MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

Autonomous Institution – UGC, Govt. of India

Accredited by NBA & NAAC with 'A' Grade

NIRF Indian Ranking, Accepted by MHRD, Govt. of India

Maisammaguda, Dhulapally, Secunderabad – 500 010, Telangana

A.Y : 2019-20 **VOL.2**

Under

Student Chapter IEEE, IETE & Technical Association Electro Spikes

TECHNITRONIX

HALF YEARLY TECHNICAL MAGAZINE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

E C E

www.mallareddyecw.com

DEPARTMENT VISION

- Our vision is to develop the department in to a full fledged Centre of learning in various fields of Electronics and Communication Engineering keeping in view the latest developments and to invoke enthusiasm among the Students to continually renew their education in rapidly developing technological scenario.

Vision

DEPARTMENT MISION

- Our mission is to inculcate a spirit of scientific temper and analytical thinking & train the students in contemporary technological trends in electronics and communication to meet the challenging needs of the industry by providing versatile sound knowledge in the field of engineering and technology

Mission

ABOUT THE DEPARTMENT

The Department of Electronics and Communication Engineering is accredited by NBA, with an intake of 240 in B.Tech Programme and also offers M.Tech Programme in Embedded Systems. The department has state of the art laboratories with latest softwares like MENTOR GRAPHICS, CADENCE, MATLAB, XILINX, CCSTUDIO, KEIL, RTOS, RT Linux, OSCAD, PSPICE and MULTISIM. The department consists of well equipped Robotics- Centre of Excellence to train the students in specific modules to design and develop innovative projects that extend the state of the art in Robotics. It has well qualified and experienced faculty members. The highly competent and professional faculties, many of them drawn from premise institutions and industry have extensive experience and contribute to the holistic development of academics, research and career building of students. The department established IEEE, IETE & ISTE student chapters under which it organizes Technical Symposiums and various co-curricular activities every Academic Year. The department organized National Conference on Signal Processing Communications and System Design (SPCOMSD) in 2014and is organizing International Conference on Signal Processing Communications and System Design (ICSPCOMSD) every year, from past 5 years. The department also organized Faculty Development Programmes on Analog & Digital Design using CADENCE Tools, Embedded System using 32 bit processor, Programmable System on Chip Mixed Signal Microcontroller, Refresher Courses on Analog and Digital Communications, Digital Signal Processing, VLSI Design using CADENCE Tools and One Week Refresher Course on “VLSI & Embedded Systems”. The department organized AICTE Sponsored Two Week Faculty Development Programme on “Speech, Image & Video Processing Techniques, Analysis & Applications”. The department also publishes the Registered Journal “International Journal of Research in Signal Processing, Computing and Communication-System Design (IJRSCSD)” with an ISSN: 2395-3187.

PO'S

PO1	Engineering knowledge	An ability to apply knowledge of mathematics (including probability, statistics and discrete mathematics), science, and engineering for solving Engineering problems and modeling
PO2	Problem analysis	An ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components
PO3	Design / development of solutions	An ability to design a complex electronic system or process to meet desired specifications and needs
PO4	Conduct investigations of complex problems	An ability to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions.
PO5	Modern tool usage	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
PO6	The engineer and society	An understanding of professional, health, safety, legal, cultural and social responsibilities
PO7	Environment and sustainability	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.
PO8	Ethics	Apply ethical principles, responsibility and norms of the engineering practice
PO9	Individual and team work	An ability to function on multi-disciplinary teams.
PO10	Communication	An ability to communicate and present effectively
PO11	Project management and finance	An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments
PO12	Life-long learning	A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning

PSO'S

The graduates of the department will attain:

PSO1: The ability to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.

PSO2: The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning

PSO3: Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

PEO'S

PEO1-PROFESSIONAL DEVELOPMENT

To develop in the students the ability to acquire knowledge of Mathematics, Science & Engineering and apply it professionally within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability with due ethical responsibility.

PEO2-CORE PROFICIENCY

To provide ability to identify, formulate and solve engineering problems with hands on experience in various technologies using modern tools necessary for engineering practice to satisfy the needs of society and the industry.

PEO3- TECHNICAL ACCOMPLISHMENTS

To equip the students with the ability to design, experiment, analyze and interpret in their core applications through multi disciplinary concepts and contemporary learning to build them into industry ready graduates.

