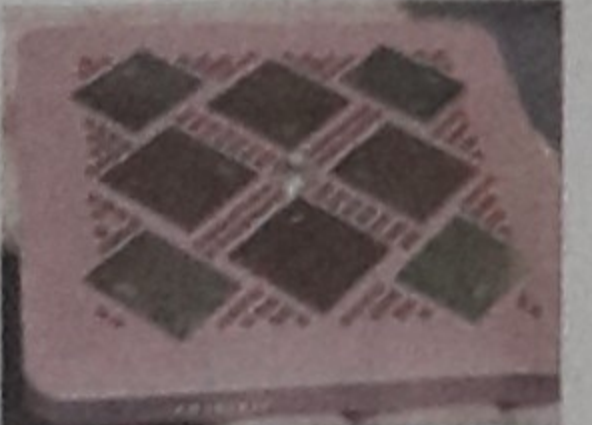




A Multi-Chip Module or MCM is a specialized electronic package where multiple integrated circuits (ICs), semiconductor dies or other modules are packaged in such a way as to facilitate their use as a single IC. The MCM itself will often be referred to as a "chip" in designs, thus illustrating its integrated nature. Multi-Chip Modules come in a variety of forms depending on the complexity and development philosophies of their designers. These can range from using pre-packaged ICs on a small printed circuit board (PCB) meant to mimic the package footprint of an existing chip package to fully custom chip packages integrating many chip dies on a High Density Interconnection (HDI) substrate.



**TECH FOCUS**

## Brain Computer Interface Hi-tech to overcome disability

EDWARD APURBA SINGHA

**I**MAGINE a machine, which receives signals from your brain and helps you control your body organs. Yes, it is not a science fiction anymore, but a real innovation that has created a landmark in the history of mankind.

This technology is called brain-computer interface (BCI), which is a promising solution that integrates both medical science and information technology. BCI is particularly helpful for those people who are unable to control body organs with the brain.

BCI research was first initiated in 1970 but the technology came in limelight in the mid-1990s. BCI resembles Neuroprosthetics but they slightly differ with each other. Neuroprosthetics typically connect the nervous system, to a device whereas BCI usually connects the brain with a computer system.

BCI and Neuroprosthetic came into reality with the vision to restoring sight, hearing, movement, ability to communicate, and even cognitive function. Both use similar experimental methods and surgical techniques.

Before we go any further, we need to understand the basic functionality of human brain. The brain is a very complicated part of the human body, which actually controls our activities.

Brain is composed of nerve cells called neurons. They are the core component of a brain. Individual neuron is connected with others by dendrites and axons. When we think, move, feel or remember something, our neurons come into action.

Neurons generate electrical pulse to send information. The signals are generated by differences in electric potential carried by ions on the membrane of each neuron.

Signals spread through the paths, which are insulated by something called myelin. But some signals escapes and scientists concentrate on this occurrence. Scientists have developed BCI systems to detect those signals.

There are three kinds of BCI systems such as invasive BCI, partially invasive BCI and non-invasive BCI. Scientists implement invasive BCI system directly into the gray matter of the brain during neurosurgery. As a result, this system can pick up better quality signals.

Because it requires invasive



surgery to set the electrodes and on the other hand this change in the brain cause the formulation of scar tissue in the gray matter. This scar tissue eventually interrupts the signal reception. Invasive BCI system is utilised to repair damaged sight and providing new functionality to paralysed people.

As the name implies, some portion of partially invasive BCI system is implemented inside the skull and the remaining part outside the brain rather than touching the grey matter.

This system produces better resolution signals than non-invasive BCI where the bone tissue of the cranium deflects and deforms signals and have a lower risk of forming scar-tissue in the brain than fully-invasive BCIs.

To implement non-invasive BCI system scientists install

electrodes on the surface of the head. This set-up is easy to handle and requires no surgery. However, it generates low quality results as the skull blocks a lot of the electrical signal and it distorts what get through.

Basically electrodes measures minute voltage difference between neurons. Then it requires some modifications. In modern BCI systems, computer program interprets the signal.

