AllenTronica

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Editor's Message

Warm greetings to all the readers of AllenTronica!

We are very pleased to share with you the 2nd edition of our newsletter. On this platform, students and faculty members can participate and share their ideas and views on various topics. It also contains the recent developments and activities taking place in the domain of Electronics and Communication Engineering. In these pages you will also find news related to diverse activities from the faculty members and students. I would like to thank all the faculty members and students who have contributed in making this newsletter a reality. I also thank the members of the editorial board for their unfathomable contribution and effort for the same.

I extend my deepest gratitude to the Director-Allenhouse Group of Institutions, Dr. Rubby Chawla for her continuous guidance, suggestions and unwavering support to bring the best out of our efforts.

Ms. Aparna Singh
Assistant Professor – ECE

About ECE

Electronics and Communication Engineering (ECE) is a discipline of engineering that involves developing and testing electronic circuits and communication devices like transmitters, receivers and integrated circuits. ECE comprises communication engineering and the core of electronics engineering. A career in this field can be very diverse and rewarding. Understanding more about this profession will help you to determine if it is the right career path for you or not. An electronics and communication engineer uses their knowledge, creativity, and analytical skills to design, develop, and oversee the production of electronic and communication tools and systems. They research, design, and develop electronic equipment used in various systems. They look after the manufacturing of communication and broadcast systems. They conceptualize and design electronic equipments like radio, television, and computer. They also develop control and communications systems and write usage recommendations. They test designs to ensure efficiency, cost-effectiveness, and safety of new prototypes. Further more, they test and evaluate electronic and communication products. They also plan and execute electronics and communication projects.

The average annual salary for electronics and communication engineers in India is Rs.2, 42, 729. However, the actual salary depends on experience, job location, and other factors. Senior electronics and communication engineers earn more than entry-level employees.

Here are a few sectors where an electronics and communication engineer can find work opportunities:

- Telecom sector: In this field of engineering, you will learn how to design and develop telecom equipment and manage and transmit telecom data through different modes of communication. This helps you get a job in the telecom sector.

- IT sector: You should have coding skills to get a job in the IT sector.

From Dean Academics's Desk

Dear All,

The EC Department at Allenhouse Institute of Technology is thrilled to share AllenTronica, a newsletter filled with breakthroughs in Electronics and Telecommunications. Join us in celebrating achievements, enjoying fun activities, and the latest tech news! Get ready for the significant impact of the INDIA SEMICONDUCTOR MISSION (ISM) on job opportunities for budding Electronics Engineers. Come, be a part of this exciting journey of innovation and excellence!

Best wishes for great success!

Warm regards,
Dr. Dev Singh
Dean Academics
Allenhouse Institute of Technology

Faculty Development Program

- VLSI to System Design: Silicon to End Application Approach.
- Teaching And Learning in Engineering.

Mr. Rajeev Kumar Sachan-HOD-ECE

- VLSI to System Design: Silicon to End Application Approach.
- Teaching and Learning in Engineering.

Mr. Abhai Shankar Chaurasia
Assistant Professor-ECE

- Teaching and Learning in Engineering

Mr. Shivakant Pandey
Assistant Professor-ECE

- Teaching and Learning in Engineering

Mr. Abhishek Dwivedi
Assistant Professor-ECE

- Teaching and Learning in Engineering(TALE)

Mr. Sumit Gupta
Assistant Professor-ECE

Unleashing Innovation: The Negative Capacitance Tunneling Field-Effect Transistor

In the ever-evolving realm of semiconductor technology, a ground breaking innovation has emerged, promising to redefine the landscape of energy-efficient electronics—the Negative Capacitance Tunneling Field-Effect Transistor (NCTFET). At its core, the NCTFET leverages the unique properties of ferroelectric materials, introducing a negative capacitance element into the transistor structure. This groundbreaking concept challenges traditional transistor limits, aiming to surpass the fundamental boundaries set by the Boltzmann distribution for sub-threshold swing—a key metric in achieving ultra-low power consumption. The distinctive characteristic of negative capacitance allows the NCTFET to amplify the gate voltage, leading to a super-steep sub-threshold swing. This capability holds immense promise for applications demanding minimal power consumption, from IoT devices to portable electronics. Furthermore, the NCTFET introduces a novel dual-source U-shaped channel architecture. This innovative channel design enhances carrier mobility, facilitating a substantial increase in on-state current. The synergy between negative capacitance and the U-shaped channel creates a powerful combination, potentially revolutionizing high-performance computing. The implications of the NCTFET extend beyond theoretical advancements. By overcoming traditional limitations, this technology paves the way for more energy-efficient integrated circuits, reducing power consumption and extending battery life—an imperative in our increasingly connected world. As researchers delve into the intricacies of material science, transistor design, and fabrication processes, the NCTFET stands as a testament to the collaborative efforts propelling the semiconductor industry forward. The promise of enhanced performance and energy efficiency makes the NCTFET a frontrunner in the race towards sustainable, high-performance electronics.