PEO4- PROFESSIONALISM

To provide training, exposure and awareness on importance of soft skills for better career and holistic personality development as well as professional attitude towards ethical issues, team work, multidisciplinary approach and capability to relate engineering issues to broader social context.

PEO5- LEARNING ENVIRONMENT

To provide students with an academic environment and make them aware of excellence, leadership, written ethical codes and guidelines and the life-long learning to become a successful professional in Electronics and Communication Engineering

MESSAGES

Founder Chairman's Message

Ch. Malla Reddy

Founder Chairman, MRGI
Hon'ble Minister, Govt. of Telangana State

MRECW has made tremendous progress in all areas and now crossing several milestones within a very short span of time and now I feel very happy to know that the students and faculty of the ECE department of MRECW are bringing out the Volume-2 of the Technical magazine Technitronix in A.Y 2019-20. As I understand this magazine is intended to bring out the inherent literary talents in the students and the teachers and also to inculcate leadership skills among them. I am confident that this issue will send a positive signal to the staff, students and the persons who are interested in the educational and literary activities

Principal's Message

I congratulate the department of ECE, MRECW for bringing out the prestigious half yearly department technical Magazine Technitronix under A.Y: 2019-20, I am sure that the magazine will provide a platform to the students and faculty members to expand their technical knowledge and sharpen their hidden literary talent and will also strengthen the all round development of the students. I am hopeful that this small piece of literary work shall not only develop the taste for reading among students but also develop a sense of belonging to the institution as well. My congratulations to the editorial board who took the responsibility for the arduous task most effectively. I extend best wishes for the success of this endeavor.

Dr. Y. Madhavee Latha

Principal

HOD'S MESSAGE

It is an occasion of great pride and satisfaction for the department of ECE, MRECW to bring out the half yearly of the Technical magazine Technitronix under A.Y:2019-20, it gives me immense pleasure to note that the response to the magazine has been over whelming. The wide spectrum of articles gives us a sense of pride that our students and faculties possess creative potential and original thinking in ample measures. Each article is entertaining interesting and absorbing.

I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them.

Dr. N. Sreekanth

HOD

SCIENTIST OF THE HALF YEAR

CHARLES-AUGUSTIN DE COULOMB

Charles-Augustin de Coulomb, (born June 14, 1736, Angoulême, France—died August 23, 1806, Paris), French physicist best known for the formulation of Coulomb's law, which states that the force between two electrical charges is proportional to the product of the charges and inversely proportional to the square of the distance between them. Coulombic force is one of the principal forces involved in atomic reactions.

Coulomb spent nine years in the West Indies as a military engineer and returned to France with impaired health. Upon the outbreak of the French Revolution, he retired to a small estate at Blois and devoted himself to scientific research. In 1802 he was appointed an inspector of public instruction.

FACULTY ARTICLES

SMART NOTE TAKER

The smart note taker provides facility to people who want to make notes quickly. It can be used in many ways.

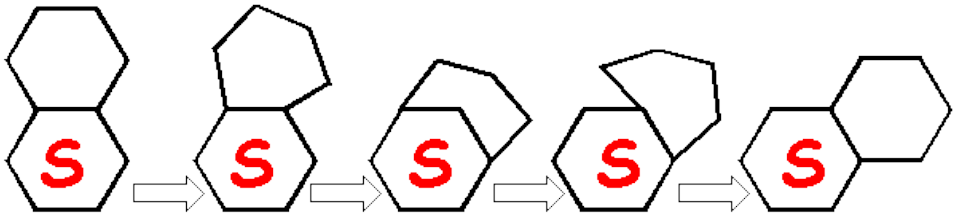
- This technology provides people with a facility of writing notes in the air while being busy in their work.
- The written notes are stored in the memory chip of pen and will be able to read in a digital medium after the conversation.
- This reduces time and facilitates life.

Applications of Smart NoteTaker:

- Apart from this, it is also proved to be very useful for blinds who think and write freely.
- It is also very useful in telephonic conversations between two people where there is a need for note-taking.
- It's also useful especially for instructors in presentations.
- The instructors may not want to present the lecture in front of the board. The drawn figure can be processed and directly sent to the server computer in the room.
- The server computer then can broadcast the drawn shape through the network to all of the computers which are present in the room.
- Through this way, the lectures are aimed to be more efficient and fun. This product will be simple but powerful.

