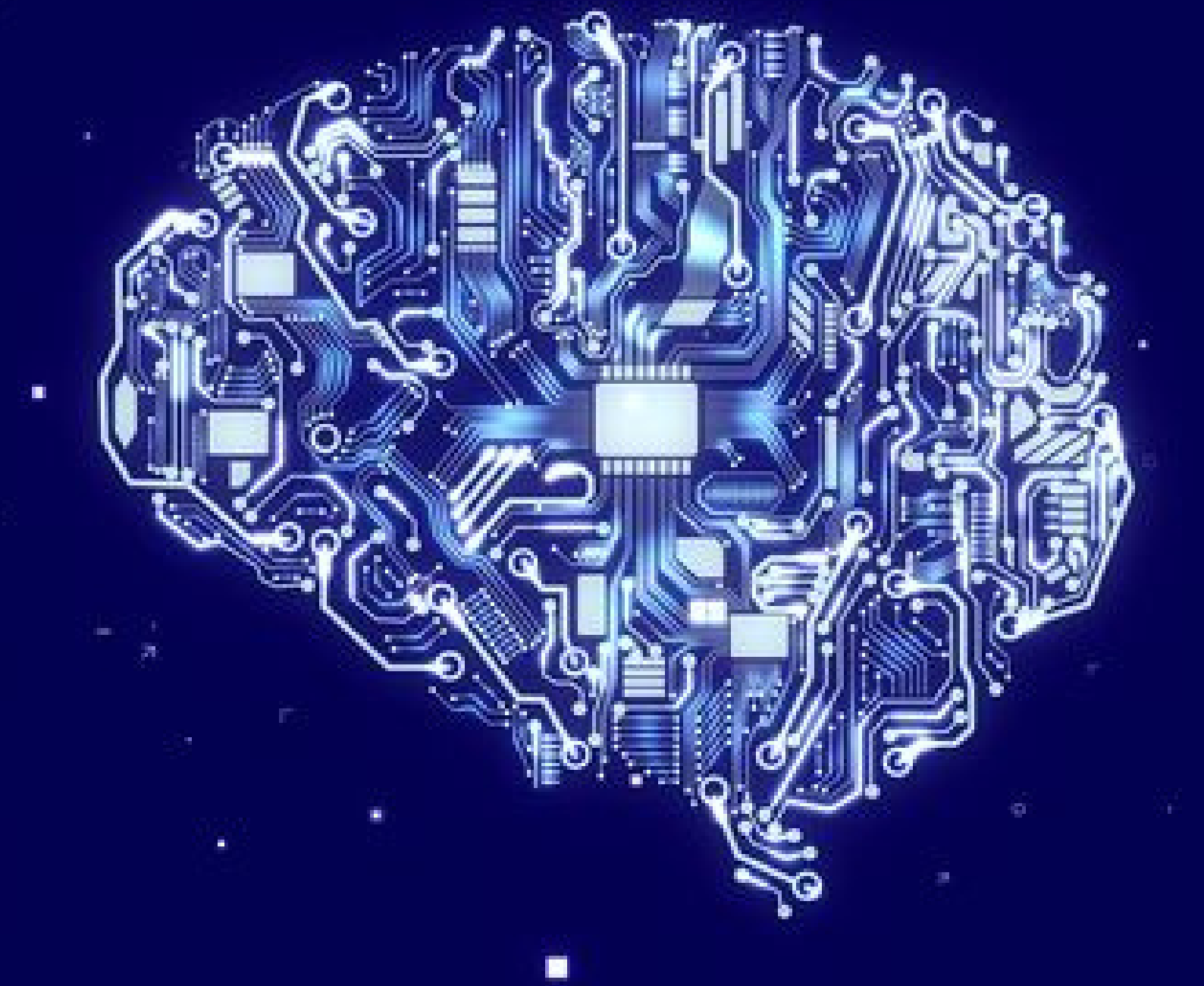
MINDRONICS

Dept. of ECE Magazine, Volume - 8, Issue 4
Apr. - Jun. 2025



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (A)

Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada
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MINDTRONICS

Dept. of ECE Magazine Apr. - Jun., 2025 Vol. 8, Issue - 4

Focus & Scope:

A department magazine encourages the students to think, present and draft that help them in developing their talent, technical and writing skills. Also it helps them to improve their power of thinking and strengthen their imagination. Our department magazine MINDTRONICS consists of Articles on Emerging Developments in Electronics, Cartoons, Poetry, Drawings and Review Writings on Latest Happenings collected from department students.

Contact
Dr. T. Satyanarayana - 9346429163
A. Jaswanth - 9390319580

Send your articles to mail ID
mindtronics.lbrce@gmail.com

Foreword

Shri. L. R. N.K. Prasad Reddy,
Chairman.

It's wonderful to hear about the success and creativity of the Department of Electronics and Communication Engineering and their magazine, "Mindtronics." Creating a platform like this not only showcases the talents of students but also contributes to the overall growth and development of the department. Expressing appreciation for the efforts of the entire team, including the Faculty Coordinators, is a great way to acknowledge their hard work and dedication. It's commendable that the department has taken the initiative to nurture and celebrate the talents of its students.

The Department of Electronics and Communication Engineering (ECE) adopts the acronym "ELECTRONICS" to embody its commitment to perpetual learning, creativity, research, innovation, and societal impact. The magazine reflects the collaborative spirit of the ECE community, with the students' team praised for their hard work in curating a diverse and impactful edition. The Faculty Coordinators are acknowledged for their valuable guidance. "Mindtronics" is seen not just as a publication but as a catalyst for the continual improvement of students' overall skill sets in the field of electronics and communication engineering.

Shri. G. Srinivasa Reddy,
President, LBCT

Foreword

Dr. K. Appa Rao,
Principal

Electronics and Communication Engineering (ECE) involves researching, designing, developing, and testing electronic equipment used in several engineering systems. It gave me great satisfaction to know that the Department of Electronics and Communication Engineering has come up with its own magazine, "Mindtronics". The way they presented it was unique, very creative and hope it will serve as a motivational and technological source for the students to exhibit their inherent talents and improve their skills. I'd like to express my appreciation to the whole team members of Mindtronics including Faculty Coordinators who really made it possible.

The branch ELECTRONICS stands for "Ever Learning, Ever Creative Through Research Onsetting New Inventions Comforting Society". The Department of ECE's magazine, "TechConnect," recently revised as "Mindtronics," that has been a source where members of the department are invoked to share their ideas, talents which includes technical, general aspects, and I strongly believe it is a wonderful platform to showcase their creative skills. I appreciate the entire students' team of Mindtronics for their efforts and hard work that they put in to bring out this edition. I extend my sincere thanks to Faculty Coordinators for their fabulous guidance. I hope this magazine gets strengthened further in all aspects to improve the overall skillset of students.

Dr. G. Srinivasulu,
Profesor & Head, ECE

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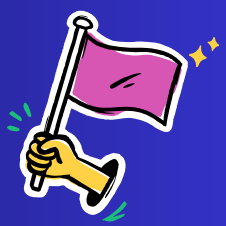


EMERGING DEVELOPMENTS

5G Wireless Technology

I. INTRODUCTION

The search engine major Google has already confirmed that the smartphone user base has surpassed the desktop userbase. If we go back a few years, the maximum RAM in a smartphone was in a few MBs only but now, even the smartphone configurations are competing with personal computers. It is evident that smartphone usage without the internet is barely minimum. With the increased dependency on IoT, internet speed plays a pivotal role.

The majority of companies think of future needs, innovations, services that could give a better life to mankind. Keeping this in mind, 5G thoughts were rolled a decade back even before the 4G technology was in place. Of course, the 4G has been a base to implement 5G. We will discuss countrywide 5G rollout further in this article. 5G simply refers to the next and newest mobile wireless standard based on the IEEE 802.11ac standard of broadband technology. Rather than faster Internet connection speeds, 5G aims at a higher capacity than current 4G LTE, allowing a higher number of mobile broadband users per area unit, and allowing consumption of data quantities in gigabyte per second. This would make it feasible for a large portion of the population to consume high-quality streaming media many hours per day on their mobile devices, also when out of reach of wifi hotspots. 5G research and development also aim at the improved support of machine to machine communication, also known as the Internet of things, aiming at a lower cost, lower battery consumption, and lower latency and to increase the security and connectivity for a large community.

