



Gnanamani

College of Technology

Technological Education

ACCREDITED BY NAAC 'A' GRADE & NBA

AUTONOMOUS

IMPULSE

**ELECTRONICS AND COMMUNICATION
ENGINEERING**

Volume 8

Issue 1

2023-2024



Accredited by NAAC 'A' Grade and NBA

NH 7, A K Samuthiram, Panchal-PO, Namakkal-637 018,

Tamil Nadu.

GNANAMANI EDUCATIONAL INSTITUTIONS

Gnyanamani Educational Institutions that have carved a niche for itself in the field of engineering education within a very short span of time. Gnanamani College of Technology which was established in the year 2006, the group comprises of Gnanamani College of Education, established in the year 2005.

Gnanodaya CBSE International School was established in the year 2015. These Institutions serve under the aegis of The Christian Educational Development Trust.

Gnyanamani Educational Institutions were established in a well-planned campus with a green environment. The Colleges are spread on a sprawling 60 acres of serene land. The Colleges are easily accessible from all major cities by road and railway networks.

These Institutions have emerged as a pioneer venture in the field of Technical Education. Dr.T.Arangannal – a Rashtria Vidhya Saraswathi Puraskar Awardee is the Chairman and Mrs.P.Malaleena is the Chairperson of the Educational Institutions.

GNANAMANI COLLEGE OF TECHNOLOGY

Gnanamani College of Technology is a leading Institution with state-of-the-art facility.

The institution is rendering noble service to the youths in rural and urban areas. The college is accredited by the NAAC and NBA (CSE, ECE, EEE, and Mechanical). The college has grown in a short span of 17 years with 12 UG Courses namely Agricultural, Artificial Intelligence and Data Science, Bio-Medical, Biotechnology, Chemical, Computer Science, Electrical and Electronics, Electronics and Communication, Food Technology, Mechanical, Information Technology and Pharmaceutical Technology.

The Institute also offers 9 PG courses in Computer Science, Construction Engineering and Management, Environmental Engineering, Embedded System Technology, Power Electronics and Drives, Industrial Engineering, VLSI Design, BME, MBA and MCA.

INSTITUTE VISION

Emerging as a technical institution of high standard and excellence to produce quality Engineers, Researchers, Administrators and Entrepreneurs with ethical and moral values to contribute the sustainable development of the society.

INSTITUTE MISSION

We facilitate our students

- To have in-depth domain knowledge with analytical and practical skills in cutting edge technologies by imparting quality technical education. To be industry ready and multi-skilled personalities to transfer technology to industries and rural areas by creating interests among students in Research and Development and Entrepreneurship.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

- The Department of Electronics and Communication Engineering (ECE) was established in 2006 with the vision of developing the department as a Centre of Excellence in R&D, and in the field of Electronics and Communication Engineering. It also puts strenuous efforts to make the students into technically strong and mentally stable.
- Our mission is to develop innovative and simple instructional material to instil the concepts into the minds of students and infuse scientific temper in the students and exhort them towards research in their specialization. It is also striving arduously with a team of committed teachers to bring out the excellence in both teaching and research. It also entails its road with a view to developing Collaborative Research and strengthening Development linkages with leading organizations in India and overseas.
- The department has Analog and Digital Circuit Lab, Communication Lab, Embedded Systems Lab, DSP/VLSI Lab, Optical and Microwave Lab, Linear Integrated Circuits lab, Electron Devices & Circuits lab, Modelling & Simulation lab, and Microprocessor & Microcontroller lab.
- All the laboratories are set up with air conditioning and supported by uninterrupted power supply facility. The state-of-the-art equipment in the laboratories makes it ideal hub for research and development in the field of Electronics and Communication Engineering.

VISION

- To produce globally competent, innovative, ethical, socially responsible and academically excellent graduates in Electronics and Communication Engineering.

MISSION

- Imparting high quality education with value added programs through state-of-the-art facilities to prepare technically strong engineers with social awareness.
- Addressing the needs of the people's aspirations and to our local needs on the Emerging technology.
- Promoting excellence towards productive careers in industry, research and entrepreneurship.

PROGRAM EDUCATIONAL OBJECTIVES

- Be able to apply mathematics, science and Engineering fundamentals and advanced concepts for their successful careers in industries, higher studies and research.
- Analyse, design and execute interdisciplinary projects by addressing the industrial and social needs.
- Demonstrate and exhibit professional practice with ethical behaviour and engage in continuous learning for career growth.

PROGRAM SPECIFIC OUTCOMES

- Possess knowledge and skills to work on analog and digital systems, AdHoc and sensor networks, embedded and communication systems
- Adapt to emerging technologies with required skills and to offer solutions to the novel problems and succeed in their career.

PROGRAM OUTCOMES

Engineering knowledge:

Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems

Problem analysis:

Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

Design/development of solutions:

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.

Conduct investigations of complex problems:

Use research-based knowledge and research methods including design

Environment and sustainability:
of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

Modern tool usage:

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Engineer and society:

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

A Individual and team work:

Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication:

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance:

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning:

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



MANAGEMENT PROFILE



PROGRAM OUTCOMES

Gnyanamani Educational Institutions are run by two legendary visionaries, Dr. T. Arangannal and Mrs. P. Malaleena, whose dedication to education has shaped the institution's identity and direction.