Mrs. R. Ramya Krishna
Department of ECE

METAMORPHIC ROBOTS

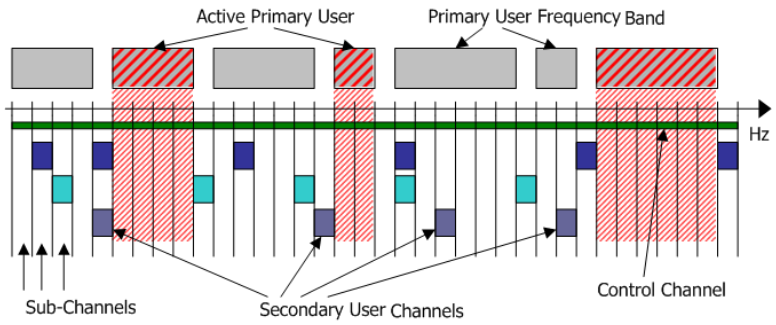


Metamorphic robots are robots able to change their shape without outside help. The robots are composed of a collection of independently controlled robots that can move around on the other robots to reform. The image below shows how a module moves. The module labeled S cannot move while another module is moving around it. The moving module wraps itself to another edge of the still module. Then it disconnects from the edge it started at and wraps itself back to hexagon shape. In our definition, every module has the identical structure, motion constraints, and computing capabilities. (All information needed by each module is computed by itself.) The modules also have a regular symmetry, so they can be packed without any gaps between them.

These robots that can change shape and move without outside intervention are useful in environments where people cannot go. Examples of such situations are out in space, in mines, deep underwater, and in burning buildings. Having many identical modules makes the system more robust and more cost-efficient. If one module breaks down, the whole system can still continue. The modules can be mass-produced cutting down on manufacturing costs. Giving the modules enough information to move without colliding with other modules is tricky. In the research I'm working on, the modules don't communicate with each other, and they don't have any way of sensing modules that are not attached to them. This makes it hard for the modules to determine where to move without colliding into one another. I'm working on an algorithm for each of the modules to run that will deterministically move each of the modules to a cell in the goal configuration when there are obstacles in the way. This means that each of the modules will know where to go without running into anyone else or the obstacle.

Mr. D. Rama Krishna
Department of ECE

SPECTRUM POOLING



The notion of spectrum pooling was first introduced in []. In this resource-sharing strategy called spectrum pooling the primary user would get the highest priority. Once a primary user appears in a frequency band all secondary users transmitting in this band would have to leave immediately, giving priority to the primary user.

A cognitive radio-based spectrum pooling concept has been developed in []. A COg-nitive Radio approach for Usage of Virtual Unlicensed Spectrum (CORVUS), a vision of a cognitive radio-based approach that uses allocated spectrum in a opportunistic manner to create virtual unlicensed bands, i.e. bands that are shared with primary users on a non-interfering basis, has been proposed in []. The principles of the CORVUS system are explained below.

CORVUS System
The basic assumptions of the CORVUS system are as follows

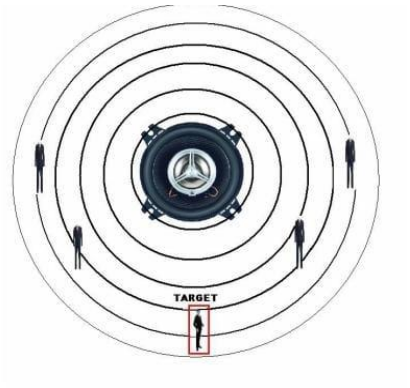
•There is plenty of spectrum available for sharing by secondary users.
•Secondary users are capable of using cognitive radio techniques to avoid interfering with primary users if present.

In this system, the SUs have to keep monitoring the presence of PUs at regular intervals and as soon as a PU is found using its spectrum band, the SU must vacate that particular band and try to relocate to some other band.