II. HOW 5G WORKS

Wireless communications systems use radio frequencies (also known as spectrum) to carry information through the air. 5G operates in the same way, but uses higher radio frequencies that are less cluttered.

This allows for it to carry more information at a much faster rate. These higher bands are called 'millimeter waves' (mmwaves). They were previously unused but have been opened up for licensing by regulators. They had been largely untouched by the public as the equipment to use them was largely inaccessible and expensive.

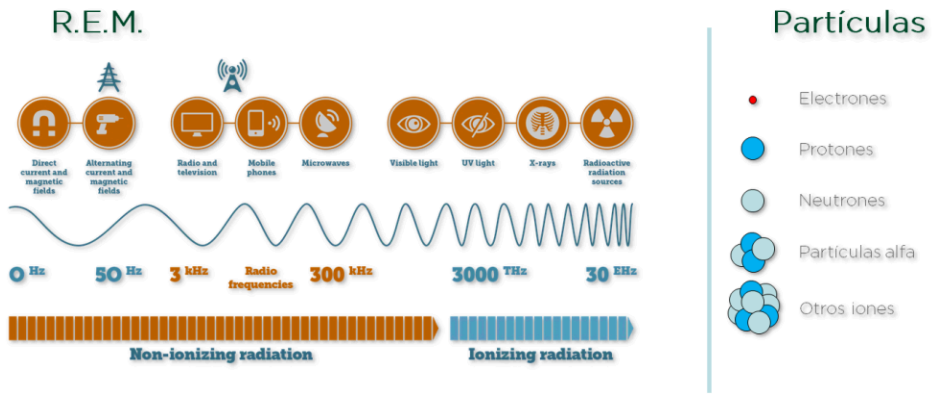
While higher bands are faster at carrying information, there can be problems with sending over large distances. They are easily blocked by physical objects such as trees and buildings. In order to circumvent this challenge, 5G will utilise multiple input and output antennae to boost signals and capacity across the wireless network. The technology will also use smaller transmitters. Placed on buildings and street furniture, as opposed to using single stand-alone masts. Current estimates say that 5G will be able to support up to 1,000 more devices per metre than 4G.

5G technology will also be able to 'slice' a physical network into multiple virtual networks. This means that operators will be able to deliver the right slice of network, depending on how it is being used, and thereby better manage their networks. This means, for example, that an operator will be able use different slice capacities depending on importance. So, a single user streaming a video would use a different slice to a business, while simpler devices could be separated from more complex and demanding applications, such as controlling autonomous vehicles. There are also plans to allow businesses to rent their own isolated and insulated network slice in order to separate them from competing Internet traffic.

III. NETWORK ARCHITECTURE OF 5G

5G networks will require a change in architecture with respect to current technology. It must be designed to support a higher demand in video transmission, better data transmission speed, greater connectivity, low latency, low power consumption, greater mobility for communications, and of course support all smart devices that will connect to the network, with the Internet of things (IoT), among others. In order to meet these requirements, the current paradigm of communications networks must be changed [1], since current technologies have generated a bottleneck in terms of resources in the current spectrum, making it difficult to improve capacities with limited bandwidth available. There are several changes in technology that are required for this new network. This document will discuss the main technologies that will allow 5G networks to meet their objectives, wireless software-defined network, network function virtualization, milimeter wave spectrum, massive MIMO, hybrid beamforming, device to device communications.

IV. RADIO SPECTRUM FOR FIFTH GENERATION (5G)



5G carries information wirelessly through the electromagnetic spectrum, specifically the radio spectrum. Within the radio spectrum are varying levels of frequency bands, some of which are used for this next-gen technology.

With 5G still in its early stages of implementation and not yet available in every country, you might be hearing about the 5G bandwidth spectrum, spectrum auctions, mmWave 5G, etc. Don't worry if this is confusing. All you really need to know about 5G frequency bands is that different companies use different parts of the spectrum to transmit data. Using one part of the spectrum over another impacts both the speed of the connection and the distance it can cover.

A. Defining The 5G Spectrum

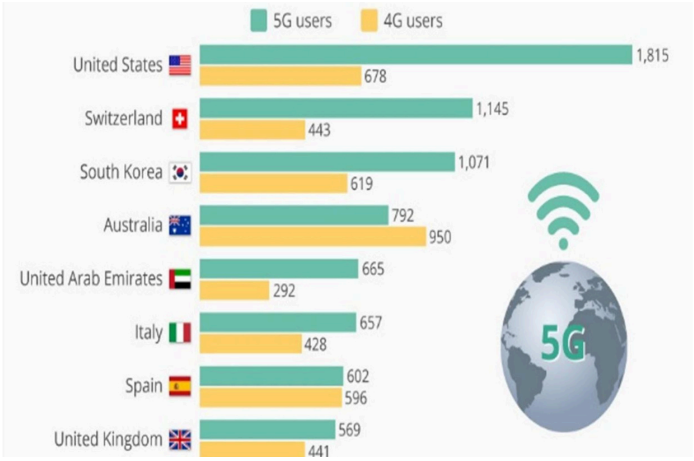
Radio wave frequencies range anywhere from 3 kilohertz (kHz) up to 300 gigahertz (GHz). Every portion of the spectrum has a range of frequencies, called a band, that go by a specific name. Some examples of radio spectrum bands include extremely low frequency (ELF), ultra low frequency (ULF), low frequency (LF), medium frequency (MF), ultra high frequency (UHF), and extremely high frequency (EHF). One part of the radio spectrum has a high frequency range between 30 GHz and 300 GHz (part of the EHF band), and is often called the millimeter band (because its wavelengths range from 1-10 mm). Wavelengths in and around this band are therefore called millimeter waves (mmWaves). mmWaves are a popular choice for 5G but also has application in areas like radio astronomy, telecommunications, and radar guns. Another part of the radio spectrum that's being used for 5G, is UHF, which is lower on the spectrum than EHF. The UHF band has a frequency range of 300 MHz to 3 GHz, and is used for everything from TV broadcasting and GPS to Wi-Fi, cordless phones, and Bluetooth.

V. ULTRA-DENSE RAN

A new conception anticipated in the state of affairs of fifth generation (5G) is UDRANETs (Ultra-Dense Radio Access Networks) . Ultra-Dense Radio 1869 Access Networks are envisioned as less power access nodes a few meters apart for within door regions. The prime aim of UDRANETs will be to offer an immensely high traffic capability over highly dependable low-range knots. Ultra- Dense Radio Access Networks will probably function in the frequency range of 10-100 GHz, which has continued virtually unutilized for mercantile cell-phone networks notwithstanding its prospective to give bandwidths of hundreds of megahertz. Modern communication & access technologies have to be flourished & systemized for this sort of systems, needing spectrum apportionment studies in millimeter waves.

A. 5G Impact on Society

The positive impact of the Fourth Industrial Revolution and its related emerging technologies will be fully realized through the wide-scale deployment of 5G communication networks in combination with other connectivity solutions. The key functional drivers of 5G will unlock a broad range of opportunities, including the optimization of service delivery, decision- making, and end-user experience. This will result in $13.2 trillion in global economic value by 2035, generating 22.3 million jobs in the 5G global value chain alone. To better understand how to realize this large estimated economic output potential, this report proposes a bottom-up approach analyzing 40 use cases that identified key industrial advances and social impact areas in addition to the main functional drivers of 5G and the required maturity levels of these drivers.



Additionally, it maps the 5G ecosystem to identify its components, its stakeholders and interdependencies, and the actions needed to accelerate 5G deployment and fully realize the potential.

Challenges The transition from 4G to 5G presents several transformational challenges which must be tackled to fully realize the 5G vision. There are challenges faced with the new technologies enabling 5G. There are also challenges with the integration of this technology to provide services in different application scenarios. Some have criticized 5G for its high projected cost and that it is incompatible with the previous generations. Just as 2G phones could not connect to 3G or 4G networks, 3G and 4G phones will not connect to a 5G network. One is forced to buy a new phone which is likely to be more expensive than 4G/LTE service.

To address these challenges, we need a drastic change in the design of cellular architecture. We also need to meet 5G system performance requirements such Mfentocells, stringent latency, network scalability, very long battery life, and green communications. It is a challenge to satisfy these requirements and minimize costs at the same time.

