MEDIA MONITOR – 24.01.2011

MINDTREE IN THE NEWS

Publication: The Times of India
Date: 23.01.2011
URL:http://epaper.timesofindia.com/Repository/ml.asp?Ref=VE9JTS8yMDExLzAxLzIzI0FyMDI2MDA=&Mode=HTML&Locale=english-skin-custom

ENABLERS FOR THE DISABLED

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Before you read any further, shut your eyes and then tie a blindfold over it. Now, try walking around your home without stubbing your toes on furniture or banging into walls. Frustrating, isn't it? Imagine how much worse it would get if you had to navigate like this in unfamiliar territory. Well, more than 15 million visually impaired people – and that's in India alone – live their lives in such darkness.INow, imagine what it would be like to wake up one day and realise that your body refuses to co-operate with you. Simple tasks like changing a TV channel, or switching on the lights turn into tedious chores. Yet, millions of people from across the country – suffering from diseases such as muscular dystrophy and arthritis – live with these challenges everyday.

Thankfully, there are a few techies out there who are working on gadgets that could help make the lives of these people slightly better...

SMART CANE

DEVELOPED BY: IIT-Delhi along with Phoenix Medical Systems Pvt Ltd
WHAT DOES IT DO: Uses bat-like echolocation, and vibrating mechanism to guide blind users
CURRENT STATUS: Preliminary tests successful; could be launched in India next year

Four IIT-Delhi undergrads – in collaboration with Phoenix Medical Systems Pvt Ltd – have developed a Smart Cane that can sense obstacles up to three metres away. It accordingly vibrates to provide blind users with navigation cues.

"Our Smart Cane also alerts users if a fast-moving object or person is moving towards them," says Rohan Paul, who created the device along with Dheeraj Mehra, Vaibhav Singh, Ankush Garg.

The technology is simple: The cane is equipped with an ultrasonic transducer and a vibrator. The former transmits high-pitched sound waves that get reflected from anything in front of it. Vibrations are then produced to give the blind person an indication that something lies ahead.

"Our product will cost Rs 2,000 and we've already received calls from interested buyers in India, Kenya, Nepal and Pakistan," says Paul.

The cane – powered by a rechargeable Li-ion battery – can be charged like a cellphone, making it convenient.

"We carried out tests at an obstacle course specifically created for visually-impaired users," Paul informs. "Tables, railings, neck-level horizontal bars and chairs were some of the obstacles that had to be avoided to complete the course. The collision rate was significantly reduced amongst the 30 users when they used the new cane. We are now working towards releasing it in the market by next year."

JELLOW

DEVELOPED BY: IDC, IIT-Bombay
WHAT DOES IT DO: Toy-like gadget helps children with cerebral palsy communicate needs and emotions
CURRENT STATUS: Final stages of testing

Jellow – equipped with six buttons that can be pressed, thumped and squeezed just like squishy jell-O – is a new gadget meant for a special category of children.

Designed by the students at Industrial Design Centre (IDC), IIT-Bombay, the idea behind the "toy" is to help cerebral palsy kids communicate emotions.

The buttons are placed on a circular disc, to make Jellow look like a toy, rather than a "complex and inhuman" thingamajig.

"Allowing children with special needs to express their emotions remains an unaddressed area," says Dhairya Dand, one of the student developers.

"I believe in 'humanizing technology' where it becomes a natural extension of ourselves," he adds.

The basis of the product is what the developers call an Emotional Language Protocol (ELP).

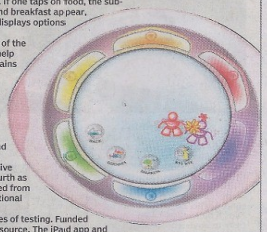
ELP, which works as Jellow's interface, is driven by colour, shape, motion and sound; corresponding to the sensory modes of the visual, the tactile and the aural.

In addition to this, a catalogue of everyday vocab—food, play, study—categorized hierarchically, has been built. If one taps on food, the sub-categories of lunch, dinner and breakfast appear, and tapping on lunch further displays options like chapati, rice or dal.

"The kid can also tap on any of the emotion buttons, which would help him express how he feels," explains Dand.

Jellow's first prototype was built by students in 2007, under the guidance of IDC professor Ravi Poovaiah. And today, there are four versions: One as an iPad app, which capitalises on the touch interaction, the second as a dedicated touch-screen device, the third as an inexpensive accessory to the PC, and the fourth as a web version, which can be used from any computer without any additional hardware purchase.

Jellow is now in its final stages of testing. Funded by the IDC, Jellow will stay open-source. The iPad app and web version are free while the base hardware cost of the touch device is around Rs 6,000. The computer accessory costs approximately Rs 150.