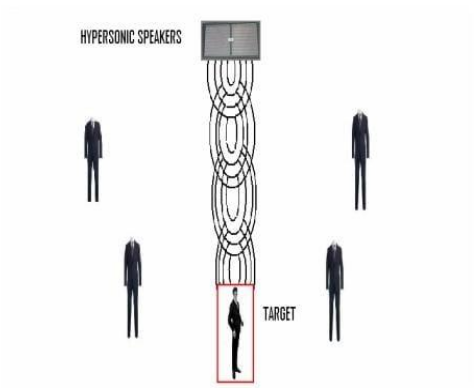
Mr. G. Harish Kumar
Department of ECE

STUDENT ARTICLES

AUDIO SPOTLIGHTING



Conventional Speaker



Audio Spotlighting system

Audio Spotlight is a narrow beam of sound that can be controlled with similar precision to light from a spotlight. It uses a beam of ultrasound as a "virtual acoustic source", enabling control of sound distribution. The ultrasound has wavelengths only a few millimeters long which are much smaller than the source, and therefore naturally travel in an extremely narrow beam. The ultrasound, which contains frequencies far outside the range of human hearing, is completely inaudible. But as the ultrasonic beam travels through the air, the inherent properties of the air cause the ultrasound to change shape in a predictable way. This gives rise to frequency components in the audible band, which can be predicted and controlled.

The targeted or directed audio technology is going to a huge commercial market in entertainment and consumer electronics and technology developers are scrambling to tap into the market. Being the most recent and drastic change in the way we perceive sound since the invention of coil loud speaker, audio spotlight technology can do many miracles in various fields like private messaging system, home theaters etc. Thus audio spotlighting helps to control where sound comes from and where it goes.

T. Varshini
18RH1A04L8
II ECE D

HIGH-ACCURACY ULTRA-LOW PRESSURE SENSORS

Many applications demand ultra-low pressure sensors (Figure 1) that can provide extremely high accuracy, including designs as diverse as medical ventilators and variable air volume (VAV) control systems for building energy conservation. And more and more engineers are turning to board-mounted pressure sensors to address common problems such as limited space and reliability.

In hemo dialysis machines depend on these pressure sensors to regulate pressure in the mixing tank as the blood approaches the artificial kidney and regulates blood flow to and from the patient. Alternatively in ventilators, they aid in monitoring a patient's breathing and detecting if it suddenly deteriorates, in addition to detecting the presence of a clogged filter. High-accuracy pressure sensors serve a similar purpose in anesthesia machines as they measure the pressure of air and oxygen, both to and from the patient, to ensure it never exceeds a safe level.

Sleep apnea machines, including CPAP, Auto-PAP, and Bilevel-PAP, utilize ultra-low pressure sensors to monitor the pressure at which air is delivered to the patient. They are also used to monitor blood pressure and hospital room air.

T. Sai Chandana
18RH1A04L9
II ECE D

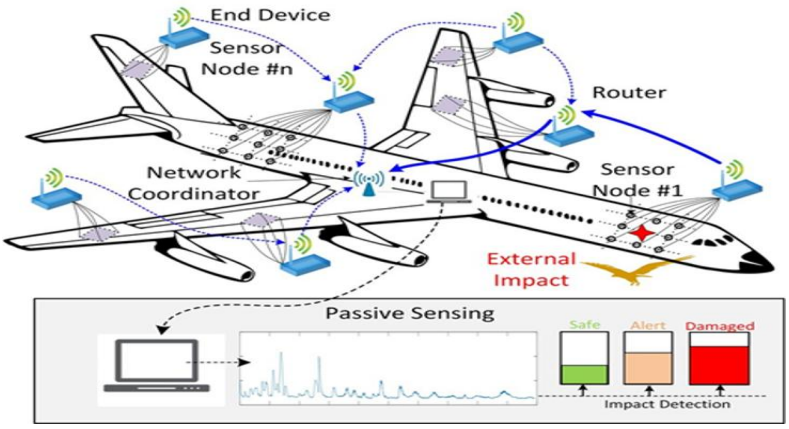
HUMANOID ROBOTS

The field of humanoids robotics, widely recognized as the current challenge for robotics research, is attracting the interest of many research groups worldwide. Important efforts have been devoted to the objective of developing humanoids and impressive results have been produced, from the technological point of view, especially for the problem of biped walking.

In Japan, important humanoid projects, started in the last decade, have been carried on by the Waseda University and by Honda Motor Co.The Humanoid Project of the Waseda University, started in 1992, is a joint project of industry, government and academia, aiming at developing robots which support humans in the field of health care and industry during their life and that share with human information and behavioral space, so that particular attention have been posed to the problem of human-computer interaction. Within the Humanoid Project, the Waseda University developed three humanoid robots, as research platforms, namely Hadaly2,Wabian and Wendy. Impressive results have been also obtained by Honda Motor Co. Ltd with P2 and P3, self-contained humanoid robots with two arms and two legs, able to walk, to turn while walking, to climb up and down stairs. These laboratories on their humanoid robots carry on studies on human-robot interaction, on human-like movements and behavior and on brain mechanics of human cognition and sensory-motor learning.