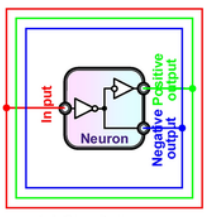
VII. CONCLUSION

Over the past two decades, the world has witnessed a rapid evolution of cellular communication technologies from the Global 2G Mobile System (GSM) to the Advanced Long Term Evolution System (LTE-A) 4G. The main motivation has been the need for more bandwidth and less latency. While performance is the actual data transfer rate, latency depends largely on the processing speed of each node data flow through. Along with performance-related performance improvements, some related parameters, such as instability, interference between Channels, connectivity, scalability, energy efficiency and compatibility with legacy networks are also taken into account when developing a new mobile technology. When technology advanced from 2G GSM to the 3G universal mobile telecommunications system (UMTS), a higher network speed and faster download speed allowed real-time video calls The data rate has improved from 64 kbps in 2G to 2 Mbps in 3G and 50–100 Mbps in 4G. 5G is expected to improve not only the data transfer speed of mobile networks, but also the scalability, connectivity and energy efficiency of the network. It is assumed that by 2020, 50 billion devices will be connected to the global IP network, which seems to present a challenge. Remote operation of critical commercial equipment and machines in a reliable 5G network will be possible without delay. Real-time control of machines using mobile devices will be possible, making Internet of things (IoT) more available to everyone. Finally, but not least, network nodes that consume less energy will be needed to achieve a greener world. Therefore, the following are the most important elements in the description of 5G: high performance, low latency, high reliability, greater scalability and mobile communication technology of low consumption.

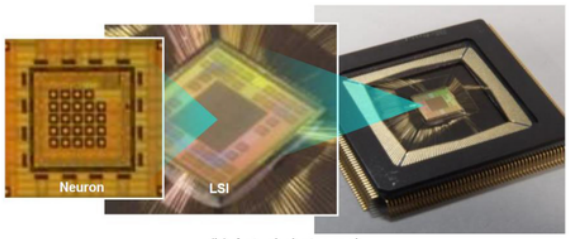
by
K.Pujitha
22761A04F5

Neuromorphic chip integrated with a large-scale integration circuit and amorphous-metal-oxide semiconductor thin-film synapse devices

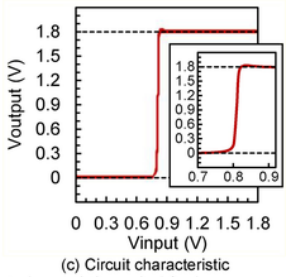
Artificial intelligences are promising in future societies, and neural networks are typical technologies with the advantages such as self-organization, self-learning, parallel distributed computing, and fault tolerance, but their size and power consumption are large. Neuromorphic systems are biomimetic systems from the hardware level, with the same advantages as living brains, especially compact size, low power, and robust operation, but some well-known ones are non-optimized systems, so the above benefits are only partially gained, for example, machine learning is processed elsewhere to download fixed parameters. To solve these problems, we are researching neuromorphic systems from various viewpoints. In this study, a neuromorphic chip integrated with a large-scale integration circuit (LSI) and amorphous-metal-oxide semiconductor (AOS) thin-film synapse devices has been developed. The neuron elements are digital circuit, which are made in an LSI, and the synapse devices are analog devices, which are made of the AOS thin film and directly integrated on the LSI. This is the world's first hybrid chip where neuron elements and synapse devices of different functional semiconductors are integrated, and local autonomous learning is utilized, which becomes possible because the AOS thin film can be deposited without heat treatment and there is no damage to the underneath layer, and has all advantages of neuromorphic systems.



(a) Circuit diagram
A binary state is generated and alternates according to the input signal.



(b) Actual photograph
A 180 nm CMOS Si technology is used, and 25×25 neuron elements are made.



(c) Circuit characteristic
A characteristic required for the neuron can be obtained with the simple circuit.

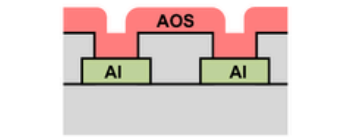
same wafer, and local autonomous learning is utilized. Compared to previous reports of similar studies the LSI and AOS thin-film synapse devices are integrated on the same wafer, which becomes possible because the AOS thin film can be deposited without heat treatment, and there is no damage to the underneath layer. Moreover, compared to other previous reports the local autonomous learning is utilized, which becomes possible because required properties can be added by controlling the materials, devices, and processes. As a result, our neuromorphic chip has the potential to have all the above advantages of neuromorphic systems.

Neuron elements made in an LSI. the circuit diagram. The neuron element is a digital circuit consisting of four transistors with two inverters connected in series. A binary state, that is, stable or firing state, is generated and alternates according to the input signal. The input, positive output, and negative output terminals are unidirectional. If the input signal is above the threshold voltage of the inverter, the stable state is generated, the positive output signal becomes Vss, and the negative output signal becomes complementarily Vdd. On the other hand, if the input signal is below the thresh- old voltage, the firing state is generated, the positive output signal becomes Vdd, and the negative output signal becomes complementarily Vss. The theoretical model of the neuron element is just a buffer block, which has exactly the same function as a two-inverter circuit. Figure shows the actual photograph. A 180 nm CMOS Si technology is used 25 × 25 neuron elements are made in the LSI, 12 × 12 neuron elements are accessible everyother column and row, these are used as input/output (I/O) neurons to see if the neuromorphic system works, and hidden neuronal elements are located between I/O neurons. Since the LSI is common digital circuits, they can be easily manufactured using the traditional method of Si CMOS FETs. Before the AOS thin-film synapse devices are integrated, the neuron elements are isolated and not connected anywhere. Figure shows the circuit characteristic. The horizontal axis is Vinput, input signal actually applied to the input terminal, while the vertical axis is Voutput, positive output signal actually measured from the positive output terminal shown in Fig. Vss is 0 V, and Vdd is 1.8 V. It is found that a step function or slight sigmoid function can be obtained, which are representative functions required for the neuron element. It turns out that a circuit characteristic required for the
neuron element can be obtained with the simple circuit.

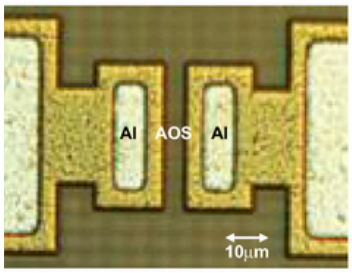
Synapse device made of the AOS thin film.

Figure shows the synapse device made of the AOS thin film. The synapse device is an analog device whose conductance continuousl changes. Figure shows the device structure, and Fig. shows the actual photograph. This is a simple two-terminal device, with an AOS thin film used as the channel layer and Al thin film as the electrode terminals. The channel width corresponds to the width of the contact holes on the electrode terminals and is 20 μm, whereas the channel length corresponds to the distance between the contact holes and is 15 μm.Figure shows the initial conductance. The synapse device made of the amorphous In-Ga-Zn-O thin film (α-IGZO) and that made of the amorphous Ga-Sn–O thin film (α-GTO) are compared. The α-IGZO is depos-
ited using radio-frequency (RF) magnetron sputtering, where the sputtering target is an IGZO ceramic with a composition of In:Ga:Zn=1:1:1, the sputtering gas is Ar with a flow rate of 20 sccm, the deposition pressure is 5 Pa, the plasma power is 60 W, the deposition time is 25 min, etc. The α-GTO is also deposited using RF magnetron sputtering, where the sputtering target is a GTO ceramic with a composition of Ga:Sn=1:3, etc., and the thickness is 100 nm.

