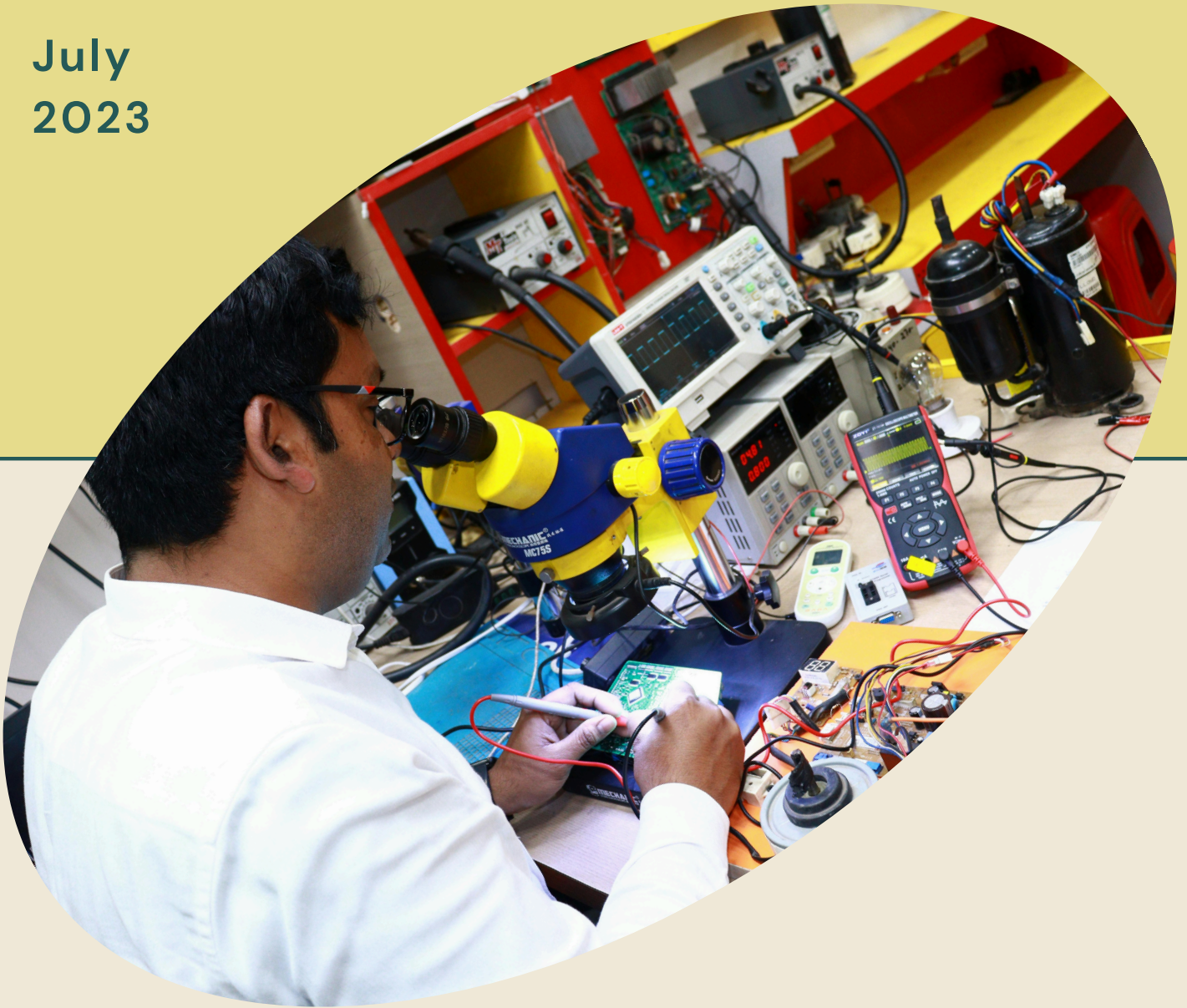


TECHPULSE

July
2023



DEPARTMENT OF ELECTRONICS AND
COMMUNICATION ENGINEERING

TECHPULSE

Electronics Department Association

St. Thomas College of Engineering and Technology, Kannur

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STUDENT EDITOR



SANA T P
STUDENT EDITOR

CEO's Message



I am delighted to witness the unveiling of the 2022-23 edition of "TechPulse," the flagship publication of the Electronics and Communication Engineering Department. This issue arrives at a pivotal time, capturing a year defined by a renewed sense of purpose and the relentless pursuit of technical mastery.

