Technical Answers for Real World Problems (TARP)

SLOT-TA2

TOPIC: Perspective- A Remote Computer Access Device

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UNDER THE GUIDANCE OF

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CERTIFICATE

This is to certify that the project work entitled "Perspective- A Remote Computer Access Device that is being submitted by is a bonafide work done under my supervision. The contents of this Project work, in full or in parts, have neither been taken from any other source nor have been submitted for any other CAL course.

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ABSTRACT

Disabled people are large minority groups, starved of services and mostly ignored by society, live in isolation, segregation, poverty, charity and even pity.

Disability includes blindness, low vision, leprosy-cured, hearing impairment, loco motor disability, mental retardation and mental illness. Due to discrimination they do not go to public places and not free to get those rights which a non-disabled person gets. They are deprived of education and employment.

Persons with disabilities in South Africa continue to face barriers that prevent them from enjoying their full civil, political, economic, social, cultural and developmental rights. This is largely due to lack of awareness, ignorance and prejudice in our society. It is also because some legislation fails to protect the rights of persons with disabilities.

Our project aims towards fulfilling the needs of such disabled people who are incapable to access the technology.

SOFTWARE USED

- Arduino

- Python

- Firebase for the database

HARDWARE USED

- AtMega328

- MPU6050

- Android based smartphone

- Laptop

<u>INTRODUCTION</u>

How the internet still fails disabled people ?

The web can be liberating for disabled adults – but a lack of training, accessibility and funding means the online world is a step too far for many . For 20 years, Cambridge Online has offered free courses to disabled and disadvantaged adults. Every year 300 new learners are referred to their centre where they deliver 4,000 one-to-one tutorials annually. "Most of the people who come here have never touched a computer before. Confidence that the whole thing's not going to blow up when they touch it is what people struggle with in the beginning," says Andrew Entecott.

There are 10 computers at the centre with adaptive hardware, touch screens, alternative keyboards and mice, and magnification and screen-reading software. "We try to sell the benefits of going online by explaining that learning how to use a mouse and keyboard can reduce the amount of time you spend on the phone speaking to the council."

The ONS found that 27% of disabled adults had never used the internet, compared to 11% of non-disabled adults

However using a computer is still something many disabled people struggle with. According to the Office for National Statistics, in May 2015, 27% of disabled adults had never used the internet, compared to 11% of non-disabled adults. In 2013, Ofcom said that factors beyond age and income, possibly related to the individual's disability, contribute to limited internet access.

Some disabled adults will never see the benefits of being online. Jack lives in sheltered accommodation at Steve Woolley Court in Peterborough. He suffers from Parkinson's disease and has no interest in the internet. "I thought it would be easy when I first heard about it, but I just get confused. I'm just so fed up with it all. Get yourself a television if you're lonely," he says. "If I was told the information I needed about my pension was online, I don't know what I'd do. I'd have to get my scheme manager to do it for me."

To navigate a website, people with vision impairments, for instance, listen to short phrases describing each element on a webpage. But in the rush to meet deadlines, web developers often skip the process of tagging photos, graphics and buttons adequately unless they're required by law. In the US, only federal agencies and their contractors are required to make information accessible to people with disabilities and even that isn't consistently enforced. Accessibility is often treated as a stage 2 project, after a webpage is launched

RESEARCH WORK

Some innovations have been made in this field which are made helpful to make the latest technologies available for the disabled people.