Both have not undergone a heat treatment. It turns out that the synapse devices made of the α-IGZO have a larger deviation in initial conductance than that made of the α-GTO. This seems to be due to the fact that the α-IGZO is a quaternary system and has a considerable variation in the element ratio from sample to sample. Furthermore, Zn is chemically active, and it is difficult to control the chemical condition uniformly without the heat treatment. The α-GTO is a ternary system, and the variation is small without the heat treatment. Moreover, since the α-GTO does not contain rare metals like In, there is almost no risk of resource depletio or cost increase, which is extremely useful in applications that uses large amounts of materials, such as synapse devices in neuromorphic systems. Therefore, the α-GTO is used in this research. Figure shows the conductance changes. The changes of the conductance are measured when a voltage ofexactly the same function as a two-inverter circuit. Figure 1b shows the actual photograph. A 180 nm CMOS Si devices are integrated, the neuron elements are isolated and not connected anywhere. Figure 1c shows the circuit film. The synapse device is an analog device whose conductance continuously changes. Figure shows the device structure, and Fig.shows the actual photograph. This is a simple two-terminal device, with an AOS 1.8 V is applied to the synapse devices. It turns out that the conductance gradually decreases over time. Figure

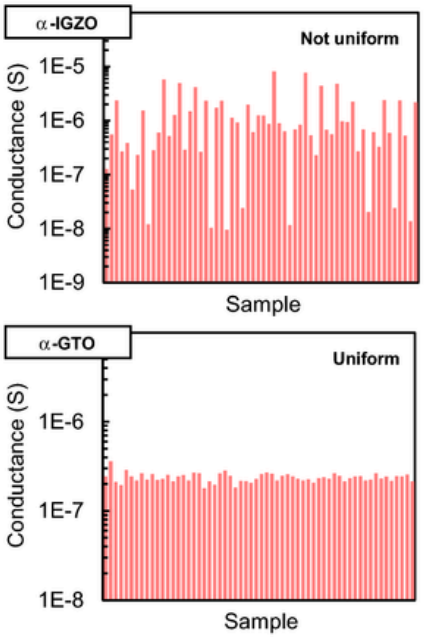


(a) Device structure

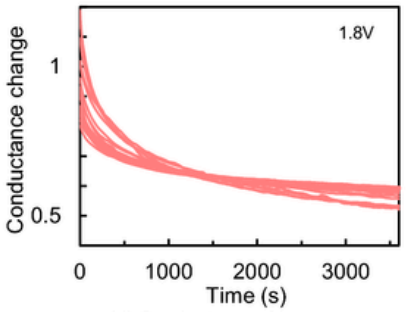


(b) Actual photograph

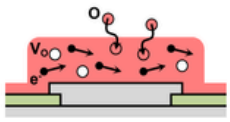
This is a simple two-terminal device with an AOS thin film as the channel layer and Al thin film as the electrode terminals.



(c) Initial conductance
The α-GTO devices have a smaller deviation.

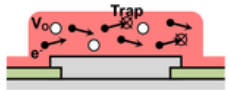


(d) Conductance changes
The conductance gradually decreases over time.



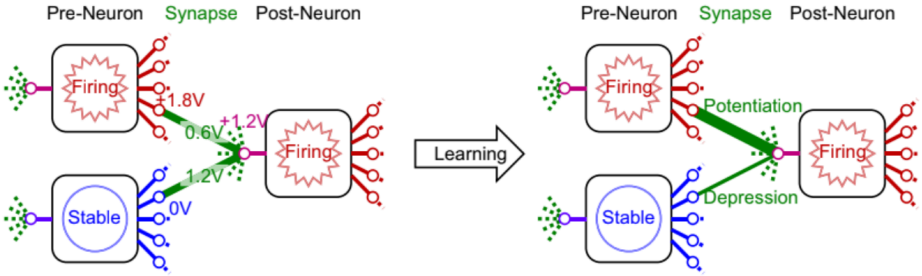
Decrease in Vo due to the uptake of O

or

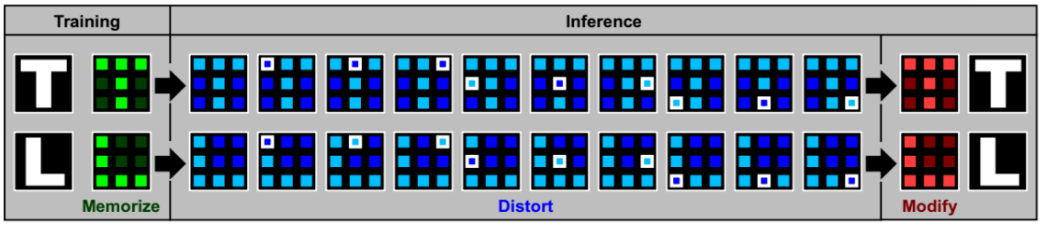


Increase in traps due to impact of the carriers

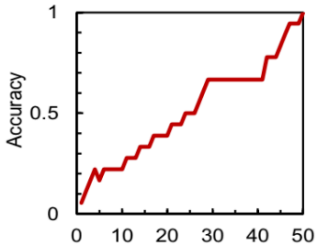
(e) Behavior mechanisms



other is the increase in traps due to impact of the carriers. In any case, the conductance changes are used as a local autonomous learning in this research.



The modified patterns are the same as the memorized patterns for all the distorted patterns, which means that this chip has a complete function of the associative memory.



Conclusion

In conclusion, a neuromorphic chip integrated with an LSI and AOS thin-film synapse devices utilizing local autonomous learning has been developed. The neuron elements are digital circuit, which were made in an LSI, and the synapse devices are analog devices, which were made of the AOS thin film and directly integrated on the LSI. It turned out that this chip has a complete function of the associative memory, which is a typical application of artificial intelligences. This is the world's first hybrid chip where neuron elements and synapse devices of different functional semiconductors are integrated, and local autonomous learning is utilized, and has all advantages of neuromorphic systems.

by
B. Prasanthi
22761A04E0

SUSTAINABLE ELECTRONICS AND GREEN TECHNOLOGY

DEFINITION

Sustainable electronics and green technology refer to the design, production, use, and disposal of electronic devices and systems in an environmentally friendly manner. These technologies aim to minimize carbon footprints, reduce electronic waste, enhance energy efficiency, and promote the use of renewable materials in electronic manufacturing.

WHY PREFER GREEN TECH?

1. Reduced Environmental Impact: Decreases pollution, conserves natural resources, and lowers greenhouse gas emissions.

2. Energy Efficiency: Promotes the use of energy-efficient components, reducing electricity consumption.
3. E-Waste Reduction: Encourages recycling and responsible disposal of electronic devices.
4. Health Benefits: Limits exposure to toxic materials found in traditional electronics.
5. Economic Savings: Lowers energy and operational costs in the long run.
6. Regulatory Compliance: Meets global sustainability standards and government regulations.

FUTURE DIRECTIONS AND IMPLEMENTATION

1. Eco-Friendly Materials: Use of biodegradable, recyclable, and non-toxic materials in electronics manufacturing.
2. Energy-Efficient Devices: Development of low-power-consuming components and renewable energy-powered electronics.
3. Circular Economy: Promotion of refurbishing, repairing, and recycling old electronics instead of disposal.
4. Smart Grids and Renewable Energy Integration: Efficient energy distribution using AI and IoT.
5. Nanotechnology and Biodegradable Electronics: Research into self-decomposing electronic components to reduce e-waste.
6. Sustainable Manufacturing Processes: Adoption of green factories with minimal emissions and water consumption.

CHALLENGES IN GREEN TECH ADOPTION

1. High Initial Costs: Developing and implementing sustainable electronics can be expensive.
2. Limited Consumer Awareness: Many users are unaware of green technology benefits and how to adopt them.
3. Technological Limitations: Some green tech solutions are still in early development and lack widespread adoption.
4. E-Waste Management Issues: Proper collection, recycling, and disposal require better infrastructure.

5. Supply Chain Constraints: Difficulty in sourcing sustainable raw materials.
6. Regulatory Barriers: Different countries have varying policies, making global implementation complex.

CONCLUSION

Sustainable electronics and green technology are crucial for reducing environmental damage and promoting a healthier planet. While challenges exist, advancements in eco-friendly materials, energy-efficient technologies, and recycling practices will drive the future of green tech, making it an essential aspect of sustainable development.

by
S. Bhargavi
22761A04I2

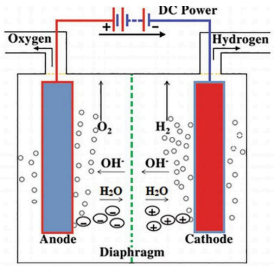
REVIEW WRITING

ELECTROCHEMICAL RECOVERY OF FERTILIZER CHEMICALS FROM ANIMAL WASTE

Animal agriculture produces large volumes of manure, which contains nutrients like ammonia (NH4+),
potassium (K+), and phosphorus (PO43−). These are valuable for crop growth but can cause:

- Water pollution (eutrophication) if overapplied or leaked.
- Air pollution from ammonia volatilization.
- Waste management issues on large farms.

