

# **M.I.E.T. ENGINEERING COLLEGE**

**Trichy-Pudukkottai Road, Trichy-7**

## **MAGAZINE**



**ELECTRONICS AND COMMUNICATION  
ENGINEERING**



**2020-2021**



Er. A MOHAMED YUNUS, B.E., M.Sc., Engg.  
Chairman  
M.I.E.T. Institutions

## CHAIRMAN'S MESSAGE:

Being the current world not a hasty track, the responsibility of creating a high-quality educational institution is challenging and embellished with a host of initiatives which validate them over an extended time span. He educated the students from the darkness of ignorance to light more lights and to inspire more lives through his vision and perspective. We at M.I.E.T., motivate and empower our students to be enduring learners, critical thinkers and prolific members of an ever-changing global society. Also, the students are encouraged to channelize their potential in the pursuit of fineness in a holistic and student-centered environment. Moreover, M.I.E.T strives hard to sensitize its students to the needs of the community and inculcate values like truthfulness, fortitude and acceptance of individual differences. His ardent faith in discipline and hard work has been getting him success one after the other in all his ventures. He has high aims and lofty ideals to secure a worthy place for this college amongst the renowned colleges in India and abroad.



Dr. A NAVEEN SAIT M.E., Ph.D.  
Principal  
M.I.E.T. Engineering College

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Education is not just a process of giving knowledge for a future job but a lifelong process which builds an understanding of moral and ethical values to guide one's life in a right path. M.I.E.T. not only focuses on the academic front, but also helps in the development of a student's personality, extra-curricular activities and over all perspective. Everything that makes a good institution - well equipped R&D Cells, Lab facilities for all the departments, Wi-Fi enabled campus, well stacked library with digital facility, career guidance, unique teaching methods, training for competitive examinations, liberty to think and express themselves – all are available to mould the students to face the challenges confidently.



**Mr. K JAVID**  
**HOD/ ECE**

### **HEAD OF THE DEPARTMENT MESSAGE:**

I am writing this message with full of pride and joy watching the talents of our department produce a quality produce like Dhvani. The goal of our magazine is to enhance and enrich the technical talents of our young minds and deploy the great technical knowledge of our faculties. I wish that the magazine provides new developments in Electronics field and encourages our students to do research and new projects. I congratulate and thank all the students and faculty coordinator who have made untiring efforts to bring out this magazine. I wish them all the very best for releasing more such magazines in future.

### **EDITORIAL BOARD**

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To be a center of excellence in Technical Education through Technical, Ethical and Professional skills for meeting the diverse needs of the Society, in particular Muslim minority community and the Nation.

### **MISSION OF THE INSTITUTION**

- To impart Quality Education, Training and Research in the fields of Engineering and Technology.
- To provide a conducive learning environment that enables the students to achieve professional and personal growth.
- To expose the contemporary issues of society, ethical practices and to create environmental awareness.
- To provide the required infrastructural facilities for developing the professional and innovative skills.

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To be a top-class technical hub in imparting knowledge in cutting edge areas of Electronics and Communication Engineering, providing pleasant learning environment, nurturing scholars of excellent proficiency to meet the global and socio-economic challenges of the country

### **MISSION OF THE DEPARTMENT**

- To provide remarkable teaching and research environment through state-of-the-art facilities.
- To strengthen the soft as well as hard skills of students to achieve technical and academic excellence.
- To raise the students to become responsible citizens with good human values and encourage them to work for the well-being of society.
- To develop the skills of lifelong learning and professional growth of students through utilization of the high-standard infrastructure facilities

## FACULTY ARTICLES

### Gesture Recognition Mrs S Mathumitha, AP,ECE

Gesture recognition is technology that uses sensors to read and interpret hand movements as commands. In the automotive industry, this capability allows drivers and passengers to interact with the vehicle – usually to control the infotainment system without touching any buttons or screens.

Aptiv developed the technology behind the first gesture recognition system for automotive applications, introduced in the BMW 7 Series in 2015, which can recognize hand gestures that control music/audio and incoming calls.

As the technology matures, gesture recognition will move beyond infotainment and will allow drivers to control [other systems within the vehicle](#), such as heating and cooling, and to connect with smart home systems. For example, imagine being able to check your home security camera as you drive home by simply making a hand gesture. Gestures could also be coupled with telematics systems, allowing the vehicle to provide information about nearby landmarks if it recognizes that an occupant is pointing at it.