More than just a summary of events, this magazine highlights the interdisciplinary spirit of our students and the steady mentorship of our faculty. From groundbreaking project prototypes to thought-provoking technical essays, the content reflects a department that thrives on curiosity. I extend my heartfelt appreciation to the editorial team and all contributors for their diligence in documenting our journey. May this edition inspire every reader to embrace the challenges of a rapidly evolving digital landscape with confidence and integrity.

Er. Rijo Thomas Jose
CEO, STM

From The Principal's Desk



It is a pleasure to witness the launch of Tech Pulse for the 2022-2023 academic year. This year has been defined by a remarkable return to the vibrant, on-campus synergy that fuels innovation in Electronics and Communication Engineering.

As the world increasingly relies on seamless connectivity and smarter hardware, the contributions of ECE engineers have never been more critical. Throughout this year, our students have demonstrated exceptional resilience, moving beyond the theoretical to master the practical complexities of Signal Processing, VLSI, and IoT. This magazine serves as a beautiful reflection of that transition—showcasing a blend of technical research, creative expression, and the department's collective achievements. I congratulate the editorial team for capturing the pulse of our budding engineers so effectively.

Dr. Shinu Mathew John

Principal, STM

HOD's Message



It is with immense pride that I present the 2022-23 edition of TechPulse. Throughout this year, our efforts have been focused on strengthening the core competencies of our students while broadening their perspectives through meaningful industry-academic collaborations. By organizing a series of events featuring experts from the Electronics and Communication domain, we have ensured that our students stay aligned with evolving professional standards.

I extend my sincere congratulations to the committed staff and the enthusiastic student editorial team for their dedicated efforts in bringing out this magazine. Their hard work and creativity are clearly reflected in the quality and richness of this publication.

This edition of TechPulse also stands as a testament to the artistic talents of both our staff and students. I am confident that the ideas and creativity showcased in these pages will motivate readers to strive for excellence with integrity.

Mr. Nithin C
HOD, Department of ECE, STM

Editor's Note



It gives me great pride and happiness to present the very first edition of the Electronics and Communication Department magazine TechPulse. This marks a new beginning for our department, creating a platform where ideas, knowledge, and creativity can be shared.

This magazine is a result of the enthusiasm and teamwork of our students and faculty. It brings together thoughts on technology, innovation, and learning beyond the classroom. Each article reflects the curiosity and effort of young minds eager to explore the world of electronics and communication.

As this is our first step, we believe it will grow stronger with time and participation. I sincerely thank everyone who contributed to making this initiative possible.

May TechPulse continue to inspire, inform, and bring our department together.

Mr. Nivin V K
Assistant Professor,
Department of ECE, STM

Vision of Department

To produce professionally competent, ethically sound and socially responsible Electronics and Communication Engineers.

Mission of Department

M1: Provide excellent infrastructure and lab facilities for quality education.

M2: Promote industry-academic interactions to keep up with technological advancements.

M3: Develop interpersonal skills and social responsibility among students through project-based and team-based learning.

Program Educational Objectives (PEOs)

Graduates of B. Tech ECE program after graduation will:

PEO1: Exemplify technical competence in designing, analyzing, testing and fabricating electronic circuits.

PEO2: Acquire leadership qualities, rapport, communication skills in the organization and adapt to changing professional and societal needs.

PEO3: Work effectively as individuals and as team members in multidisciplinary projects

Program Specific Outcomes (PSOs)

PSO1: Define, design, implement, model, and test electronic circuits and systems that perform signal processing functions.

PSO2: Segregate and select appropriate technologies for implementation of a modern communication system.

ARTICLES



OUTCOME-BASED EDUCATION: SHAPING FUTURE ENGINEERS

**ANETHA MARY SOMAN
ASSOCIATE PROFESSOR
DEPARTMENT OF ECE**

In today's rapidly advancing world, electronics has become the silent force driving industrial growth and innovation. From automated production lines to intelligent monitoring systems, electronics play a crucial role in transforming traditional industries into efficient, precise, and highly productive environments. It is not just a supporting tool anymore—it is the backbone of modern industry.