Traditional manure management involves costly treatment or open field application, both with environmental risks.



The Electrochemical Process

Researchers from the University of Illinois Urbana-Champaign have developed an energy-efficient electrochemical method to selectively recover nutrients:

Key Components:

1. Electrochemical Cell Setup:
   - Two chambers separated by a membrane.
   - Electrodes (e.g., based on Prussian Blue analogs) capture specific ions.
2. Selective Ion Separation:
   - Ammonium (NH4+) and potassium (K+) ions are selectively absorbed.
   - No need to filter the entire manure; only the desired ions are targeted.
3. Regeneration and Reuse:
   - Ions are released and collected into a clean solution.
   - Electrodes can be reused multiple times, reducing waste.
4. Hydrogen Gas Byproduct:
   - Hydrogen (H2) is generated at the cathode.

Advantages

- Zero Chemical Additives: No acids or alkalis needed.
- Energy Efficient: Requires less energy than evaporation or biological treatment.
- Dual Benefit: Produces fertilizer and green hydrogen.
- Prevents Pollution: Minimizes nitrogen runoff into waterways.

Applications

- Precision Agriculture: On-site nutrient recovery for direct field use.
- Hydrogen Economy: Adds value through clean hydrogen fuel production.
- Rural Waste Management: Sustainable manure processing in remote farms.
- Commercial Fertilizer Production: Supplies ammonium nitrate and potassium salts.

Challenges

- Scaling the system for large-scale farms.
- Cost of electrode materials, though Prussian Blue analogs are inexpensive.
- Integrating with existing manure treatment infrastructure.

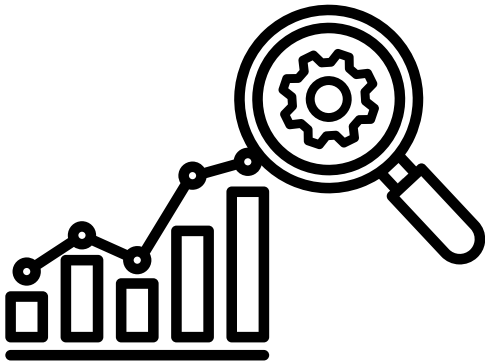
Future Outlook

This system aligns with the global goals of:

- Sustainable farming
- Nutrient circularity
- Low-carbon hydrogen production

With further development, it can transform agricultural waste into valuable resources, helping combat both climate and food security challenges.

by
M. Deepika
22761A04H3



GENE EDITING

Gene editing, also known as genome editing, is a technique that enables scientists to change an organism's DNA. It allows the addition, removal, or alteration of genetic material at specific locations in the genome. Technologies like CRISPR-Cas9 have revolutionized this field, making genetic modification more precise, efficient, and accessible.

Gene editing holds promise for curing diseases and advancing science, but it also raises ethical and regulatory concerns. Since genes are the building blocks of life, guiding the growth and function of all organisms, their alteration must be approached responsibly.

WHAT IS A GENE?

A gene is the fundamental unit of heredity. It is a segment of DNA (deoxyribonucleic acid) that contains instructions for building and maintaining cells.

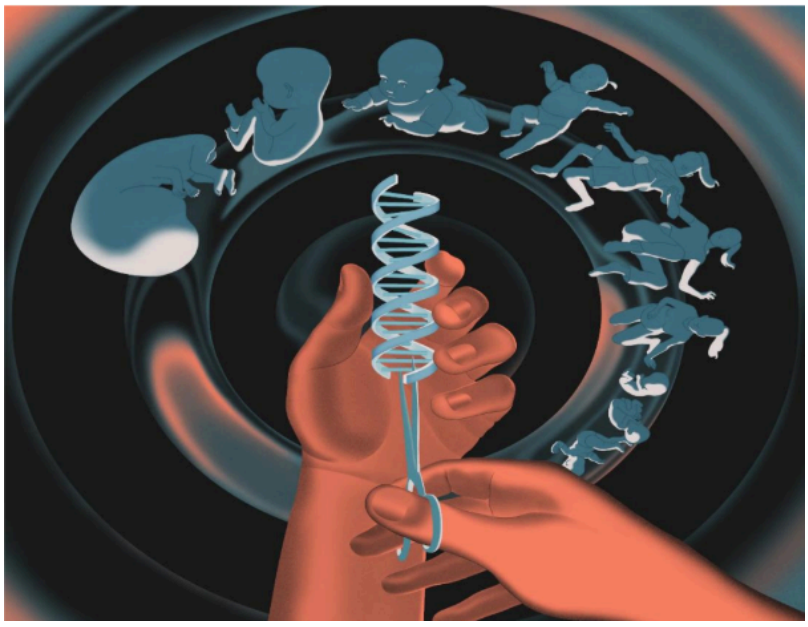
Key points about genes:

Structure: Made of DNA bases—adenine (A), thymine (T), cytosine (C), and guanine (G)—that code for proteins or RNA molecules.

Function: Genes act as blueprints for proteins, which perform essential biological tasks such as building cell structures and catalyzing reactions.

Inheritance: Genes are passed from parents to offspring, one copy from each parent, explaining family resemblances.

Variation: Genetic differences contribute to diversity and influence traits and disease susceptibility.

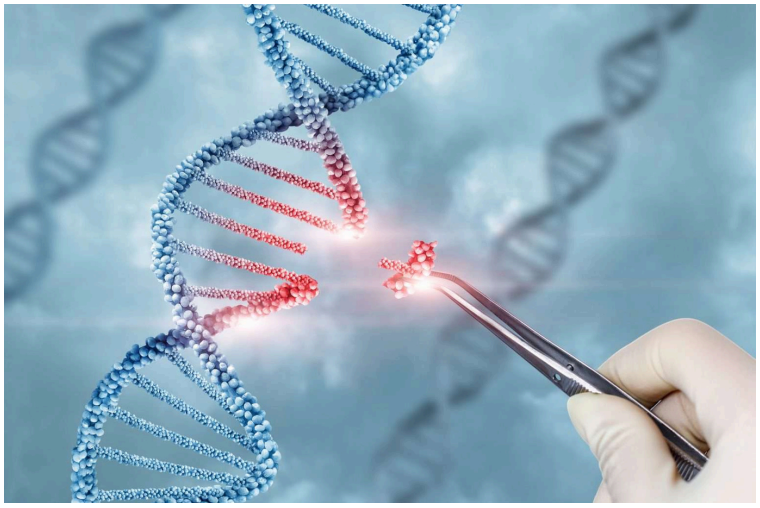


KEY ASPECTS OF GENE EDITING

CRISPR-Cas9: Functions like molecular scissors that cut DNA at targeted sites for accurate gene modification.

Applications: Used in medicine, agriculture, and research to correct genetic disorders, improve crops, and study diseases.

Ethics: Concerns arise with human germline editing (in embryos, eggs, or sperm), which could affect future generations permanently.



ROLE OF GENE EDITING IN THE WORLD

1. Medicine

Genetic Disorders: Can potentially cure diseases like cystic fibrosis, sickle cell anemia, and muscular dystrophy.

Cancer Therapy: CRISPR may target and destroy cancer cells more effectively.

Infectious Diseases: Used to develop resistance to viruses like HIV and aid in future pandemic control.

2. Agriculture

Crop Improvement: Enhances yield, nutrition, and resistance to pests and diseases for sustainable farming.

Livestock: Edits can improve animal health, productivity, and disease resistance.

3. Environmental Conservation

Biodiversity: Helps preserve endangered species and manage invasive species.

Bioremediation: Engineered organisms can clean up pollutants and restore ecosystems.

CHALLENGES AND CONCERNS

Technical Challenges

Off-target Effects: Unintended DNA changes may cause harmful mutations.

Ethical Concerns

Germline Editing: Raises issues of consent and long-term consequences.

Designer Babies: Non-medical enhancements (e.g., intelligence, appearance) could create social inequality.

Biodiversity Concerns

Ecological Impact: Editing wild species or pests could disturb ecosystems and reduce biodiversity.

ROLE IN ELECTRONICS AND COMMUNICATION ENGINEERING

Although gene editing focuses on biology, it has indirect applications in electronics through bio-inspired technologies:

1. Biologically Inspired Electronics

Bioelectronics: Genetically modified organisms are used in biosensors for detecting pollutants or pathogens.

