ELECTRONICS & COMMUNICATION ENGINEERING SOCIETY

Electronics & Communication Engineering Society
ECES
M.M.M. University Of Technology

THE ELECTRONICLE

VOLUME XVII

TOUCHABLE 3D

A LIFESTYLE INNOVATION...

MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY

TERRA INCOGNITA

"Technology is just a tool. In terms of getting the kids working and motivating them, the teacher is the most important."

-Bill Gates

No need to be tethered down, a freehand device

Equip the tiny and featherweight device on your fingertip and you will not only be able to bring up a screen out of thin air, but also touch and feel virtual objects as if they were really there.

The technology you use impresses no one, the experience you create with it is everything.

-SEAN GERETY

TOUCHABLE 3D

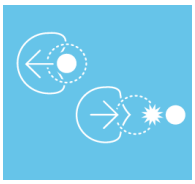
Until now we have only seen it in science fiction movies, a screen appears out of thin air and allows us to push, grab and manipulate it, all with the sense that we are actually touching something. The researchers have brought this dream into reality by designing the first digital interface in the world, we can touch. Complete with an abundance of textures that provide the sensation what we are manipulating is actually there in front of us.

Revival of the three senses

You will be able to use this device to push, grab and feel virtual objects as if they were really there. These devices reinvent the senses of sight, touch and sound to let you feel what is on your screen, from a rough table top to a soft pillow.

A sense of pressure = A sense of contact
Things like hard and soft.

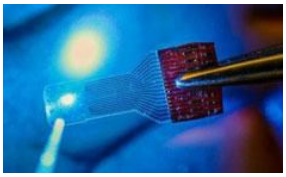
A sense of touch = A tactile sensation & roughness
Things like smooth and rough.



A sense of force (haptic) = Touch & response
Things like squeezing, pinching and pulling.

This touchable 3D technology works on the principle of haptic technology that is a tactile feedback technology which recreates the sense of touch by applying forces, vibrations, or motions to the user. This mechanical stimulation can be used to assist in the creation of virtual objects in a computer simulation, to control such virtual objects, and to enhance the remote control of machines and devices. This technology has made it possible to investigate how the human sense of touch works by allowing the creation of carefully controlled haptic virtual objects. These objects are used to systematically probe human haptic capabilities, which would otherwise be difficult to achieve.

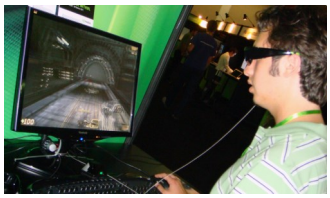
See-through sensors open new window into the brain



Engineers have developed invisible implantable medical sensor microarrays to allow for seeing brain tissue. The transparent sensors could be a boon to neuromodulation therapies, which physicians increasingly are using to control symptoms, restore function, and relieve pain in patients with diseases or disorders.

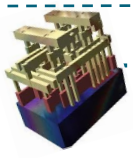
The 3D-Haptics Technology uses a virtual-reality headset and wrist-mounted box connected to a fingertip-attached moulding, coin-shaped moulding, stick or pen. This setup allows a user to feel the virtual objects, like the resistance of a button. Many of the previous Haptics Technology remained in planar expression of haptics. In contrast, it is the original world's first 3D-Haptics Technology by AIST and MIRAISENS, which was expanded to 3-Dimensional space based on the "Illusionary Haptic Generation Technology" which is the patent technology invented by the Founder, Norio Nakamura. Tactile feeling and kinesthetic feeling can be reproduced in the space with having nothing, just only by installing a small device on a fingertip. It is not necessary to set a device on a table, a wall, etc. just like the conventional fixing style. In the air, it is just a freely behavior style like a free hand, and it is possible to enjoy haptic experience. With one device, we can concurrently experience three types of sensation, that is, the pressure sensations (rapping, tapping, etc.), the tactile sensations (grainy, rugged, etc.) and the kinesthetic force sensations (tightly, snap, steadily, etc.) which are said to be indispensable for generation of tactile feeling and kinesthetic feeling of objects.