At the heart of industrial electronics lies automation. Machines equipped with sensors, controllers, and embedded systems can perform complex tasks with remarkable accuracy and speed. Technologies like Programmable Logic Controllers (PLCs) and microcontrollers are widely used to control machinery, reduce human intervention, and ensure consistent quality.

This not only improves productivity but also minimizes errors and operational costs. Industries such as manufacturing, automotive, and packaging heavily rely on these systems to maintain smooth and continuous operations.

Another significant contribution of electronics in industry is in monitoring and control systems. Advanced electronic instruments can measure temperature, pressure, flow, and other critical parameters in real time. This data helps industries maintain safety standards and optimize performance. For instance, in chemical plants and power stations, electronic control systems prevent hazardous situations by detecting abnormalities instantly and triggering corrective actions.

The rise of smart technologies has further enhanced the role of electronics in industry. Concepts like the Internet of Things (IoT) have enabled machines to communicate with each other, creating interconnected systems known as smart factories.

These systems can analyze data, predict maintenance needs, and improve decision-making processes. As a result, industries can reduce downtime, save energy, and increase overall efficiency.

Electronics also plays a key role in robotics and artificial intelligence within industrial settings. Robots powered by electronic systems can perform repetitive and dangerous tasks with precision, ensuring worker safety and higher productivity. In sectors like automobile manufacturing, robotic arms are used for welding, painting, and assembly, showcasing the perfect blend of electronics and engineering.

Moreover, electronics contribute to energy management and sustainability in industries. With the help of advanced electronic devices, industries can monitor energy consumption, reduce wastage, and adopt renewable energy solutions. This not only lowers operational costs but also supports environmental conservation.

However, the increasing dependence on electronics also brings challenges. However, the increasing dependence on electronics also brings challenges. Industries must invest in skilled personnel to manage and maintain complex systems.

Additionally, cybersecurity has become a major concern as interconnected systems are vulnerable to cyber threats. Despite these challenges, the benefits of industrial electronics far outweigh the drawbacks.

In conclusion, electronics has revolutionized the industrial sector by enhancing efficiency, safety, and innovation. As technology continues to evolve, the role of electronics in industry will only grow stronger, paving the way for smarter, more sustainable, and highly advanced industrial systems. It is clear that the future of industry is inseparably linked with the progress of electronics, making it one of the most vital components of modern development.

5G COMMUNICATION TECHNOLOGY

**FATHIMA NADHA
S6 ECE**

5G, the fifth generation of wireless communication technology, represents a paradigm shift in how data is transmitted, processed, and utilized across digital ecosystems. Unlike its predecessors, 5G is engineered to deliver ultra-high-speed connectivity, ultra-low latency (as low as 1 millisecond), and massive network capacity, enabling seamless communication between billions of devices.

At its core, 5G leverages a diverse range of frequency bands—from low-band sub-1 GHz to mid-band (1–6 GHz) and high-band millimeter waves (above 24 GHz). This spectrum flexibility allows for tailored deployment strategies: low-band for wide coverage, mid-band for balanced performance, and mmWave for ultra-fast data in dense urban environments. Technologies such as Massive MIMO (Multiple Input Multiple Output), beamforming, and dynamic spectrum sharing further enhance signal strength, coverage, and efficiency.

One of the most transformative aspects of 5G is its ability to support massive machine-type communications (mMTC) and ultra-reliable low-latency communications (URLLC). These capabilities are foundational for mission-critical applications like autonomous vehicles, remote surgeries, industrial automation, and real-time robotics. In smart cities, 5G enables intelligent traffic systems, energy-efficient infrastructure, and responsive public services through interconnected sensors and edge computing.

Industries across the spectrum are being reshaped by 5G:

Healthcare: Real-time remote diagnostics, wearable health monitors, and robotic-assisted surgeries.

Transportation: Vehicle-to-everything (V2X) communication, predictive maintenance, and autonomous navigation.

Manufacturing: Smart factories with AI-driven automation, predictive analytics, and digital twins.

Entertainment: Immersive AR/VR experiences, cloud gaming, and 8K video streaming.

Moreover, 5G introduces network slicing, a revolutionary concept that allows operators to create multiple virtual networks within a single physical infrastructure. Each slice can be customized for specific use cases—such as high-speed consumer internet, low-latency industrial control, or secure enterprise communication—ensuring optimal performance and resource allocation.

