DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

e-SRUSHTI

An Innovative Bucket...

TECHNICAL MAGAZINE

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CONTENTS

NARAYANA ENGINEERING COLLEGE :: NELLORE

AUTONOMOUS

Vision of the Institute

To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for technological and Socio-economic development of the nation.

Mission of the Institute

- To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.
- To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.
- To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

Vision of the Department

To produce technically competent and creative engineers who can cater to the industry and societal requirements in the field of Electronics & Communication Engineering.

Mission of the Department

- To impart quality engineering education to students to enhance ability to pursue knowledge by providing core competency and state of the art infrastructure.
- To provide industry oriented learning for empowering and facilitating the learner through industry institute interaction and leadership qualities.
- To promote participation in research and extension activities for addressing the social needs by providing value based education along with life-long learning abilities.

Program Educational Objectives (PEOs)

PEO_1: Attain professional excellence or gain higher degree to face challenges posed by industry and society.

PEO_2: Address complex problems in a responsive and innovative manner.

PEO_3: Gain reputation by functioning effectively to address social and ethical responsibilities.

Program Specific Outcomes (PSOs)

PSO_1 Domain Specific Knowledge: Implement electronic systems related to Electronics Devices & Circuits, VLSI, Signal processing, Microcomputers, Embedded and Communication Systems to fulfill the solutions to real world challenges

PSO_2 Hardware Product Development: Apply the software and hardware tools in Analog and Digital Electronic circuit design to address complex Electronics and Communication engineering problems.

Program Outcomes(POs)

Engineering Graduates will be able to:

1.Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3.Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4.Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5.Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6.The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal & environmental contexts, and demonstrate the knowledge of,and need for sustainable development.

8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9.Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Professor Desk

Telecommunication

Radar Tracking System

The Department of Electronics and CommunicationEngineering is committed to render-quality and professional pedagogy to pioneering engineers.

The Department magazine exemplifies the voyage transverse and exhibits the technical skills of our students.

Congratulations to the editorial team for their determined efforts in bringing out this edition of technical magazine. On this occasion, I convey my good wishes to the Students.

Dr. E. Vijayalakshmi
Professor,
Dept. of ECE.

Telecommunication is the transmission of information by various types of technologies over wire, radio, optical, or other electromagnetic systems. It has its origin in the desire of humans for communication over a distance greater than that feasible with the human voice, but with a similar scale of expediency; thus, slow systems (such as postal mail) are excluded from the field.

The Transmission media which is in telecommunication have evolved through numerous stages of technology, from beacons and other visual signals (such as smoke signals, semaphore telegraphs, signal flags, and optical heliographs), to electrical cable and electromagnetic radiation, including light. Such transmission paths are often divided into communication channels, which afford the advantages of multiplexing multiple concurrent communication sessions.

20th- and 21st-century technologies for long-distance communication usually involve electrical and electromagnetic technologies, such as telegraph, telephone, television and teleprinter, networks, cradio,

microwave transmission, optical fiber, and Communication satellite.
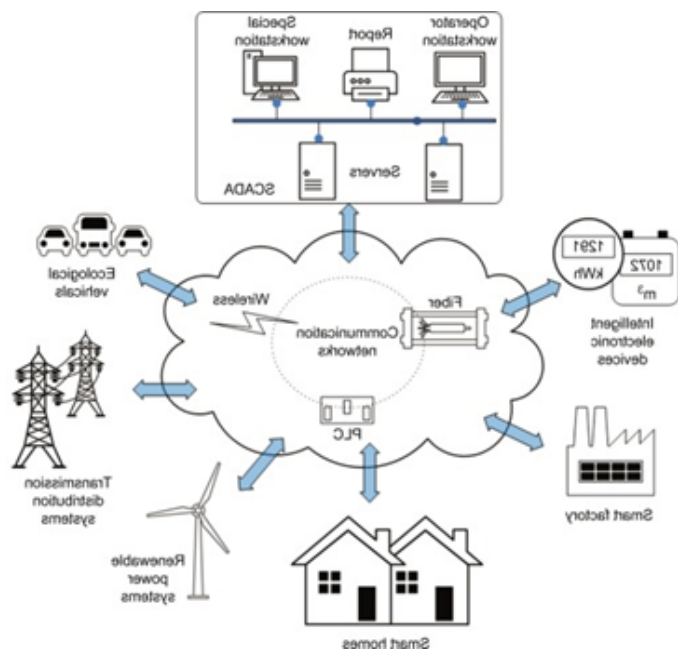
Communication System