APPLICATIONS



It has potential to bring out reactions never seen before from games. It provides a huge sense of satisfaction and spark passion through an interactive feeling, utilizing both senses of sight and touch resembling that of real life.

Even in the automotive Industry, this 3D gesture feedback technology can be used to effectively provide drivers with a great variety of Information. This technology could add to the driving experience to help drivers make more precise movements, as if the automobile was an extension of their own limbs, bringing about a new level of comfort and fun.



Monolithic 3D Chip

In a monolithic 3-D circuit, a chipmaker would simply continue building on top of a 2-D chip, adding an additional layer of silicon on which another set of circuitry could be built. The vertical connections made in this process could potentially be as dense as those found on a 2-D logic chip.

In future it holds the potential for a virtual piano application that will allow you to actually feel the keys while you simply play with the keys or even deliver a musical performance.

It has an extraordinary level of compatibility between wearable devices and virtual reality. The ability to grab and manipulate virtual objects as if they were really there and had substance that has not been made possible until now.

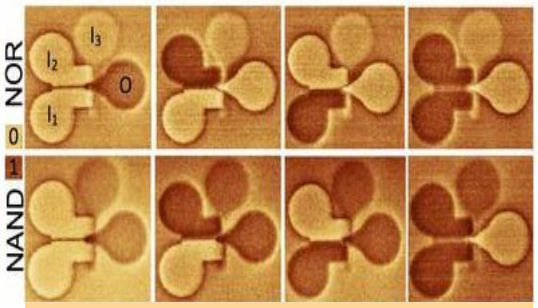
The delicate operation of remote-controlled robots requires a high level of engineering and someone with refined skills. But if you apply this 3D feedback gesture technology to robot control you will feel like you are remotely touching and sensing the same things the robot is interacting with.

Scan the **QR code** to view online the showcase of 3D touchable technology by a Japanese firm.

TECHNISCHE

"Education is not the learning of facts but the training of the minds to think."

-Albert Einstein



Magnetic force microscopy images of a 3D majority logic gate showing magnetization states of three input and one output magnet.

A New Dimension for Integrated Circuits

In a 3D stack of nanomagnets, a so-called majority logic gate is implemented which could serve as a programmable switch in a digital circuit. It can be understood by the underlying principle with a simple illustration. Think of the way ordinary bar magnets behave when you bring them near each other, with opposite poles attracting and like poles repelling each other. Now imagine bringing several bar magnets together and holding all but one in a fixed position. Their magnetic fields can be thought of as being coupled into one and the north-south polarity of the magnet that is free to flip will be determined by the orientation of the majority of fixed magnets.

Gates made from field-coupled nanomagnets work in an analogous way, with the reversal of polarity representing a switch between Boolean logic states, the binary digits 1 and 0. In the 3D majority gate, the state of the device is determined by three input magnets, one of which sits 60 nanometers below the other two, and is read out by a single output magnet.

- ***Nanomagnetic logic can allow very dense packing.***
- ***Nanomagnets operate purely with coupling fields.***
- ***It can take fewer magnets than transistors to get the same job done.***

It can be used in order to realize monolithic, sequentially stacked magnetic circuits promising better scalability and improved packing density. There might be applications where the non-volatile, ultralow-power operation and high integration density offered by 3D nanomagnetic circuits give them an edge.

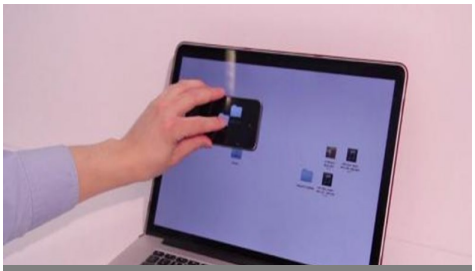
Wireless Microcontroller (MCU) suits low power applications

The SimpleLink CC2540T, a low power wireless MCU that can operate in temperatures ranging from -40 to 125°C, featuring Bluetooth Low Energy functionality and USB connectivity.

