GALGOTIAS COLLEGE OF ENGINEERING AND TECHNOLOGY

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Department of Electronics & Communication Engineering

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About ECE Department

The Department of ECE offers B.Tech and M.Tech course in Electronics and Communication Engineering from Dr. A.P.J. Abdul Kalam Technical University, (formerly Uttar Pradesh Technical University / Gautam Buddh Technical University) Lucknow. Electronics & Communication Engineering deals with the electronic devices, circuits, communication equipments like transmitter, receiver, integrated circuits (IC). microprocessors, satellite communication, microwave engineering, antenna and wave progression.The department aims to impart high quality education in ECE and conduct top notch research in ECE related fields.

The department provides state-of-art infrastructure and computing facilities to students and faculty. The faculty members are actively involved in different domains of research with special focus in four thrust areas: (i) Wireless Communication and Networks (ii) Microwave and Antennas, (iii) VLSI Design (iv) Communication Systems (v) Signal and Image Processing. The department has a regular hardware and software labs as well as the state-of-art research labs in microwave and antennas, where faculty and students are working on funding projects and offering consultancy services. Some of the available softwares in ECE department are MATLAB, HFSS, ns-2, ns-3, Riverbed Academic edition, OrCAD PSPICE, eSim, SCILAB, OR-Tools, Expeyes, etc. The Department follows a well proven pedagogy of sharing knowledge with the young and vibrant minds of the college. As we are affiliated to AKTU University, Lucknow, the curriculum and subjects are prescribed by AKTU University. In addition to instruction in core ECE subjects, we also teach elective subjects in advanced topics such as Voice over Internet Protocol, Filter Design, Digital Image Processing, Digital System Design using VHDL, Speech Processing, Advance Digital Design using Verilog, Microcontroller for Embedded Systems, etc.

The department imparts world class training and research besides promoting active industry-institute collaboration by identifying current trends and taking part in sponsored research projects and consultancy services. The department also has a worldwide reach with its vibrant alumni network. Working shoulder with shoulder with the institution, it is constantly aiming towards reaching greater heights to serve the needs of the society and meet the aspirations of the student community.

Vision of Department:

To be recognized as a center of excellence in Electronics and Communication Engineering for the quality and global education, interdisciplinary research and innovation, to produce committed graduates who can apply knowledge and skills for the benefit of society.

Mission of Department:

DM1: To provide quality education by providing state of the art facility and solutions for global challenges.

DM2: To provide a framework for promoting the industry-institution collaboration and empower the students in interdisciplinary research.

DM3: To transform students into socially responsible, ethical and technically proficient engineers with innovative skills and usage of modern tools.

DM4: To make the students corporate ready with spirit and necessary interpersonal skills.

Program Edu. Objectives:

PEOs of the B.Tech in Electronics and Communication Engineering are:

PEO1: Graduates will excel in their career by acquiring knowledge in the field of Electronics and Communication Engineering with the usage of modern tools and emerging technologies.

PEO2: Graduates will have the capability to analyze real life problems of the society and produce innovative solutions.

PEO3: Graduates exhibit professionalism, ethical attitude, communication skills and team work in core engineering, academia and research organizations through professional development and lifelong learning.

Program Specific Outcomes:

By the completion of Electronics & Communication Engineering program the student will have following Program specific outcomes:

PSO1: Design and develop models for analog &digital electronic circuits and systems.

PSO2: Design, develop and test electronic and communication systems for applications with real time constraints.

The Institution of Engineers (India):

The Institution of Engineers (India) was registered under the Indian Companies Act, 1913 in the year 1920 and was formally inaugurated in 1921 by Lord Chelmsford, the then Viceroy and Governor General of India to promote and advance the science, practice and business of engineering in all its branches in India. Starting with this humble beginning, The Institution of Engineers (India) is now an unique professional body encompassing 15 engineering disciplines and with an overall membership of over 0.5 million. The life Institutional membership of Galgotias college of Engineering & Technology was started on 27th April 2017.

List of Faculty for odd semester

Faculty name	Designation	Qualification
Dr. Praydot kala	Professor, HOD	Ph.D.
Dr. R.L. Yadav	Professor	Ph.D.
Ms. Jaspreet Kaur	Associate Professor	ME/M.Tech
Mr. Atul Kumar	Associate Professor	ME/M.Tech
Mr. Shahid Eqbal	Associate Professor	ME/M.Tech
Mr. Saurabh Katiyar	Assistant Professor	ME/M.Tech
Mr. S.P. Singh	Assistant Professor	ME/M.Tech
Mr. Amanpreet Singh	Assistant Professor	ME/M.Tech
Mr. P.C. Joshi	Assistant Professor	ME/M.Tech
Mr. Madan Sharma	Assistant Professor	ME/M.Tech
Mr. Satya Prakash	Assistant Professor	ME/M.Tech
Mr. Deepak Gangwar	Assistant Professor	ME/M.Tech
Mr. Kuldeep Singh	Assistant Professor	ME/M.Tech
Ranjana Kumari	Assistant Professor	ME/M.Tech
Ms. Ruchi Agrawal	Assistant Professor	ME/M.Tech
Mr. Ankit Sharma	Assistant Professor	ME/M.Tech
Mr. Vinay Singh	Assistant Professor	ME/M.Tech
Mr. Gaurav Mehra	Assistant Professor	ME/M.Tech
Mr. Sachin Kumar	Assistant Professor	ME/M.Tech
Mr. Deependra Sinha	Assistant Professor	ME/M.Tech
Mr. Vipin Sharma	Assistant Professor	ME/M.Tech
Mr. Gaurav Saxena	Assistant Professor	ME/M.Tech
Mr. Sarvesh Kumar	Assistant Professor	ME/M.Tech
Dr. Shilpa Choudhary	Assistant Professor	ME/M.Tech
Mr. Mohd. Shibly	Assistant Professor	ME/M.Tech
Mrs. Nishtha Rani	Assistant Professor	ME/M.Tech
Mr Vipin Sharma	Assistant Professor	ME/M.Tech
Mr Rohit Kumar	Assistant Professor	ME/M.Tech