#### How it works

A gesture recognition system starts with a camera pointed at a specific three-dimensional zone within the vehicle, capturing frame-by-frame images of hand positions and motions. This camera is typically mounted in the roof module or other vantage point that is unlikely to be obstructed. The system illuminates the area with infrared LEDs or lasers for a clear image even when there is not much natural light. Those images are analyzed in real time by computer vision and machine learning technologies, which translate the hand motions into commands, based on a predetermined library of signs.



Commands generated by the gesture recognition software become just another type of [input](#), similar to turning a dial, pressing a button or touching a screen. Additionally, as the quantity and quality of cabin cameras improves, other passengers in the vehicle could eventually get in on the act.

#### What are the most common gestures?

Each OEM might develop its own variations, but here are some of the basic hand motions:

- A single finger spun clockwise to turn the radio volume up or zoom in on a map
- A single finger spun counterclockwise for the opposite action
- A pointing gesture, with either one or two fingers, to accept a call
- A swipe gesture to reject a call

In the BMW, a gesture of two fingers, without motion, controls a variety of other functions, such as muting or unmuting the audio

A pinching motion between thumb and forefinger could also manipulate an image on the vehicle display. This would allow a driver to, for example, get a visual image of the vehicle in a tight parking spot from all angles.

## Field programmable Gate arrays - A solution to mixed signal design

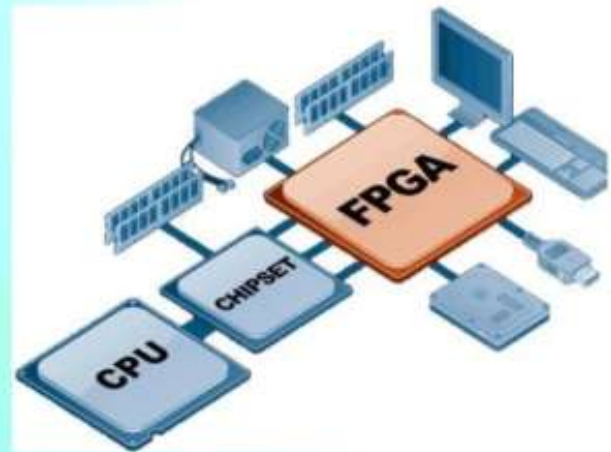
Mrs B. T Kirthika, AP/ECE

Electronic industry has simulations and prototyping as their important segments since a long period. Electronic companies design the hardware dedicated to their products with their standards and protocols which makes it challenging for the end users to reconfigure the hardware as per their needs. This requirement for hardware led to the growth of a new segment of customer-configurable field programmable integrated circuits called FPGAs.

A field-programmable gate array (FPGA) is an integrated circuit that can be programmed or reprogrammed to the required functionality or application after manufacturing. Important characteristics of field-programmable gate arrays include lower complexity, higher speed, volume designs and programmable functions. With more technological advances, field-programmable gate arrays are a convenient proposition for most designs and markets. The FPGA is Field Programmable Gate Array. It is a type of device that is widely used in electronic circuits. FPGAs are semiconductor devices which contain programmable logic blocks and interconnection circuits. It can be programmed or reprogrammed to the required functionality after manufacturing.

When a circuit board is manufactured and if it contains an FPGA as a part of it. This is programmed during the manufacturing process and further can be reprogrammed later to create an update or make necessary changes.

This feature of FPGA makes it unique from ASIC. Application Specific Integrated Circuits (ASIC) are custom manufactured for specific design task. In past FPGAs are used to develop low speed, complex and volume design, but



today FPGA easily pushes the performance barrier up to 500MHz.

In microcontrollers, the chip is designed for a customer and they have to write the software and compile it to hex file to load onto the microcontroller. This software can be easily replaced as it is stored in flash memory.

In FPGAs, there is no processor to run the software and we are the one designing the circuit. We can configure an FPGA as simple as an AND gate or a complex as the multi-core processor.

To create a design we write Hardware Description Language (HDL), which is of two types - Verilog and VHDL. Then the HDL is synthesized into a bit file using a BITGEN to configure the FPGA.

The FPGA stores the configuration in RAM, that is the configuration is lost when there is no power connectivity. Hence, they must be configured every time power is supplied.

FPGAs are prefabricated silicon chips that can be programmed electrically to implement digital designs. The first static memory-based FPGA called SRAM is used for configuring both logic and interconnection using a stream of configuration bits.