As 5G continues to roll out globally, it is not merely an upgrade in speed but a foundational enabler of the Fourth Industrial Revolution. It bridges the gap between physical and digital realms, fostering innovation, economic growth, and a hyper-connected future.

ARTIFICIAL INTELLIGENCE IN ELECTRONICS

NIKHIL DAS
S6 ECE

Artificial Intelligence (AI) has emerged as a transformative force in modern electronics, redefining how systems perceive, process, and respond to information. By mimicking cognitive functions such as learning, reasoning, and problem-solving, AI enables machines to perform tasks that traditionally required human intelligence—often with greater speed, precision, and scalability.

At the heart of AI are techniques like machine learning (ML), deep learning, and neural networks, which empower systems to analyze vast datasets, identify patterns, and make autonomous decisions. These technologies are increasingly integrated into electronic systems for applications ranging from signal processing and image recognition to intelligent automation and adaptive control.

In the domain of Electronics and Communication Engineering (ECE), AI is revolutionizing several key areas:

Speech and Voice Recognition: AI algorithms enable devices to understand and respond to spoken commands, facilitating hands-free control in smartphones, smart speakers, and embedded systems.

Predictive Maintenance: AI models analyze sensor data to forecast equipment failures, reducing downtime and optimizing maintenance schedules in industrial electronics.

Smart Communication Systems: AI enhances network performance through dynamic resource allocation, traffic prediction, and anomaly detection, ensuring efficient and secure data transmission.

The fusion of AI with embedded systems and IoT (Internet of Things) technologies is driving innovation across multiple sectors:

Robotics: AI-powered robots can navigate complex environments, interact with humans, and perform precision tasks in manufacturing, healthcare, and service industries.

Autonomous Systems: From drones to self-driving vehicles, AI enables real-time decision-making based on sensor inputs, environmental data, and predictive modeling.

Smart Devices: AI enhances user experience in consumer electronics through personalized recommendations, intelligent assistants, and adaptive interfaces.

Moreover, AI is playing a pivotal role in hardware optimization, where it assists in designing energy-efficient circuits, optimizing chip layouts, and accelerating simulation processes. In signal processing,

AI algorithms improve noise reduction, feature extraction, and real-time analysis, making systems more responsive and accurate.

As AI continues to evolve, its integration into electronics is expected to deepen, leading to self-learning systems, context-aware devices, and cognitive networks. This convergence is not only enhancing system intelligence but also reshaping the future of engineering—where machines are not just tools but collaborative partners in innovation.

In essence, Artificial Intelligence is no longer a futuristic concept—it is a present-day catalyst for smarter, faster, and more adaptive electronic systems. Its influence will continue to expand, unlocking new possibilities in research, development, and real-world applications across the globe.

VLSI TECHNOLOGY

ABHAY RITHIK
S4 ECE

Very Large Scale Integration (VLSI) technology is the backbone of modern electronics, enabling the integration of millions—now billions—of transistors onto a single silicon chip. This breakthrough in miniaturization has transformed bulky circuits into compact, high-speed, and energy-efficient systems that power everything from smartphones to supercomputers.

VLSI design is a multi-layered process involving:

Circuit Design: Translating logical functions into transistor-level schematics.

Layout Design: Physically arranging components on silicon using CAD tools.

Fabrication & Testing: Manufacturing the chip and verifying its performance under real-world conditions.

These stages demand precision, creativity, and a deep understanding of semiconductor physics and digital logic.

VLSI plays a pivotal role in developing:

Microprocessors: The central processing units of computers and embedded systems.

Memory Devices: RAM, ROM, flash storage, and cache modules.

Digital Signal Processors (DSPs): Specialized chips for audio, video, and communication signal processing.

The evolution of VLSI has been driven by Moore's Law, which predicted the doubling of transistor density every two years. This exponential growth has led to faster computation, reduced power consumption, and smaller device footprints. Innovations like FinFETs, 3D stacking, and chiplet architectures are pushing VLSI into new frontiers.

In the realm of Electronics and Communication Engineering, VLSI enables high-speed data processing, efficient modulation techniques, and real-time signal analysis. It supports the infrastructure behind 5G networks, IoT ecosystems, and AI accelerators.

As fabrication nodes shrink below 5 nanometers, VLSI continues to evolve—integrating machine learning cores, neuromorphic circuits, and secure hardware modules. It's not just a technology; it's a catalyst for the digital revolution.