Researchers use magnetic resonance imaging (MRI) to select the exact place on the brain to install electrodes. For instance, if researchers need to set electrodes that will enable a person to control a robotic arm, they first identify the pacific portion of the brain for this activity through MRI. The MRI will show which area of the brain is active during arm movement, giving them a clearer target for

electrode placement.

But in practice the robotic arm movement is not that much easy. Special software is used to coordinate the entire process. But the software requires several trails to understand the signal associated with particular brain activity.

Software connected to a robotic hand is programmed to receive the "close hand" signal and interpret it to mean that the robotic hand should close. At that point, when the subject thinks about closing the hand, the signals are sent and the robotic hand closes.

Controlling robotic arm creates limitless potential for BCI implementation. Physically challenged people could have braces attached to their own limbs, allowing them to move and directly interact with the surroundings.

Cochlear implant is the oldest

metaphor of BCI implementation. When people listen to any sound, the sound waves enter the ear and pass through several tiny organs that eventually pass the vibrations on to the auditory nerves in the form of electric signals.

If this natural process of hearing become dysfunctional people basically is not able to respond to any sound. However, the auditory nerves may be functioning perfectly well. They just aren't receiving any signals.

A cochlear implant solve this problem by bypassing the defected part of the ear and process the sound waves into electric signals and passes them via electrodes right to the auditory nerves. Although this tactic not perfectly allow a deaf person to hear but he or she can conduct conversation.

In principle the process to resolve hearing problem is equally applicable for the visually impaired person. But in practice the brain functions more critically to process visual information. On the contrary, the artificial eye development does not perfectly support this system.

In the installation process electrodes are implanted in or near the visual cortex, the area of the brain that processes visual information from the retinas. A pair of glasses holding small cameras is connected to a computer and, in turn, to the implants.

Several companies are now engrossed in research in order to come up with more advanced BCI system. Neural signal is now developing a technology to restore speech for disabled people. In this regard, an implant picks up signals from the area of the brain associated with speech then transmits the signals to a computer and a speaker. The system systematically recognises each of the 39 phonemes in the English language and redevelops speech through the computer and speaker.

Nasa is working on a similar system which actually reads electric signals from the nerves in the mouth and throat area instead directly from the brain. Cyberkinetics Neurotechnology Systems is marketing the BrainGate, a neural interface system that allows disabled people to control a wheelchair, robotic prosthesis or computer cursor. Japanese researchers have developed a preliminary BCI that allows the user to control their avatar in the online world 'Second Life'.

**TECH NEWS**

### 'Digital divide' widens between rich and poor countries: UNCTAD

AFP, Geneva

**T**HE 'digital divide' between rich and poor countries is growing with developing countries still far behind in the use of broadband internet, the UN trade and development agency has warned.

Developed countries are expected to reach a broadband penetration rate of 28 percent in 2008, while developing countries languish on just 3.0 percent, the UN Conference on Trade and Development (UNCTAD) said in a report issued late Wednesday. "The diffusion of information and communications technology (ICT) in developing countries is growing but... such countries lag far behind the industrialised world in the application of ICT and its use by businesses," UNCTAD said in its "Information Economy Report 2007-2008."

The gap has widened for broadband "due to the fast pace of technological development" and associated high costs, UNCTAD official An-Nga Tran-Nguyen said. UNCTAD has already highlighted broadband as a vital tool in economic development, saying last November

that it is so vital for businesses that it should be considered a utility comparable to water and electricity.

UNCTAD did note some progress in narrowing other aspects of the digital divide

mobile penetration rate of nearly 50 percent, although this is still way behind developed countries which have reached saturation point with some rates above 100 percent.

Mobile phone subscribers almost tripled in developing countries over the last five years and now make up 58 percent of global subscribers, UNCTAD said.

"Mobile handsets provide a starting point for digital literacy," Tran-Nguyen said. "For many individuals and communities, once the initial hurdle of ICT acceptance has been overcome, the adoption of higher-level technologies may be less daunting," she added.

UNCTAD urged the international community to take steps to bridge the digital divide, such as improving flexibility on intellectual property rights, boosting infrastructure in developing countries, establishing public-private partnerships for research and development, and promoting open access models.

"Significant reductions in this divide will only be possible with the sustained support of the international community," she reports said.



since its November 2006 report, particularly with the use of mobile phone technology.