List of Faculty for even semester

Faculty name	Designation	Qualification
Dr. Lakshmanan M	Professor, HOD	Ph.D.
Dr. R.L. Yadav	Professor	Ph.D.
Ms. Jaspreet Kaur	Associate Professor	ME/M.Tech
Mr. Atul Kumar	Associate Professor	ME/M.Tech
Mr. Shahid Eqbal	Associate Professor	ME/M.Tech
Mr. Saurabh Katiyar	Assistant Professor	ME/M.Tech
Mr. S.P. Singh	Assistant Professor	ME/M.Tech
Mr. Amanpreet Singh	Assistant Professor	ME/M.Tech
Mr. P.C. Joshi	Assistant Professor	ME/M.Tech
Mr. Madan Sharma	Assistant Professor	ME/M.Tech
Mr. Satya Prakash	Assistant Professor	ME/M.Tech
Mr. Deepak Gangwar	Assistant Professor	ME/M.Tech
Mr. Kuldeep Singh	Assistant Professor	ME/M.Tech
Ranjana Kumari	Assistant Professor	ME/M.Tech
Ms. Ruchi Agrawal	Assistant Professor	ME/M.Tech
Mr. Ankit Sharma	Assistant Professor	ME/M.Tech
Mr. Vinay Singh	Assistant Professor	ME/M.Tech
Mr. Gaurav Mehra	Assistant Professor	ME/M.Tech
Mr. Deependra Sinha	Assistant Professor	ME/M.Tech
Mr. Vipin Sharma	Assistant Professor	ME/M.Tech
Mr. Gaurav Saxena	Assistant Professor	ME/M.Tech
Mr. Sarvesh Kumar	Assistant Professor	ME/M.Tech
Dr. Shilpa Choudhary	Assistant Professor	ME/M.Tech
Mr. Mohd. Shibly	Assistant Professor	ME/M.Tech
Mrs. Nishtha Rani	Assistant Professor	ME/M.Tech
Mr Vipin Sharma	Assistant Professor	ME/M.Tech
Mr Rohit Kumar	Assistant Professor	ME/M.Tech
Mr. Piyush Jain	Assistant Professor	ME/M.Tech

NEW FACULTY JOINED IN THIS ACADEMIC YEAR:

In Odd Semester:

Name : Nishtha Rani
Designation : Assistant Professor
Qualification : M.Tech, B.Tech
Email : nishtha.rani@galgotiacollege.edu

Name : Rohit Kumar
Designation : Assistant Professor
Qualification : M.Tech, B.Tech
Email : rohit.kumardas@galgotiacollege.edu

In Even Semester:

Name : Piyush Jain
Designation : Assistant Professor
Qualification : M.Tech, B.Tech
Email : piyush.jain@galgotiacollege.edu

Name : Dr. Lakshmanan M
Designation : Professor, HOD
Qualification : P. hD, M.Tech, B.Tech
Email: lakshmanan.m@galgotiacollege.edu

Faculty Articles

ARTICLE: Green Communications

Nowadays, the whole world of telecommunications and information communities is facing a serious challenge, like, on one side the transmitted multimedia-rich data are exploding at an astonishing speed, however on the other side the total energy consumption by the communication and networking devices and the relevant global CO_2 emission are increasing terribly.

It has been pointed out that "*currently 3% of the world-wide energy is consumed by the ICT (Information & Communications Technology) infrastructure that causes about 2% of the world-wide CO_2 emissions, which is comparable to the world-wide CO_2 emissions by airplanes or one quarter of the world-wide CO_2 emissions by cars*" .

According to the recent research report, energy costs account for as much as half of a mobile operator's operating expenses. Therefore, telecommunications applications can have a direct, tangible impact on lowering greenhouse gas emissions, power consumption, and achieve efficient recycling of equipment waste. Moreover, to find radio networking solutions that can greatly improve energy-efficiency as well as resource-efficiency (termed as Green Communications) is not only benefit for the global environment but it also makes commercial sense for telecommunication operators supporting sustainable and profitable business. Within the framework of "Green Communications", a number of paradigm-shifting technical approaches can be expected, including but not limited to energy-efficient network architecture & protocols, energy-efficient wireless transmission techniques (e.g., reduced transmission power & reduced radiation), cross-layer optimization methods, and opportunistic spectrum sharing without causing harmful interference pollution (i.e. Green Spectrum).

Prepared By:
Dr. R.L. Yadav
Professor, ECE

ARTICLE: Gravitational Waves for the THIRD Time

The Laser Interferometer Gravitational-wave Observatory (LIGO) has again detected gravitational waves rippling away from a cosmic collision between a pair of black holes. Gravitational waves are 'ripples' in the fabric of space-time caused by some of the most violent and energetic processes in the Universe. Albert Einstein predicted the existence of gravitational waves in 1916 in his general theory of relativity.

LIGO's first big hit was announced back in February 2016, a cautious five months after theoretical ripples in space-time predicted by general relativity were first observed. A second set of waves was also detected on Christmas Day 2015, making for one colossal stocking filler for scientists. Researchers have now confirmed that a third black hole merger was detected on 4 January 2017, earning it the memorable name GW170104.

The first collision resulted in a single black hole with a mass of around 62 times that of our Sun, while the second resulted in a comparative lightweight, coming in at just 21 solar masses. The black hole created by this latest detected merger fills a gap right in-between the first two, being 49 times our Sun's mass. David Shoemaker from MIT, the spokesperson for the LIGO Scientific Collaboration, said that their team had further confirmation of the existence of stellar-mass black holes that were larger than 20 solar masses – these were objects they didn't know existed before LIGO detected them.