# Optical Fibers - a solution to faster communication

Mrs B Atchaya, AP/ECE

Optical fibre is the technology associated with data transmission using light pulses travelling along with a long fibre which is usually made of plastic or glass. Metal wires are preferred for transmission in optical fibre communication as signals travel with fewer damages. Optical fibres are also unaffected by electromagnetic interference.

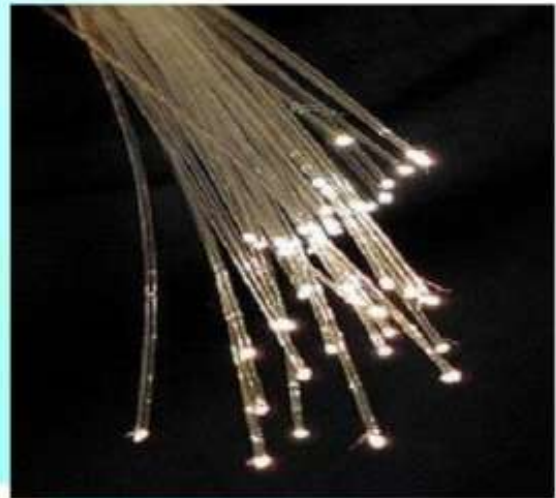
The fibre optical cable uses the application of total internal reflection of light. The fibres are designed such that they facilitate the propagation of light along with the optical fibre depending on the requirement of power and distance of transmission. Single-mode fibre is used for long-distance transmission, while multimode fibre is used for shorter distances. The outer cladding of these fibres needs better protection than metal wires.

The types of optical fibres depend on the [refractive index](#), materials used, and mode of propagation of light. The classification based on the refractive index is as follows:

- 1. Step Index Fibres:** It consists of a core surrounded by the cladding, which has a single uniform index of refraction.
- 2. Graded Index Fibres:** The refractive index of the optical fibre decreases as the radial distance from the fibre axis increases.

The classification based on the materials used is as follows:

- 3. Plastic Optical Fibres:** The polymethylmethacrylate is used as a core material for the transmission of light.
- 4. Glass Fibres:** It consists of extremely fine glass fibres.



The classification based on the mode of propagation of light is as follows:

- 5. Single-Mode Fibres:** These fibres are used for long-distance transmission of signals.
- 6. Multimode Fibres:** These fibres are used for short-distance transmission of signals.

The mode of propagation and refractive index of the core is used to form four combination types of optic fibres can be Step index-single mode fibres, Graded index-Single mode fibres, Step index-Multimode fibres, Graded index-Multimode fibres

The optical fibre works on the principle of total internal reflection. Light rays can be used to transmit a huge amount of data, but there is a problem here - the light rays travel in straight lines. So unless we have a long straight wire without any bends at all, harnessing this advantage will be very tedious. Instead, the optical cables are designed such that they bend all the light rays inwards (using TIR). Light rays travel continuously, bouncing off the optical fibre walls and transmitting end to end data. Although light signals degrade over progressing distances, depending on the purity of the material used, the loss is much less than using metal cables.

## Multi scale face detector

Ms. Chandni C, IV Year, ECE

Face recognition is a hotly debated issue in PC vision. It is the fundamental advance for face-related applications, for example, face acknowledgment, face characteristic arrangement, face beautification, and so on. Over the most recent two decades, numerous methodologies have been proposed to explain it. The countenances in the wild fluctuate in scales and posture, and they normally show up in jumbled foundations. These circumstances increment the trouble of face discovery occurs.

The two fundamental focal points of the face identification task are the speed and exactness of the proposed methodologies. They are both significant. For the most part, the methodologies with high computational unpredictability perform better, however, they run in low running velocity. These days, the greater part of the face discovery applications are sent on inserted gadgets. Inserted gadgets, as a rule, have low calculation assets. Subsequently, building effective strategies with a decent equalization of speed and exactness is significant.

Another bottleneck of the implanted gadgets is the constrained measure of accessible framework memory, which is talked about in. Keeping the face finder's memory multifaceted nature low is likewise significant for installed gadgets.