G.Jahnavi (20711A0445)
III ECE-A

The Bluetooth Technology

Bluetooth is a short-range wireless technology that lets you connect computers, mobile phones, and handheld devices to each other and to the Internet. Bluetooth technology eliminates the need for the cables that connect devices together. Bluetooth-enabled devices connect wirelessly within a 10 m range. Bluetooth it's a specification for the use of low-power radio communications to wirelessly link phones, computers and other network devices over short distances. The name Bluetooth is borrowed from Harald Bluetooth, a king in Denmark more than 1,000 years ago. Bluetooth technology was designed primarily to support simple wireless networking of personal

consumer devices and peripherals, including cell phones, PDAs, and wireless headsets. Wireless signals transmitted with Bluetooth cover short distances, typically up to 30 feet (10 meters).Bluetooth devices generally communicate at less than 1 Mbps.

Bluetooth Transmission System

Naseema Shaik (21715A0405)
III ECE-A

Nano electronics

Nano Technology in Electronics

Nanoelectronics refers to the use of nanotechnology in electronic components. The term covers a diverse set of devices and materials, with the common characteristic that they are so small that inter-atomic interactions and quantum mechanical properties need to be studied extensively.

Some of these candidates include: hybrid molecular/semiconductor in the electronics, one-dimensional nano tubes /nanowires (e.g. silicon nanowires or carbon nanotubes) or advanced molecular electronics.

Nano electronic devices have critical dimensions with a size range between 1 nm and 100 nm. [1] Recent silicon MOSFET (metal–oxide–semiconductor field-effect transistor, or MOS transistor) technology generations are already within this regime, including 22 nanometers CMOS (complementary MOS) nodes and succeeding 14 nm, 10 nm and 7 nm FinFET (fin field-effect transistor) generations.
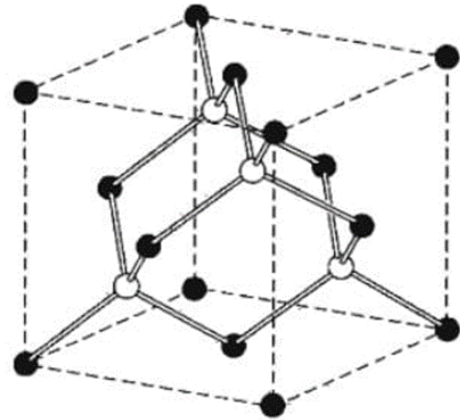
Nanoelectronics is sometimes considered as disruptive technology because present candidates are significantly different from traditional transistors.

Nano Electronic Devices in ICs

P.Yashwanth (19711A0489)
III ECE-B

# Crystal Structure of Wide Bandgap Semiconductors

Crystal structure of cubic zinc sulfide

Wide-band-gap semiconductors are endowed with the physical properties to revolutionize solid-state power devices at high frequencies. An outstanding example is the rapid development of GaN microwave transistors, which opens up new opportunities for many applications. Enabled by the AlGaN/GaN heterostructure to form a high-electron-mobility transistor (HEMT), the GaN-based HEMTs have attracted great attention from many research groups throughout the world, leading to tremendous progress as represented by a power density 30 times that of the conventional GaAs field effect transistors.

This chapter covers the development of the state-of-the-art GaN- and SiC- power devices with emphasis on GaN-based microwave HEMTs. The topics include standard and advanced device structures, as well as issues and solutions based on device physics.Application-specific examples and performance are also presented. GaN- and SiC- switching power devices are also discussed, which, although less matured, have shown great potential to change the power semiconductor industry in electrical power conversion.