At the forefront is Dr. T. Arangannal, Chairman, a distinguished leader, who has been a driving force behind the institution's evolution. A recipient of the Rashtriya Vidya Saraswati Puraskar and an honorary Doctorate from the University of Sri Lanka, Dr. Arangannal is widely revered for his lifelong contributions to the field of education. His visionary leadership has cultivated a culture of excellence, discipline, and innovation across all levels of the institution.

Mrs. P. Malaleena, Chairperson, whose unwavering commitment and strategic foresight have been instrumental in establishing the institution's strong ethical and academic foundations. Her focus on student-centered learning and inclusive growth continues to define its mission, vision, and core values.

The leadership team also includes Ms. Madhuvanthinie Arangannal, Vice-Chairperson, who brings a contemporary vision and strategic insight to the institution's development. Her dynamic leadership focuses on aligning the institution with global academic standards and fostering innovation in education.

Operational administration is efficiently managed by Dr. P. Premkumar, Chief Administrative Officer, whose expertise in institutional management and policy implementation ensures the smooth functioning of all academic and support services. His strategic leadership plays a vital role in sustaining and enhancing the institution's quality standards.

Academic affairs are led by Dr. T.K. Kannan, Principal, who is committed to providing a rigorous and engaging academic environment. His leadership promotes research-driven teaching, skills development, and student empowerment, ensuring that learners are prepared to meet the demands of a rapidly changing global landscape.



CHAIRMAN'S MESSAGE



It gives me immense pleasure to express that our Electronics and Communication Engineering release the department magazine for the academic year 2023-24 highlighting the various activities and budding talents of the students on this special occasion. I value the emerging ability and the endowment of the students in their articles, poems, drawing etc., which bloom out their young talents and skills. I appreciate our magazine committee for their venture in bring out this memorable edition.

I wish the Principal, Magazine Committee and the Editorial team, Staff and Students and all the hands that rendered service to bring out a fabulous magazine for this year, I am passionately waiting for the editorial team to reach another mile stone of perfection in the next magazine. I wish them all success.

Dr. T. Arangannal



CHAIRPERSON'S MESSAGE



I am glad to know that our Gnanamani College Of Technology is leading a step forward by releasing the magazine 2023-2024. This magazine would be a common platform for the students to express their hidden talents and creativity. My hearty wishes to the Principal, staff members and students for the completion of this IMPULSE.

Wishing you all success in their Academic Endeavours.

Tmt.P.Malaleena



VICE CHAIRPERSON'S MESSAGE



Impulse is particularly important as it encourages the students to share the knowledge they have acquired. Writing articles for the magazine also improves the communication skills of the budding engineers of the ECE department. It is common knowledge that representation of an idea is as important as, if not more important, than the idea itself.

I would like to congratulate the faculty and the students of the editorial team on bringing out the issue of Iconic and my best wishes to the students for a bright future.

Ms. Madhuvanthinie Arangannal



CAO'S MESSAGE



It is my privilege to know that Department of Electronics and Communication Engineering releasing its achievements in a nutshell in the form of a magazine. This magazine is a skylight which always exhibit innovative and the creative thoughts of the blooming engineers. I take this opportunity to congratulate and wish all faculty members and students success.

Dr.P.Premkumar



PRINCIPAL'S MESSAGE



Impulse represents a cloud with a silver lining for the world of technology. It aims to inspire and nurture upcoming-world of technology. The magazine captures the current engineers to bring a revolution in this ever-evolving technological advancements.

I would like to congratulate the vice principal, HoD, Staff members and students for bringing out the issue of Impulse.

Dr. T.K. Kannan



HOD'S MESSAGE



Congratulations to the students and faculty associated to magazine committee for successfully publishing the issue of departmental technical magazine Iconic. Iconic is creating platform which provides an opportunity to the students and staff to express their original thoughts on technical topics.

The magazine plays an instrumental role in providing exposure to the students to develop written communication skills and command over the language. It is a step towards building professional and ethical attitude in them. The entire journey of creating Impulse is an outcome of rigorous effort made by students and faculty.

On concluding note, I would like to thank all the stakeholders for their involvement and encouragement and wish all the best for their bright future.

Dr. R. Prabhu

How Wireless communication Works ?

Have you ever wondered how text messages, pictures, and videos are sent to your wireless phone? Every day billions of devices around the world connect and share data at the speed of light. It may look like magic, but really just a powerful, invisible, and under-appreciated force known as electromagnetism.

Electromagnetism is one of the four fundamental forces in nature. As the name suggests it is the interaction between the electric and magnetic fields. Electricity and magnetism were originally thought to be separate forces, but were unified when James Clerk Maxwell published his Treatise on Electricity and Magnetism in 1873 showing that both phenomena could be explained by one force. In this article, we explore how this force is used in all forms of



wireless communications.