A proficient face recognition system ought to accomplish a decent exchange off of speed and precision. To construct such a proficient system, we think there are two contemplations. On one hand, the design of the system ought to be effective while it ought to keep up the important system limit with regards to being precision. Then again, not quite the same as the general systems proposed in late face finders that improve the precision to the



detriment of lessening the speed a ton [2,7], the procedures to improve the productive system's exactness should bring less extra calculation costs as could be expected under the circumstances. In this paper, we utilize the skimming point tasks every second (FLOPS) as the file of the identifier's speed, for it mirrors the calculation multifaceted nature of the location system and it isn't influenced by explicit gadgets and explicit derivation libraries. Consequently, the key is to assemble systems with low FLOPS and enough limit and propose methodologies to improve its exactness without including such a large number of FLOPS one of the first microcontroller families to use on-chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time.

To decrease the FLOPS without giving up an excess of limit, right off the bat, we embrace the convolution factorization module to utilize the profundity astute convolutions and direct insightful convolutions toward manufacture the entire finder as proficient as could reasonably be expected; furthermore, we set the progressive downsampling convolutions in the few starting phases of the system which expel the pointless layers.

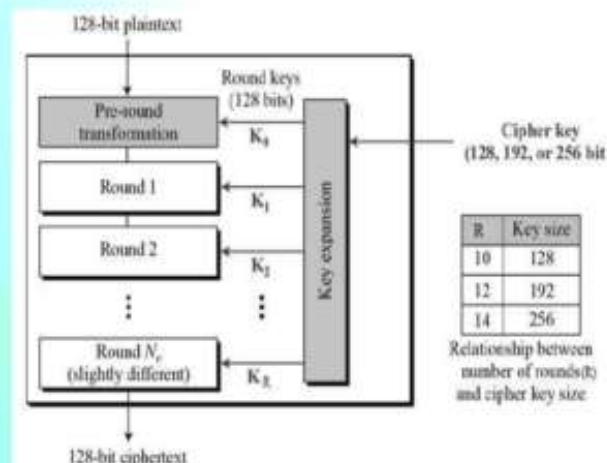


## ENCRYPTION USING AES ALGORITHM

Ms. Zam Zam Haliya A, IV Year, ECE

Cryptography, often called encryption, is the practice of creating and using a cryptosystem or cipher to prevent all but the intended recipient(s) from reading or using the information or application encrypted. A cryptosystem is a technique used to encode a message. The recipient can view the encrypted message only by decoding it with the correct algorithm and keys. The process of encryption takes a clear-text document and applies a key and a mathematical algorithm to it, converting it into crypto-text. In crypto-text, the document is unreadable unless the reader possesses the key that can undo the encryption. In 1997 the National Institute of Standards and Technology (NIST), a branch of the US government, started a process to identify a replacement for the Data Encryption Standard (DES).

The AES encryption algorithm is a block cipher that uses an encryption key and a several rounds of encryption. The Schematic structure of an aes algorithm is given in the figure 1.1. A block cipher is an encryption algorithm that works on a single block of data at a time. In the case of standard AES encryption the block is 128 bits, or 16 bytes, in length. The term "rounds" refers to the way in which the encryption algorithm mixes the data re-encrypting it ten to fourteen times depending on the length of the key. The AES algorithm is not a computer program or computer source code. It is a mathematical description of a process of obscuring data. A number of people have created source code implementations of AES encryption



AES encryption uses a single key as a part of the encryption process. The key can be 128 bits (16 bytes), 192 bits (24 bytes), or 256 bits (32 bytes) in length. The term 128-bit encryption refers to the use of a 128-bit encryption key. With AES both the encryption and the decryption are performed using the same key. This is called a symmetric encryption algorithm. Encryption algorithms that use two different keys, a public and a private key, are called asymmetric encryption algorithms. An encryption key is simply a binary string of data used in the encryption process. Because the same encryption key is used to encrypt and decrypt data, it is important to keep the encryption key a secret and to use keys that are hard to guess

Side channel Attacks are attacks on the implementation of AES, not on the input or the AES cipher text. It attempts to correlate various measurements of the encrypting tool with time in an attempt to guess the key. Data closer to the output lead will not take as much time to be retrieved as data further away, because it will not take as long for the signal to propagate its way out of the chip.

## DUAL-BAND MILLIMETER-WAVE ANTENNA FOR 5G MOBILE APPLICATION

Mr. Vigneshwaran M, IV Year, ECE

The demand for high speed for mobile communication is rapidly growing. The amount of mobile data has exploded throughout the years due to the availability of smart handheld devices, which support broadband wireless applications such as multimedia and interactive gaming. To meet these needs, the research and development of fifth generation (5G) antenna is already underway.