Black holes can actually spin. And it is not just about the heated disc of material swirling around it – the actual mass has angular momentum, meaning the black hole itself rotates on its axis. When two black holes rotate in the same direction as their orbit around one another, astronomers say they are 'aligned'. The alignment of the spins can have an effect on the waveform of the gravitational waves that come from the binary black hole system.

With this observation of a black hole spinning in the opposite direction to its orbit, astronomers now have evidence of black holes pairing up after their rotations have been established. The crashing of black holes rank as some of the Universe's most powerful events, with the first merger seen by LIGO releasing in its final second an estimated 10 times more energy as gravitational waves than the amount of light energy pouring out of every star in the Universe.

This latest detected black hole merger was smaller and more than twice the distance away, and was still detectable. Improving design sensitivity could eventually allow us to move onto studying less energetic (but still huge) astronomical phenomena, such as the collisions of neutron stars.

Each new event detected also gives physicists one more opportunity to test general relativity. Einstein's theory is still standing strong, but even a glint of trouble in the theory's accuracy could open the way to new physics that might show how it marries with quantum mechanics.

Prepared By:
Mr. S.P. Singh
Asst. Professor, ECE

ARTICLE: Transparent OLED Displays

Transparent OLED is a breakthrough transparent display technology that displays dynamic or interactive information on a transparent surface glass. This revolutionary display allows users to view what is shown on a glass video screen while still being able to see through it. Designers can overlay text, digital images, and video content onto physical objects or scenes that sit behind the glass. Transparent OLED displays are self-emitting and utilize cutting-edge Organic Light Emitting Diode (OLED) technology to eliminate the need for a backlight or enclosure, making it possible to create truly see-through installations in a virtually frameless glass design.

Transparent OLED Pixels are Partially Clear……

Each pixel in a transparent OLED display is made up of 4 sub-pixels. Colour is created by the combination of the red, green, and blue sub-pixels and the remaining area of the pixel is clear. That clear section creates the transparency. This is why there is a direct relationship between resolution and transparency. If the display contains more active pixels that creates less space for the clear pixels and results in a display that is less see through.

Black is Clear, White is Opaque……

Unlike transparent LCD displays, black or dark content on the screen is clear and white or bright content is opaque. You can see this in the photos below. The car image appears to be floating in space and through the black background you can clearly see the books and pencils which are physical objects set behind the display. The full screen image of the boat appears in the foreground, but if you look closely at the hull of the boat you will see some objects behind the display, made visible by the dark area.

White or bright content will be opaque and will shine from the screen and appear in the foreground

Ambient Light Affects Perceived Transparency….

Just like any glass surface, ambient light affects that appearance of transparency. The two images below are the same display, the same on-screen content (of the model), and the same plant behind the display. The only difference is that the plant has been "unlit." With more light on the object behind the screen you can see that the leaves of grass are much more visible through the display than they would be if the light was off. A transparent display in an entirely dark room will appear opaque. A transparent display in a light filled room with objects or scenes heavily lit behind the display will appear like transparent glass.

Readability Makes Exhibits Possible……

OLED transparent display can be quite clear, which makes reading fine details or text on objects behind the display possible. This means that retail merchandisers or museum exhibit designers could put the display in front of goods or artifacts without obscuring their view.

Broad Color Gamut Reads as Brightness ….

Transparent OLED technology has long been recognized for its amazing color performance. While best-in-class LCD displays achieve around 72% NTSC color space (a measure of the number of colors that the display is capable of showing), OLED can achieve greater than 100%. This means more vivid reds, more vibrant greens, and eye-popping blues. These color performances, together with the peak brightness characteristics of the emissive display, create a display that appears much brighter than you might expect from reading the specifications alone. Your eye translates color as brightness and in a side-by-side comparison with a "brighter" display, the transparent OLED will be the most vivid.

Prepared By:
Mr. Amit Gupta
Asst. Professor, ECE

ARTICLE: Camera pill technology set to ease cancer diagnosis

Colonoscopies can be an uncomfortable procedure for patients who may already be worried about what the results may find. The process involves probing the large intestine with a tiny fibre optic camera, known as an endoscope, embedded in a 4ft long, flexible tube.As well as colon cancer, colonoscopies can be used to detect and diagnose a whole host of diseases, including irritable bowel syndrome (IBS) and Crohn's disease. The procedure itself is not only uncomfortable and expensive, it can also be ineffective at spotting smaller tumours – leading to misdiagnosis. Around 750,000 incomplete colonoscopies occur each year in the US alone, which means patients often have to undergo an additional procedure, such as an X-ray or CT scan, in order to complete the colorectal examination – incurring extra costs and risks in the process.

"PillCam Colon 2 is the only minimally invasive tool that offers direct visualisation of the colon at low risk and high accuracy," says Gregory Davault, VP of global market development for capsule endoscopy at Given Imaging. "It doesn't require sedation, which means patients can carry on with their normal day, and recovery is immediate."There is no internal memory or internal processing capability within the capsule itself. Instead, data is transmitted in real time via the RF transmitter and on-board antenna to a data recorder worn by the patient either on a shoulder strap or a belt.When the PillCam is closed, two magnetic strips on the lid activate a MEMS switch to keep it in the off state. The device only activates when the lid is opened.

"There were definitely performance problems with the first product," says Garner. "One of the things we learned from our trial was that the capsule behaves very differently in the colon than it does in the small bowel. The diameter of the colon is about twice the size and the peristaltic movements are different. In the small bowel, you have steady peristaltic movements that help propel the pill through it steadily, whereas in the colon you may have two or three peristaltic waves per day. This meant that the capsule would literally park in a section of the colon for a period of time and then, after a large peristaltic wave, move and then park again very quickly, meaning it would miss some markers along the way. It was only through the use of specially developed medication and the adjustable frame rate of the imagers that this could be overcome."