T. Gayatri
18RH1A04M0
II ECE D

PIEZOELECTRIC ENERGY HARVESTING



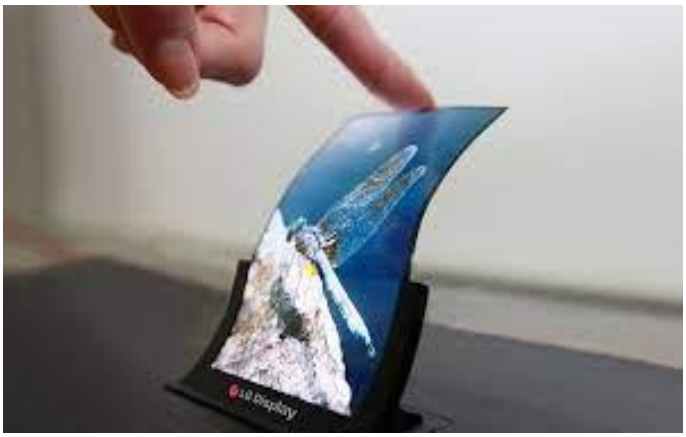
Airplanes have become a common mode of transportation in the modern world. In a single airplane miles and miles of wiring is used to power many instrumentation sensors that make an airplane functional and safe. The wiring is complicated and contributes to the weight of the airplane. Piezoelectric energy harvesting is a possible solution to eliminate aircraft wiring, especially in testing. Via the piezoelectric effect, aerodynamic vibrations are transformed into usable electrical power to supply small sensors and wireless nodes.

The piezoelectric energy harvesting technique is based on the materials property of generating an electric field when a mechanical force is applied. This phenomenon is known as the direct piezoelectric effect. Piezoelectric transducers can be of different shapes and materials, making them suitable for a multitude of applications.

Piezoelectric materials are used to obtain energy from exerted forces or vibrations. The deformation of the material produces an internal dipole moment, which in turn, produces an electrical charge across its surfaces. This process is reversible, when an electric current is run through the material, its shape also changes. The polarity of charge results in an alternating current (AC), which is then converted into direct current (DC). The converted current is then used to charge a capacitor or a battery, which can store the energy for later use.

T. Sai Deeksha
18RH1A04M2
II ECE D

FLEXIBLE SCREEN



Many consumer electronics manufacturers are showing interest in flexible displays – they are working to apply this technology to smartphones and tablets. OLEDs based on a flexible substrate (be it metal, plastic, or glass) are among the most promising electronic visual displays that can be bent. The metal and glass panels used in flexible OLEDs are very thin, light, durable, and virtually shatterproof.

OLED screens are made of organic materials that emit light when electricity is passed through them. They do not require backlights to function, and as a result, can be made thin enough to the point where they become flexible, forming the basis of flexible screens.

At CES 2018, LG unveiled the prototype of a rollable 65-inch 4K OLED display. The TV unrolls at the touch of a button and then moves out of sight when not needed. Similarly, in September 2019, Samsung launched a new foldable smartphone used as a tablet and smartphone.The current generation folding devices might have many flaws. They might be technology demonstrators with high price tags. However, flexible displays evolve into something very different, leading to remarkable developments in the tech industry in the coming years.

T. Pravalika
18RH1A04M3
II ECE D

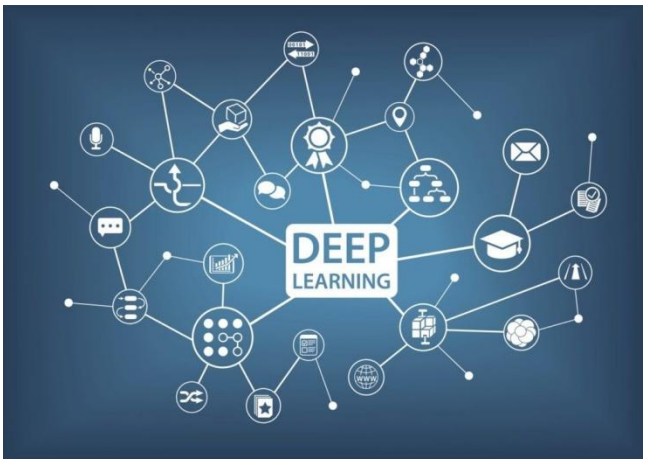
BLUE GENE

Blue Gene is a computer architecture project designed to produce several next-generation supercomputers, designed to reach operating speeds in the petaflops range, and currently reaching sustained speeds over 360 teraflops.It is a cooperative project among IBM (particularly the Thomas J.