How Waves Are Transmitted

An electromagnetic wave is created when there is a disturbance in the electromagnetic field. A disturbance like this can be created when you do something as simple as briefly touch both ends of a wire to the terminals of a battery. This allows an electric current to flow through the wire, which in turn creates a weak electromagnetic wave which expands outward in all directions. The wave created in our example would not travel far and would not contain any information. If it were intercepted by a radio transmitter, it would just sound like static.

How Waves Carry Information

In the early 20th century radio waves transmitted data as Morse code. This process of

information transfer was slow and had limited capabilities. World War I and II dramatically accelerated the development of modern radios, contributing to the first commercial radio broadcasting in the 1920s.

Today electromagnetic waves can represent, and therefore transmit, virtually any kind of data imaginable. Just as waves in a lake move up and down as they expand outward, electromagnetic waves do much the same thing. Note that these kinds of waves resemble a sine function, as seen below.

A limited number of frequencies can be used to send electromagnetic waves, so we designate ranges of frequencies for certain purposes, which collectively make up the radio spectrum.

Using different frequencies allows multiple radio signals to be sent at the same time, in the same area, and be distinguishable from one another. When you visit a radio station on 95.1 FM, for example, you are tuning into a radio station that broadcasts at an electromagnetic frequency of 95,100,000 cycles per second. By listening to only this frequency, your radio distinguishes this radio station from others.

Sending and Receiving Information
 Transmitting information between two devices using radio waves requires a transmitter and a receiver. The transmitter takes information like audio or video, encodes it into a sine function, and transmits the function into the air in the form of an electromagnetic wave. The receiver detects the wave and decodes the data. Antennas are used by transmitters to

transmit waves

by receivers to detect them.

Electromagnetic waves can travel anywhere from a few miles (for television broadcasts) to millions of kilometers (for deep space transmissions) depending on the power of the transmission. As radio waves propagate out into space in every direction they lose a small amount of energy and become harder to detect. Accordingly, higher powered transmitters must be used to send radio waves over a longer distances.

The Force Is All Around You

The ability to sense electromagnetic waves is known as magnetoreception, and is an ability shared by many in the animal kingdom including birds, bats, fruit flies, and mice. Birds are known to use the earth's magnetic field for

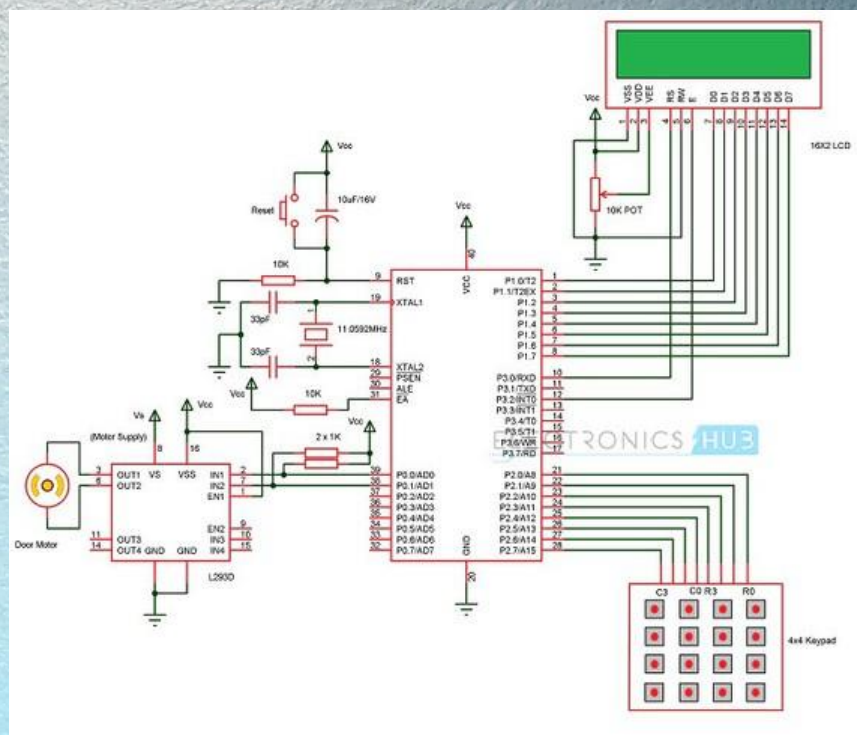
navigation — an ability that helps them orient themselves relative to the ground and develop regional maps.

Although we can't see them, there are countless electromagnetic waves

all around us traveling at the speed of light. Electromagnetic waves are used for television broadcasts, cell phones, Bluetooth, radio, and every other form of wireless communication.

Password Based Door Lock System using 8051 Microcontroller

Password Based Door Lock System using 8051 Microcontroller is a simple project where a secure password will act as a door unlocking system. Traditional lock systems using mechanical lock and key mechanism are being replaced by new advanced techniques of locking system. These techniques are an integration of mechanical and electronic devices and are highly intelligent. One of the prominent features of these innovative lock systems



is their simplicity and high efficiency.