Wide band gap semiconductors (oxides and chalcogenides) modified with molecular species are unique materials. Owing to mutual interaction between the lattice and the molecular species they show peculiar emergent properties, among which the PEPS effect is perhaps the most intriguing. While the conductivity type is not affected by surface modification (i.e. the Fermi level potential and doping density remain almost intact), their photoelectrochemical properties are completely changed.
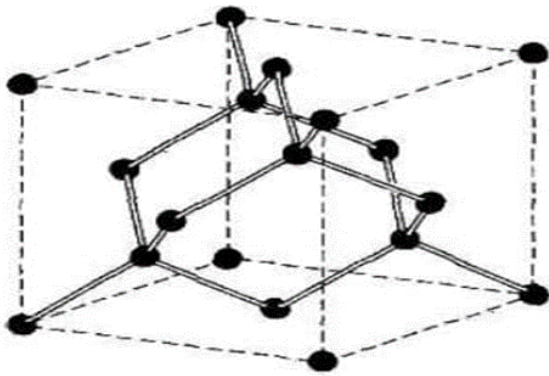
Crystal structure of a Diamond

k.Bhargavi (20711A0463)
III ECE-B

Fibre Optic Communication

Fibre optic communication has revolutionized the way we communicate by providing fast, reliable, and secure data transmission over long distances. It is a technology that uses thin, flexible glass or plastic fibres to transmit light signals through total internal reflection, allowing data to be transmitted at very high speeds.

The basic principle of fibre optic communication is the transmission of light signals through the optical fibres.
Optical fibres are thin, flexible fibres made of glass or plastic and have a

diameter similar to that of a human hair. They are coated with a protective cladding to prevent light leakage and protect the fibre from damage. The light signals travel through the fibres by bouncing off the walls of the fibre in a process called total internal reflection.

Fiber Optic Cables with Fibers

Another advantage of fibre optic communication is its immunity to electromagnetic interference. Unlike copper cables, which can be affected by electromagnetic interference from other devices, fibre optic cables are immune to such interference.

Fibre optic communication is widely used in various applications such as telecommunications, cable television, and the internet. It has revolutionized the way we communicate and has made it possible for people to connect with each other from different parts of the world.

Otical Fiber for Transmitting Signals

SK.Ahmed Kabeer (19711A0496)
IV ECE-B

Flexible Technology

In software, a flexible technology solution is one that supports easy adaptation of the system to meet future requirements and changes through configuration, rather than new development. Flexible technology is underpinned by a low-code approach that allows for high levels of customization and agility without having to develop new code, which can otherwise lead to technical debt, rising costs for maintenance and an inability to adapt to business needs.Flexible technology meets the demands for highly configurable and cost-effective solutions from implementation, through to management and maintenance.
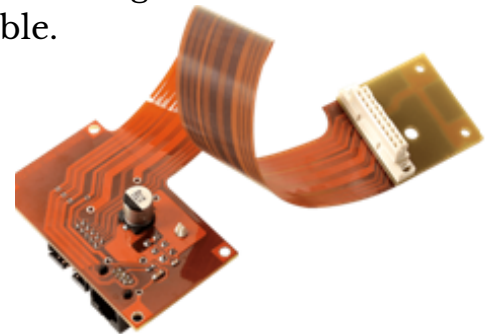

Flexible PCBs

AI diagnostic tools allow tech problems to be fixed quickly rather than forcing employees to wait until IT personnel are available to help. Applying machine learning to automate IT assistance improves flexibility by giving everyone on your team more time to focus on the most important tasks.

Flexible electronics describes circuits that can bend and stretch, enabling significant versatility in applications and the prospect of low-cost manufacturing processes. They represent an important technological advance, in terms of their performance characteristics and potential range of applications, ranging from medical care, packaging, lighting and signage, consumer electronics and alternative energy (especially solar energy).

Among the benefits of flexible electronics (compared to traditional, rigid alternatives) are size, weight, portability, and energy efficiency.
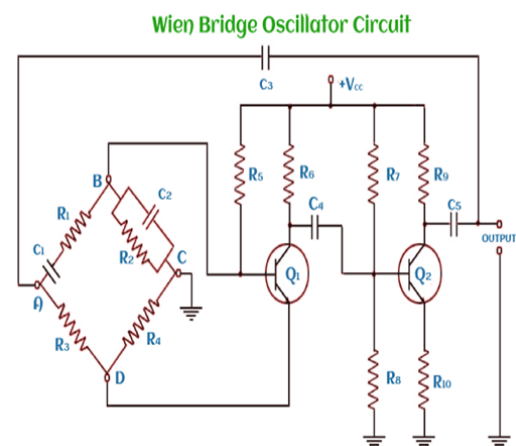
Above all, they make previously impossible designs and technologies such as wearable devices) possible.