For 2008, it expects developing countries to reach a

**TECH NEWS**

### D-Link introduces 'Empower Partner Program'

STAR TECH DESK

**D**-LINK, leading manufacturer of wireless and Ethernet computer networking products, for the first time in Bangladesh inaugurated the 'Empower Partner Program' at a local hotel on February 4.

This initiative mainly helps D-Link partners to strengthen their product experience and at the same time increases their capability to provide best quality services to the clients. "Bangladesh is an emerging market with tremendous potential for D-Link. The 'Empower Partner Program' will help us reach out to the Bangladesh market. It will help us forge closer ties with our partners and upgrade their skill sets to enable them to move up the value chain," said Debraj Dam, associate vice president, Operation, East, D-Link India Ltd.

The programme is targeted towards D-Link's current as well



Debraj Dam, associate vice president, Operation, East, D-Link India Ltd, speaks at the event

as new and emerging system integrators (Sis) / partners and helps them get ready access to cater to the fast growing Small and Medium Business (SMB) and Small and Medium Enterprise (SME) markets in Bangladesh. The 'Empower Partner Programme' will be D-Link's latest foray into the fast growing SI / partner community in Bangladesh. The programme has been designed to attract partners servicing the SMB and enterprise space and will be rolled out by D-Link's local distributor Spectrum Engineering and Consortium Ltd.

**TECH NEWS**

### The world's lightest Tablet PC

STARTECH DESK

**C**OMPUTER Source Ltd. (CSL), leading ICT distributor in Bangladesh, has introduced the stylish tablet pc Fujitsu LifeBook T2010, which is said to be the world's lightest A4 convertible tablet PC, says a press release.

This Tablet PC is all about productivity in a mobile situation as it gives an avenue to work on the edge. It is unbelievably light-weight is around 1.58kg and has bi-directional 12.1 inch wide touch-screen monitor which has wide viewing angle with high brightness.

It has superior security features for enhanced data and hardware protection. The notebook has battery support up to 9hrs. It supports genuine Windows Vista operating system.

It comes with Intel Centrino Duo processor technology with a processing speed of 1.2GHz. It has 1GB DDR2 RAM and has a 160GB hard drive. The 5400rpm SATA HDD is protected by Fujitsu 3D shock sensor.

Other features including high definition audio codec with dual built in stereo speakers and dual built in digital microphone are also there. Wireless LAN, Bluetooth are standard while you can specify an optional 3G module for you to experience broadband speeds without the cables.

The T2010 has a price-tag of Tk 1,90,000 with one-year international warranty.

### EWU to participate in ACM ICPC world final

STAR TECH DESK

**E**AST West University (EWU) Bangladesh, one of the leading private universities in the country is going to participate at the ACM ICPC world

final to be held in Alberta, Canada this year.

The EWU team 'EWU Dream of Twilight' qualified to compete at world final when they secured the third position at the ACM ICPC Dhaka Regional 2007 held on December 6, 2007 at the Bangladesh China Friendship Conference Centre (BCFCC).

To mark the occasion a press conference was organised at EWU on January 26. Prof. Mohammed Sharif, vice chancellor, EWU admired the team and expressed his commitment to continue their support to produce competent programmers.

"We are optimistic that the EWU team will bring another stunning success for us and it will enlighten the nation as a whole", said Jalaluddin Ahmed, president, board of directors, EWU. ACM ICPC is a unique platform for the coders to prove their competency. Only hundred teams around the world will join the battle of coders at the world final. Finalists were selected from 213 regional competing sites. Dhaka regional contest champion, Buet team will lead the nation at the world final.



The EWU team 'EWU Dream of Twilight' with EWU faculty members

**PHOTO TECH**

### THE A2 HYPERSONIC JET

A handout image obtained in London on February 5, shows an artists impression of the A2 aircraft. British engineers unveiled plans Tuesday for a hypersonic jet which could fly from Europe to Australia in less than five hours. The A2 plane, designed by engineering company Reaction Engines based in Oxfordshire, southern England, could carry 300 passengers at a top speed of almost 4,000 mph (6,400 kmh), five times the speed of sound.



PHOTO: AFP