Hardware Requirements

- 8051 Microcontroller
- 8051 Development Board
- 8051 Programmer
- 4×4 Matrix Keypad
- 16×2 LCD
- L293D Motor Driver Board • DC Motor
- 10KΩ Potentiometer • Connecting wires
- Power Supply

Software Requirements

- Keil μVision IDE
- Willar Programmer
- Proteus (for circuit diagram and simulation)

Algorithm

1. Initially, declare the PORT1 to LCD data pins and control pins (RS and E) to P3.0 and P3.2. Also, declare PORT2 to keypad. Also use P0.0 and P0.1 for motor driver.
2. Then, display the message “enter password” on LCD.
3. Now read the five digit password from the user.
4. Compare the entered password with the stored password.
5. If password is correct, then make P0.0 pin HIGH and P0.1 pin LOW to open the door. During this time, display “Door opening” on LCD.
6. After some time, make P0.0 pin LOW and P0.1 pin HIGH to close the door and after this display “Door closing” on LCD.
7. If the password is wrong, then display “Wrong Password” on LCD.
8. After some delay again ask to enter password.

3D-IC Technology

Three-dimensional integrated circuit (3D-IC) is a die-stacking technology used in semiconductor packaging that offers new levels of efficiency, power, performance, and form-factor advantages to the semiconductor industry. 3D-IC is built by wafer-on-wafer or chip-on-wafer stacking on a single package interconnected using through-silicon vias (TSVs).

3D-ICs promise “more than More” integration by packing improved functionality into small form factors while enhancing performance and reducing costs. 3D-IC packages accommodate multiple heterogeneous die such as logic, memory, analog, RF, and micro-electrical mechanical systems (MEMS) at different advanced process nodes for high-speed logic and older nodes for analog.

BENEFITS OF 3D-IC:

- Lower costs are possible because not all functionalities, such as analog and memory, need to move to advanced process nodes.
- It's easier to meet high interconnect speeds and bandwidth requirements, reaching 100Gbps for advanced memory technologies.
- 3D-ICs allow miniaturization, saving

board space and end product space. They're ideal for extremely compact mobile devices.

- 3D-ICs can reduce power because significant drivers are no longer needed. A 3D stack can use small I/O drivers with lower power. Further, reduced resistance-inductance-capacitance (RLC) helps minimize power.
- Interconnect between packages is reduced, allowing faster performance and a better power profile.
- Time to market can be faster, thanks to modularity, the potential for “die reuse,” and the ability to leave analog/RF at higher process nodes.
- Emerging technologies such as photonics or MEMS can be integrated into 3D stacks.

SOLITON TECHNOLOGIES

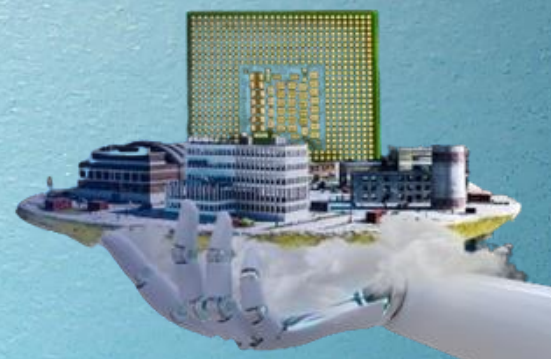
Regarded as a trusted partner for achieving Test & Measurement excellence through Automation and AI. Collaborated with hi-tech engineering companies, ranging from startups to Fortune 500, across industries such as Semiconductors, Medical Devices, Automotive, and Robotics, aims to assist in the enhancement of competitiveness and the release of Exceptional products through the implementation of Digital Transformation Service

FIELD OF WORK

- Cybersecurity Suite
- Digital Transformation Platforms
- Data Analytics and Business Intelligence Tools
- IoT (Internet of Things) Solutions
- Cloud Services
- Semiconductor Chip Characterization Automation

SKILLS

- Technical Proficiency
- Artificial Intelligence and Machine Learning
- Cybersecurity



Knowledge

- Digital Transformation

Expertise • IoT Skills

- Cloud Computing
- Collaboration and Communication •

Adaptability and Learning

Agility

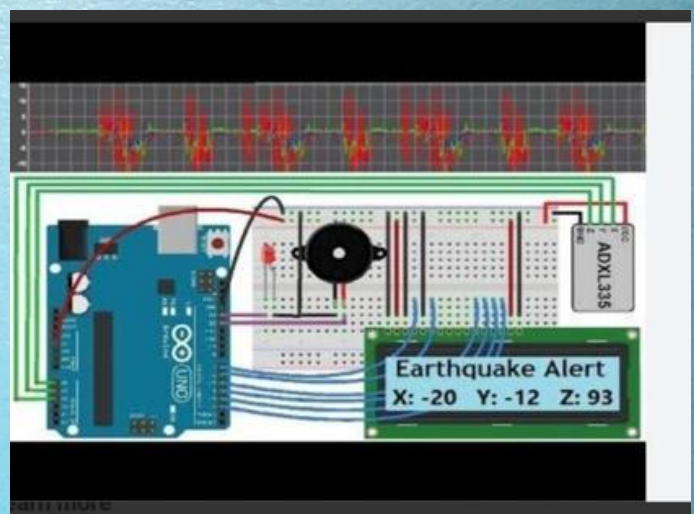
- Problem-Solving and Critical Thinking

Arduino Earthquake Detector Alarm using Accelerometer

In this project, we will learn how to design Arduino Earthquake Detector Alarm with Seismic Graph. We have used ADXL335 3 axis Accelerometer as a sensor for detecting tilting, trembling, or any shaking movement of an earthquake. We have an interfaced ADXL335 Accelerometer with Arduino and LCD display for designing Arduino Earthquake Detector Alarm with Seismic Graph.