Neural Interfaces: Gene editing can improve neuron compatibility with electronic devices, enhancing brain–computer interfaces.

2. Communication Systems

Biological Communication: Insights from cellular signaling inspire efficient and secure communication protocols.

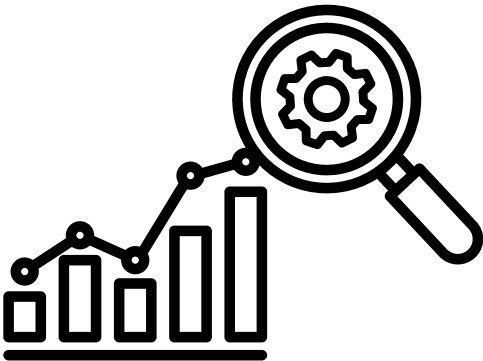
3. Material Science

Biodegradable Electronics: Engineered organisms can produce eco-friendly materials for sustainable electronic components.

CONCLUSION

Gene editing is a transformative scientific tool that offers vast potential in medicine, agriculture, and environmental conservation. However, it demands responsible use, ensuring benefits are maximized while minimizing risks. Its indirect impact on electronics highlights the power of cross-disciplinary innovation between biology and technology.

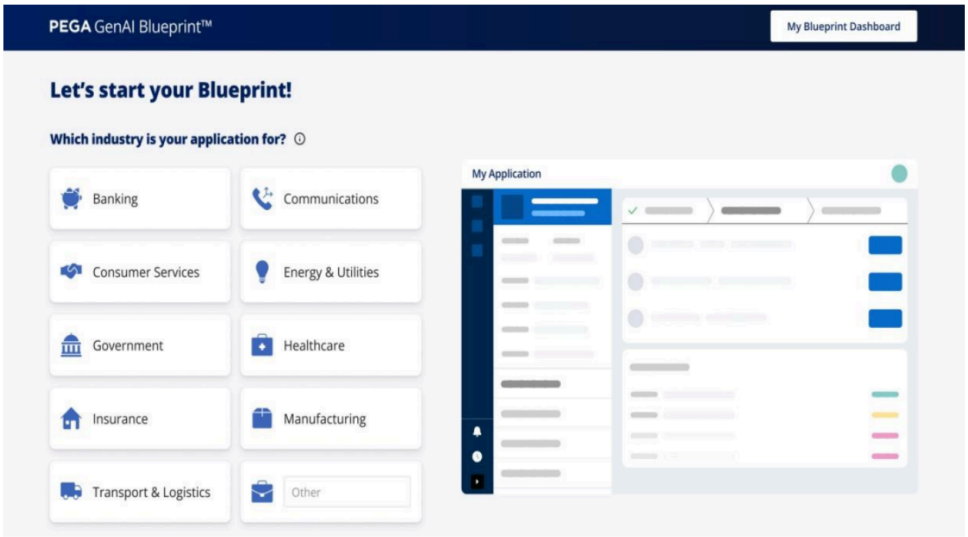
by
P. Srija
22761A04H8



INTRODUCTION TO PEGA GENAI BLUEPRINT

Pega GenAI marks a revolutionary advancement in combining artificial intelligence (AI) with business processes. It empowers organizations to enhance productivity, streamline workflows, and improve customer engagement. The GenAI Blueprint acts as a strategic roadmap that guides businesses on how to effectively integrate AI within the Pega ecosystem.

Pega GenAI utilizes AI and machine learning to automate tasks, analyze data, and support better decision-making. By leveraging natural language processing and adaptive intelligence, it enables organizations to create smart, dynamic applications that evolve with changing business needs and customer demands. This approach helps companies harness AI's full potential for operational excellence and innovation.



PURPOSE OF THE GENAI BLUEPRINT

The GenAI Blueprint provides a structured methodology for integrating AI into business operations. It helps organizations:

Spot Opportunities: Identify areas where AI can add value or increase efficiency.

Create Solutions: Develop custom AI models that align with specific business goals.

Implement Effectively: Follow proven practices to integrate AI into existing Pega applications with minimal disruption.

Monitor and Improve: Continuously evaluate AI performance using data-driven insights to optimize outcomes.

KEY COMPONENTS OF THE GENAI BLUEPRINT

Assessment Framework: Tools to assess current workflows and identify AI improvement areas.
Model Development Guidelines: Best practices for building and training AI models suited to business objectives.
Integration Strategies: Methods to embed AI functionalities into current Pega applications.
Performance Metrics: Quantitative indicators to measure AI's effectiveness and contribution to business goals.
Continuous Improvement: A feedback-driven approach for refining AI systems based on real-world performance and user feedback.

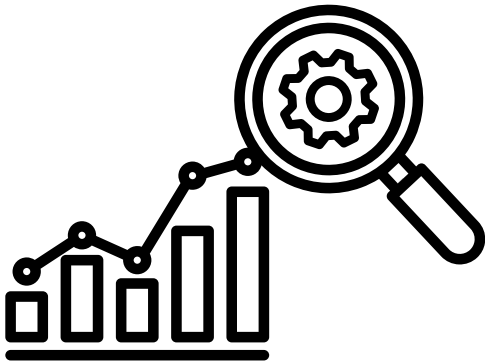
USES OF PEGA GENAI BLUEPRINT

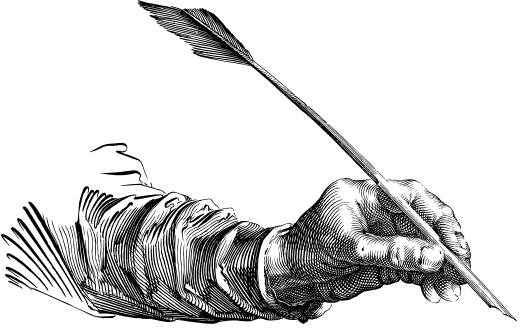
Structured Framework: Offers a clear and organized roadmap for AI implementation.
Seamless Integration: Merges AI capabilities into existing workflows with minimal disruption.
User Accessibility: Designed for ease of use, enabling participation from both technical and non-technical users.
Scalability: Supports business growth by accommodating projects of varying sizes.
Data-Driven Decisions: Improves operational efficiency and accuracy through analytical insights.

CONCLUSION

The Pega GenAI Blueprint provides a comprehensive, strategic, and adaptable approach for embedding AI into business processes. While it presents some challenges—particularly around data management and technical expertise—it offers organizations a powerful framework to innovate, scale, and optimize performance using intelligent automation.

by
M. Hari Krishna
22761A04H1





POETRY

whisper of the wild

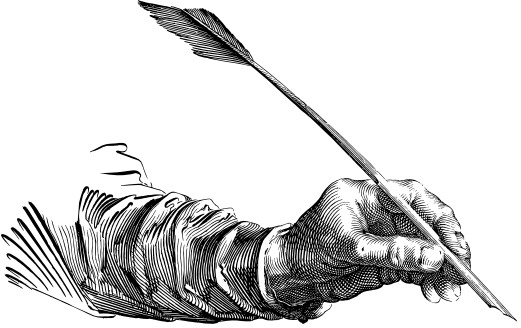
THE MORNING SUN, SO SOFT, SO BRIGHT,
SPILLS GOLDEN THREADS OF DANCING LIGHT.
THE GENTLE BREEZE, A FLEETING GUEST,
STIRS EMERALD LEAVES IN QUIET REST.

THE RIVER HUMS A SOOTHING TUNE,
REFLECTING SHARDS OF SILVER MOON.
MOUNTAINS RISE WITH STEADFAST GRACE,
TIME-WORN GIANTS, LOST IN SPACE.

FLOWERS BLOOM IN HUES SO BOLD,
TALES OF SPRING IN PETALS TOLD.
THE FOREST HUMS, THE MEADOWS SING,
A SYMPHONY OF ENDLESS SPRING.