Flexible technology in PCBs

P.Nanda Kishore (19711A0479)
IV ECE-B

Wein Bridge Oscillator

A Wien bridge oscillator is a type of electronic oscillator that generates sine waves. It can generate a large range of frequencies. The oscillator is based on a bridge circuit originally developed by Max Wien in 1891 for the measurement of impedances. The bridge comprises four resistors and two capacitors. A band pass filter that provides positive feedback. Automatic gain control, intentional non-linearity and incidental non-linearity limit the output amplitude in various implementations of the oscillator.

The circuit shown to the right depicts a once-common implementation of the oscillator, with automatic gain control

using an incandescent lamp. Under the condition that R1=R2=R and C1=C2=C, the frequency of oscillation is given by: fo=2πRC.
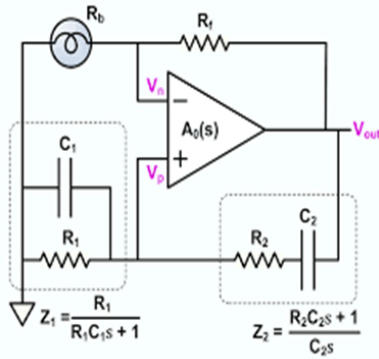
Op-Amp based Wien Bridge Oscillator

G.Harshitha (20711A0444)
**III ECE-A**

Radar Bullet

A land mine is an explosive device that designed to destroy or disable enemy and hided under or on the surface of ground, especially in mine-affected countries like Afghanistan and Iraq. The mines which are implanted during the war time may remain undetected. As the name suggests detection is done using Radar Bullets and hence can be done further away from the mine carefully.

Radar Bullets

Bullets fire from helicopter emits radar pulses as it grinds to the halt these radar pulses reflects from landed mines due to that reflection landmines can be estimated approximately. This is the method in which special type of radar bullet are use to find landmines without

setting foot into the ground offering safe and efficient way of landmine detection. There are some methods for detection of land mines, such Metal detector method, Biological method and mechanical method. These methods are dangerous and risk is involved to life of solider. A safe method for detecting land mines is "mine detection using radar bullets".
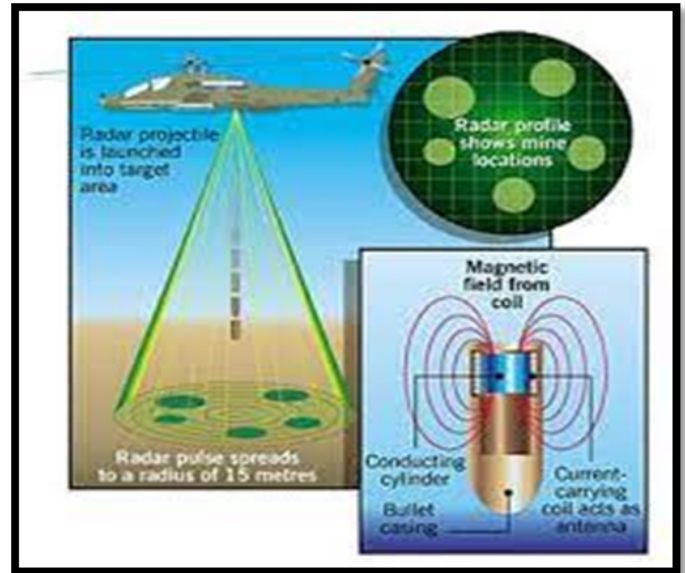
Radar Bullet Technology

Radar means detection of radio waves and ranging. Radar makes use of radio waves to detect and locate objects. Radar works like a sensor and its purpose is estimating certain characteristic if its surroundings, mostly the presence and motion of aircrafts. Radar operates by transmitting electromagnetic energy into the surroundings and detecting energy reflected by objects. The direction from which reflections comes the bearing object can be detected. The distance to the reflecting object is estimated. In radar bullet principle, the change of medium by the waves must be taken into consideration. Radar is basically a means of gathering information about distant objects that we interested in or targets of which information is needed by sending electromagnetic waves towards object to be detected and analyzing the echoes.