Components Required:

- Arduino UNO
- Accelerometer ADXL335
- 16x2 LCD
- Buzzer
- BC547 transistor
- 1k Resistors
- 10K



POT •

LED

- Power Supply 9v/12v
- Berg sticks male/female

Working Explanation:

This Accelerometer module, based on the ADXL335 IC, interprets X, Y, and Z acceleration as analog voltages.

The Arduino Earthquake Detector uses the accelerometer to sense vibrations along any axis. Upon vibration, it translates these into ADC values read by Arduino, displayed on a 16x2 LCD, and graphically represented using Processing. Calibration involves sampling surrounding vibrations during Arduino startup, subtracting them for real readings. If values deviate from predefined thresholds, the Arduino triggers a buzzer, displays an alert on the LCD, and activates an LED. Sensitivity adjustments are possible by modifying predefined values in the Arduino code.

SILICON LABS

Leader in secure, intelligent wireless technology for a more connected world. The integrated hardware and software platform, along with intuitive development tools, an unmatched

ecosystem, and robust support, position as the ideal long-term partner for building advanced industrial, commercial, home, and life applications.

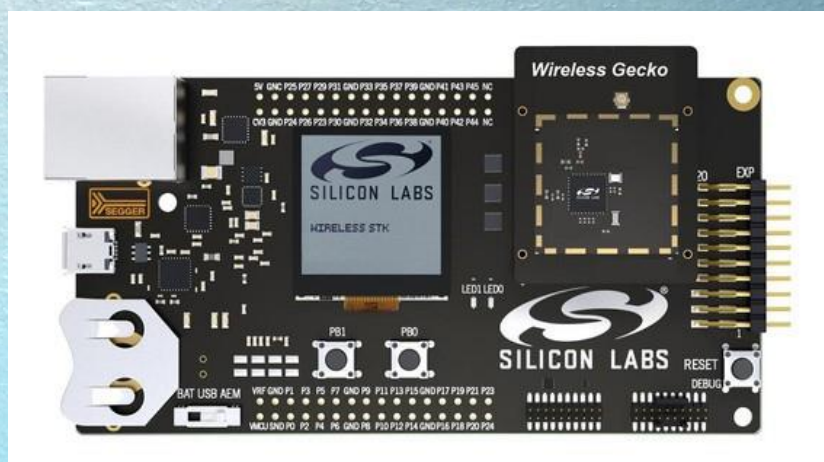
SKILLS

- Wireless Communication Protocols (Bluetooth, Zigbee, Z-Wave, WiFi, etc.)
- Networking (IP addressing, routing, network protocols)
- Firmware Development (C/C++)
- Hardware Design (PCB layout, analog/digital circuit design)
- Embedded Systems Software Development (Python, Java, C#)
- Prototyping and Machine Learning
- Troubleshooting and Debugging
- Project Management and Power Management
- Documentation
- Continuous Learning



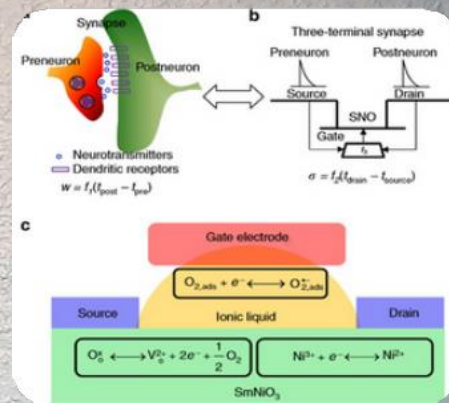
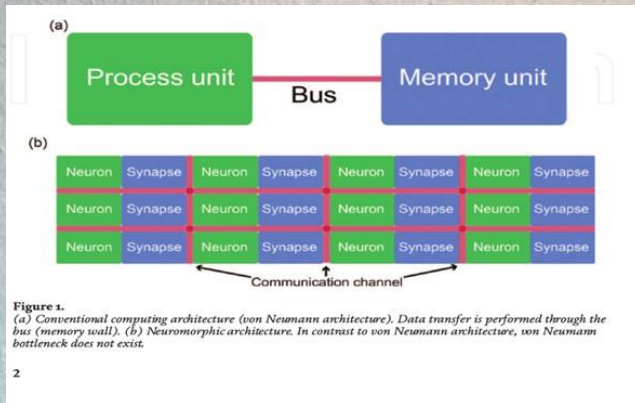
FIELD OF WORK