SO PAUSE, BREATHE DEEP, EMBRACE THE LAND,
FEEL THE EARTH'S KIND, LOVING HAND.
FOR NATURE SPEAKS IN QUIET WAYS,
A SONG OF PEACE THAT NEVER FADES.

by
P. Sowjanya
23761A04I0



whispers of the moon

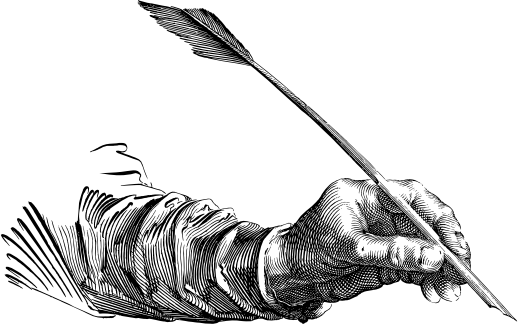
THE MOONLIGHT DRAPES THE SILENT HILLS,
A SILVER HUSH, A BREATH SO STILL.
IT SINGS TO THOSE WHO DARE TO DREAM,
A VOICE AS SOFT AS STARLIT STREAMS.

THE TREES BOW LOW IN MIDNIGHT'S KEEP,
THEIR SHADOWS LONG, THEIR ROOTS RUN DEEP.
THEY LISTEN WELL, THEY NEVER TELL,
THE STORIES WHISPERED WHERE NIGHT DWELLS.

A LANTERN FLICKERS IN THE DARK,
A TRAVELER LOST WITHOUT A SPARK.
YET IN THE SKY, A PATH IS DRAWN,
A THREAD OF LIGHT TO LEAD TILL DAWN.

FOR THOSE WHO WANDER, THOSE WHO ROAM,
THE MOON WILL ALWAYS GUIDE THEM HOME.

by
T. Srinivas
23761A04J0



The Silent Soldier

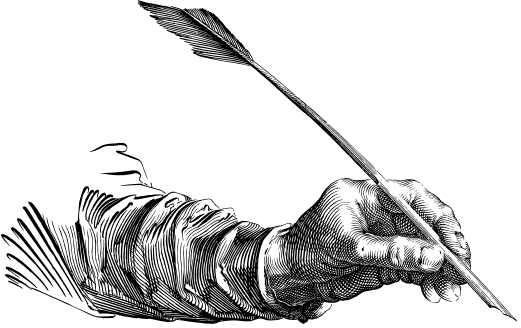
HE STANDS WHERE ECHOES FADE TO DUST,
WHERE STEEL AND EARTH BETRAY THEIR TRUST.
THE SKY IS GRAY, THE GROUND IS RED,
A THOUSAND VOICES HAUNT HIS HEAD.

HE MARCHES ON WITH WEARY TREAD,
A NAME LONG LOST, A PAST UNSAID.
HIS HANDS HAVE HELD BOTH SWORD AND PLEA,
A FIGHTER BOUND, YET LONGING FREE.

THE WORLD MOVES ON, THE BANNERS FALL,
THE STORIES FADE, FORGOTTEN ALL.
YET IN THE NIGHT, BENEATH THE STARS,
HE COUNTS THE WEIGHT OF UNSEEN SCARS.

FOR WAR WILL END, AND TIME WILL BEND,
BUT SOLDIERS NEVER BREAK—THEY BEND.

by
K. Prabhod kumar
23761A04F8



The river called life

LIFE IS A RIVER, GENTLE AND WILD,
SOMETIMES CALM, SOMETIMES RILED.
IT TWISTS THROUGH VALLEYS, CLIMBS EACH HILL,
GUIDED BY DREAMS, BY HEART, BY WILL.

SUNLIGHT DANCES, SHADOWS PLAY,
NEW HOPES ARE BORN WITH EVERY DAY.
WE LAUGH, WE FALL, WE LEARN, WE MEND,
EACH BEND A START, NOT JUST AN END.

STORMS MAY COME, AND SKIES MAY CRY,
BUT RAINBOWS BLOOM WHEN TEARS RUN DRY.
FOR EVERY SCAR, A STORY GROWS,
FOR EVERY LOSS, NEW COURAGE FLOWS.

SO DRIFT, DON'T RUSH, THROUGH JOY AND STRIFE —
FOR BEAUTY LIVES IN THIS BREATH OF LIFE.
A FLEETING SPARK, YET SHINING BRIGHT,
A JOURNEY FROM DAWN TO ENDLESS NIGHT.

by
S. Poojitha
23761A04I9

DRAWINGS

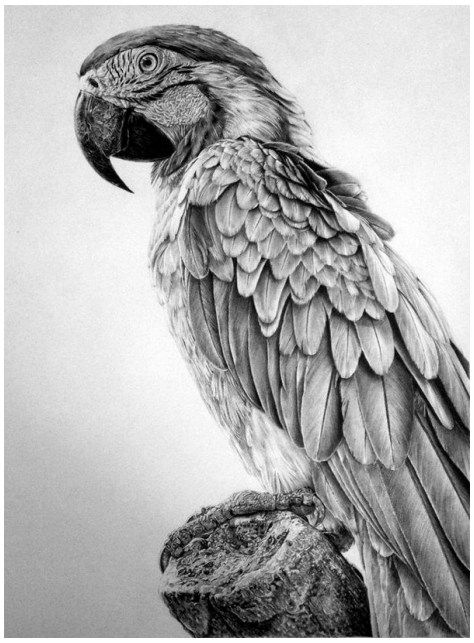
Sculpture

by
K. Prakash Reddy
23761A04F7

Bunny

by
E. Venkata sai sudharshan Reddy
23761A04E6

Macaw



by
M. Manisha
23761A04A0

Landscape

by
B. Gangadhar Lakshmi Narasimha Reddy
23761A04D8

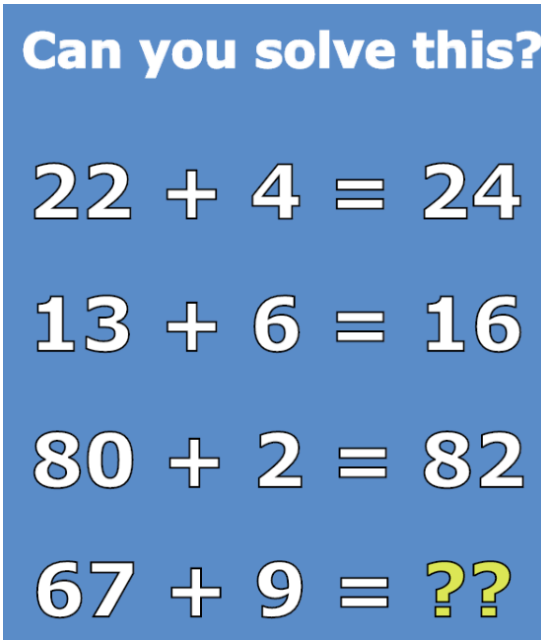
PUZZLES

Puzzle 1

		4						2
2	5			8	1			3
6		1	2				9	
				2				
				9		3	2	
3	9	2	6	1	7			
	1	7					6	8
4		8	1	7				
			9		8			1

by
M. Anusha
23761A04A6

Puzzle 2



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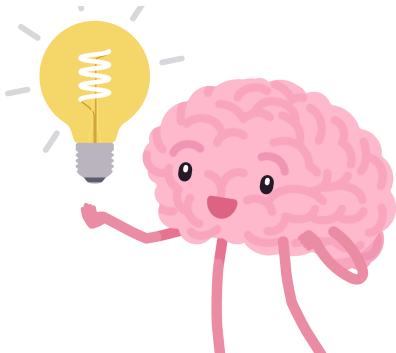


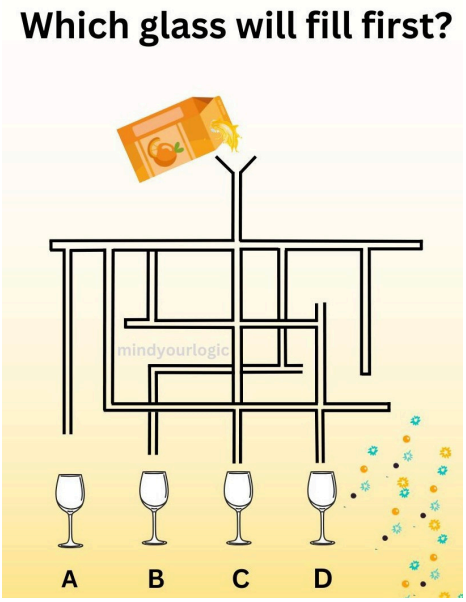
puzzle 3

Find the following words in the grid:
MAGAZINE, PUZZLE, READER, FUN, CHALLENGE, MYSTERY, BRAIN, QUIZ