In conclusion, the Negative Capacitance Tunneling Field-Effect Transistor is more than a technological breakthrough—it's a beacon of innovation guiding us towards a future where electronics are not only powerful but also mindful of our energy resources. The journey of the NCTFET is a testament to human ingenuity and the relentless pursuit of efficiency in the digital age.

Mr. Rajeev Kumar Sachan
HOD-ECE

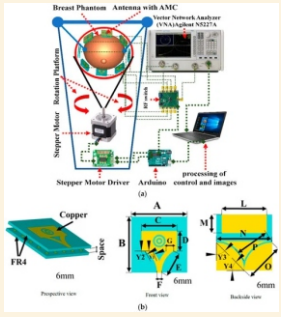
Recent Published Paper

"Design and Analysis of the Flexible Antenna behavior for Microwave Imaging of breast cancer".- Scopus

Mr. Abhai Shankar Chaurasia- Assistant Professor-ECE

Microwave Imaging and Sensing Techniques for Breast Cancer Detection

Medical imaging methods such as magnetic resonance imaging, ultrasound, and X-ray mammography are vital for early detection and follow-up of breast cancer. However, there are drawbacks to these traditional imaging methods, thus a more precise and sensitive substitute is required. Since microwave imaging is non-invasive, non-ionizing, and reasonably priced, it has become a viable method for the identification of breast cancer. Novel avenues for early breast cancer diagnosis and therapy have been made possible by recent developments in microwave imaging and sensing technologies. Breast cancers can be quickly and economically identified and classified using microwave imaging methodologies by fusing machine learning techniques with microwave sensing. An extensive review of the most recent advancements in microwave imaging and sensing methods for breast cancer early detection is given in this publication. It explains the fundamentals and uses of microwave imaging while highlighting its benefits over traditional imaging modalities. Additionally, the publication explores the integration of machine learning algorithms to improve the efficacy and precision of microwave imaging in the identification of breast cancer.



Mr. Abhai Shankar Chaurasia
Assistant Professor-ECE

Wireless Communication System

Transferring information or a message from one place to another is called communication. Correspondence systems can be either guided or unguided, and they can use either wired or wireless media. Coaxial cables, twisted pair cables, high-speed optical fiber links, and other physical paths are examples of the media used in wired communication. Conversely, wireless communication propagates a signal across space rather than a physical medium. When it comes to wireless communication, antennas are crucial for both signal transmission and reception beyond distance. Wireless systems have been a part of human life since the use of smoke signals, banners, and glowing mirrors. They are still evolving today. For almost a century, people have been using electrical impulses and radio waves for communication. Many distant frameworks and tactics flourished as remote correspondence advanced, whereas many others vanished. A great deal of wireless systems and techniques have emerged and vanished over the course of wireless communication development. The best illustration of this is the transmission of television and telephone calls. All phone-related communication was initially done through wired networks. However, as mobile communication grew quickly, the intricate landline telephone system began to fade away. In this case, wired technology was rendered obsolete, and wireless communication took its place. Wireless communication technology, networking, and systems have many benefits over wired communication, including reduced costs, increased mobility, easier installation, and increased reliability. Different kinds of wireless communication exist today. Using light waves rather than radio waves for communication, free space optics is one of the most significant forms of wireless communication. An alternative to wired optical fiber communication at high speeds is free space optics. Links for free view remote correspondence may be provided by flexible, easily installable Free Space Optic interchanges. As a means of meeting the demand for broadband communication in the future, Free Space Optics is particularly alluring due to the quick and massive data transfer capacity provided by light wave correspondence innovation. Free space optics are preferred over radio frequency wireless communication to get around the bandwidth restriction. The decreased cost of installation and integration of this technology into cellular networks, such as 3G and 4G, are additional factors propelling the growth of the free space optics market. On the other hand, atmospheric turbulence and unfavorable weather patterns may act as market constraints. New market opportunities will arise from the development of free space optics technology and the expanding economies of emerging nations.