- Smart Home Appliances
- Security Cameras
- Sensors
- Industrial IoT
- Access Control
- Asset Tracking
- Factory Automation
- Smart Buildings



- Street Lighting
- Wi-Fi Access Points

Breakthrough in Neuromorphic Computing: Synaptic Transistor Mimics Human Intelligence

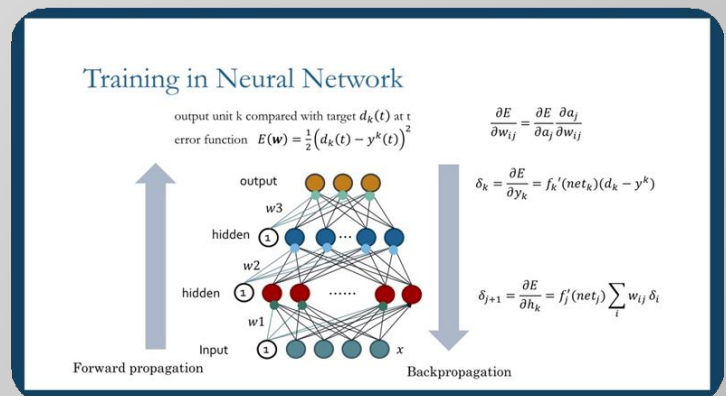
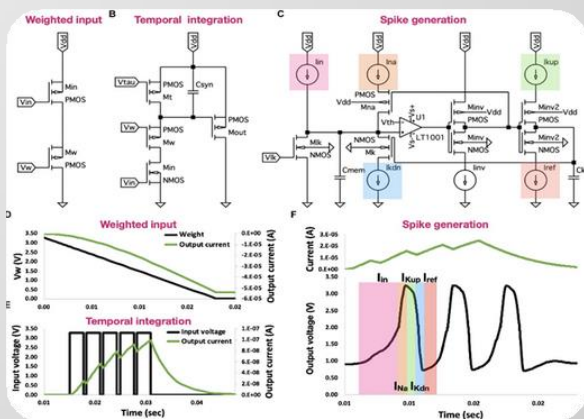


In a groundbreaking collaboration between Northwestern University, Boston College, and MIT, researchers have achieved a breakthrough in neuromorphic computing. They have developed a synaptic transistor that emulates the human brain's capabilities, showcasing simultaneous information processing and storage. Unlike its predecessors, this transistor operates efficiently at room temperature, eliminating the need for cryogenic conditions. Addressing the limitations of current computing hardware, especially for AI and machine-learning tasks, this breakthrough underscores the need for a paradigm shift in computing, particularly in the era of big data. The

success of this synaptic transistor in recognizing similar patterns under complex conditions showcases its potential to tackle real-world challenges, signifying a significant stride towards more efficient and human-like computing with transformative impacts on various industries and applications. The newly engineered synaptic transistor goes beyond conventional machine-learning tasks, exhibiting associative learning and enabling it to categorize data and identify similar patterns, reflecting a higher level of cognitive function. Published in the prestigious journal *Nature* on December 20, 2023, this research leveraged moiré patterns, a geometric design emerging when two patterns are layered, to achieve

unprecedented tunability of electronic properties. By combining bilayer graphene and hexagonal boron nitride, the researchers harnessed moiré physics to enable neuromorphic functionality at room temperature. Lead researcher Mark C. Hersam

emphasized the departure from the traditional silicon architecture, highlighting the transistor's mimicry of the brain's architecture, resulting in significantly higher energy efficiency through concurrent memory and information processing.



EPFL Researchers Develop Breakthrough Algorithm, PhyLL, for Analog Neural Network Training
 EPFL researchers have developed the PhyLL algorithm, enabling the training of analog neural networks with efficiency comparable to digital counterparts. This breakthrough addresses the challenges

associated with the size, complexity, and energy consumption of deep learning hardware, offering a more sustainable alternative. PhyLL focuses on training physical systems using sound waves, light waves, and microwaves for information processing. Traditional neural network

training involves a backward pass (backpropagation), which is energy-intensive and unsuitable for physical systems. The researchers replaced backpropagation with a second forward pass through the physical system, updating each network layer locally. This approach reduces energy consumption, eliminates the need for a digital twin, and aligns more closely with biological learning processes. PhyLL was successfully applied to experimental acoustic and microwave systems, as well as a modeled optical system, achieving accuracy comparable to traditional backpropagation-based training. The method demonstrated robustness and adaptability, even in systems

SKILLS

- Technical Proficiency
- Artificial Intelligence and Machine Learning
- Cybersecurity

Knowledge

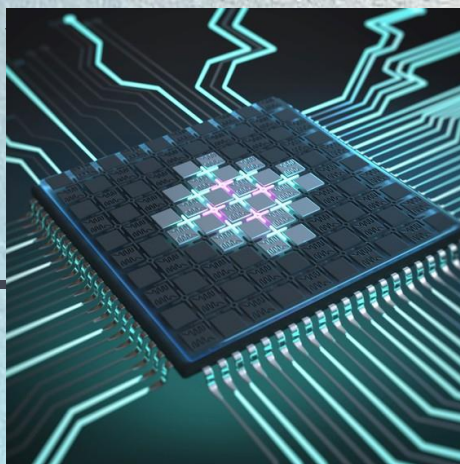
- Digital Transformation Expertise
- IoT Skills
- Cloud Computing
- Collaboration and Communication
- Adaptability and Learning Agility
- Problem-Solving and Critical Thinking

exposed to unpredictable external perturbations. While the approach involves some digital updates, the researchers aim to minimize digital computation, moving towards a more analog-centric training approach. Future efforts will focus on implementing the algorithm in a small-scale optical system, with the goal of scaling up networks to handle more complex tasks.