Smartphone System THAW

The system THAW allows a smartphone user to seamlessly interact with other computer devices via their screen. The system is meant to bridge the gap that exists between user devices, transferring files between phones and a desktop computer for example by placing the phone on the larger screen and dragging icons to the phone or continuing to play a video game started on a console on a mobile device. The same system allows for using a smartphone as a peripheral device, moving files on a computer screen or manipulating images.

THAW works by projecting a grid onto an underlying video screen, and then using it to orient itself. Imagery is brought into the smartphone via its camera, where software takes over, recognizing what is happening and then launching a companion application or software meant to manipulate objects on the underlying device.



We can drag/drop multiple files at once or use a phone as an advanced clipboard

Vision Correcting Displays

A computational display technology that predistorts the presented content for an observer so that the target image is perceived without the need for eyewear.

By designing optics in concert with prefiltering algorithms, significantly higher resolution and contrast is achieved.

DNA Based Computer Circuits

A potential technology revolution that has brought significant breakthrough toward developing DNA-based electrical circuits. Molecular electronics, which uses molecules as building blocks for the fabrication of electronic components, has been seen as the ultimate solution to the miniaturization challenge. DNA computing is a form of computing which uses DNA, biochemistry and molecular biology, instead of the traditional silicon-based computer technologies.

DNA can be induced to self-assemble into various structures, its use in building circuits can greatly expand the potential of computers.

However, till date, no one has actually been able to make complex electrical circuits using molecules. Now scientists report reproducible and quantitative measurements of electricity flow through long molecules made of four DNA strands, signaling a significant breakthrough towards the development of DNA-based electrical circuits. This research paves the way for implementing DNA-based programmable circuits for molecular electronics, a new generation of computer circuits that can be more sophisticated, cheaper and simpler to make.

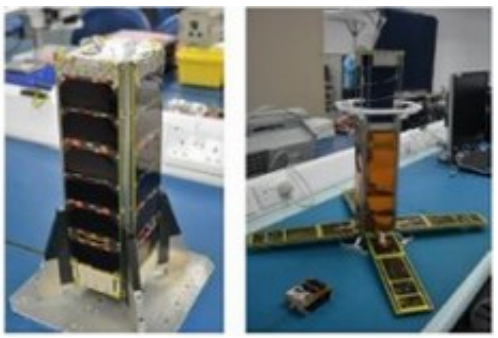
Smart window that tints and powers itself

Researchers have developed a smart window that can darken or brighten without the need for an external power source. This new smart electrochromic window is bi-functional. It is also a transparent battery. It charges up and turns blue when there is oxygen present in the electrolyte. In other words, it breathes.

ZigBee Based Inter Satellite

The engineering team at the Satellite Research Centre has successfully piloted the world's first ZigBee based inter-satellite communication system named VELOX-1, which is lightweight, low power-consuming wireless communication system. It consists of a nanosatellite weighing 3.5 kg and a piggyback picosatellite weighing 1.5 kg. Both miniature satellites were configured with a ZigBee wireless network and equipped with small sensor nodes that perform functions such as local sensing, distributed computing and data-gathering.

It is designed to test the hypothesis that ZigBee, a cheap but powerful land-based wireless system, will perform equally well in space. After conducting Received Signal Strength Indicator tests on the satellite radio frequency modules, a maximum range of 1 km was found to be achievable for inter-satellite communication. An even longer communication range can be expected in free space, due to the absence of signal attenuation caused by fading and diffraction.



(a) *(b)*

VELOX-1 in (a) Launch Configuration
(b) After deployment

ELECTRONIC NOSE

Electronic nose is used for detection of chemical warfare gases. It consists of 15 commercial sensors, a data acquisition system, and a computer. It smells and further processes the data, through pattern recognition, to warn of the presence of gases.