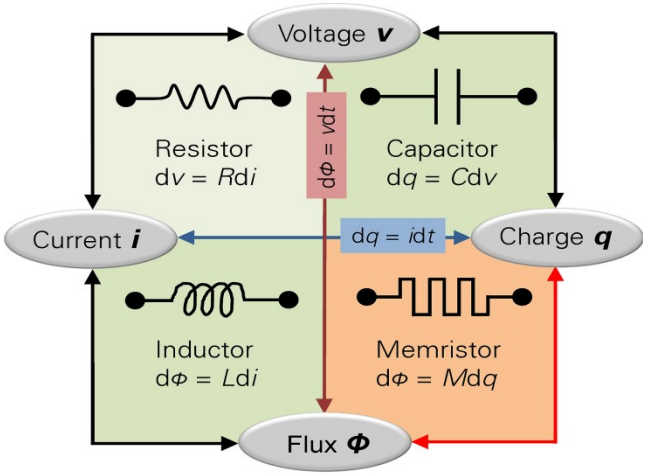
"We have a very active R&D department," he says. "We're interested to see if we can combine sensors with imagers to detect different elements in the GI tract. We also want to explore the potential for a sensor that can detect the presence of blood, and a capsule that can identify things like PH levels and temperature, as well as capture images."With further development, we believe it could even be possible to make the PillCam manoeuvrable through the use of magnetics. A lot of science fiction prototypes show smart pills with robotic arms coming out of them that can take samples and deliver drugs. These are areas we continue to look into to understand all the challenges involved. However, it will be some time yet before this kind of thing is possible."

Looking at how far the technology has come in just 10 years, it will be interesting to see how it evolves over the next decade and what new vistas of the human body it will open up to our vision and understanding.

Prepared By:
Mrs. Ranjana Kumari
Asst. Professor, ECE

ARTICLE: Memristor – The 4th basic circuit element

There are four fundamental circuit variables in circuit theory. They are current, voltage, charge and flux. There are six possible combinations of the four fundamental circuit variables. For nearly 150 years, the known fundamental passive circuit elements were limited to capacitor (discovered in 1745), resistor (in 1827) and inductor (in 1831). Anyone common with electronic circuit theory know the three basic two-terminal devices namely the resistor, the capacitor and the inductor are defined in terms of the relation between two of the four fundamental circuit variables (i.e current, voltage, charge and flux).



As shown in Figure, A resistor is described by link between voltage and current (dV= RdI), capacitor is described by link between charge and voltage (dQ= CdV), inductor is described by link between flux and current(dØ=LdI), current is described as the time derivative of charge (I = dQ/dt) and voltage is described as the time derivative of flux (V=dØ/dt). Therefore out of six possible combinations of four fundamental circuit variables, five are defined. The missing element proposed by L.O.Chua in 1971 sets up the relation between flux and charge to complete the symmetry and he called this Memristor, the contraction of memory resistor, is a two terminal passive element behaves like a non linear resistor (i.e non linear voltage- current characteristics). The way a resistor measures resistance, a conductor measures conduction, and an inductor measures inductance, a memristor measures memristance. Memristor is necessarily different from the other circuit element, as its memristance (measured in ohms) remembers how much charge (for current driven) or flux linkage (for voltage driven) has passed through device over the time. Therefore ideal memristor will continue to change its memristance as long as input is applied on the element. Once the driving signal is removed, it will maintain its state until the driving signal is applied again. That's an effect which cannot be duplicated by any other circuit element, hence memristor qualifies as a fundamental circuit element. Technically such mechanism can be duplicated using transistors and capacitors, but it takes a lot of such elements to do the job of the single memristor.

A memristor is said to be charge –controlled if memristance is expressed as a function of electric charge and it is said to be flux-controlled if memristance is expressed as a function of the flux linkage.

For **charge-controlled** memristor,

$$\varphi = X(q)$$
$$v(t) = M(q).i(t)$$

Where $q = \int_{\infty}^{t} i(\lambda)d\lambda$ and $M(q) = \frac{dX(q)}{dq}$

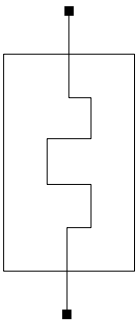
M(q) is called memristance and it has unit of resistance.

For **flux-controlled** memristor,

$$q = X(\varphi)$$
$$i(t) = W(\varphi)v(t)$$

Where $\varphi = \int_{\infty}^{t} v(\lambda)d\lambda$ and $W(\varphi) = \frac{dX(\varphi)}{d\varphi}$

W(ø)is called memductance and it has units of conductance.



Prepared By:
Ms. Nishtha Rani
Asst. Professor, ECE

ARTICLE: Cryptocurrency

A cryptocurrency is a digital or virtual currency that uses cryptography for security. A cryptocurrency is difficult to counterfeit because of this security feature. A defining feature of a cryptocurrency, and arguably its most endearing allure, is its organic nature; it is not issued by any central authority, rendering it theoretically immune to government interference or manipulation.

