**7 Tech Breakthroughs That Empower People With Disabilities**

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Adaptive technology is a fairly new term, but the basic idea is not. Some adaptive devices are simple, like the cane, which has a history as old as mankind itself. Others seem to come more from the realm of science fiction. However mundane or complicated, all are a testament to human determination, creativity and ambition. Here, we look at seven high-tech assistive devices and how they’re helping those with disabilities lead full and fulfilling lives.

**1. The DynaVox EyeMax System**

In combination with the Vmax+, the DynaVox EyeMax system gives individuals with paralysis, cerebral palsy and stroke victims the ability to participate in spoken communication using only their eyes. Using a sophisticated eye tracking system, users can interact with an on-screen keyboard, allowing them to enter words and phrases, which are then translated into spoken text via the device’s text-to-speech mechanism.

In addition to the on-screen keyboard, the InterACCt language software on the device offers hundreds of pre-defined phrases and words, which can be selected from lists or chosen via pictures and scenes, making the device instantly accessible to young children and the mentally disabled who may be unable to grasp written language.

**2. The Kapten PLUS Personal Navigation Device**

Traveling alone can be a challenge for the visually impaired, whether it’s across the country or down the street. There is always the possibility of taking a wrong turn or getting disoriented in the shuffle of busy pedestrians. That’s where the Kapten comes in. The Kapten PLUS Personal Navigation Device is a very small GPS locator designed to be carried on one’s person.

As the user walks down the street, the device speaks direction and location, so the user always knows where they are and where they’re heading. In addition, the user can plan and store routes and tag locations for later reference.

Designed as an affordable GPS accessory (and not a total replacement) to cane or guide-dog travel, the Kapten offers an incredible amount of security, confidence and a wealth of useful information, allowing blind people to travel independently without fear of getting lost or wandering in the wrong direction.

**3. The Car for the Blind**

Speaking of mobility for the blind, engineer Dennis Hong is developing a car that can actually be driven by the blind. The aim is to integrate several computer systems, sensors and cameras to observe the environment around the vehicle and provide alternate forms of sensory input, including sound and vibration. This may include seat vibrations of various strengths and locations, pulsing vibration signals in gloves worn by the driver, auditory alerts from a headset and a sort of screen that paints a virtual picture of the surroundings using compressed air.

We admit, it sounds a bit intimidating. We’re not sure we’d trust ourselves behind the wheel of this car, or that we’d particularly want to be on the road with it in its current state. However, the technology is extremely promising, and even if the vehicle never makes it to street as a legal, safe and affordable car, the sensors and innovations coming out of the project are sure to help in other areas. Whether it’s further study of brain re-mapping and alternate sensory input, the practical implications of better sensors and safety devices which can be applied to all motor vehicles or an all-out safe, practical means of driving blind, this technology excites us.

**4. Google’s Driverless Car**

We wrote about Google’s driverless car back at TED, but it holds huge amounts of potential in the assistive technology department and deserves a mention here. Not only could this car serve as a means of independent, safe transportation for the visually impaired, but also for any number of individuals with physical and mental handicaps that prevent them from operating a motor vehicle.

Led by Sebastian Thrun, director of the Stanford Artificial Intelligence Laboratory and co-inventor of Google Street View, the team of engineers at Google has created a vehicle which operates on a combination of information from Google Street View, artificial intelligence surrounding information gathered by numerous sensors and cameras mounted on the vehicle to drive itself.

Mashable’s Adam Ostrow got a chance to take a spin the self-driving car in March, as it sped at a harrowing pace around a test track with amazingly accurate performance. If you haven’t seen it, check out the video of Adam’s experience.

The Google car is already “street legal” in Nevada and could one day be a liberating, potentially life-changing device for disabled individuals everywhere.

**5. The DEKA Robotic Arm**

Segway inventor Dean Kamen and his group of researchers didn’t stop at their stair-climbing wheelchair. Funded on a grant from the Department of Defense’s DARPA research agency, Kamen and his team were tasked with the job of creating a highly sophisticated, highly functional prosthetic arm for injured soldiers returning from the Middle East.

The results are amazing — a less-than-eight-pound prosthetic arm with such precision and control that it can peel a grape. The arm supports a number of customizable controls and modular components, making it easy to tailor to the wearer’s individual needs, whether he requires only a hand or an entire arm and shoulder socket.

Another promising feature of the arm is its sensory feedback system. Hand sensors measure the strength of the hand grip, for instance, and provide feedback to the wearer in the form of vibrations that grow stronger as the strength of the grip increases. This enables the wearer to learn what level of grip strength is and isn’t appropriate for specific tasks, and how much pressure is being applied.

**6. Cochlear Implant**

We couldn’t talk about cool technologies without mentioning the cochlear implant. Sure, it’s not new, but this little device is still pretty amazing and only grows more so as the software and hardware continue to improve.

More than just a hearing aid, the cochlear implant first picks up sound via a microphone, which then carries the signal to a small computer worn behind the ear, where it is transferred to a digital signal and transmitted to the implant, itself. Once received by the implant, the device then directly stimulates the auditory nerve, providing an entirely new means of auditory sensory input.

Development on the cochlear implant first began in the late 1950s, and the first commercial implant device received FDA approval in 1984. However, cochlear implants have come a long way since those early days. Initially, the single-channel implant provided mostly static, while early commercial implants with five channels allowed for some indication of cadence and rhythm. Today’s cochlear implants, however, have more than twenty sound channels, allowing wearers to hear with much better quality. The implant is still far from perfect, with background noise continually being a problem, but the technology has advanced to such a point now that voices can be heard with enough clarity to be readily understood and identified, making verbal communication possible and productive.

**7. The iBot Stair-Climbing Wheelchair**

Once again, from the mind of Dean Kamen, the iBot is a self-balancing, stair-climbing wheelchair for the physically disabled. Stairs are nearly everywhere, and navigating them in a traditional wheelchair is impossible. Enlisting the services of others to drag or carry you and your chair up those stairs is dangerous, inconvenient and often embarrassing. Using self-balancing technology similar to that found in the Segway, the iBot aims to change this by giving wheelchair-bound individuals the freedom to navigate any terrain. In short, this is the ATV of wheelchairs.

Though it seems to be a truly revolutionary device, the iBot is currently not in production. We felt it was worth a mention anyway, due to its extreme potential, and we’re hopeful that we’ll one day see the return of the iBot to the market.