LITERARIO

"A creative man is motivated by the desire to achieve not by the desire to beat others."

-Ayn Rand

YOUTH EMPOWERMENT

What is youth empowerment? In a nutshell, it is the means through which the youths of any country are assisted to succeed in life but it has more to it. Youth empowerment is the outcome by which youth, as change agents, gain the skills to impact their own lives and lives of other individuals, organizations and communities. It is an attitudinal, structural, and cultural process which changes their own lives and the lives of other people, including youth and adults. Do you as a reader think that youth empowerment will do our world any good? It is often addressed as a gateway to intergenerational equity, civic engagement and democracy building. No one would deny this fact that youth are the backbone of every nation, be it developed nation, under developed or developing nation. Today youth are tomorrow's leaders and if appropriate opportunities are made available to put their natural endowment to creative and productive channels, they are indeed capable of working wonders.

The youth is full of vast and untapped energy, thus today it is globally realized that youth empowerment led the nation and prosperity for next generations.

One example of youth empowerment is one world youth project. The goal of One World Youth Project is to enhance education towards a more discerning, empathetic and empowered generation of global citizens.

Thus youth empowerment can provide a healthy nation which has prosperity, innovation, transparent social and political systems, good education standard and many more benefits.

ENERGY OF DESIRE

Desire is wanting to have something or wanting something to happen. Each and every one of us have desires. And to get those desires fulfilled, we act and behave in a particular way. To fulfill our desires we get motivated, which can be named as desire motivation. But sometimes we act due to fear motivation too. Fear motivation aims to protect and to focus on penalties for failure leading to the feeling of inhibition or compulsion. Whereas the energy of desire is a powerful motivator and creative force. Desires and the energy that it creates, affect our intentions and actions. Desire motivation seeks reward for success .It leads to volition and propulsion. By our every action we are either moving towards something we want or moving away from some we do not want. And always our efforts towards something we want is more efficient than our efforts to move away from something we do not want. The way we express our feelings shapes our beliefs and intensions which affects our actions that's why it is very necessary to have positive beliefs and attitude towards our desire to have the best results. It is always the energy produced by the deepest desires of our heart which carry us forward to success. So it is very important to make the motivation and energy of our desires the reason of our actions that leads us to the path of success.

INTERROGATORY

"Live as if you were to die tomorrow. Learn as if you were to live forever."

-Mahatma Gandhi

CONFER WITH

Prof. Onkar Singh
Vice Chancellor

What are the future plans for the development of University?

For the development of University, there will be an addition of a new branch "*Chemical and Sugar Technology*" having the intake of 60 students. We are upgrading the strength of all branches, by increasing their intake to 120 students. We have already sent a five year plan for the development of University to the UP Government. We have also received funds for the construction of a seminar hall and a girls hostel.

We will be recruiting new faculty within two months for qualitative education. We are focused upon enhancing our University's academics, infrastructure and placement so that more number of students get benefit from the resources of this institution. My message for the students is ***"Utilize the resources of University to nurture your Creativity and Professional personality."***

Shri G.S.Tripathi
Associate Prof. &
Faculty Advisor (ECES)

What innovative steps should be taken for further development of ECE branch? Tell us something about your experiences in MMMUT Gorakhpur.

As I am working in this institute (formerly MMMEC) since 1983, a lot of changes have taken place since then. Up to 2000 the University was under D.D.U. Gorakhpur after that it was undertaken by UPTU which further enhanced its level. In 2011 it became Autonomous and from the last one year it is known as ***M.M.M. UNIVERSITY OF TECHNOLOGY***.

As far as the development of ECE branch is concerned I would like to say that there should be addition of some advanced activities. It should not be in repetitive pattern and the level of interaction among teachers, senior and junior students should increase so that the students are able to learn more about the latest trends in technology. At last I would say that the students should remain focused and work hard to achieve their goals.