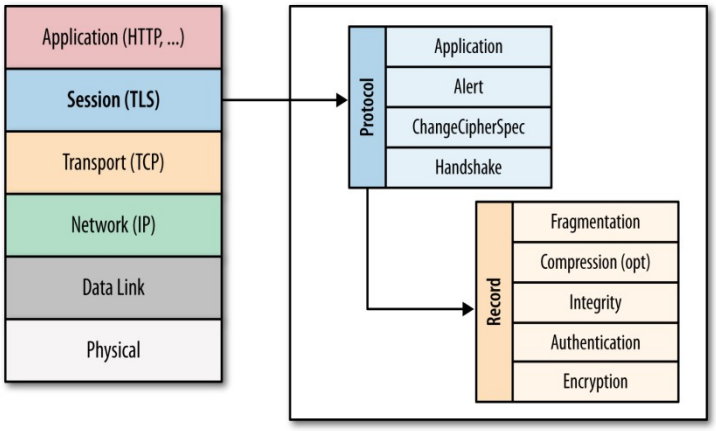
Cryptography: Cryptography is an indispensable tool for protecting information in computer systems.Cryptography includes techniques such as microdots, merging words with images, and other ways to hide information in storage or transit. However, in today's computer-centric world, cryptography is most often associated with scrambling plaintext (ordinary text, sometimes referred to as cleartext) into ciphertext (a process called encryption), then back again (known as decryption). Individuals who practice this field are known as cryptographers.Modern cryptography concerns itself with the following four objectives:-**Confidentiality** (the information cannot be understood by anyone for whom it was unintended) **Integrity** (the information cannot be altered in storage or transit between sender and intended receiver without the alteration being detected) **Non-repudiation** (the creator/sender of the information cannot deny at a later stage his or her intentions in the creation or transmission of the information)**Authentication** (the sender and receiver can confirm each other's identity and the origin/destination of the information)

More on Cryptocurrency: The first cryptocurrency to capture the public imagination was Bitcoin, which was launched in 2009 by an individual or group known under the pseudonym Satoshi Nakamoto. As of September 2015, there were over 14.6 million bitcoins in circulation with a total market value of $3.4 billion. Bitcoin's success has spawned a number of competing cryptocurrencies, such as Litecoin, Namecoin and PPCoin. Cryptocurrencies make it easier to transfer funds between two parties in a transaction; these transfers are facilitated through the use of public and private keys for security purposes. These fund transfers are done with minimal processing fees, allowing users to avoid the steep fees charged by most banks and financial institutions for wire transfers. However, because cryptocurrencies are virtual and do not have a central repository, a digital cryptocurrency balance can be wiped out by a computer crash if a backup copy of the holdings does not exist. Since prices are based on supply and demand, the rate at which a cryptocurrency can be exchanged for another currency can fluctuate widely. Cryptocurrencies are not immune to the threat of hacking. In Bitcoin's short history, the company has been subject to over 40 thefts, including a few that exceeded $1 million in value. Still, many observers look at cryptocurrencies as hope that a currency can exist that preserves value, facilitates exchange, is more transportable than hard metals, and is outside the influence of central banks and governments.

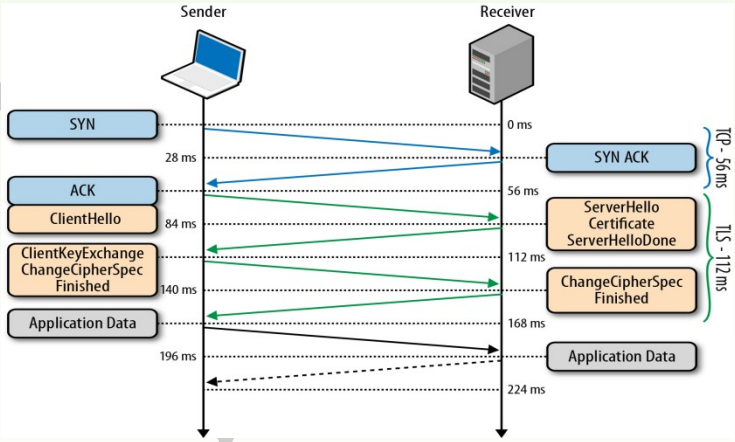
Prepared By:
Mrs. Ruchi Aggarwal
Asst. Professor, ECE

ARTICLE: Transport Layer Security Protocol

Transport Layer Security (**TLS**) and its predecessor, **Secure Sockets Layer** (**SSL**), both of which are frequently referred to as 'SSL', are cryptographic protocols designed to provide communications security over a computer network. Major web sites use TLS to secure all communications between their servers and web browsers.When SSL is used correctly, a third-party observer can only infer the connection endpoints, type of encryption, as well as the frequency and an approximate amount of data sent, but cannot read or modify any of the actual data.



The primary goal of the TLS protocol is to provide privacy and data integrity between two communicating computer applications. The protocol is composed of two layers: the TLS Record Protocol and the TLS Handshake Protocol. The TLS Record Protocol is used for encapsulation of various higher-level protocols. The TLS Record Protocol provides connection security with some encryption method such as the Data Encryption Standard (DES). The TLS Record Protocol can also be used without encryption.



The TLS Handshake Protocol allows the server and client to authenticate each other and to negotiate an encryption algorithm and cryptographic keys before data is exchanged. Before the client and the server can begin exchanging application data over TLS, the encrypted tunnel must be negotiated: the client and the server must agree on the version of the TLS protocol, choose the ciphersuite, and verify certificates if necessary.

Encryption, Authentication, and Integrity…

The TLS protocol is designed to provide three essential services to all applications running above it: encryption, authentication, and data integrity. Technically, you are not required to use all three in every situation. You may decide to accept a certificate without validating its authenticity, but you should be well aware of the security risks and implications of doing so. In practice, a secure web application will leverage all three services. **Encryption is** a mechanism to obfuscate what is sent from one computer to another. **Authentication** is a mechanism to verify the validity of provided identification material. **Integrity** is a mechanism to detect message tampering and forgery.