S.Navya Sree (19711A0492)
IV-ECE-B

Sensor Technology

Sensor Technology

Sensors have a very wide range, and there are many types, but fundamentally, sensors are devices that detect the feature quantity of a measurement object and convert this quantity into a readable signal, which is displayed on an instrument. And sensing technology, simply put, is a technology that uses sensors to acquire information by detecting the physical, chemical, or biological property quantities and convert them into readable signal.There are a wide variety of sensors available for practically any industrial need. For demanding, mission-critical industrial applications, sensors can help improve processes, and offer unmatched asset protection.


These sensors offer real-time monitoring, including detection and reporting, as needed by a process. Data monitored and collected by sensors is sent for control and analysis, and any anomaly in a particular property is reported by emitting an electrical signal by that sensor.

This way, sensors enhance process efficiency and product quality, while ensuring that processes comply with best practices.

M. Kavya (20711A0484)
III ECE-B

Hartley oscillator

The Hartley oscillator is an electronic oscillator circuit in which the oscillation frequency is determined by a tuned circuit consisting of capacitors and inductors, that is, an LC oscillator. The circuit was invented in 1915 by American engineer Ralph Hartley.

Circuit Diagram of Hartley Oscillator
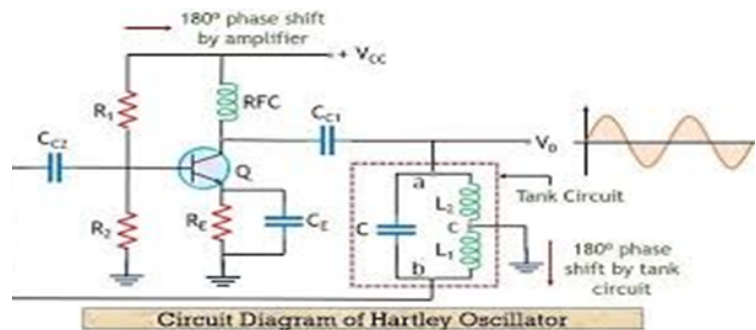
The distinguishing feature of the Hartley oscillator is that the tuned circuit consists of a single capacitor in parallel with two inductors in series (or a single tapped inductor), and the feedback signal needed for oscillation is taken from the center connection of the two inductors
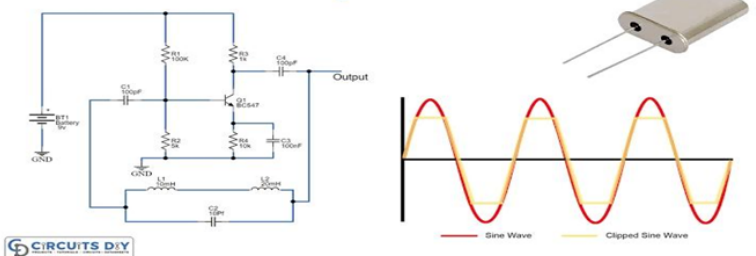

we calculate a hartley oscillator frequency based on the formula, frequency= $1/2\pi\sqrt{}$ LtC where C is the value of the capacitor and LT is the equivalent .

P.Divya (19711A0488)
IV-ECE-A

Technical aspects of Google lens

The google lens was first introduced by Google in 2017, in 2019 some more features were added. Upgraded android mobiles already have google lens in the camera but one can easily install and enjoy the application. Talking about features, google lens assists you to identify, search, shop, translate, by just using your mobile camera. For instance, using GL, take a picture of SSID sticker on the back of a wi-fi router, will automatically connect you to the wifi.

Technology behind this application: After the Google Go captures an image, it needs to make sense (shapes and letters) for text and image recognition, so optical character recognition (OCR) uses Region Proposal Network (RPN). This is a fully convolutional network which predicts object and objectness scores at each position. It is trained to generate high quality region proposals and uses Fast R-CNN for detection. While capturing the text, it can have different fonts, styles or it can be blurry, it can cause the model to misunderstand words. To improve the accuracy, GL uses Knowledge Graph, this provides contextual clues, such as a word is a noun and should not be spell-corrected etc. The Convolutional Neural Networks have become the backbone of most of the computer vision applications, for obvious reasons.
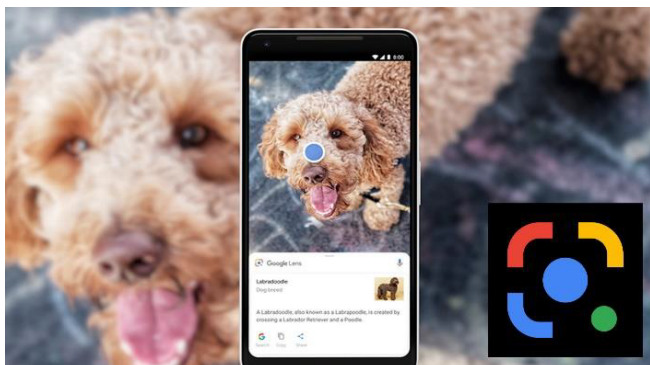
Google Lens Capturing Image