VLSI remains a cornerstone of the semiconductor industry, driving innovation in computing, communication, and consumer electronics. Its influence is profound, shaping the future of engineering with every new chip designed.

STORIES





Persistence

Arjun sat in the lab, staring at the circuit that refused to work. Hours had passed, yet the output remained unchanged. Frustration slowly turned into determination.

He decided to start again, checking each connection carefully. This time, he noticed a small mistake—one misplaced wire. As he corrected it and powered the circuit, the LED finally glowed.

At that moment, Arjun realized that success in engineering, like in life, often comes down to persistence and attention to detail. Sometimes, the smallest correction can make the biggest difference.



SANA T P
S4 ECE

Student Life

(Self Reflection)

Engineering is not just about formulas and circuits; it is a journey of growth, resilience, and self-discovery. Each day brings new challenges, whether it is understanding complex concepts or meeting deadlines. Yet, amidst the pressure, there are moments of joy—late-night discussions, teamwork, and small achievements that make the journey worthwhile.

The life of an engineering student teaches more than academics. It builds patience, discipline, and the ability to think critically. In the end, it is not just about becoming an engineer, but about becoming a better individual prepared to face the world.

FATHIMA NADHA
S6 ECE



The Alchemy of Reason: Sherlock Holmes and the enduring appeal of the Rational Hero

Sherlock Holmes, the creation of Sir Arthur Conan Doyle, stands as the paramount figure of detective fiction, yet his literary significance extends far beyond the confines of the genre. He is an archetype of the rational man, a figure born of the late Victorian era who perfectly embodies the age's fervent belief in science, logic, and the mastery of empirical observation over superstition and confusion. The adventures recounted from the gaslit rooms of 221B Baker Street are not merely mysteries to be solved; they are philosophical demonstrations, asserting the triumphant power of intellect to penetrate and illuminate the chaotic heart of humanity.

Holmes's genius lies in his method, a rigorous application of deductive reasoning that elevated the craft of detection into an art form. While other literary investigators relied on brute force or lucky guesses, Holmes transformed the crime scene into a laboratory. He meticulously analyzed footprint molds, studied tobacco ash varieties, and compiled exhaustive monographs on obscure subjects, treating every detail—no matter how minute—as a critical piece of data. This commitment to the scientific method in an intensely human context is what gives the stories their unique intellectual thrill. The famous pronouncements, often delivered with dramatic flair, are the culmination of a systematic process, offering the reader the satisfaction of watching order emerge from disorder, and truth coalesce from fragmented evidence.

The perfect foil and essential narrator for this isolated genius is Dr. John Watson. Watson's literary function is profound: he serves as the emotional and moral intermediary between Holmes's cold, exacting logic and the reader's natural human sensibility. It is through Watson's astonished yet loyal perspective that Holmes's eccentricities and brilliance are magnified. The doctor's warm, conventional humanity anchors the stories, ensuring they remain grounded in relatable concerns of justice, fear, and human frailty. Watson does not merely transcribe the cases; he provides the necessary narrative filter that transforms the dry analysis of data into a compelling, episodic drama, allowing the reader to experience both the wonder of the deduction and the humanity of the stakes.

Ultimately, the enduring appeal of Sherlock Holmes is rooted in the deep human desire for clarity and justice. In a world often governed by randomness and obscured by appearances, Holmes offers the comforting assurance that all problems are solvable, all deceptions penetrable, and all truth ultimately discernible through the application of pure, disciplined reason. His adventures remain timeless literary achievements, not because of the crimes themselves, but because they perpetually celebrate the highest function of the human mind: the elegant triumph of logic over the shadows of doubt.

**AMITH AK
S4 ECE**





The Empire of Signals (KGF 2.0)

In a land where gold mines glittered like endless data reservoirs, there rose a man named Rocky, not just a conqueror of kingdoms but the CPU of an empire. His vision was clear: to build a communication network so strong that no interference could break it.

The mines of KGF were more than treasure—they were storage units of raw information, waiting to be processed. Rocky, like a master engineer, mined this data and amplified it into power, just as signals are boosted to travel across vast distances. His army became the transmission lines, carrying his commands like encoded signals across noisy channels filled with enemies.