An Outreach Programme & Seminar of *Bhabha Atomic Research Centre*

A seminar on "Atomic Energy for Inclusive Growth of the Nation" was organized on 15 September,2014. Dr. Prabhat Kumar, Chairman and managing director of *Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI),* Kalpakkam, was the Chief guest of the seminar. An eminent scientist Shri R.K.Singh, head of Media Relations & Public Awareness section, delivered the talks on the theme of the seminar.

PROCUREMENTS FROM ECE BRANCH:-

Tata Consultancy Services Limited is the largest Indian company by market capitalization and is the largest India based IT services company. It came for recruitment on **19/09/14** and selected **27 students**.

Wipro Limited is an Indian Consulting and System Integration services company headquartered in Bangalore, Karnataka. Company came for recruitment on **7/10/14** and selected **4 students**.

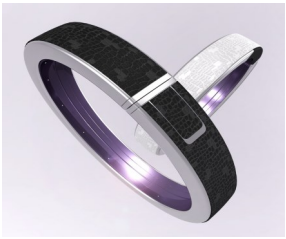
GIZMOZ

"A new gadget that lasts only five minutes is worth more than an immortal work that bores everyone."

SAMSUNG GALAXY NOTE EDGE: Display: 5.60 - inch| Processor : 2.7GHz| Front Camera: 3.7 megapixel| Resolution : 1440 x 2560 pixels| RAM:3GB| OS: Android v 4.4.4 (Kit Kat)| CPU : Quad-core 2.7 GHz Krait 450| Storage: 32GB| Rear Camera : 16-megapixel| Battery capacity: 3000mAh. The Samsung Galaxy Edge features a wraparound screen that adds another dimension to smartphone use by adding the Edge Screen UX.

OCULUS RIFT: A virtual reality headset that lets players step inside games and virtual world. The Rift is designed to make users feel as though they are actually inside the world of the game by following their movements in real time. It has custom tracking technology to provide ultra low latency 360° head tracking. It is a combination of the wide field of view with head tracking and stereoscopic 3D. Video games are the target market for the Rift, but the technology also has implications for architecture design and more.

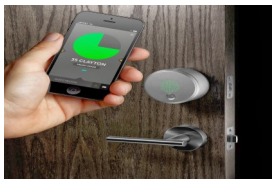
RITOT: A projection watch that projects the dial on your wrist, allows incoming Caller ID, text messages, reminders, meetings, clock, emails, Facebook messages, Twitter, weather alerts, silent vibrating alarm and timer, notifications for any other apps. The projection technology being used in this watch is absolutely safe for your skin and health. The projection colour of the watch can be changed in just one click.



DYSON VACUUM : A self-adjusting cleaner head with carbon fiber bristles which remove fine dust from hard floors. Dyson cyclones capture more microscopic dust than any other. The 360-degree camera mounted on the top, constantly scan the room for obstacles. Its latest Ball technology turns on a dime, have quick and hygienic bin emptying. The clear bin is made from tough polycarbonate. It's an on board combination and stair tool.

SCIO MOLECULAR SCANNER: It is a tiny spectrometer that allows you to get instant relevant information about the chemical make up of materials around you, sent directly to your smartphone. SCIO includes a light source that illuminates the sample and an optical sensor called a spectrometer that collects the light reflected from the sample.

AUGUST SMART-LOCK : A new lock that enables you to send a virtual key to anyone you choose to have access to your home through a Bluetooth low energy (BLE) enabled locking mechanism and an elegant and intuitive mobile application. This lock turns smartphones into keys. The device, unlocks the door with a tap on the screen of iPhone or Android phone.



AERICAM ANURA: It is a pocket sized flying camera about the size of a thicker 4.7 inch iPhone 6 when its wings are folded. It connects with iOS and Android smartphones via Wi-Fi and has a built-in micro camera, which offers a live aerial view on the smartphone. The connected smartphone also serves as the remote control for the Anura.

TECH-BUZZ

"You must accept the truth from whatever source it comes."