Google lens also uses CNN and LSTM networks, as models, trained on data from a variety of sources, ranging from ReCaptcha to scanned images from Google Books. To build a universal tool, google used CameraX, to capture highquality images with nominal lag. CameraX is a new Android support library, available in Jetpack. It is an abstraction layer over the Android Camera2 API that resolves device compatibility issues. Lens uses Google Translate's Neural Network Translation Algorithms, to translate entire sentences at a time, rather than going word-by-word, this preserves proper grammar and diction. The most helpful way with Google Lens is reading the text aloud.

For High-fidelity audio, google applies machine learning to disambiguate and detect entities like dates, phone numbers and addresses, and generates realistic speech using DeepMind's WaveNet. This application is indeed a breakthrough in mobile applications using artificial intelligence.

Sk. Ashida (21715A0403)
III ECE – A

Digital Electronics

Digital electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by two discrete voltages or logic levels.

Digital electronics are used in computers to store, process, and transmit data. They are used in the central processing units (CPUs) of computers, as well as in other components such as memory, storage, and input/output devices

Digital IC

Digital electronics deals with the electronic manipulation of numbers, or with the manipulation of varying quantities by means of numbers. Because it is convenient to do so, today's digital systems deal only with the numbers 'zero' and 'one', because they can be represented easily by 'off and 'on' within a circuit.

Digital signals can convey information with less noise, distortion, and interference. Digital circuits can be reproduced easily in mass quantities at comparatively low costs. Digital signal processing is more flexible because DSP operations can be altered using digitally programmable systems.
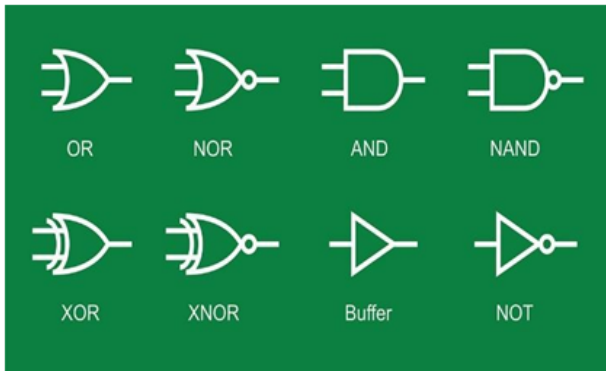
Different Types of Gates

There are two types of Digital Circuits: Combinational Digital circuits and Sequential Digital Circuits. Combinational Digital Circuits are the type of digital circuits in which output depends upon inputs at that present time.

·Digital transformation puts technology at the core of business strategy. This approach can reduce operating expenses and inefficiency. It could even change the course of your business. With a unified model across business and technology, it's easier to achieve future ambitions.

J.Sravani (20711A0455)
III ECE-A

# Recent Progress on Novel DSP Techniques for Mode Division Multiplexing Systems

This is an overview of latest progress on the novel advanced digital signal processing (DSP) techniques for long-haul mode division multiplexing (MDM) systems with high capacity. Space- division multiplexing (SDM) techniques have been developed for a period to increase the capacity of optical communication system by at least one order of magnitude through MDM techniques using few-mode fibers (FMFs) or multi-core multiplexing (MCM) using multi-core fibers (MCFs).
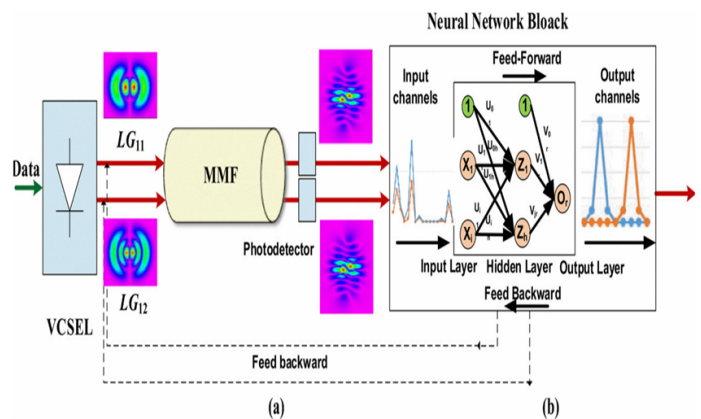
Mode Division Multiplexing System