But interference was everywhere. Rival warlords acted like noise in communication systems, trying to distort Rocky's message. Yet Rocky had his own filters and modulation schemes—strategies that ensured his empire's signals remained strong and clear.

Every battle was a test of signal processing. His weapons weren't just guns and blades; they were algorithms, sharpening his influence and eliminating distortion. His rise from a lone fighter to the ruler of KGF was nothing less than amplification, where a weak input transformed into a dominant output.

In the end, Rocky's empire stood as a fully integrated system, synchronized like a digital circuit, where every follower was a transistor switching in perfect harmony. His legacy was not just of gold, but of communication perfected—an empire where signals never died, and the message of power echoed eternally



FASMIRA ISMAIL
S4 ECE

POEMS

... forgot,
... mind?
... tance be forgot,
... auld lang syne!

Chorus

For auld lang syne, my dear,
For auld lang syne,
We'll tak a cup o' kindness yet,
For auld lang syne.
And surely ye'll be your pint stoup!
And surely I'll be mine!
And we'll take a cup o' kindness yet,
For auld lang syne.

Chorus

We twa hae run about the braes,
And pou'd the gowans fine;
But we've wander'd mony a weary fit,
Sin' auld lang syne.

Chorus

We twa hae paidl'd in the burn,
Frae morning sun till dine;
But seas between us braid hae roar'd
Sin' auld lang syne.

Chorus

And there's a hand, my trusty fiere!
And gie's a hand o thine!
And we'll tak a right gude-willie-waught,
For auld lang syne.





Technology + Life

In circuits we trust, in logic we believe,
Through wires and waves, solutions we weave.
From signals unseen to systems so bright,
Engineering minds turn ideas to light.
Beyond the codes and equations we solve,
A world of creativity continues to evolve.
For within every engineer lies an art,
A balance of science and a creative heart.

**ANUGRAH P
S6 ECE**

Turning of the Year

Spring wakes softly,
brushing frost from winter's hair—
buds whisper open,
and the world remembers color.
Summer arrives singing,
warm light spilling over fields,
days stretching like lazy cats,
nights humming with crickets and heat.
Autumn steps quietly,
painting edges in gold and amber,
leaves drifting down like slow applause
for the year's long performance.
Winter closes the curtain,
cool breath clouding the air,
snow stitching silence across the earth
so life can dream again.
And in this endless circle,
each season hands the world
to the next—
a gentle passing of time's lantern.

**FATHIMATHU SAFA PP
S6 ECE**



Old Photographs

Old photos hide inside a drawer,
Silent keepers of “before”;
Edges worn and colors fade,
Yet stories linger, gently made.
Memories sealed from years long past,
Frozen moments meant to last;
A laugh, a smile, a stolen glance—
A frame that holds a fleeting chance.
Yet one small look can bring them back,
Like sunlight breaking through the black;
A single glance can fill the eyes,
With joy, with ache, with soft surprise.
They rise like dust in morning light,
Softly swirling, warm and bright;
Echoes of people, places, days,
Whispering through the golden haze.
Old photographs don’t simply stay—
They carry worlds tucked far away;
And when we hold them, heart in hand,
We relive moments once so grand.
For time may move and life may race,
But photographs remain a place—
Where memories breathe, and gently call,
Reminding us we’ve lived it all.

**ANUGRAH M
S4 ECE**



Echoes of Circuits and Signals

In silent wires where currents flow,
A world of logic starts to glow,
Through tiny paths of coded light,
Electronics turns dark into insight.
With resistors, chips, and signals bright,
It builds the bridge from thought to sight,
A language formed in volts and waves,
Where every pulse a purpose saves.
Across the air, unseen yet near,
Messages travel, loud and clear,
Through space and time, they find their way,
Turning night into a connected day.
From whispered bits to data streams,
Communication carries dreams,
Linking hearts and minds afar,
Like constellations joined by a star.
Together they stand, a perfect pair,
One gives form, one sends it through air,
Engineering not just machines, but connection—
A harmony of circuits and human reflection.
So here it lies, this field so true,
Where science meets what we can do,
Electronics builds, communication binds,
Shaping the future of connected minds.