5G mmWave is a revolutionary cellular technology generally originated in the range of frequency bands above 24GHz to 40GHz - use massive MIMO to expand capacity and extend coverage. Here, a question arises, what is the benefit of 5G mmWave technology / what is a distinguishing feature of 5G mmWave? 5G networks utilizing mmWave or millimeter wave technology that can provide adequate bandwidth (5g mmwave frequency bands) for the growth of internet-connected devices, and for this reason, 5G mmWave will open the doors to several applications such as railways passenger data experience autonomous vehicles, telemedicine, traffic management, indoor shopping centers, education hubs, stadiums, convention centers, and other data-heavy uses.

MmWave 5G phones or 5G CPEs can act as FWAs (Fixed wireless access) to provide Wi-Fi services for commercial and residential applications which are alternatives to fiber-based wired communication. With 5G networks on their way to several iterations of development, critical components like 5G spectrum, 5G antennas, 5G mmwave and many more play a great role in making the technology robust, more powerful and fastest than ever. As the number of 5G antennas and base stations are increasing, the size of these components is getting smaller, leading to complex designs and functionality as per requirements to satisfy a particular use case. Correct positioning of 5G antennas and 5G mmwave frequencies could



lead to the development of multiple sophisticated use cases for various industry verticals. Operators need to strictly design network antennas suiting the requisites and the area of placement to deliver excellent network coverage. Network operators have already made 5G on air in a few parts of the world that includes the US, the UK creating significant excitement about this new technology and what it means for the upcoming future. For instance, T-Mobile made its 5G service commercially available to users in more than 5k cities and towns.

Antennas have a pivotal role in enhancing the 5G network with more mobility in new-age sophisticated applications as it continues to improve 5G coverage and optimize bandwidth capacity with a key focus on RF signals on the areas they are required the most. Exploration of new use cases of 5G in different ways has brought unprecedented opportunities for operators to build new modernized capabilities for the ecosystem and enhance their business productivity for the long haul.

A microstrip antenna fed by a coplanar waveguide (CPW) structure with a matching port connected to a 50- $\Omega$  resistor can be designed for operating bandwidth of the antenna to be able to cover both the 28GHz and the 39 GHz bands for 5G millimeter wave applications. In addition, an eight-element array is developed and studied. Results show that the array can cover the beamwidth from  $-30^\circ$  to  $30^\circ$  in yoz-plane, which can meet the beamforming requirement for the 5G wireless communications.

## OBJECT DETECTION FOR STREET LIGHTING APPROACH AND FAULT IDENTIFICATION

Ms. Janani M, III year, ECE

The city street lamp is correlated with both safety and energy conservation. In this project to address the existing problems, a Smart Street Lamp (SSL) based on DALI protocol using sensing devices in wireless sensor network system (Digital Addressable Lighting Interface) decentralized computing for smart cities.

The proposed system is vision based — object detection in SSL is dynamic, brightness, luminous adjustment. All street lamps can be adjusted dynamically; each street lamp can report the abnormal status independently such as light fault and camera fault via SlviS or e-mail through IOT platform. The experimental results showed that proposed SSL can improve energy efficiency and loadment. Smart Street lights could be equipped with surveillance camera which could detect if any object comes near the pole and the light gets brighter, ensure safety purpose, an autonomous alert which reports about abnormal activities.

Microcontroller is the heart of the device which handles all the sub devices connected across it. Atmel microcontroller is used for this purpose.

New technologies in communication and robotics have had a substantial influence on our daily lifestyle of which transportation is no exception. In [1] many technologies have given rise to the prospect of autonomous vehicle (AV) technology which aims to reduce crashes, energy consumption, pollution, and congestion while at the same time increasing transport accessibility. The idea of driverless vehicles has been around



for decades; the exorbitant costs have hindered large-scale production. Nevertheless, there has been an acceleration in the research and development efforts in the last decade to bring the idea of the AV to fruition. For example, the advent of the Google car brought AV to the spotlight.

An algorithm for shading object detection and tracking in view of the thresholding level was proposed in [14]. This algorithm can be executed to track a question of any colour or shading. The same has been exhibited on a red hued telephone. At first, this red shaded telephone is recognized from a continuous picture utilizing colour threshold method.

The accuracy is enhanced by morphological process, where the object to be recognized is signified as white leaving the background black. At that point its location is followed by getting its coordinates from the picture. This procedure can be utilized for real-time video processing. Identifying and locating object in computerized image has turned out to be a standout amongst the most imperative applications for modern use to ease user spare time.



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