The signals in MDM links are mainly impaired by the linear and nonlinear effects in FMFs, making DSP techniques become necessary to undo these impairments. In this paper, we not only review the advanced multiple-input multiple-output (MIMO) DSP techniques

we focus on the fast tracking of time-varying (TV) channels in FMF links through frequency-domain (FD) recursive least square (RLS) algorithm. Besides, we also cover the mainstream DSP solutions for mode-dependent loss (MDL) and several possible methods to compensate nonlinearity in FMF. Moreover, artificial intelligence (AI) technologies are also discussed for its high nonlinearity tolerance
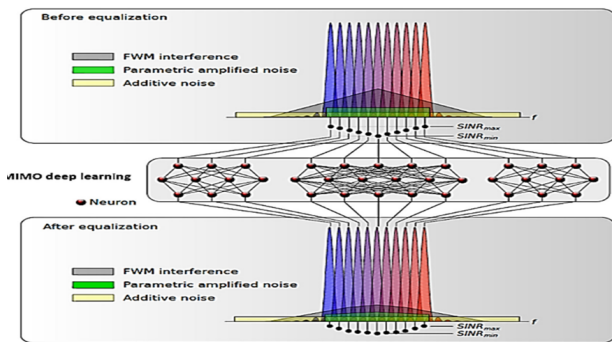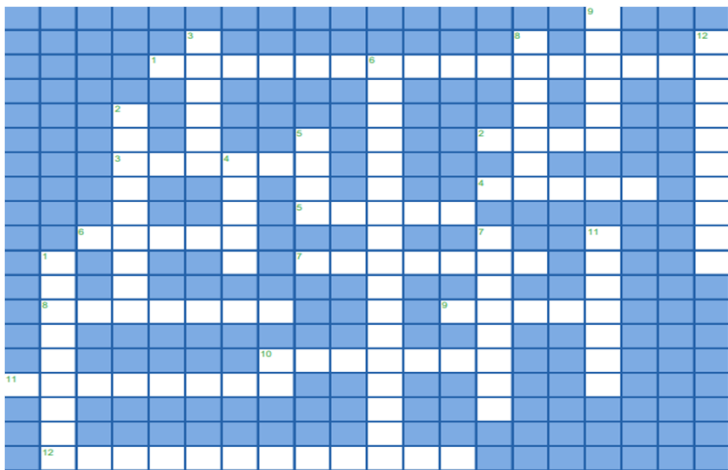

MIMO Technology in DSP

Ch.Sahithi (20711A0428)
III ECE-A

Electronics cross word

Across

1. Two resistors connected together, across a power supply (9, 7)

2. Process used to remove unwanted copper from a PCB (4)

3. Colour band used to indicate the number 7 (6)

4. Colour band used to indicate the number 0 (5)

5. Connects the components together on a PCB (5)

6. A component which allows current to flow only in one direction (5)

7. Makes a sound (7)

8. A collection of components, connected together (7)

9. The L in LED (5)

10. Flows through a circuit (7)

11. Electronics that works with real voltages (9)

12. Type of capacitor, which is polarized(12)

Down

1.Shape of the schematic symbol for a resistor (9)

2. Stores charge (9)

3. Electrically joints components to a PCB (6)

4. Energy that allows the electronics to work (5)

5. Check the board works, after construction (4)

6. A chip / part with two row of pins (10, 7)

7. Component with coloured bands to determine it's value (8)

8. Something that can only be true / false, 0 or 1 (7)

9. Used to turn things on and off (6)

10. Letters used to mark commercial electronics sold in Europe (2)

11. Measured across components such as batteries (7)

12. A component that acts like an electronic switch (10)

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ENGINEERING COLLEGE