Samsung unveils 60GHz WiFi technology

A new Wi-Fi technology enable data transmission speeds of up to 4.6Gb/s five times faster than the 866Mb/s currently achievable. 802.11ad standard, 60GHz Wi-Fi will soon allow to download a 1GB movie in less than three seconds.

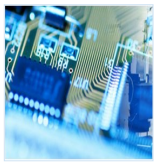
Micrium offers end-to-end embedded Internet of Things (IoT) package

Micrium, Inc., the premier RTOS provider for embedded systems, introduced Micrium Spectrum a pre-integrated end-to-end portfolio of embedded software, protocol stacks, cloud services to facilitate development of IoT devices. IoT-ready devices require a solid software infrastructure.

Android 5.0 heralds SE-Linux Enforcing mode

New security features in Android 5.0, mention is made of Smart Lock and full device encryption becoming the phone's default mode, for securing all data enforcement of the Android security model further into the core of the OS.

Singapore invests $200m in semiconductor R&D



New four labs in Singapore which will come at a cost of around $200. Faster and cheaper marketing of semiconductor technologies will be achieved .

Weightless-N standard issued

The Weightless Special Interest Group announced the launch of Weightless-N, a complementary open standard for the internet of things. The vision of the SIG is to deliver the wide-area machine connectivity standard that enables the 95% of the IoT opportunity denied by the high cost and power consumption characteristics of traditional cellular alternatives.

Inventors of blue LEDs win 2014 Nobel Prize in physics

The Nobel Prize in Physics 2014 was awarded jointly to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura for the invention of efficient blue light-emitting diodes which has enabled bright and energy-saving white light sources.

Bluetooth v4.2 puts sensors on the net

The Bluetooth Special Interest Group aims to push Bluetooth Smart further into IoT applications by adopting version 4.2 of Bluetooth core specification. A new profile will enable IP connectivity, and updates improve privacy and increase speed.

Qualcomm to buy CSR for £1.6bn

Qualcomm has announced that it has agreed a £1.6bn ($2.5bn) takeover of Cambridge Silicon Radio (CSR), the Cambridge-based Bluetooth and wireless chip firm. It will make Qualcomm, the leading mobile phone chipset supplier.

LED chip aims for bulb replacements

International Rectifier is supporting in LED driver designs for bulb replacement. It is designed to give flicker-free dimming with triac based dimmers. The device can also operate over a wide input voltage range.

RTOS learning kit

SMX Learning Kits (L-Kits) are free, fully functional releases of the SMX (Superior Multitasking Executive) kernel for non-commercial use in personal and class projects. L-Kits utilize powerful EWARM suite from IAR.

ARM creates new division for IoT, OS

ARM will release a free, open source operating system for Cortex-M devices and processor agnostic IoT cloud software. The ARM platform offers a superior mix of IoT security tools and protocols.

Gas sensors made on CMOS line

Cambridge CMOS Sensors is combining MEMS and CMOS processing to make metal oxide gas sensors. Key to this technology is etching silicon to leave a thin micro hotplate.

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REVIEWS

ARPIT AGRAWAL (2012)

It gives me immense pleasure to tell that this edition of Electronicle is a fine display of efforts and consistency. Overall it is a nice effort and keep going.

DIVYANK SINGH (2009)

Another good job guys. I just hope that the real target audience is receiving it as enthusiastically as we do.

AKHIL AGRAWAL(2012)

Tremendous job done by ECES executives...keep it up...

ARUN SINGH (2010)

Best edition ever. Congratulations to all Electronicle team. Keep giving your best.

PARNIKA TRIPATHI (2011)

Great Effort by you & your team. I am indeed very proud. I can see that you have tried to make it interactive which is very important. Good variety and presentation. Keep it up!!!

ASHWIN SRIVASTAVA (2012)

Congratulations...this really is the best one so far... Congrats team Electronicle for taking this edition to a better level...

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