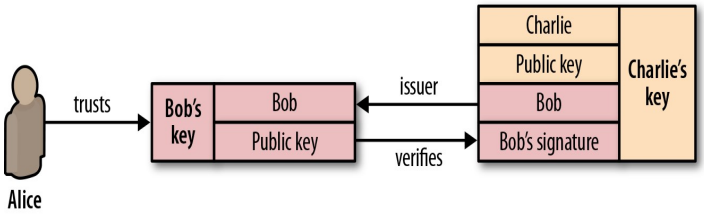
Chain of Trust and Certificate Authorities…

Authentication is an integral part of establishing every TLS connection. After all, it is possible to carry out a conversation over an encrypted tunnel with any peer, including an attacker, and unless we can be sure that the

computer we are speaking to is the one we trust, then all the encryption work could be for nothing. To understand how we can verify the peer's identity, let's examine a simple authentication workflow between Alice and Bob:

- Both Alice and Bob generate their own public and private keys.
- Both Alice and Bob hide their respective private keys.
- Alice shares her public key with Bob, and Bob shares his with Alice.
- Alice generates a new message for Bob and signs it with her private key.
- Bob uses Alice's public key to verify the provided message signature.

Trust is a key component of the preceding exchange. Specifically, public key encryption allows us to use the public key of the sender to verify that the message was signed with the right private key, but the decision to approve the sender is still one that is based on trust. In the exchange just shown, Alice and Bob could have exchanged their public keys when they met in person, and because they know each other well, they are certain that their exchange was not compromised by an impostor—perhaps they even verified their identities through another, secret (physical) handshake they had established earlier!



Next, Alice receives a message from Charlie, whom she has never met, but who claims to be a friend of Bob's. In fact, to prove that he is friends with Bob, Charlie asked Bob to sign his own public key with Bob's private key and attached this signature with his message. In this case, Alice first checks Bob's signature of Charlie's key. She knows Bob's public key and is thus able to verify that Bob did indeed sign Charlie's key. Because she trusts Bob's decision to verify Charlie, she accepts the message and performs a similar integrity check on Charlie's message to ensure that it is, indeed, from Charlie.

A typical workflow for delivering application data is as follows:

- Record protocol receives application data.
- Received data is divided into blocks: maximum of 2^{14} bytes, or 16 KB per record.
- Application data is optionally compressed.
- Message authentication code (MAC) or HMAC is added.
- Data is encrypted using the negotiated cipher.

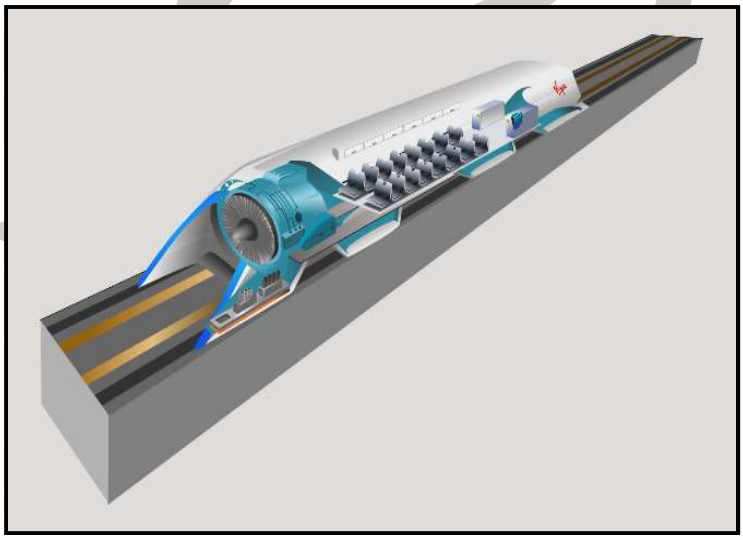
Once these steps are complete, the encrypted data is passed down to the TCP layer for transport. On the receiving end, the same workflow, but in reverse, is applied by the peer: decrypt data using negotiated cipher, verify MAC, extract and deliver the data to the application above it.

Prepared By:
Mr. Madan Sharma
Asst. Professor, ECE

Students Articles

ARTICLE: HYPERLOOP

We live in the era of unbelievable technological progress and one would think change things for the future purposes i.e. things doing fastest work. yet many changes are done in various areas but not in everyone, transportation is one of that example, the roads are still lined with cars, the fantasy for futuristic transportation is very much alive, flying cars are the one of the example of the futuristic transportation. The Hyperloop could revolutionize shorting travel times on land, mass transportation and reducing environmental damage in the process. The Hyperloop is technically the fifth mode of transportation after trains, cars, boats and technically rockets.



The Hyperloop is a high speed transport system in which passengers sit in a pressurized capsule that rides on a cushion of air, the capsule operates in a sealed near vacuum environment.

The idea of Hyperloop is very first proposed by the billionaire, inventor and businessman Elon Musk, he once said that the idea came in his mind when he got late for the meeting for about one hour due to heavy traffic. Hyperloop might be the fastest and cheapest medium for the transportation because of its advantages that theoretically pod can't crash, and it's also much cheaper to build also very fast that a one way trip from San Francisco to Los Angeles on the Hyperloop could take about 35 minutes which is faster than other proposed or yet available fastest transportation systems. it's also energy efficient due to solar power utilization in fact, Hyperloop can generate more than it consumes and store for the 24-hour operation without using batteries, i.e. it's actually a power generator.

As we already know there might be possible problems like how to deal with equipment malfunctioning and emergency evacuation also experience could be frightening for the passengers due to the narrow sealed windowless capsule inside a sealed tunnel also a very fast acceleration and noisy vibration could cause motion sickness.

The Hyperloop concept has been explicitly open-sourced by Musk and SpaceX, and others have been encouraged to take the ideas and further develop them. so, the Hyperloop seems to be a concept that could revolutionize medium distance travel, the whole concept is an amazing opportunity for young engineers, designers and inventors to get their mind working on the idea that could change the history.