LET US KNOW!

OPTOELECTRONICS

Optoelectronics (or optronics) is the study and application of electronic devices and systems that find, detect and control light, usually considered a sub-field of photonics. In this context, light often includes invisible forms of radiation such as gamma rays, X-rays, ultraviolet and infrared, in addition to



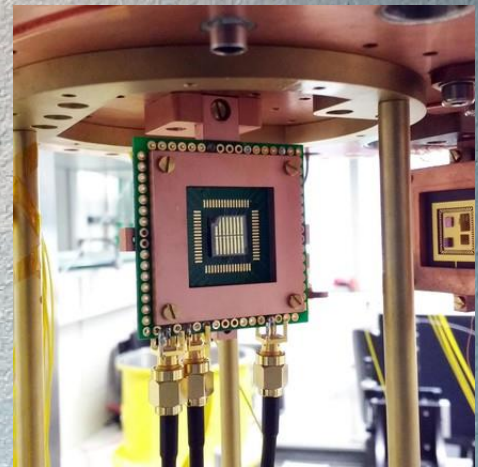
visible electronic devices are used for optical-to-electrical conversion or vice versa. Optoelectronic devices are used in applications such as optical-to-electrical conversion, optical-to-optical conversion, and optical-to-electrical conversion.

SUPERCONDUCTING ELECTRONICS

The field of superconducting electronics is an important area in the research and development of hybrid quantum devices with lower power consumption. Superconducting hybrid structures, consisting of a superconductor and non-superconducting material (normal metal N, ferromagnet F, etc.), operate by means of the proximity effect.

SUPERCONDUCTING QUANTUM COMPUTING

Superconducting logic refers to a class of logic circuits or logic gates that use the unique properties of superconductors, including zero-resistance wires, ultrafast Josephson junction switches, and quantization of magnetic flux (fluxoid). As of 2023, superconducting computing is a form of cryogenic computing, as superconductive electronic circuits require cooling to cryogenic temperatures for operation, typically below 10 kelvin. Often superconducting computing is applied to quantum computing, with an important application known as superconducting quantum computing.



Home Automation with Arduino: Temperature-Triggered AC and Fan Control

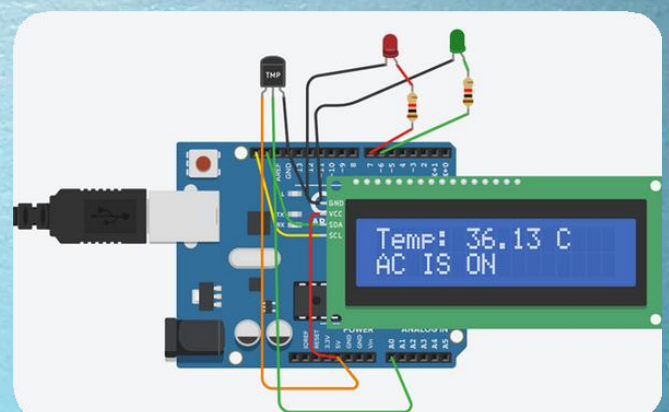
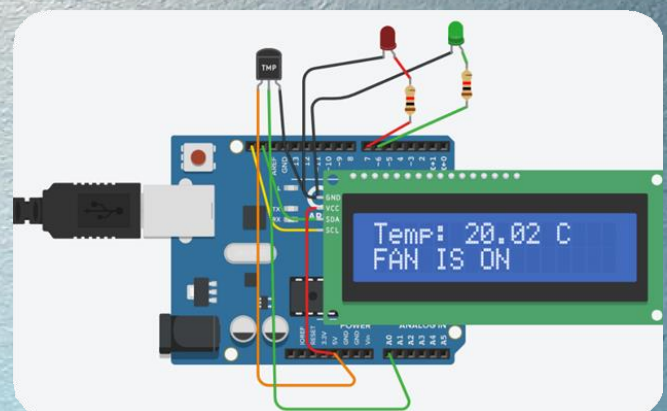
This mini project focuses on designing an Arduino-based temperature monitoring and control system which showcases the integration of sensors and LEDs with Arduino for temperature monitoring and also introduces a rudimentary control mechanism, making it a valuable prototype for small-scale climate control applications.