Mr. Abhishek Dwivedi
Assistant Professor-ECE

India may export handsets worth $9 billion in FY23

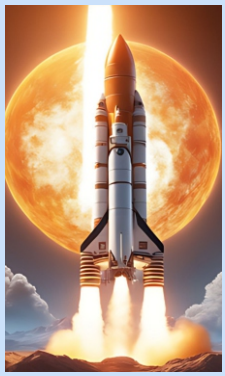
In the financial year 2023, India is projected to export mobile phones worth approximately $9 billion, which is an increase from the previous year's $5.8 billion, due to manufacturers ramping up production and exports. India is on track to accomplish a comprehensive electronics manufacturing target of $300 billion by FY26. According to statistics provided by the India Cellular and Electronics Association (ICEA), the domestic production of electronics amounted to approximately $87 billion in FY22, and it is projected to increase to $100 billion in FY23.

In the initial seven months (April-October) of FY23, the export of mobile phones has already surpassed the $5 billion milestone, which is more than twice the $2.2 billion achieved by India during the same period last year. This surge in exports can be attributed to the efforts of prominent companies like Apple and Samsung. The implementation of production linked incentive (PLI) schemes has played a significant role in fostering the growth of an electronic manufacturing ecosystem and subsequently boosting exports.

Student-Shubham Singh
ECE (4th year)

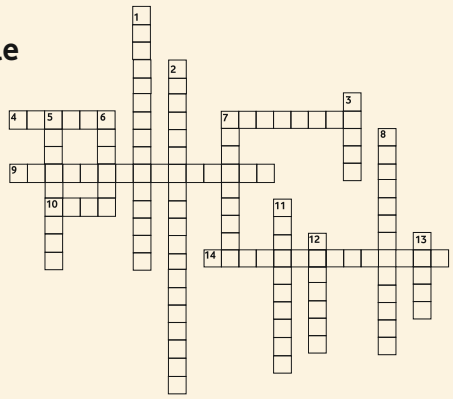
Aditya L1

After the success of Chandrayaan 3, ISRO launched the Aditya-L1 mission to study the central component of our Solar System i.e. the Sun. Aditya-L1 is very interesting and complex in its design. It will achieve such a fascinating task, that will increase our understanding of the formation of the universe. It will study about solar flares, UV emission and imaging of the Sun, solar storm etc. Now lets understand the complexities of the mission. L1 point is the point of equilibrium for small-mass objects under the gravitational influence of two massive orbiting bodies, in our case it is Sun and Earth. It is 1.5 million kms away from the Earth. Now, lets understand the working of one of the important payload of AdityaL1 that is SUIT(Solar UV Image Telescope), it takes the image of the chromosphere region of the Sun in UV i.e in range of 200nm to 400nm. Chromosphere is the region of the Sun from where Solar Flares originate. You may ask why it takes images of UV region. It is because when we heat any matter, it emits wavelength that moves towards the left in the emission spectra. The Sun Chromosphere wavelength falls in this region. The thermal filter will only allow 1% sunlight that falls on SUIT to prevent overheating of the instruments and allow light only in the range of 200nm< and > 400nm. The light falls on primary mirror and then secondary mirror. At the end there are 2 filter wheels that have 16 filters(8 each) to filter UV light to get in the operating range. Finally, the light falls on main sensor and it is necessary to maintain the sensor temperature very low. The sensor has a resolution of 4k × 4k but it all depends on internal temperature, Are you also excited for the first images of SUIT?



Student-Harsh Daryani
ECE (2nd year)

Puzzle



Across

4. If one wants to design a binary counter the preferred type of flip-flop is_____
7. In a NAND based S'-R' latch if S'=1& R'=1 then the state of the latch is_____
9. One example of the use of an S-R flip flop is as_____
10. How many types of flip-flops are?
14. What does the half circle on the clock input of a J-K flip-flop mean?

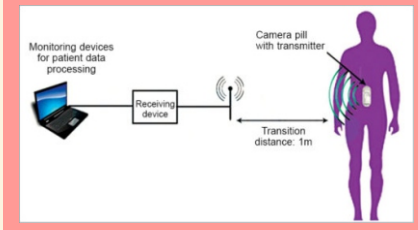
Down

1. Flip-flops are_____
2. In JK flip flop same input i.e. at a particular time or during a clock pulse the output will oscillate back and forth between 0 and 1 at the end of the clock pulse the value of output Q is uncertain the situation is referred to as?
3. In S-R flip-flop if Q=0 the output is said to be ____
5. Which of the following flip-flops is free from the race around the problem?
6. 0 state the asynchronous input can be used to set the flip-flop to the _____
7. When both inputs of a J-K flip flop cycle the output will_____
8. In a positive edge triggered JK flip flop a low J and low K produces?
11. Which of the following is the universal flip-flop?
12. Both the J-K & the T flip-flop are derived from the basic_____
13. If an active HIGH S-R latch has a 0 on the S input and a 1 on the R input and then the R input goes to 0 the latch will be_____

see answer on 4th page

MICROELECTRONIC PILLS- A REVOLUTION IN MEDICAL FIELD

A multichannel sensor used for biological measurement using nanotechnology. The pill is of 16mm diameter, 55mm long weighing around 5 gram that is covered by the chemically coated polyether.