SWAROOP P
S4 ECE

WORD PUZZLE

CAPACITOR

ALIASING

RECEIVER

DIODE

CIRCUITS

ANTENNA

AMPLIFIER

FILTER

CHANNEL

SIGNAL

MOSFET

LED

BANDWIDTH

OSCILLATOR

TRANSISTORS

MODULATION

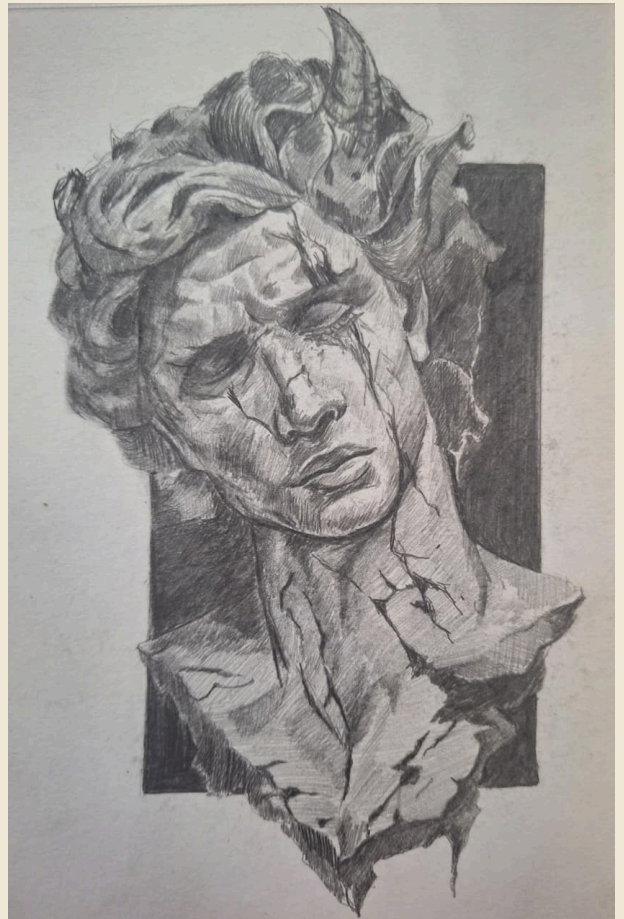
TRANSMITTER

A	F	Q	F	A	A	N	T	E	N	N	A	H	Q	G
H	W	L	F	Z	M	U	V	D	Y	H	L	M	T	N
C	R	H	Z	I	P	D	N	I	N	U	I	Y	R	H
A	H	D	G	S	L	D	L	E	D	T	A	H	A	K
P	D	A	G	Q	I	T	F	Y	I	R	S	R	N	M
A	X	J	N	N	F	G	E	N	O	A	I	S	S	O
C	G	B	H	N	I	Q	N	R	D	N	N	G	I	I
I	B	F	Y	N	E	L	D	A	E	S	G	R	S	U
T	H	K	L	Q	R	L	D	P	L	M	X	E	T	L
O	P	M	O	S	F	E	T	U	E	I	P	C	O	A
R	N	H	G	G	A	F	B	L	U	T	M	E	R	T
N	V	I	H	C	I	R	C	U	I	T	S	I	H	I
X	D	B	U	M	V	Q	L	B	Q	E	P	V	J	O
B	A	N	D	W	I	D	T	H	K	R	J	E	Q	N
Q	Y	P	O	S	C	I	L	L	A	T	O	R	P	Y

SKETCHES



NIKHIL DAS
S6 ECE



ACHIEVEMENTS



MOMENTS OF PRIDE

- Dr. Anetha Mary Soman attended a 7-Day FDP on system Design Through Verilog, Organized by IIT Madras
- Ms. Arsha C Dinesh, Ms. Sreetha Sreedhar K, Mr Nivin V & Mr. Manu Thomas attended a 3-Day FDP on practical Aspects of Communication Engineering with Hands on, organized by ECE Department, VAST.
- Ms.Arsha C Dinesh & Athira V attended a 5-Day FDP on opportunities of power electronics in Smart grid, renewable energy resources and electric vehicles, organized by EEE Department, SCMS Ernakulam
- Dr. Anetha Mary Soman, Ms Sreetha Sreedhar K and Mr Nithin C attended a 37-Day FDP on NBA Accreditation and Teaching and Learning in Engineering, organized by IIT Madras
- Mr Manu Thomas and Mr Nithin attended a 7-Day FDP on ChatGPT and AI Tools, organized by Marian College, Kuttikkanam.

PHOTO GALLERY