Components required:

1. Arduino Microcontroller
2. LM35 Temperature Sensor
3. Red LED (AC Status Indicator)
4. Green LED (Fan Status Indicator)

Working:

The heart of the system is the LM35 temperature sensor, which accurately measures ambient temperature. Connected to an Arduino microcontroller, the LM35 provides real-time temperature data. The system incorporates two LEDs - a red LED indicating the status of an air conditioner (AC) and a green LED representing the

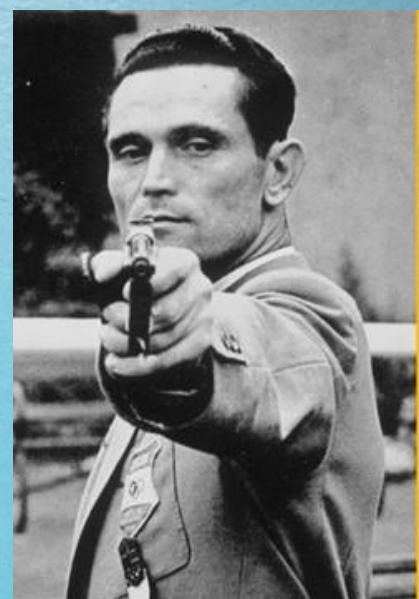


status of a fan. Programmed thresholds within the Arduino code determine the activation conditions for each component based on the temperature readings. If the temperature exceeds the set limit of 29.95 degrees Celsius, the red LED signals the activation of the AC, providing a visual cue that cooling is in progress. On the other hand, if the temperature stays within the specified limit, the green LED illuminates to signify the fan is operational for temperature regulation.

INSPIRING STORY OF KAROLY TAKACS

Karoly Takacs of the Hungarian Army was top pistol shooter in the world for men's 25 metre rapid fire pistol. He had won many national and international championship in shooting. He was preparing for Olympics 1940 and was expected to win Gold for his nation.

But one day in 1938 during his army



session a hand grade exploded in his right hand, his shooting hand and with the loss of his hand he also lost his dream of winning Gold in Olympics.

He spent a month in hospital recovering. He decided that he is not gonna feel pity and held onto his Olympics dream. He figured that he had a fully functional and healthy Left arm. He chose to explore the world of possibilities.

Karoly had will to succeed. He decided to practice shooting with his left hand. Despite the fact that he was not left-handed, he was determined to make his left hand the best shooting hand in world. For months he practiced by himself and decided not to tell anyone.

In 1939, he showed up at National Pistol Shooting Championship. There other shooter approached him to give condolences

and to congratulate him to have a strength to come and watch other in shooting championship.

Karoly replied, "I didn't come here to watch. I came to compete." Everyone was surprised to know that and what surprised people even more was the fact that he won that championship with his left hand.

The 1940 and 1944 Olympics were cancelled because of World War II.

Karoly kept training and qualified for 1948 Olympics and won Gold

medal. He won 1952 Olympics also

PHOTOELECTRONICS

INTRODUCTION

Photoelectronics is a branch of electronics that focuses on the study and application of devices and systems involving the interaction of light (photons) with electronic components. It encompasses technologies such as photodetectors, optoelectronic devices, fiber optics, image sensors, and light modulation. Photoelectronics plays a crucial role in various applications, including optical communication, imaging systems, sensors, and optoelectronic devices used in electronic cameras and displays.



WORKING PRINCIPLE

Photoelectronics operates on the fundamental principle of the interaction between light (photons) and electronic materials, giving rise to a diverse array of devices with specific functionalities. Photodetectors, such as photodiodes and phototransistors, rely on the photoelectric effect, where incident photons generate electron-hole pairs within semiconductor materials, resulting in a measurable photocurrent or voltage. Optoelectronic devices, including light-emitting diodes (LEDs), lasers, and solar cells, utilize the generation and manipulation of photons for

applications ranging from illumination to energy conversion. In fiber optics, the total internal reflection of light pulses through optical fibers enables high-speed communication, with photoelectronic components like lasers and detectors facilitating signal transmission.

SKILLS

- Technical Proficiency
- Artificial Intelligence and Machine Learning
- Cybersecurity Knowledge
- Digital Transformation Expertise
- IoT Skills
- Cloud Computing
- Collaboration and Communication
- Adaptability and Learning Agility
- Problem-Solving and Critical Thinking

APPLICATIONS

- **Telecommunications:** Fiber optic cables carry vast amounts of data globally with high speed and bandwidth.
- **Healthcare:** Lasers are used in surgery, diagnostics, and imaging techniques.
- **Manufacturing:** Photonics enables precise material processing, inspection, and control.
- **Environmental monitoring:** Light-based sensors track air and water quality, pollution levels, and climate change.
- **Entertainment and displays:** LEDs

illuminate homes, stadiums, and large screens, while advanced optics enhance projection and virtual reality experiences.

SKILLS

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Moral:

To Achieve anything Worthy in Life, one needs Attitude and Will. Skills and techniques can be learned, can be taught but not will. We need to Work towards our Goal with full determination to Succeed.

Editorial Board – Faculty

Dr.Jennifer S Raj, Prof/ECE &Dr.R.Prabhu, ASP/ECE

Editorial Board-Students –

Abinesh Kumar E, Dhanush Kumar R and
Nandhini P

