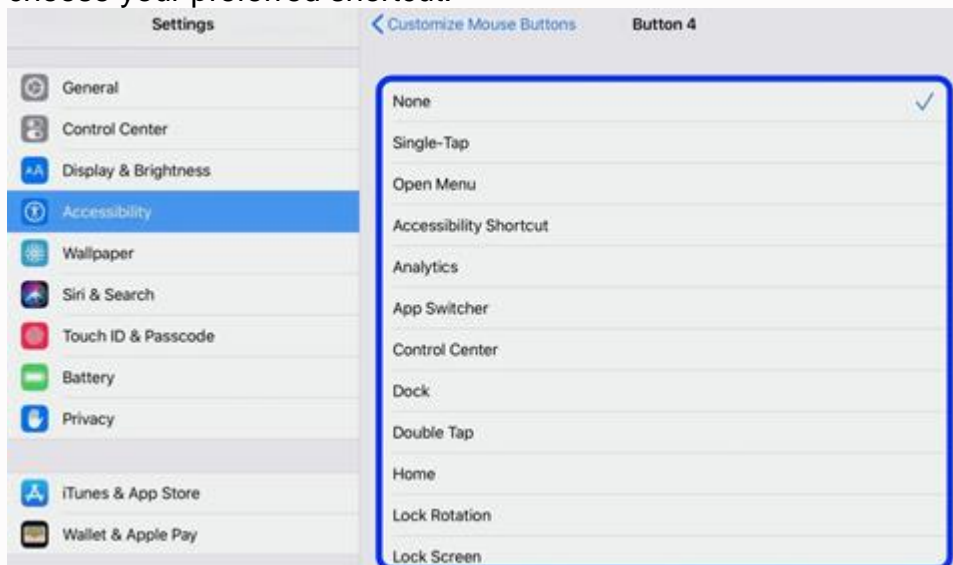
- As shown above, click or tap the “i” to customize your mouse buttons.



- Now choose **Customize Additional Buttons...**



- iPadOS will have you click the mouse button you'd like to customize, then choose your preferred shortcut.



- iPadOS supports multiple shortcut buttons, depending on the mouse you're using.



- Back under the main AssistiveTouch settings, you can adjust the tracking speed of your mouse from your iPad as well as opt to turn off the default

AssistiveTouch menu icon.



You can similarly follow the same steps in order to use a mouse with an iPhone with iOS 13.