Basically, a pill is consist of the major electronic parts such as -: Control chips, Silicon diode, ION-Selective field effect transistor (ISFET) and Radio transmitter along with other electronic components. The pill can reach the small intestine region and provide video wirelessly to the receiver to monitor the transmission of the data that take place by the radio communication. The entire process of the Pills is done by the electronics and communication engineering. The pill provides an interface between the Human body and Doctors. The microelectronic pill is used to treat the various kind of the internal diseases of the human body. It uses digital modulation technique, Frequency Shift Keying (FSK) modulation scheme of 1kbps of data transfer rate. The frequency of the radio transmitter is 40.01 MHZ with a 10 KHZ of bandwidth and consumes the 6.8 mW power at 2.2mA of current. It uses the two silver oxide batteries whose operating time of approx 40 hrs and supply voltage of 3.1 V. The major disadvantage of pills is that it cannot be reusable and cannot detects the radiation abnormalities. The pills are not available in all countries and expensive also. But due to High sensitivity, Good Reliability, less power consumption and small size they are easy and familiar to use with the Human body.

Student-Himanshu Raj
ECE (3rd year)

Electronics is clearly the winner of the day.

— John Ford —

From Gold To Dirt: Sand Battery

As we try to keep up with the fast-paced world and ever-changing technological advancements, the demand for efficient, renewable, and clean energy sources is ever-increasing. Two researchers from Finland, Tommi Eronen and Ville Kivioja of Polar Night Energy, have developed a battery made of sand that can store energy for months in the form of heat. It was first installed in Finland's Kankaanpää town in June 2022 and is used to heat residential and commercial buildings and public water systems. The battery is a massive steel storehouse, 7m tall and 4m wide, filled with heat transfer pipes and 100 tonnes of sand collected from construction sites. Sand, being a non-superconductor heats up to more than 600 degree. The maximum temperature of this heat storehouse is not limited by the properties of the storage medium, i.e. sand, but by the heat resistance of the construction materials of the silo. The sand is heated with electricity from renewable sources. The electrical energy is transferred to the unit using a closed- loop air-pipe arrangement. Air is heated using electrical resistors and circulated in the heat transfer piping. This concept is known as resistive heating, where the friction of electrical currents heats a material. This heat can be utilized by passing cool air through the pipes. This sand-based battery can power industries that are inherently dependent on fossil fuels as their energy source, thus making the environment cleaner.

Student-Samrah Rizwan
ECE-(3rd Year)

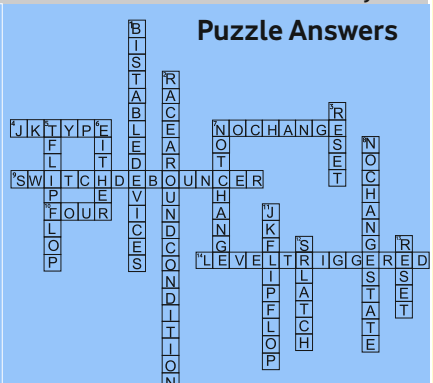
Dream Achievers

...and many more!

10th B.Tech Convocation (Session-2018-22)

Placement Felicitation Ceremony

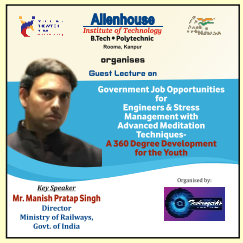
Puzzle Answers



Toycathon 2.0
ECE Departmental Event

'Toycathon-2.0' was organised to explore India's potential to build and sustain a creative ecosystem for the development of toys and games to celebrate Aatma Nirbhar Bharat. Currently, the global toy market is worth about $100 billion and India's share in this is only around one & a half billion dollars. Thus, PM Modi stresses the need to actively change the scenario to make Indians and India, as a whole, **Aatmanirbhar**. India imports about 80% of its toys and the country's crores of rupees get vested in it, despite having such a rich tradition of Indian toys & games. **Technogeeks** is a society of the Department of Electronics and Communication Engineering, which was formed on December 13, 2022. Students participated in the activity with vigor and exhibited the toys they had made with passion, inspiring everyone to remember their own childhood. Gratitude to everyone who took part. The event was a huge success!

Guest Lecture
organised by ECE Department



TECHNOGEEKS, the society of the Department of Electronics & Communication Engineering of Allenhouse Institute of Technology, in association with the Institution's Innovation Council, organized a Guest Lecture on "Government Job Opportunities for Engineers & Stress Management with Advanced Meditation Techniques–A 360-degree development for the Youth".