BIONIC EYE PROJECT

DEVELOPED BY: Doheny Retina Institute, USC
WHAT DOES IT DO: Enables those suffering from Retinitis Pigmentosa to see
STATUS: On the verge of clinical trials in India

Boffins from the Doheny Retina Institute at the University of Southern California – along with US-based Second Sight Medical Products – are working on a bionic eye meant for the visually challenged suffering from a retinal disorder known as Retinitis Pigmentosa.

The apparatus consists of a miniature camera mounted on a pair of glasses that sends images in the form of electrical signals to the portion of the retina that is not damaged by the disease.

"The video camera processes the surroundings. This data is passed through a microprocessor that transfers it wirelessly to 60 electrodes implanted in the eye," explains Rajat N Agrawal, an Indian ophthalmologist working on the project at the university.

"These electrodes stimulate the retina to create a pattern, which the brain perceives as sight," he adds.

Agarwal, who plans on bringing the technology to India, is also the founder of non-profit Retina India, which is working with various government agencies to allow for clinical trials in the country. The handmade device, which takes about six months to fabricate, is likely to be cleared for sale in Europe soon.

"Since the treatment costs anywhere between $50,000 to $1,00,000, Retina India will be working to help bring down the costs in the near term, and offer a cheaper device to Indian patients in the long term," Agarwal says.

ONBOARD

DEVELOPED BY: IIT-Delhi
WHAT DOES IT DO: Gadget uses radio signals to communicate with corresponding module on bus to inform the visually challenged of route
CURRENT STATUS: Technology has been demonstrated to the BEST; real-world tests yet to be carried out

OnBoard is a project from IIT-Delhi, where researchers are working towards a "talking bus". Desperately seeking the support of public transport providers such as BEST and DTC, this invention could ensure that thousands of visually-impaired people have a safer commute everyday.

The technology was invented after Dipendra Manocha – managing trustee of Saksham Trust that caters to the visually-impaired – told the students about the problems faced by the blind when using public transport.

"Imagine you are a visually-challenged person trying to commute, but don't know what bus has arrived at the stop that caters to 15 other routes," Manocha said.

So, undergrads Vaibhav Singh, Dheeraj Mehra, Rohan Paul and Ankush Garg – who have also worked on the Smart Cane – created a technology that allows the blind to board public transport independently. The system comprises two devices: A user module that is carried by the person and a bus module, which is installed at the entry of the vehicle. Once the user hears a bus approaching the stop, he or she presses the query button on the handheld device, which transmits a radio signal to the vehicle. The bus module then responds by transmitting its route number. Mumbai's BEST has already looked into the technology, but is yet to conduct real-world tests.

ADITI

DEVELOPED BY: IIT-Madras
WHAT DOES IT DO: Helps people with debilitating diseases – such cerebral palsy and severe muscular skeletal disorders – to communicate using simple gestures
CURRENT STATUS: Prototype testing in India and South-east Asia; set for launch in February

Many people – suffering from some debilitating disease or the other – are unable to communicate verbally or even gesture to indicate what they might require. Their option, therefore, is some sort of a screen-based device – which they have to always carry around – running software that provides them with visual options; whether it is to indicate an emotion, specify whether they are hungry or thirsty, or to make simple choices such as 'yes' or 'no'.

But then, there are those that can't even move their fingers to click on the options... For these patients, researchers at IIT-Madras have created a new gizmo that lets them 'click' and communicate using simple gestures.

Using ADITI, these patients can nod their heads, move their feet or simply shake their hands to generate a mouse click.

An acronym for Analog Digital Theremin Interface, ADITI is an indigenous USB device that senses movement within a six-inch radius. And, when accompanied with communication software – generally in the form of a graphical, choice-based menu system – the device can prove to be a great boon for patients who suffer from severe muscular skeletal disorders.

"ADITI enables people to choose from a list of alphabets, words or pictures to express themselves," says Anil Prabhakar, the inventor of ADITI and professor at the department of electrical engineering, IIT-Madras.

Set to launch by February this year, the device has already undergone three revisions. "We are in the process of field-testing a proto batch of 20 in India and the south-east Asia," says Raja Shanmugam, CEO, Mindtree Foundation that supports ADITI.

CePal

DEVELOPED BY: Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar
WHAT DOES IT DO: Infra-red, gesture-based remote control helps the motor-impaired, and those with limb-related disorders to complete routine tasks such as operate a TV, AC, lights and fans
CURRENT STATUS: Prototype development stage

CePal – meant for the motor-impaired – is a gizmo, which can be worn like a watch and used to operate infra-red, remote-controlled utilities such as TVs, ACs, and even lights and fans. Tilt CePal to the left and one can reduce the volume on a TV screen, tilt it upwards or downwards and the channels change.