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
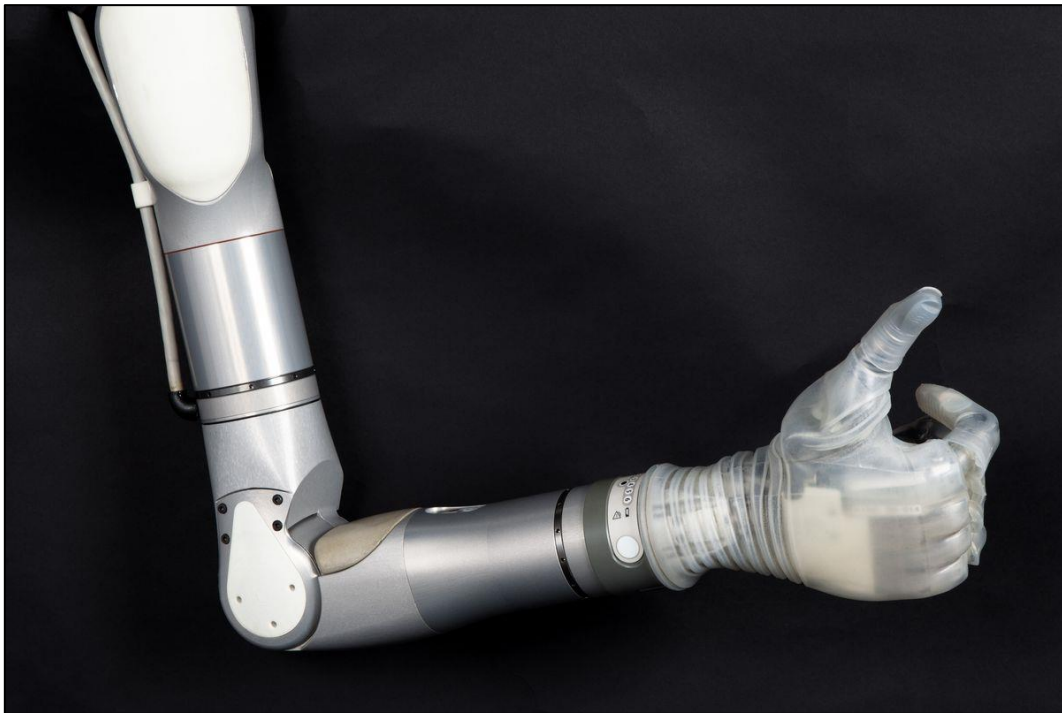
Segway inventor Dean Kamen and his group of researchers didn't stop at their stair-climbing wheelchair. Funded on a grant from the Department of Defense's DARPA research agency, Kamen and his team were tasked with the job of creating a highly sophisticated, highly functional prosthetic arm for injured 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
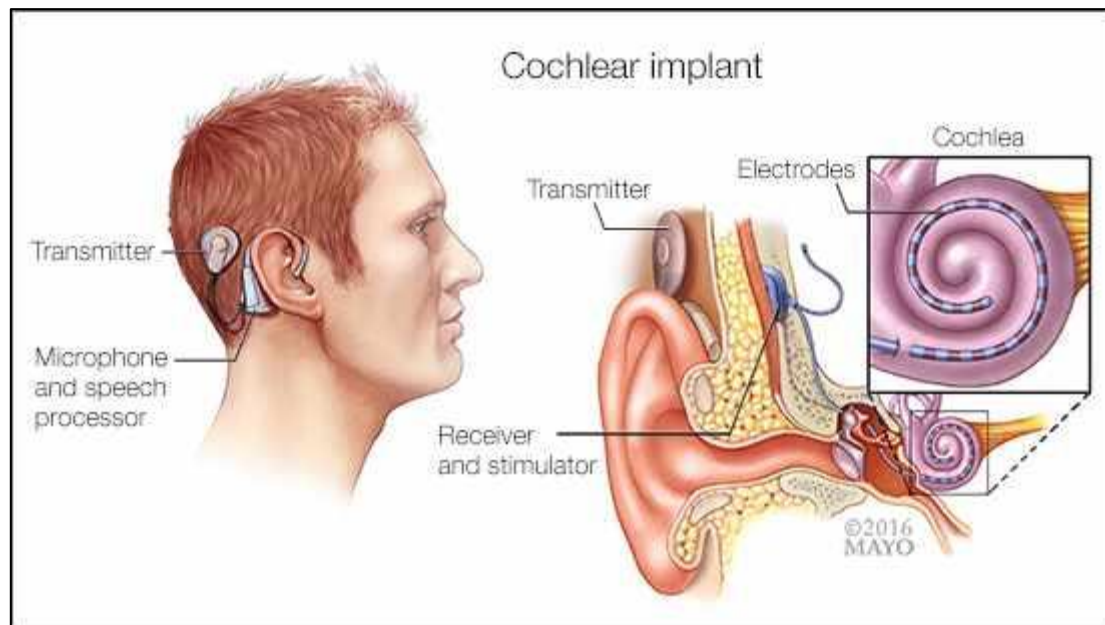
We couldn't talk about cool technologies without mentioning the cochlear implant. Sure, it's not new, but this little device is still pretty amazing and only grows more so as the software and hardware continue to improve.

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.

FUTURE DEVELOPMENT

We observed that the hardware is costing us a lot and it requires power backup which customer are not likely to do. So, we thought of making it completely software based and would be using the accelerometer and gyroscope of the mobile itself for air mouse. Which will tremendously reduce the cost of the product.

Also, we are looking to incorporate this device with Industrial IOT to operate different machines and devices where direct human intervention is dangerous.

<u>CONCLUSION</u>

People with physical impairment face various problems in their daily life as the modern assistive devices are often not meeting the consumer requirements in term of price and level of assistance. It is therefore important to develop a cost effective and simple means of providing the physically impaired assistance for mobility and working around at a cost-effective price which is in reach of the poor. So, the aim of the project is to develop a cheap and more efficient way to help physically impaired to navigate with greater comfort, speed and confidence. Our model will definitely create a change in the thinking process and advancement in business.

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