There are four Blue Gene projects in development: BlueGene/L, BlueGene/C, BlueGene/P, and BlueGene/Q.On June 26, 2007, IBM unveiled Blue Gene/P, the second generation of the Blue Gene supercomputer.Designed to run continuously at one petaflop, it can be configured to reach speeds in excess of three petaflops.Furthermore, it is at least seven times more energy efficient than any other supercomputer, accomplished by using many small, low-power chips connected through five specialized networks.

T. Nikhila
18RH1A04M4
II ECE D

DEEP LEARNING



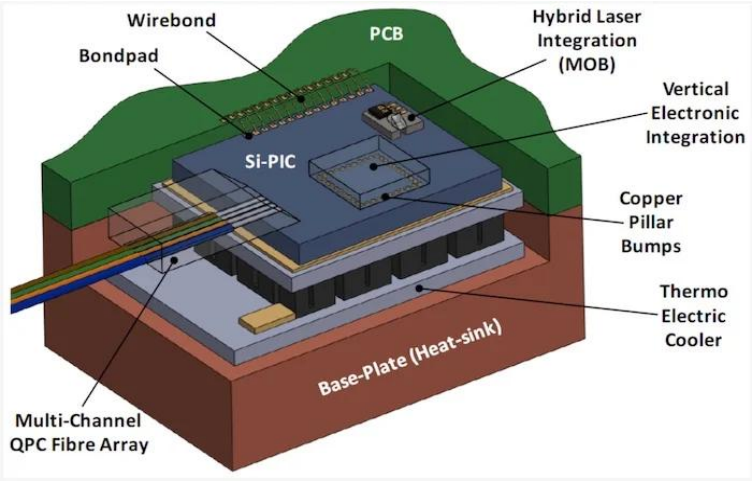
Deep learning (also known as deep structured learning) is part of a broader family of machine learning methods based on artificial neural networks with representation learning. Learning can be supervised, semi-supervised or unsupervised.

Deep-learning architectures such as deep neural networks, deep belief networks, deep reinforcement learning, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, speech recognition, natural language processing, machine translation, bioinformatics, drug design, medical image analysis, climate science, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance.

Artificial neural networks (ANNs) were inspired by information processing and distributed communication nodes in biological systems. ANNs have various differences from biological brains. Specifically, artificial neural networks tend to be static and symbolic, while the biological brain of most living organisms is dynamic (plastic) and analogue

T. Spoorthi
18RH1A04M6
II ECE D

PHOTONIC WIRE BONDING



Traditional photonic devices are usually connected by standard single-mode fibres. Unfortunately, this technique for connectivity can create a mismatch between the optical mode of the strongly-guiding on-chip waveguides and the optical fiber. Manufacturers follow a step-by-step process to fabricate photonic wire bonds. Moreover, the fabrication process employs three-dimensional direct laser writing (3D DLW) based on multi-photon induced polymerization.

All in all, the photonic wire bonding technology is keen to offer photonic systems with high packaging density and increased design flexibility of photonic integrated circuits.
After sample preparation, the optical module and a resist material are inserted into a 3D direct laser writing lithography system. In addition, a photoresist material is deposited between the interconnect regions of the feed waveguides.

T. Richa Swarna Latha
18RH1A04M7
II ECE D

IMPORTANT WEBSITES

www.ieee.org/india

www.engineering.careers360

www.technologyreview.com

www.mathworks.in/products/matlab/

www.microwaves101.com/

www.ece.utoronto.ca/student-life-links

https://www.ece.org/

Science Commons.org

MathGV.com:

http://www.engineeringchallenges.org/

http://engineering.stanford.edu/announcement/stanford-announces-16-online-courses-fall-quart

http://www.tryengineering.org/

http://www.engineergirl.org/

http://www.discoverengineering.org/

http://www.eng-tips.com/

http://efymag.com

http://efymagonline.com/

http://electronicsforu.com

www.dspguide.com

www.howstuffworks.com

http://nptel.iitm.ac.in

http://www.opencircuitdesign.com/

http://www.futuresinengineering.com/

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