Prepared By:
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Departmental Events

Seminar/ Workshop/ Expert lectures:

Topic	Date	Expert Name/ Organization	Description
Lecture on IP Star Satellite Technology	21/04/17	Mr. Umesh Arya, Satellite Earth Station, BSNL, Sikandrabad, Bulandshar, U.P.	Satellite Communication System
Expert Lecture on Introduction to SOI Technology and Level Crossing Analog and Digital Converter	07/04/17	Dr. A.K. Gupta, Professor, Department of ECE, NIT, Kurukshetra	Analog & Digital Circuits Design
GIS for rural applications	30/03/17	Prof. (Dr.) Masood A. Siddiqui, Professor, JMI, Delhi	Microwave & Antennas for Remote Sensing Applications
Remote Sensing for agriculture applications	30/03/17	Dr. Manjit Singh, Professor, Department of ECE, Punjabi University, Patiala	Microwave & Antennas for Remote Sensing Applications
Optical Communication for rural applications	30/03/17	Dr. Manish Dev Sharma, Professor, Panjab University, Chandigarh	Microwave & Antennas for Remote Sensing Applications
Sensor Networks in Remote Sensing Applications	30/03/17	Dr. S. A. Imam, Professor, Department of ECE, JMI, Delhi	Microwave & Antennas for Remote Sensing Applications
Microstrip Antenna for Laptop Applications	31/03/17	Dr. A.K. Gautam, Dean, School of Engineering, GBU, Greater Noida	Microwave & Antennas for Remote Sensing Applications
Big data analytics for communication	31/03/17	Dr. J. Jeevanandam, Technical Head, Galgotias	Microwave & Antennas for Remote Sensing

Applications		University, Greater Noida	Applications
Lecture on Low Power VLSI Circuit design	31/03/17	Mr. Taranjeet Kulkal, Cadence, Noida	Microwave & Antennas for Remote Sensing Applications
Seminar on Scope in Medical Electronics	17/02/17	Mr. G.P.S. Sekhawat, Director, Horizon Meditech Pvt.	Medical Instrumentation
Expert Lecture on Recent Trend in Wireless Communication	10/10/16	Dr. Noor Mohammed V, Associate Professor, School of Engineering VIT University, Vellore	Wireless Communication
Seminar on PLC and Industry Automation	22/09/16	Mr. Harinath Sisodia, O&M Manager, Moserbear, Greater Noida	Control System
Expert Lecture on Recent technologies in Mobile Communication	15/09/16	Dr. M. Palanivelan Prof. & Head (ECE) Rjalakshmi Engineering College, Chennai	Mobile Communication

GNIX (An official club of Department of ECE, GCET)

GNIX DEPARTMENTS:

Technical –

One machine can do the work of 50 ordinary men. No machine can do the work of extraordinary men. The technical department of GNIX gives you the platform, enthusiasm and support to create, develop and show your technical skills.

Marketing-

Our job is to connect to people to interact with them in a way that leave them better than we found them, more able to get where they would like to go.

Literary-

This department avails opportunity to students to be able to improve their english writing ability through anchoring,writing applications getting permissions and so on.

Creativity-

Creativity is a subset of intelligence .Intelligence is a subset of creativity. This department is a place where something new and somehow valuable is formed. All creations created here are intangible.

G-care-

Caring by our seniors is the greatest responsibility they have. Those who walked before us have given so much and made possible the life we all enjoy. Without a sense of caring, there can be no sense of community.

MISENTRA- National Seminar:

Recently, the most veracious two days National Seminar was organised on Emerging Microwave Remote Sensing Technology for Rural application (MISENTRA 2017) during 30 & 31 March 2017 in Seminar Hall, which was sponsored by Department of Science and Technology, Ministry of Science and Technology, Govt of India at Galgotias College of Engineering & Technology

ZEST - A Technical & Cultural Event:

GNIX student forum organized a two days technical fest ZEST- 2017, which includes various fascinating events (like code cracker, Spot the bug, Circuit debugging, Poster presentation, Treasure Hunt, Wire loop, Debate, Rangoli, X-factor, General Quiz, Math Quiz, Digital Quiz etc) during 15th and 16th February 2017 in association with MADE EASY.

Workshop on Semiconductor Industory Trends:

Today's trend is that of shifting from personal computers to personal communication and computing, where system knowledge and expertise is now being encapsulated into single-chip solutions incorporating both hardware and software. This revolution is enabled and fuelled by deep submicron CMOS technologies, enabling gigascale integration. Program which is planned to conduct introduces all the key areas of knowledge and skills required to command the System-on-Chip technology, namely hardware design, embedded software design, analog circuit and ideas for project works was conducted by DKOP Labs Pvt. Ltd. on 26 August 2016.

Events & Contest Participated by Students:

Name of student	Event	Position
Vatsala Shukla	CANSAT satellite 'National Students Space Challenge' at IIT Kharagpur	1 Rank
Sanchit Goel	Dance events: at NLU	Winner
Sanchit Goel	Dance events: at NSIT	Winner
Shubham Bhambey	Group dance competition at PEARL UTSAV'14 at TALKATORA STADIUM, NEW DELHI.	2 Rank

Faculty Publications:

Faculty Publications in Journals

S No.	Name of Author	Title of Paper	Name of Journal
1.	S. Pratap Singh, et al	A MGF Based Closed Form Expressions for Error Probability and Capacity Over EGK Fading for Interference Limited System	Wireless Personal Communications, Vol. 91
2.	S. Pratap Singh, et al	Closed form expressions for ABER and capacity over EGK fading channel in presence of CCI	International Journal of Electronics, Vol. 104
3.	Bhawna Ahuja, et al.	Optical parameters testing to redefine visibility for low cost transmissometer using channel modeling	Optik- Journal, Vol. 127, pg. 11326-11335
4.	Saurabh Katiyar, et al.	Stability Analysis of SIDR Model for Worm Propagation in Wireless Sensor Network	Indian Journal of Science and Technology, Vol. 9, No. 32, pg. 7-18
5.	Ramlal Yadava, et al.	A Quad Band Sierpinski Trapezoidal Fractal Patch Antenna for Wireless Applications	Journal of Microwaves, Optoelectronics & Electromagnetic Applications, Vol. 16, No. 1, pg. 25-37.
6.	Deepak	Gain Enhancement of Microstrip Patch Antenna Loaded with Split Ring	Wireless Personal Communications