Created by students of Gandhinagar's Dhirubhai Ambani Institute of Information and Communication Technology, CePal was developed by Sachin Garg, Mohit Maheshwari and Hitesh Sabnani under the mentorship of their professor Prabhat Ranjan in 2009.

"At first, we thought of making a mouse, but then we realised that it'd be cooler if we could create something that would help the handicapped with routine tasks," Garg says.

There are a large number of people affected with cerebral palsy who may not use computers and this device is targeted at making them more self-reliant, he adds.

But there's one drawback: CePal – which is currently in the prototype development stage – has to be customised for each individual.

"Every user has a different degree of control when it comes to movement," Garg says, "and users have to spend enough time with our gizmo before they master its operations."

CePal, which costs around Rs 900, is currently designed to assist people who are partially handicapped, and those suffering from arthritis, paralysis or any other limb-related disorders.

vOICe

DEVELOPED BY: Dutch scientist Peter Meijer
WHAT DOES IT DO: Software enables the blind to "see" by converting visuals into a 'soundscape'
CURRENT STATUS: Downloadable software available at www.seeingwithsound.com

Pranav Lal uses his ears to 'read' visual cues while commuting in and around Delhi. Visually impaired since birth, the 31-year-old information security consultant uses a pair of headphones to listen to what you and me might mistake for meaningless jumble of sounds. But for Lal, these sounds paint a picture of his surroundings.

The apparatus that helps this B-school graduate "see", also comprises a pair of 'Made in China' eye glasses that are equipped with a mini camera, capable of capturing images in real-time, and a netbook equipped with a software called vOICe (where OIC stands for Oh, I see).

The camera feed is sent to the netbook after which the free-off-the-internet software converts those images into sounds.

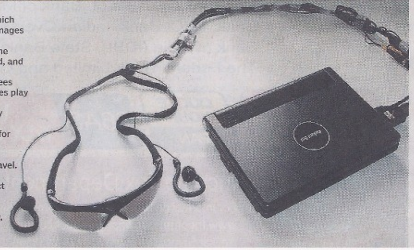
"The higher the object, the higher the pitch of the sound; the brighter the object, the louder the sound, and so on and so forth," Lal reveals.

He uses vOICe when he's in a car, "to see the trees outside" or when he's at the beach "to see the waves play with the rising sun and rocks".

With the software – which has been designed by Dutch scientist Peter Meijer – Lal can perceive the environment around him without having to "grope for items or follow the wall".

The application works on Android and Symbian phones too, making it portable for long-distance travel. Lal is a photo-enthusiast and takes pictures using vOICe to help him align himself in front of the object he wants to capture. "I can now even access art as the software has a colour recognizer," he says.

But making sense of the soundscape is not easy, he adds. "It will take some amount of practice to actually be able to benefit from the technology."



Ultrasonic Haptic Helmet

DEVELOPED BY: Ahmedabad-based CU College of Engineering and Technology
WHAT DOES IT DO: Helmet employs echolocation to "see" the surroundings; vibrates to provide "handsfree" navigational cues
CURRENT STATUS: Work in progress

Engineering student Dhyey Rawal and his classmates from Ahmedabad-based CU College of Engineering and Technology have created a lightweight helmet equipped with an ultrasonic "rangefinder" sensor that can sense objects in the vicinity. And, every time an obstacle is detected using the technology, motors in the helmet vibrate to alert the user about the direction he should take.

The apparatus works like this: Six tiny micro-vibrators are mounted on the inner side of the headgear, with each of them covering an arc of 30 degrees. These vibrators take their cue from the rangefinder that rotates at the top of the helmet.

Rawal, Jainam Shah and Manthan Shukla, all students of biomedical and instrumentation engineering visited the Blind People's Association in Ahmedabad where they tested the apparatus.

Ramji Bhai, a visually-impaired person who was involved in the testing – and pictured with Rawal (top) – says: "My hands were free when I used this helmet. I could board a bus easily and pick up objects too, it made things a bit easier..."

After user feedback, the helmet was reprogrammed to work in accordance to the rules of the white cane.

"We want to get a R&D company to support us so that we can make sure that our haptic helmet is transformed into an actual product," Rawal says. "It is a simple, automatic and an easy-to-operate device. Also, switching from the white cane to the headgear can be quite seamless as they both use the same principles," he says.

The helmet is powered by two 9V batteries that last for a day, a micro sensor and a reprogrammable chip. The creators intend to develop it further so that it can even detect speed-breakers and potholes.