M A G A Z I N E F U N
P U Z Z L E Q U I Z B
B R A I N C H A L L E
R E A D E R Y M Y S T
Y E R Y B R A I N P U
Z Z L E F U N C H A L
Q U I Z M A G A Z I N
E R R E A D E R B R A

by
Y.Sai charan
23761A04J8

puzzle 4



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Y. Akhil
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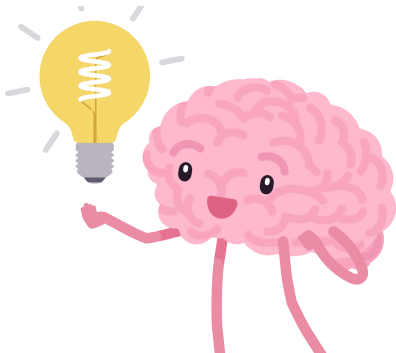
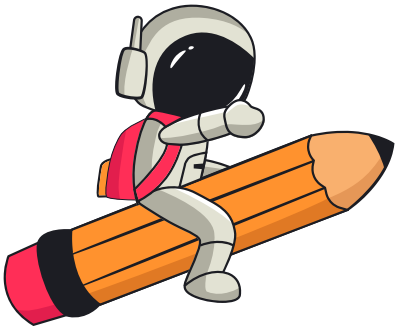




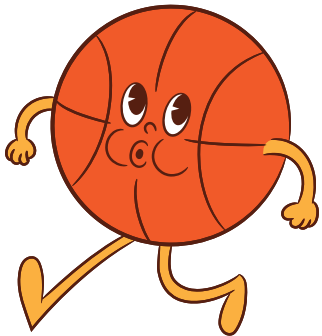
CARTOONS

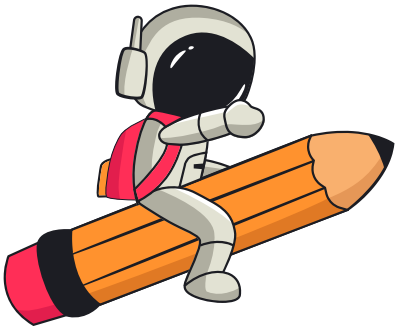
CARTOON 1

by
R.Prathyusha
23761A0447

CARTOON 2

by
M.Manideep
24761A0441





CARTOON 3

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R.Sai Charan
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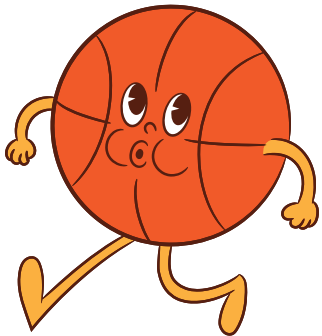
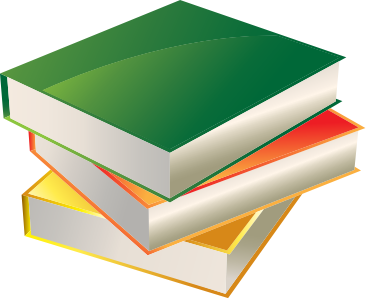
CARTOON 4

by
V. Anand Kumar
23761A04J4

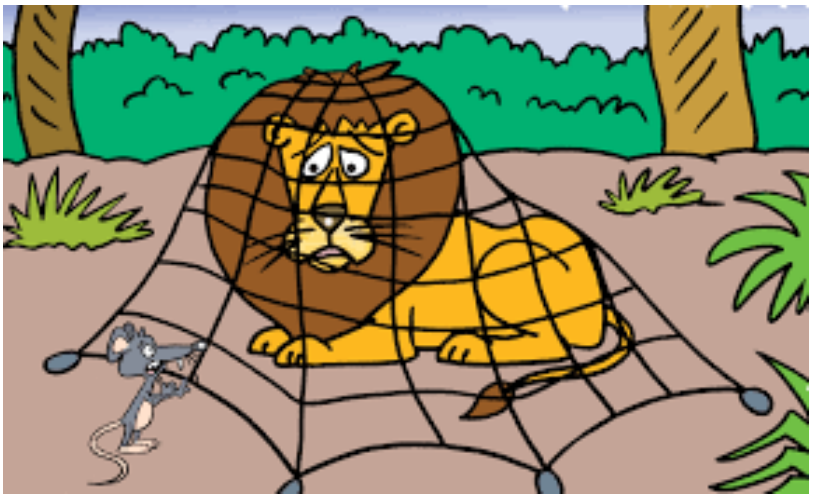




Stories

The Lion and the Mouse

A lion was once sleeping in the jungle when a mouse started running up and down his body just for fun. This disturbed the lion's sleep, and he woke up quite angry. He was about to eat the mouse when the mouse desperately requested the lion to set him free. "I promise you, I will be of great help to you someday if you save me." The lion laughed at the mouse's confidence and let him go.

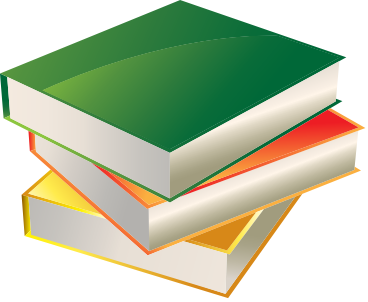


One day, a few hunters came into the forest and took the lion with them. They tied him up against a tree. The lion was struggling to get out and started to whimper. Soon, the mouse walked past and noticed the lion in trouble. Quickly, he ran and gnawed on the ropes to set the lion free. Both of them sped off into the jungle.

Moral of the Story

A small act of kindness can go a long way.

by
P.Ramya sri
22761A0442



The Boy Who Cried Wolf

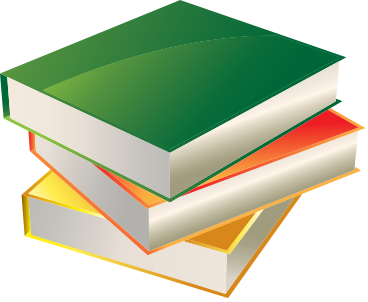
In a village, lived a carefree boy with his father. The boy's father told him that he was old enough to watch over the sheep while they graze in the fields. Every day, he had to take the sheep to the grassy fields and watch them as they graze. However, the boy was unhappy and didn't want to take the sheep to the fields. He wanted to run and play, not watch the boring sheep graze in the field. So, he decided to have some fun. He cried, "Wolf! Wolf!" until the entire village came running with stones to chase away the wolf before it could eat any of the sheep. When the villagers saw that there was no wolf, they left muttering under their breath about how the boy had wasted their time. The next day, the boy cried once more, "Wolf! Wolf!" and, again, the villagers rushed there to chase the wolf away.

The boy laughed at the fright he had caused. This time, the villagers left angrily. The third day, as the boy went up the small hill, he suddenly saw a wolf attacking his sheep. He cried as hard as he could, "Wolf! Wolf! Wolf!", but not a single villager came to help him. The villagers thought that he was trying to fool them again and did not come to rescue him or his sheep. The little boy lost many sheep that day, all because of his foolishness.

Moral of the Story

It is difficult to trust people who lie, so it's important to always be truthful.

by
Pushpa Lavanya
22761A0441



THE POWER OF HOPE AND HARD WORK

TIn a village there lived a couple named Venkat and Laxmi. They had two children a daughter and a son. The daughter was older and son was younger. For some time, family was very happy and joy. They can live with lots of happiness. The daughter and son was studying. The daughter name is Sam and son name is Ram. Daughter studying intermediate but the son failed his10th grade exams. His father however encouraged him to study again ,and he passed in 10th SSC examinations.

Later her father sent the son to study intermediate (junior college). Again he failed at that point. Her father stopped supporting his education. But he continued to support his education and she studying well. The daughter understanding her father's situation, also convinced him to let her brother complete his intermediate studies. She even paid the fee for his education.

Her father was angry with his son and often insulted him. But son however did not give up. He worked hard and try to study very careful and understand everything and eventually secured a good job than her sister. He then took care of his father and restored his pride.

The father realized the importance of his son and valued him more than his daughter.

MORAL OF THE STORY

This story teaches us the value of perservance and determination. Even in difficult circumstances, with hard work and dedication one can achieve success.

And also don't underestimate any one and also don't judge by see a cover of the book.

by
T.Nageswari
23761A04C5

E-Resources

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Assistant Professor

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21761A0466

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