	Gangwar, R. L. Yadava, et al.	Resonator Based Relative Permeability Near Zero as Superstrate	
7.	Satya P Singh, et al.	Accurate and Fast Computation of Exponent Fourier Moment	Arabian Journal of Science and Engineering
8.	S. Pratap Singh, Amit Kumar, et al.	Novel expressions for CEP/BEP under GGD noise for nano communication system	International Journal of Electronics Letters, pg. 112.
9.	Nishtha Rani, et al.	Single CCTA based high frequency floating and grounded type of incremental/decremental memristor emulator and its application	Microelectronics Journal, Vol. 16, pg. 119-125.
10.	Deependra Sinha, et al.	Thresholding based R- Peak Detection in ECG Signals	International Journal of Science Technology & Engineering, Vol. 3, No. 11, pg. 63-66
11.	Deependra Sinha, et al.	Face Recognition using DWT, 2D PCA and Neural Network	International Journal of Science Technology & Engineering, Vol. 3, No. 12, pg. 66-70
12.	Ramlal Yadava, et al.	Intelligent System for Two Wheelers	International Research Journal of Engineering and Technology , Vol. 4 No. 4. Pg. 1-6.
13.	Vinay Singh, et al.	A Comparative Analysis of Offline SVM and Neural Network Based Signature Verification Schemes	International Journal of Science Technology & Engineering (IJSTE), Vol. 3, No. 12, pg. 73-77

Faculty Publications in Conferences

S. No.	Name of Author	Title of Paper	Name of Conference
1.	Lakshmanan. M et al	Distance Based Uplink Resource Sharing for Device-to-Device Communication	International Conference on Electronics and Communication Syatem(ICECS)
2.	Lakshmanan M et al	A Power Allocation Scheme for MIMO Cognitive Radio Network	international Conference on innovations in information embedded

			and Communication Systems(ICIIECS), Volume–III
3.	Lakshmanan M et al	Optimized Allocation of Resources for D2D Communication	international Conference on innovations in information embedded and Communication Systems(ICIIECS), Volume –III
4.	S Pratap Singh, et al	Performance Analysis of differential dual hop relaying system over Alpha-mu Fading Channel	IEEE International Conference on Next Generation Computing Technologies
5.	S Pratap Singh et al	BER analysis of various modulation schemes over GG fading channel for differential dual hop relaying system	IEEE International Conference on Communication Control and Intelligent System
6.	S.Pratap Singh et al	A Novel POCA-TWDP Based Joint Fading Model for Indoor Wireless System	*IEEE* International Conference on Signal Processing & Integrated Networks,
7.	S.Pratap Singh and Vinay Singh et al	A Novel Rayleigh-TWDP Based Joint Fading Model for Indoor Wireless System	*IEEE* International Conference on Signal Processing & Integrated Networks
8.	**S Pratap Singh** et al	A Novel Expression for Probability of Error for Nano Communication System	*IEEE* International Conference on Computing for Sustainable Global Development
9.	**S Pratap Singh,** et al	BEP/SEP of Binary and M-ary Signals over k-μ Shadowed Fading Channel	*IEEE* International Conference on Signal Processing & Integrated Networks
10.	**S Pratap Singh** et al	New Expression of Error Rates for Nano Communication System	*IEEE* International Conference on Signal Processing & Integrated Networks
11.	Singh S. P. et al	Carbon Based Nanomaterial in Biomedical Applications	Nanofim-2016, Chemnitz, Germany
12.	Satya P Singh et al	Geometric Invariant Feature Extraction of Medical Images using Hu's Invariants	International Conference on "Computing for Sustainable Global Development
13.	Ankit Sharma. et al	Design of Cosine Modulated Filter Banks exploiting spline	Power Electronics, Intelligent Control and Energy Systems (ICPEICES), IEEE

		function for spectrum sensing in Cognitive Radio applications	International Conference
14.	Deepak Gangwar et al	Miniaturized EBG hairpin resonators for dual band applications	Power Electronics, Intelligent Control and Energy Systems (ICPEICES), IEEE International Conference on. IEEE
15.	Nishtha Rani, et al	Programmable and Electronically Tunable Voltage Mode Universal Biquadratic Filter Based on Simple CMOS OTA	3rd international Conference on Devices, Circuits and Systems (ICDCS16),
16.	M.K. Sharma, et al	UWB-MIMO Diversity Antenna for Next Generation Wireless Applications	3rd international Conference on Computing for Sustainable Global Development

Students Publications:

Suboor Jamal, Syed Taha Kamal Ahmad, "Intelligent system for two wheelers", International Research Journal of Engineering and Technology, Vol. 4, No. 4, Apr 2017.

Industrial Visit:

Students of 3rd year Electronics and Communication Engineering visited BSNL Satellite Earth Station, Sikandrabad (U.P.) on 23/3/2017 and 24/3/2017.

A leading telecom infrastructure and solutions company, HUAWEI Telecommunications, Gurugram (Haryana) is visited by students of 2nd year Electronics and Communication Engineering on 11/4/2017 and Moserbear, Greater Noida, Uttar Pradesh on 25/8/2016.

Placements:

Company Name	No. of Students placed
IDEA	5
Cognizant	15
Ericsson	14
VIVO Mobile Pvt.Ltd.	9
Relcom Infotech Pvt. Ltd..	3
HCL Tech	2
IBM	12
Infosys	17
Tech Mahindra	7
Wipro Technologies	16

Eminent Recruiters: