NIRMA UNIVERSITY
INSTITUTE OF TECHNOLOGY
NAAC ACCREDITED 'A+' GRADE

तरंग

VOLUME 5
ISSUE 1
JULY-DEC, 2023

Department of Electronics and Communication Engineering
Institute of Technology, Nirma University
Ahmedabad-382481

Vision of the Department

~ To lead in developing cutting-edge knowledge & technology and producing globally competent professionals in Electronics and Communication Engineering.

Mission of the Department

~ To shape technically competent, analytical, creative and problem solving Electronics and Communication Engineers capable of meeting industry challenges and social needs.

~ To foster a conducive environment for multidisciplinary research and innovation.

~ To encourage faculty and students to achieve excellence in the profession and to grow as ethical and socially responsible leaders.

Preface

Dr. Nagendra P. Gajjar
Professor & PG (Embedded Systems) Coordinator
Department of Electronics
and Communication Engineering,
Institute of Technology, Nirma University

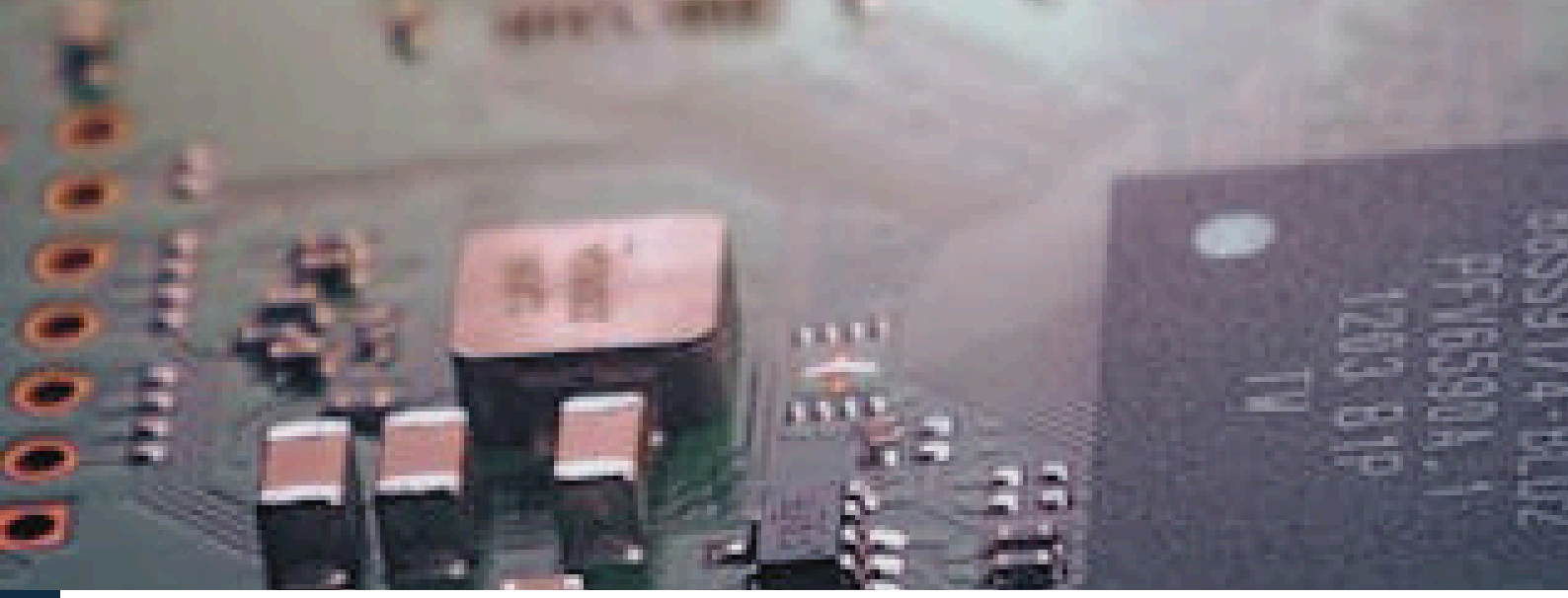
Firstly, We, EC Department, Institute of Technology, Nirma University were invited by India Semiconductor Mission and India Electronics and Semiconductor Association (IESA) to set up the booth to showcase our strength to the nation at SemiconIndia 2023 being organized at Mahatma Mandir, Gandhinagar during 25-30 July 2023. The SemiconIndia 2023, is a pivotal event that brought together industry leaders, innovators, and visionaries in the field of semiconductor technology. From breakthroughs in chip design to advancements in manufacturing processes, we unravel the latest trends and insights that are driving the semiconductor industry forward. We have an active role in SemiconIndia 2023 in terms of the department's booth, faculty visit and students visit.

Next, our attention turns to the IEEE International Symposium on Smart Electronic Systems (IEEE – iSES 2023), a gathering of minds dedicated to exploring the frontiers of smart technologies which was organised in December 2023 at our campus. This symposium brought together leading experts, researchers, and innovators in the field of smart electronic systems from around the globe.

On the educational front, we explore the implications of the revised syllabus as per the New Education Policy. This new syllabus has already been in effect for the second year students, subsequently it will be updated. With a focus on holistic learning, skill development, and a forward-looking approach, the new syllabus aims to equip students with the knowledge and capabilities to thrive in a rapidly evolving world.

Join us on a journey of exploration and discovery as we navigate through the dynamic intersections of technology and education in this edition of Tarang. We invite you to engage with the insightful articles, events etc. presented within these pages, and to join the conversation on shaping the future of our world.

Happy reading, and may Tarang inspire you to reach new heights of knowledge and understanding.



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TOP 7 MACHINE VISION TRENDS

Predicting trends in machine vision can be a straightforward process in consistent times. However, following 2020, a year of prevalent insecurity, planning ahead has turned more intricate than before. In spite of this ambiguity, Teq Diligent recently collected insights that reveal the budding nature of the marketplace to back machine vision specialists in setting up work in near future. Machine vision is the capability to deliver an imaging-based inspection to explicit machines. It facilitates industrial tools and robots to execute tasks like manufacturing and quality verification.

01

Increase in Demands for 3D Inspections

Traditional inspection approaches offer inspection and measurement in 2D forms. This scenario limits users in accessing data and precisely analyzing involved structures as the resultant data sets are constrained to a flat 2D x-ray image. Increasing requirements and demand for superior quality inspection in different industrial verticals is steering the extensive usage and applications of 3D imaging-based inspection systems. A 3D inspection system can monitor, check, and examine objects with a depth of field and provide precise, real-time 3D position insights to enhance the performance levels of involved applications. With involvement across 3D imaging companies, Teq Diligent views this marketplace to boost demand due to the new social distancing implications because of the COVID-19 pandemic.

02

Heightened Use of SWIR Cameras

Short-wave infrared (SWIR) technology relates to the visible light in the photons absorbed by an object that offers the sturdy contrast required for superior resolution imaging. With developments and advancements in sensor-based technologies, the applications of SWIR camera are boosting. This machine vision camera is better used in precise silicon inspections, hyper spectral imaging, advanced laser beam profiling, medical imaging, plastic and chemical sensing. The SWIR imaging encloses the wavelength scope right from 900 nm to 1700 nm.

Machine vision systems are in significant requirements for manufacturing, planning, and precise quality control. The machine vision system worldwide is predicted to mature from $7.91 billion in 2017 to $12.29 billion by 2023. It is even forecasted that machine vision technology will reach a near 100 million installed base by the year 2025. Noteworthy findings comprise significant growth in modern-day utilization of SWIR cameras, CoaXPress 2.0, 3D inspection, embedded vision, and vision-guided robots. Now, as the industrial sector enters the fresh era of digitization, these technologies are likely to offer much more commitments for involved companies.

03

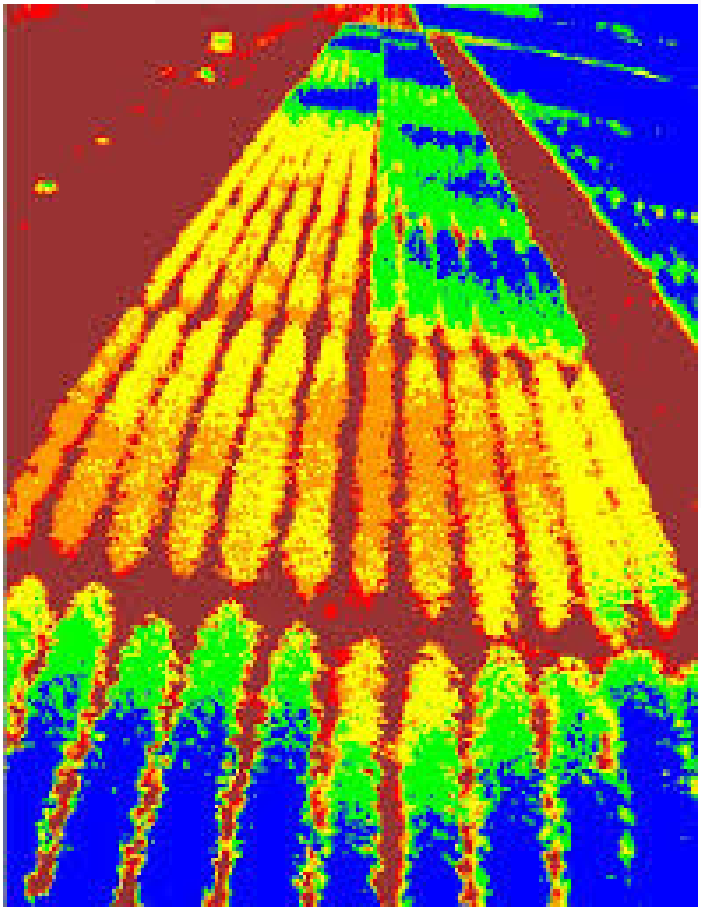
Embedded Vision

Embedded vision encloses image capturing and processing abilities into a solitary device. This machine vision advancement has led to more comprehensive industrial applications like detailed inspection and sorting solutions. Manufacturing companies have even used embedded vision technology in innovative products such as autonomous drones, driverless vehicles, and smartphones. The subsequent front line for embedded vision will engage deep learning, made likely by more influential FPGAs that will offer more openings to accelerate computationally intensive vision and neural algorithms right on the involved embedded devices.

04

Vision Guided Robotics

The requirements for vision-guided robotics (VGR) will radically observe substantial growth as it offers smarter and swifter 3D measurement and technology backing. It can also enable an aging population and mounting labor costs by executing jobs the same as humans do. The pandemic has further led to the growth of VGR that trims down human contact in loads of working set-ups.



05

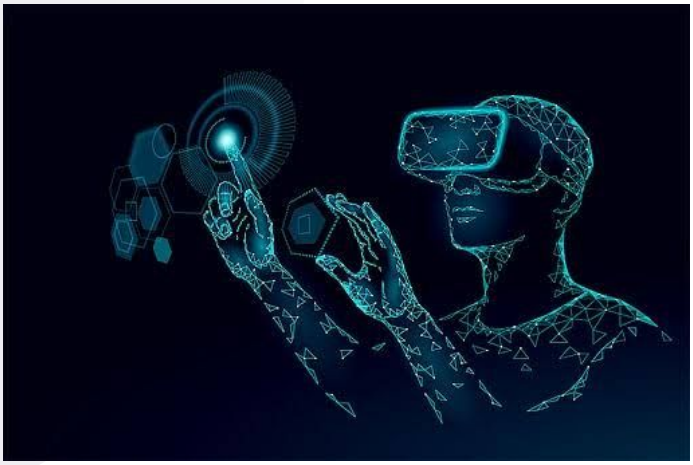
Integration and blending of CoaXPress v2.0

The integration and blending of CoaXPress v2.0, the newest version of the CoaXPress vision interface, will be more applied and utilized by system integrators. This is due to its cable bandwidth which has now been two times to the earlier generation to 10 Gbps and 12.5 Gbps per link. They are preferred for superior and higher-speed machine vision interfaces. CXP v2.0 is swiftly integrated into aerospace and smart traffic tracking as these domains have been extensively dependent on Coaxial cable. There is also a steer towards the utilization of CXP over fiber.

06

Thermal Imaging

Thermal imaging is a commanding remote sensing technique that is being applied for security measures, people safety and used in defence. This imaging system enables the procedure of transforming infrared radiations to visible images. The process further illustrates the spatial distribution of temperature disparity in a scene sighted by the use of a thermal camera. A thermal imaging-powered machine vision system checks the temperature or the emanations from the offered procedures remotely.



07

Enhancing AR and VR Abilities

AR and VR technologies are influential ahead of their possible use for entertainment and video games. They will be more utilized for real-time instructions, training resources, and many other applications. Machine vision is moving ahead with the applications of AR and VR, taking them to the subsequent levels to leverage further realistic virtual restorations of reality.

Moving Forward

As a significant component of industry 5.0, machine vision technology assists industrial automation systems by strengthening efficiency levels, enhancing inventory, and identifying damaged products, ultimately getting better on the superior quality of manufacturing. The coming years are going to see a boost in acceptance and quick adoption of Machine Vision applications in the manufacturing and industrial automation marketplaces. Principally steered by trimming down the overall costs and enabling new technologies like Artificial Intelligence (AI), the domestic marketplace is set to see sturdy expansions across machine vision technologies. Further, we are going to view numerous global market players making massive investments in these advanced technologies across the subcontinent in the coming time.

Siddharth Mistry (2003 Pass out Batch)

He is the Founder of Teq Diligent and is the Director of Product Engineering.
He has more than 15 years of experience in Embedded Product Engineering and his expertise covers the complete product design cycle right from feasibility analysis, system architecture, and design to volume production

MeitY RESEARCH PROJECT

Abstract: Machine Learning (ML) and Artificial Intelligence (AI) is revolutionizing the world owing to its application in various domains like healthcare, finance, speech recognition, security etc. However, ML applications are both data and compute-intensive, which requires large data transfers between memory and compute during every instance of training and inference. Existing state-of-the-art computing systems are based on the Von-Neumann model, which has a separate memory unit and compute unit. This architecture limits the performances of data-intensive applications like neural networks and video applications because of costly (in terms of latency and energy) data movement between physically decoupled memory and core. A variety of alternatives to Von-Neumann architecture are being proposed, of which In-Memory Computing (IMC) has emerged as one of the most promising solutions. It is shown that while performing IMC, performance can be improved significantly while reducing energy consumption.

The processor groups at Intel, IBM, NXP and other industries are interested in exploring IMC for their next-generation AI-enabled productsThe two significant proposals in this domain are IMC in main memory (DRAMs,STT-RAM, RRAM, etc.) and IMC in Caches. In this project, our deliverables are focused on IMC in Caches, while we will explore the possibility of using IMC in main memory.

इलेक्ट्रॉनिकी एवं
सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF
ELECTRONICS AND
INFORMATION TECHNOLOGY
सत्यमेव जयते

This project is designed to navigate the challenges this shift brings, focusing on circuit design and system-level analysis. We will be leveraging the latest advancements in IMC to build a system that is both energy-efficient and capable of handling high-performance tasks. The goal is to create a chip that can be used in edge applications, providing faster data access and processing speeds. This project is a consortium project with the institutes IIT Gandhinagar, SVNIT Surat and DAIICT.

Chips to Startup Programme
An initiative by Ministry of Electronic and IT, Government of India

Capacity Building and Skill Development Scheme

PUBLICATIONS
AT THE DEPARTMENT

Development of Nursing Assistant Robot
Dhaval Shah, Akash Mecwan

Nirma University Journal of Engineering
Index, 1/1, Pg. No. 20-25
Nov, 2023

On the performance of dual-hop mixed RF and hybrid RF-FSO relaying
Hardik Joshi, Shilpi Gupta

Optical and Quantum Electronics
WoS, SCI, SCOPUS, UGC, 55-9, Pg. No. 803
Jun, 2023

Runaway electron mitigation with pulsed localized vertical magnetic field perturbation in ADITYA tokamak
Chetna Chauhan

Journal
SCOPUS, UGC, 63, Pg. No. 086011
Jun, 2023

Advances in VLSI and Embedded Systems
Sachin Gajjar

Springer (Book Chapter)
ISBN No.: 1876-1119
Nov, 2023

Influence of Pr-ion substitution in Cu2X hexaferrites on their magnetic and dielectric properties
Tanuj Gupta, Chetna C Chauhan, Abhishek Gor, Ankita Singh, Rajshree B Jotania

Ceramics International
WoS, SCI, SCOPUS, Volume, Pages
Nov, 2023

Design, development, and testing of a 16-bit reduced instruction set computer architecture-based processor
Manan Jain(18BEC050), Het Kanzariya(18BEC047), Neel Joshi(18BEC045), Yesha Masharu(18BEC053), Sachin Gajjar and Dhaval Shah

Sådhanå
SCI, SCOPUS, UGC, 48/244, Pg. No. 1-7
Nov, 2023

Feature Based Image Registration Using ORB and CNN for Remote Sensing Images
Laukikkumar K Patel, Manish I. Patel

Indian Journal of Science and Technology
WoS, 16/42, Pg. No. 3803-3813
Nov, 2023

Prediction of Oral Cancer Treatment Plan using Machine Learning
Heli Shah (18BEC098), Yash Patil (18BME088), Rutul Patel

International Journal of Computer Information Systems and Industrial Management Applications
SCOPUS, 15/2023, Pg. No. 408-417
Jun, 2023

Fuzzy-based unequal clustering protocol for underwater wireless sensor networks
Hetal Panchal, Sachin Gajjar

International Journal of Communication Systems, Wiley Publications
SCOPUS, 36, Issue 16, Pg. No. 1-18
Nov, 2023

CONFERENCE

Versatile Applications of High-Coercivity, Moderately Saturated Magnetic Materials: A Multifunctional Perspective

Aryan Kalariya (20BME010), Tanuj Gupta, Chetna C. Chauhan, Rajshree B. Jotania

IEEE 9th International Symposium on Smart Electronic Systems (IEEE – iSES)
18.12.2023 to 20.12.2023
Dec, 2023

ESP32 Chatlink - Real Time Peer to Peer Communication via ESP - Now

Dhyanik Pujara (20BEC028), Palak Naik (20BEC077), Riya Gautam (20BEC038), Akash Mecwan

8th International Conference on Smart Trends in Computing and Communicaition
12.01.2024 - 13.01.2024
Dec, 2023

Neighborhood Image Processing using Verilog HDL

Trushti Selarka (20BEC131), Yash Viradiya (20BEC135), Dhaval Shah

3rd International Conference on Advancement in Electronics and Communication Engineering
23.11.23 to 24.11.23
Nov, 2023

Real Time Voice Recognition System Using TinyML on Arduino Nano 33 BLE

Parth Patel (20BEC086), Nikhil Gupta (19BEC078), Sachin Gajjar

IEEE 9th International Symposium on Smart Electronic Systems (IEEE – iSES)
18.12.2023 to 20.12.2023
Dec, 2023

Incorporating Visual Intelligence in the Line Following Robots

Dhyanik Pujara (20BEC028), Palak Naik (20BEC077), Riya Gautam (20BEC038), Akash Mecwan

9th International Symposium on Smart Electronics Systems
18.12.2023 to 20.12.2023
Dec, 2023

Integrative Home Automation System - A Multifaceted Approach

Dhyanik Pujara (20BEC028), Riya Gautam (20BEC038), Dhaval Shah

9th International Symposium on Smart Electronics Systems iSES-2023
18.12.23 to 20.12.23
Dec, 2023

IOT based smart dustbin for effective waste management

Dr Amisha Naik

IEEE 9th symposium on smart electronics
18.12.23
Dec, 2023

Implementaion if 1-bit Full Adder using various Low Power Techniques on 45nm Technology

Nishant Sahay (22MECV14), Akash Mecwan

9th International Conference on Signal Processing and Communication
21.12.23 to 23.12.23
Dec, 2023

Enhanced Smart Stick Design for Visually Impaired

Dhyanik Pujara (20BEC028), Riya Gautam (20BEC038), Burhanuddin Sabuwala (21BEC108), Dhaval Shah

9th International Symposium on Smart Electronics Systems iSES-2023
18.12.23 to 20.12.23
Dec, 2023

PAPERS

Model-Based Software Development for Predictive Battery Temperature Estimation

Parth Oza (21MECE06), Dhaval Shah

3rd Asian Conference on Innovation in Technology (ASIANCON)
25.08.23 to 27.08.23
Aug, 2023

Design, Development, and Testing of Electronic Control Unit Prototype in an Electric Vehicle

Riththika Sukanandan(20bec102), Sachin Gajjar

IEEE 9th International Symposium on Smart Electronic Systems (IEEE – iSES)
18.12.2023 to 20.12.2023
Dec, 2023

Threshold based Image Compression Scheme for Improved Compressibilty

Maharshi Patel(20BEC061), Aditya Arakh(20BEC001), Twinkle Bhavsar

International Conference on Computing, Communication and Networking
6.7.23 to 8.7.23
Jul, 2023

Design of low noise high sensistive Front end for the charge read out from SI-PM detector for future space

Panara Harsh(19BEC083), Dr Amisha Naik

IEEE 9th symposium on smart electronics
18.12.23 to 20.12.23
Dec, 2023

Development of a software platform for e- certificate generation and auto-sending

Aditya Agrawal, Parth Parikh, Dhruvi Patel, Shah, Vaishali Dhare

Raj Kumar Goel Institute of Technology, Ghaziabad
23.11.23 to 24.11.23
Nov, 2023

Cycle Slip Detection on IRNSS/NavIC Data for Single and Dual Frequency Receiver

Mahek Vyas, Sachin Gajjar, Manisha Upadhyay, Rajat Acharya

The Fourteenth International Conference on Computing, Communication and Networking Technologies (ICCCNT)
6.07.2023 to 8.07.2023
Jul, 2023

Data Acquisition System for Abrasive Wheel Manufacturing Industry

Dhyanik Pujara (20BEC028), Trushti Selarka (20BEC131), Sachin Gajjar

IEEE 9th International Symposium on Smart Electronic Systems (IEEE – iSES)
18.12.2023 to 20.12.2023
Dec, 2023

Efficient 1-bit Hybrid Full Adder Design with Low Power Delay Product using Finfet-TGDI Technology: Simulation and Comparative Study

Parthiv Bhau (20FTPHDE40), Vijay Savani

27th International Symposium VLSI Design and Test, Vdat 2023
29.09.2023 to 01.10.2023
Sep, 2023

iSES 2023


NIRMA UNIVERSITY
9th IEEE International Symposium on Smart Electronic Systems
iSES-2023
Institute of Technology, Nirma University Ahmedabad, India
www.ieee-isces.org
December 18-20, 2023
IEEE
computer society
VLSI

The Electronics and Communication Engineering Department at the Institute of Technology, Nirma University organized the 9th IEEE International Symposium on Smart Electronic Systems IEEE iSES – 2023 from 18-20 December 2023. The symposium saw a plethora of researchers, academicians, industry experts and professionals from the domain of Smart Electronic Systems, Internet of Things (IoT) and cyber-physical systems (CPS), come together and present their works as well as indulge in fruitful technical discussions and exchange of knowledge. More than 150 submissions were received from all over the globe, out of which, after rigorous review with domain experts, around 105 papers were selected and 88 were presented. The experts and participants were from various geographical locations and countries like India, the USA, Germany, the UK, and Europe, to name a few.

There were in total 16 Sessions including technical paper presentations, Special Sessions, Student Research Forum, Late Breaking Research and Research Demonstrations. The technical Sessions witnessed researchers present their work in areas like Internet of Things (IoT) and cyber-physical systems (CPS), Energy-Efficient, Reliable VLSI Systems, Hardware/ Software for Internet of Things and Consumer Electronics, Nano-electronic VLSI and Sensor Systems, Hardware for Secure Information Processing and Hardware/ Software for Vehicular Intelligent Systems - Nano-electronic VLSI and Sensor Systems. The Special Sessions included research works in the domain of AI in Cyber-Physical Systems; Efficient Chip Design for Emerging Applications; Synthesis, Analysis

and Verification of In-Memory Computing Designs using Memristors; IoT for Smart Villages and Smart Technologies.

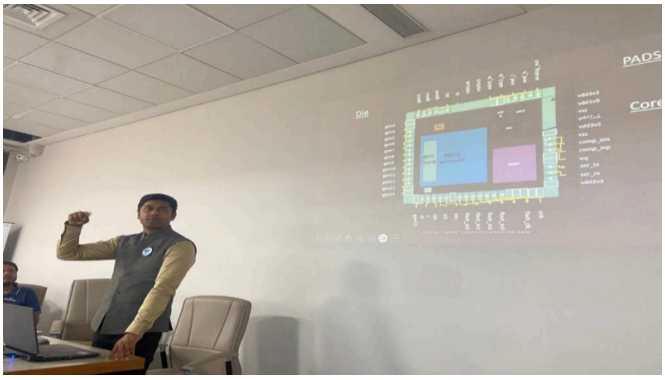
Along with technical presentations, the Symposium also hosted Keynote talks by eminent speakers from around the globe, as well as two panel discussions.

Six keynote addresses spanning all three days were scheduled, which included talks on Transforming Cloud Infrastructure for the AI era, Smart Healthcare - Cybersecurity Perspectives, Breaking the Thermal and Power Delivery Walls for 3D IC, Security and Privacy of Machine Learning Systems and Leveraging Spintronic Devices for Neuromorphic and Signal Processing at Edge of Network. The panel discussions brought experts from diverse fields to discuss on Growth of the Semiconductor Industry & Eco System in India and Hiring Women Engineers: Employers' Perception. The participants also gained knowledge and understanding through the pre-conference tutorials on Smart Healthcare, Advanced SES systems: Insights & Architecture blocks and Design Techniques for Non-Conventional Transistors, which were organized on 17 December 2023.

The 9th IEEE International Symposium on Smart Electronic Systems IEEE, iSES – 2023, provided a comprehensive platform for knowledge exchange, collaboration, and exploration of the latest trends in the field. The diverse range of technical sessions, keynote talks and tutorials contributed to the success of the event, facilitating knowledge exchange, collaboration and discussions for the advancement of smart electronic systems.

RISC V
ROADSHOW

The Department of Electronics & Communication Engineering, Institute of Technology, Nirma University organised event “RISCV Roadshow” July 26, 2023. The one-day event was in collaboration with India Electronics and Semiconductor Association (IESA) and E-infochips.



The sessions in this workshop were conducted by the experts from Chipcorn Organization. The workshop was coordinated by Dr. Nagendra Gajjar and Dr. Sachin Gajjar from the Department of Electronics and Communication Engineering. During the programme, apart from the lectures by the experts, there were hands-on sessions on RISV processor. In all the event was attended by 40 participants including the MTech students of Nirma University and engineers from e-Infochips. The participants were familiarized with concepts related to RTL design, GDS tools, Linux OS, github, and C++ programming. The participants did hands-on using VSDSquadron the open- source educational kit that teaches RISC-V programming and VLSI chip design.

EXPERT LECTURE on
Firmware in Embedded Systems

by

Mrs. Nayana Patel,

Senior UEFI Firmware Engineer,
Intel Corporation

Students explored the foundational aspects of firmware in embedded systems, discovering the critical role that C/C++ languages play in developing efficient and reliable software for hardware devices. They also gained insights into the value of scripting languages, such as Python, in automating tasks and enhancing flexibility within firmware development workflows. Companies seeking candidates with this knowledge are likely focused on building innovative embedded solutions, where a strong grasp of both low-level programming and high-level scripting is essential for success.

SYNOPSYS PRESENTATION on
About the company and opportunities at Synopsys

The session aimed to inspire female students to consider careers in the semiconductor industry. It offered a glimpse into the dynamic work environment at Synopsys, along with practical advice on industry practices and career-building strategies.

by

Asha Ramachandran and the Synopsys Team

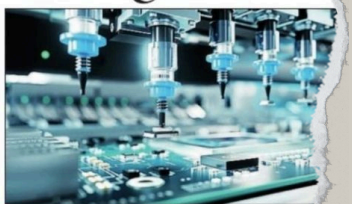
EC MAKING HEADLINES

નિરમા યુનિવર્સિટીમાં iSES પર ઇન્ટરનેશનલ સિમ્પોઝિયમ યોજાયું

અમદાવાદ : નિરમા યુનિવર્સિટી ખાતે 'સ્માર્ટ ઈલેક્ટ્રોનિક સિસ્ટમ્સ (iSES)' પર નવમું IEEE ઈન્ટરનેશનલ સિમ્પોઝિયમ યોજાયું હતું. સિમ્પોઝિયમમાં વિશ્વભરમાંથી iSESના ક્ષેત્રમાં અગ્રણી નિષ્ણાતો અને સંશોધકોએ હાજરી આપી હતી. iSESનું ઉદ્ઘાટન સરજુ પી. મોહંતી ડૉ. શ્રીનિવાસ કાતકૂરી, પ્રો. અનુપ સિંઘની ઉપસ્થિતિમાં કરવામાં આવ્યું હતું. સાથે જ સિમ્પોઝિયમમાં[illegible] આયોજન કરવામાં આવ્યું હતું. સ્ટડન્ટ્સના નોલેજ શેરિંગ અને સ્માર્ટ ઈલેક્ટ્રોનિક

Micron hires first ba of engineering stude

Parth Shastri & Parag Dave | TNN



Ahmedabad: Micron Semiconductor India Pvt Ltd (MSIPL), the chip manufacturer which had committed to starting India's first semiconductor plant in Sanand soon, has made its first round of recruitments from local campuses. Thirty-odd students have received employment offers or internship-cum-employment opportunities at the firm. Experts expect around 150 fresh engineering graduates from Gujarat to be absorbed in the new and upcoming semicon sector by year-end.

Fresh electronics and communications (E&C) graduates have bagged annual packages ranging from Rs 15 lakh to Rs 20 lakh.

Micron's Sanand plant is India's first big-ticket semiconductor project with an estimated investment of Rs 22,500 crore. At Sanand GIDC, the company is set to establish one of the country's biggest Assembly, Testing, Marking and Packaging (ATMP) plant, which is expected to provide direct employment to 5,000 and indirect employment to 15,000-odd professionals. Prof Usha Mehta, professor and postgraduate coordinator for very large-scale integration (VLSI) design course at the Electronics and Communications (E&C) Department, Institute of Technology of Nirma University, said that MSIPL has extended offers to 12 E&C graduating students so far. "The students are trained in VLSI design – an integral part of creating an integrated circuit. It is a direct campus recruitment."

Prof Mehta said the semiconductor sector promises to open up lucrative opportunities for engineering graduates. She added the company is already back for the second round where interns are being hired for a six-month period.

At Dhirubhai Ambani Institute of Information and Communication Technology (DAIICT), Gandhinagar, the semiconductor manufacturer has so far recruited four students. Placement coordinators said it is the start of the placement process and more students are expected to be absorbed by MSIPL.

Experts expect around 150 fresh graduates from the state to be absorbed in the semicon sector by year-end

"The offer currently has six months of paid internship which would include three months' training at the Malaysia facility of Micron Technology. The firm will provide the travel expenses and accommodation," said a DAIICT official. Prof S S Manoharan, director general, Pandit Deendayal Energy University (PDEU), said at least 10 students have received MSIPL offers so far.

"The number is set to rise as the firm is alre[illegible] the second round the focus is on t[illegible] engineers, but I b[illegible] future recruitmen[illegible] wider in the conte[illegible] neering disciplin[illegible] cater to different[illegible] chip manufacturi[illegible] id. Experts asso[illegible] the initiative s[illegible] ICT has alread[illegible] fledged cours[illegible] ductors, whe[illegible] other enginee[illegible] have either a[illegible] or have focuse[illegible] sign as a com[illegible] they can opt f[illegible] miconductor[illegible] the state gover[illegible] on condition[illegible] that by year-[illegible] likely to absor[illegible] engineering g[illegible] "The trai[illegible] start from Jan[illegible] By the end of t[illegible] would have t[illegible] experts who[illegible] production[illegible] te," he said[illegible] and other[illegible] benefit wi[illegible] Ajit Shah, Industrie[illegible] they are[illegible] up a min[illegible] to cater[illegible] will provi[illegible] skill deve[illegible] uths," he

નિરમા યુનિવર્સિટીમાં ઇન્ટરનેશનલ સિમ્પોઝિયમમાં ટેક્સાસ યુનિવર્સિટીના પ્રો.સરજુ પી.મોહંતીએ કહ્યું કે, સ્માર્ટ ઈલેક્ટ્રોનિક્સના નિર્માણમાં ખર્ચ અને સમયની બચત જરૂરી

Nirma Univ hosts symposiu on Smart Electronics Syste

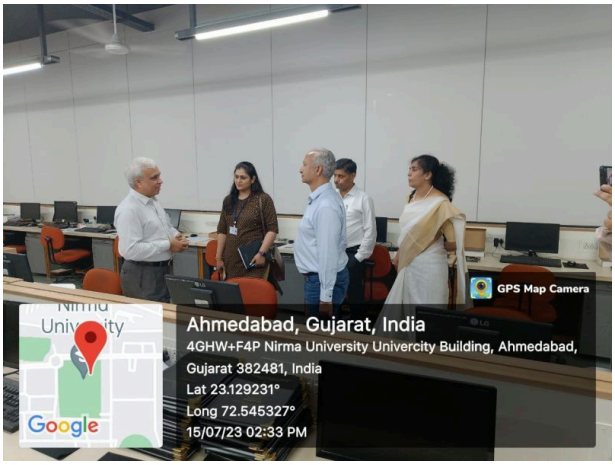
The Nirma University hosted the 9th IEEE International Symp on Smart Electronic Systems (iSES) that brought together e researchers, and innovators in the field of smart electronic tems from around the globe. The three-day event served as orm for robust discussions, knowledge sharing, and explor dge advancements in sma ystems.

IEEE IN[illegible] POSIUM ON SMART ELECTRONICS SYSTEMS (IEEE-ISES)

e 9th IEEE International mposium on Smart ctronic Systems (iSES), s held recently and con- ded successfully in medabad. This sympo- m brought together lead- experts, researchers, and innovators in the field of smart electronic system und the globe. In the auspicious presence of Saraju P. Mohanty, University o xas, USA as chief guest, Dr Srinivas Katkoori of the University of South Florida Guest of Honour and Prof. Anup Singh, Director General, Nirma Univer esident, the iSES was inaugurated. The participants were also addressed jesh N. Patel, Director, Institute of Technology, Nirma University and Dr. Usha ad, EC Department. During the iSES participants learned from insightful k ssions by Navin Bishnoi (India Country Manager, and AVP CCS (Compute & C lutions), Marvell India), Dr Rolf Drechsler (University of Bremen, Germa rcea Stan (Director of Computer Engineering, University of Virginia, USA), Dr ndu (University of Massachusetts, USA), Dr Saraju P. Mohanty (University o xas, USA) and Dr Ron DeMara (University of Central Florida, USA), along wi ay of papers presented and two engaging panel discussions.

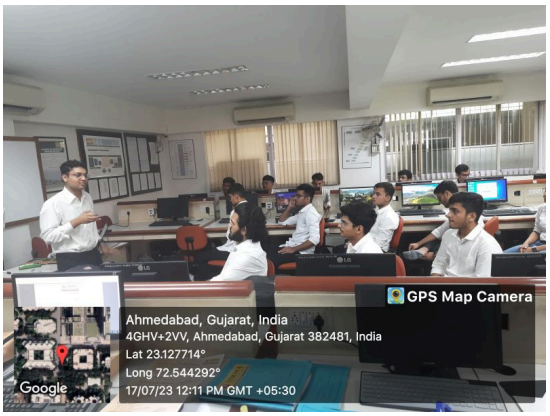
EVENTS AT THE DEPARTMENT

15th July 2023



Mr. Hem Takiar (Corporate Vice President Package Development & Engineering), Micron Technology Inc and **Ms. Shubhangi Shah** (Project Manager), Gujarat State Electronics Mission visited EC Dept. Institute of Technology Nirma University. Looking forward to the ecosystem for semiconductor technology.

17-18 July 2023



EC Dept. Institute of Technology Nirma University starts the new semester with **Orientation program**. All enjoyed the new experience and learning. Thanks to the students involved and ECO - Electronics and Communication Students' Organisation. Thanks to Pranav Joshi for sparing time and delivering one expert session to ignite mind of budding engineers.

EVENTS AT THE DEPARTMENT

25th July 2023

Students and faculties of EC Dept. Institute of Technology Nirma University visited 'SemiconIndia 2023' at Mahatma Mandir, Gandhinagar on its first day!
Many tech giants for semiconductor/microchip/electronics can be reached under one umbrella of 'SemiconIndia 2023', really awesome! Worth to visit '**SemiconIndia 2023**' to foresee the growth of semiconductor and electronics in India.
We, EC Dept. Institute of Technology Nirma University were invited by India Semiconductor Mission (ISM) and India Electronics and Semiconductor Association (IESA) to set up the booth to showcase our strength to the nation at 'SemiconIndia 2023'.

17-18 July 2023

We EC Dept. Institute of Technology Nirma University is happy for getting a special mention during **IEEE International Test Conference** ITC India 2023 Inauguration session today for the TTTC workshop organised at the department.

EVENTS AT THE DEPARTMENT

12th October 2023

Industrial Visit by the students of M.Tech. EC - VLSI and Embedded Systems, Semester I of EC Dept. Institute of Technology Nirma University at eInfochips (An Arrow Company), Ahmedabad.

11th November 2023

The Electronics and Communication Students' Organisation at ITNU is scripting a new chapter in giving! Renowned for the flagship event **'Sweet Distribution'** witnessed by over 400 dedicated support staff members of ITNU since its inception, this year's #ECOGIVESBACK campaign has soared to new heights.

EVENTS

Code Cook *(3rd October 2023)*
Organized on Online Platform of Coding Ninja

Workshop on Smart Stick Design *(4th November 2023)*
For the Blind person

by ECO

Cloth Donation *(8th November 2023)*

At Andhjan Mandal, (Blind People's Association Ahmedbad)

Sweet Distribution *(9th November 2023)*

On Diwali among Nirma Staff and Faculty

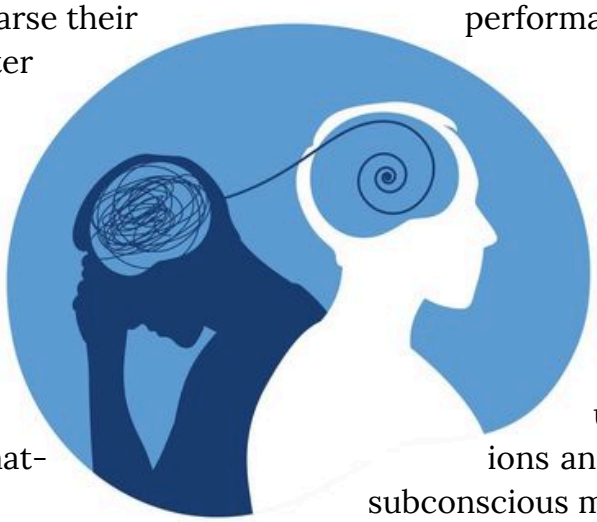
UNLEASHING THE POWER OF YOUR SUBCONSCIOUS MIND

Siya Patel, 21BEC093

In the realm of psychology and self-improvement, there exists a fascinating concept that has captured the attention of many scholars and practitioners alike - the power of the subconscious mind. While the conscious mind serves as the gatekeeper of our thoughts and actions, it is the subconscious mind that holds the key to unlocking our true potential and achieving remarkable feats.
Beneath our cognitive consciousness, the subconscious mind quietly shapes our feelings, ideas, and actions. The subconscious mind is creative, intuitive, and very open to ideas, in contrast to the conscious mind, which functions in a rational and analytical way.

One of the most intriguing aspects of the subconscious mind is its ability to manifest our deepest desires and beliefs into reality. By use of methods like affirmations, hypnosis, and visualization, we may establish direct communication with our subconscious and sow the seeds of prosperity and success.

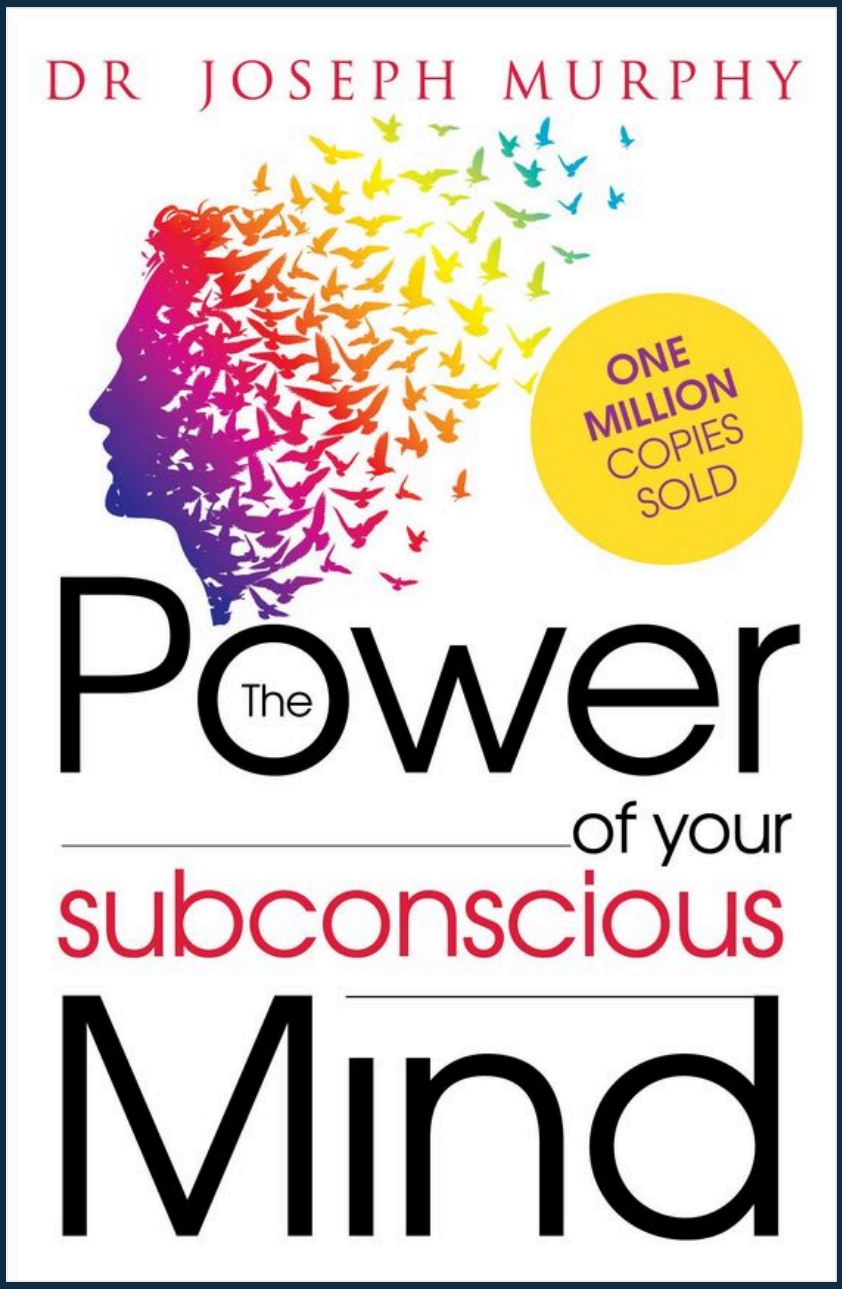
Numerous studies have demonstrated the profound impact of harnessing the power of the subconscious mind. Athletes visualize themselves achieving their goals, musicians mentally rehearse their performances, and entrepreneurs use affirmations to bolster their confidence and resilience.



Furthermore, our views and opinions about the world and ourselves are greatly influenced by the subconscious mind. Limiting thoughts and negative self-talk may build self-imposed obstacles that stand in the way of our development and keep us from realizing our full potential. Positive affirmations and powerful ideas may be reprogrammed into our subconscious mind to help us overcome these challenges and clear the path to success and joy.

In addition, the subconscious mind is a fount of unrealized insight and creativity. Through the process of stilling the constant buzz of our conscious mind and reaching into our subconscious, we may find creative answers to challenging issues as well as novel ideas.

Essentially, the subconscious mind's strength is in its capacity to serve as a catalyst for change and individual development.



We may materialize our innermost wishes, break away from self-limiting behaviours, and develop beneficial habits by using its enormous potential.

Let's embrace the transforming potential of the subconscious mind as we explore further into its secrets and set out on a path of self-discovery and empowerment. By cultivating a positive mindset, nurturing our innermost dreams and aspirations, and trusting in the infinite potential of our subconscious, we can create a life filled with joy, abundance, and limitless possibilities.
I recommend reading The Secret and Power of Your Subconscious Mind to everyone.

EVOLUTION AND FUTURE OF MEMORY TECHNOLOGIES

Viraj Shah, 22BEC145

Introduction:
Memory is the process of electronically holding instructions and data so the computer can access and process it. With the growing modern world, the demand for data storage is rising exponentially and we have to match it by developing more efficient and compact memory devices. When we look back at the history of data and how it stored, we realise that it is all about decreasing the size data storage component, increasing the capacity and performance simultaneously.

The history goes back to 1837 when Charles Babbage first purposed the Analytical Engine, which was the first computer to use punch cards as memory. In 1930s Gustav Tauschek developed drum memory and the data was stored in magnetic tapes and magnetic drums. Then cathode ray tubes and electron tubes evolved in 1940s followed by floppy disks in 1970s. In 1970 Intel released its first commercially available DRAM (Dynamic random-access memory), capable of storing 1024 bytes or 1KB of memory. In 1990s CD disks and DVDs were invented and in early 2000 micro drives like USB flash drive and SD card came into existence.

Then we developed DDR SDRAM series devices, Solid State Devices and Hybrid memory devices that enable more storage in a given space and faster processing of data in a given time. Key developments such as FPM DRAM (Fast Page Mode DRAM) and EDO DRAM (Extended Data Output DRAM) enhanced memory access speeds, allowing for faster data retrieval and improved system performance.

Then emerged the latest DDR (Double Data Rate) memory technology revolutionized memory speeds by allowing data to be transferred on both the rising and falling edges of the system clock. This innovation effectively doubled the data transfer rate, providing higher memory bandwidth and significantly accelerating overall system performance. DDR, along with subsequent generations, played a pivotal role in optimizing memory speeds and catering to the increasing demands of modern computing applications

The Road Ahead: Next-Generation Memory:
3D NAND and Emerging Memory Technologies: To address the limitations of traditional NAND flash, the industry embraced 3D NAND technology. Stacking memory cells vertically increased storage density and improved performance. Additionally, emerging memory technologies like Resistive RAM (ReRAM) and Phase Change Memory (PCM) offer promising alternatives, combining speed, endurance, and energy efficiency.

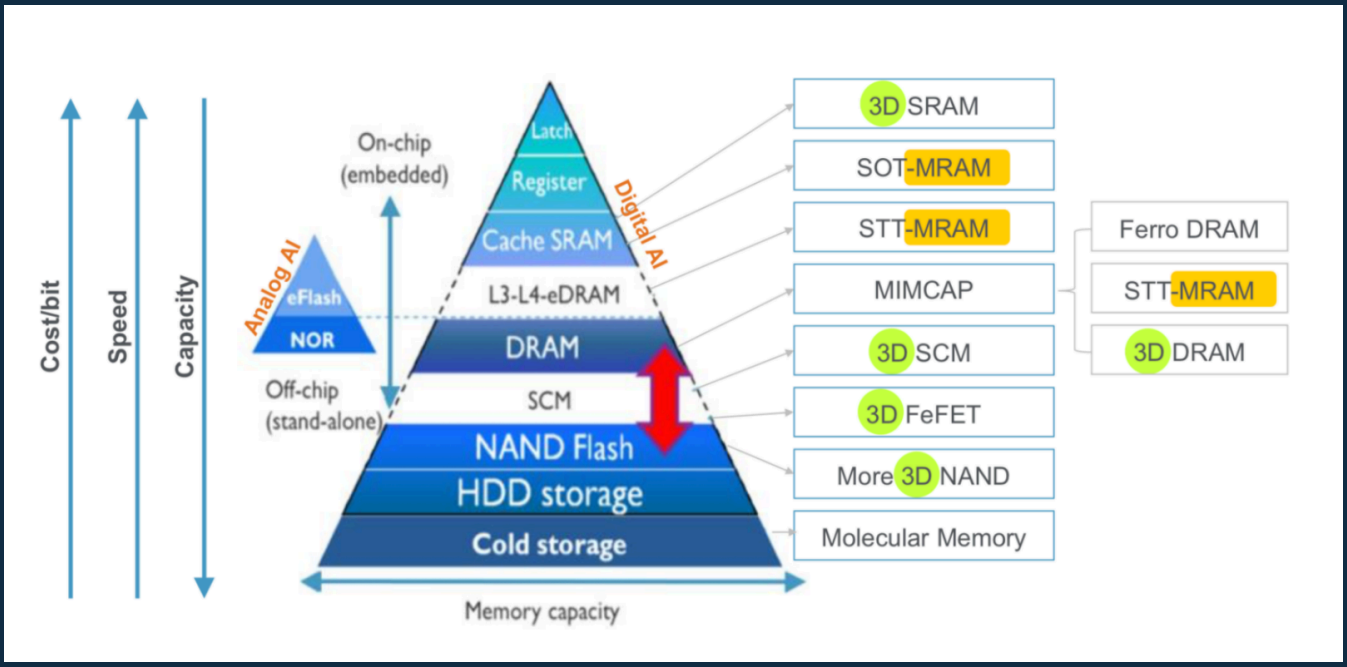


Image Reference: Semiconductor Engineering, The Next new memories by Mark lapedus

Quantum Storage: The future is being shaped by potential of quantum storage. Quantum bits leverage superposition and entanglement, promising unparalleled storage capacity and processing speed. It represents the forefront of innovation

Holographic Technology: In future the computer memory may reside in holographic technology. Holographic data storage is latest technology in high-capacity data storage, which is currently dominated by optical and magnetic storage devices. These storage devices rely on individual bits being stored as distinct magnetic or optical changes on the surface of the recording medium. Holographic data storage is capable of recording multiple images in the same area utilizing light at different angles and records information throughout the volume of the medium. Holographic data storage might be the next big thing.

FITTING IN, WITH GENZ

Arjit Singh, 21BEC010

Fitting in, isn't it what we all are trying to do , whether to fit into those slim jeans or fitting in cargo pants to catch up with the latest fashion trends. We all are in a race to fit in with people, for various reasons, older generation wants to fit in so they don't get left behind, younger generation trying to fit in to yet again not get left behind and then comes our present generation, the Generation Z or famously called the Gen Z. This generation has seen a lot of modern age transitions. From switching to touch screen smart phone from our Nokias, we are the generation who went from fighting our parents to let us go play cricket with our friends to again fighting our parents to let us play with our friends, but not cricket but video games like PUBG, Clash of Clans and what not. From kids who used to get their clothes dirty while playing in mud to children wearing glasses of power 3 or 4 due to excess screen time. Somewhere between these transitions we all grew up...or maybe lost a little part of ourselves.

From waking up at 5 AM in the morning to watch our favourite cartoons and now fast forward to 2023 where we wake up " till " 5 AM scrolling through people's feed. Looking at the fabulous and happy lives of our friends, we are rotting our minds with garbage which is specifically designed to make us feel bad about ourselves. We have diverted so much from who we actually are that we have lost ourselves in the void and ever sucking blackhole of social media and so called "societal norms".
Everyone wants to be happy not because they want to be, but because others are also happy. We want to buy things to get validation from people who we don't know and some people are willing to throw away their friends and loved ones just to look "cool" in front of others.

The urge of fitting in has impacted so deeply within our generation that we have lost our true identity. We forgot that we have a life that no one needs to know about and struggles that we don't need to be embarrassed about. Everyone wants to have what others have and yet no one is willing to accept that what we really need to be happy, we already have it. We have deluded ourselves so much that instead of counting our blessings and thanking God, we are cursing him for not giving us what others have.

A lot of people think that Gen Z are the ones polluting the world with social anxiety and high unachievable thirst of getting the other person's "YES". But don't you think that we are humans after all. We grew up so fast and with rules of being better than your classmate, pressure of getting better grades that we lost our innocence and were pushed into the world's rat race from an early age.
Deep down every kid is trying to find the childhood he lost due to computers, the self esteem that little 9 year old girl lost just because some random brainless dude called her unattractive on facebook. We all miss those days of hanging out with our friends on bicycles as now the only thing we do is update our snapchat while sitting right next to them. We have come a long way , a way where we lost hope of making friends , lost the ability to feel complete again and now all we are doing is trying everything whether it includes selling our souls for it , just to "FIT IN" , we go to starbucks just to post on Instagram so we look rich and fight our parents to buy those unnecessary branded clothes and those over- expensive sneakers just so that a bunch of kids we don't like will give us a thumbs up and make us believe that NOW we are cool.

Some say its show-off , some say it's being fake , some say it is trying to impress others but maybe we do those things just to be SEEN. And not looked upon as a success or a failure but just a human being with feelings who is not less loved or less respected just because he or she is not pretty enough for society, just because that boy didn't crack a job during placements he shouldn't be respected as an equal and called a liability. Just because that girl is a little dusky and hence no boy will marry her and so many reasons to not feel enough. Maybe we do all those tik tok social media circus just so that we can have the validation that the world or maybe our closest ones never gave us.
Gen-Z are not an attention seeking generation who only wants materialistic things but maybe we are those innocent kids who lost our way of perceiving life and are still trying to find out who we

DIGITAL FILTERS AND ITS BASIC DESIGN FLOW

Heer Mehta, 22bec048

"Digital filters craft the perfect balance between signal fidelity and computational efficiency."
Digital filters revolutionize the way we manipulate and analyse signals, as they offer utmost precision and ease of implementation.
Digital filters are algorithms designed to manipulate specific frequencies, as they act upon discrete-time signals by using various mathematical operations.

Types of digital filters :

I. Finite impulse response filters

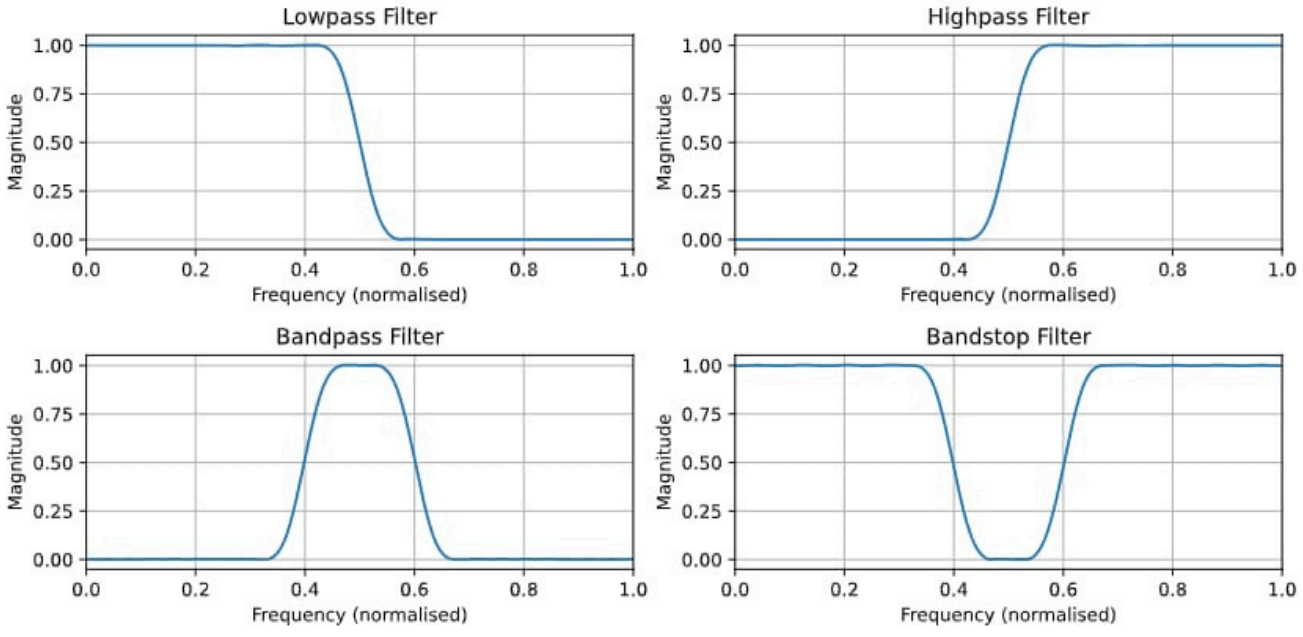
Finite impulse response simply means that the current output is dependent only on the previous input samples and that the impulse response is of finite time. They have a linear phase response and can be of four types , depending on the order and symmetricity of the given sequence of samples.

II. Infinite impulse response filters

These filters posses an infinite impulse response as they have feedback property. This indicates that the current output is dependent on previous and current inputs and previous outputs.

III. Specific filter designs

Some filter designs show specific frequency response features. Butterworth filters have flat passbands, Chebyshev filters display passbands with equal
ripples and Elliptic filters have equal ripples in both passbands and stopbands.



These filters follow a certain series of steps to be designed requiring specific mathematical computations. The steps are as follows :

1) **Design specification**
We need to determine characteristics like passband ripple, transition bandwidth, attenuation, frequency of interest, cost and order of filter.

2) **Filter type selection**
Based on requirements, we need to choose FIR or IIR filters depending upon frequency response, phase response and computational complexity.

3) **Design method and representation selection**
A suitable design and computation method has to be selected, like frequency sampling, windowing, Parks-McClellan algorithm, Butterworth, Chebyshev or Elliptic characteristics. Deciding on representation means to decide on the structure, i.e.; direct form, cascading, transversal.

4) **Filter design**
Use mathematical tools and algorithms to determine filter coefficients, poles and zeros.

5) **Implementation**
Computations require multipliers, adders and delays, and memory elements. The implementation can be done with the use of hardware like FPGAs and digital signal processors or software tools like Matlab or Python libraries.

Various mathematical methods used for determining filter parameters are :
i. **Fourier Transform** is used to deteremine frequency response, and for sampling.
ii. **Z Transform** is used to analyse discrete time systems and for pole-zero and stability.
iii. **Transfer function** in frequency domain relates input and outputs in frequency domain and helps in determining ripple ans attenuation.

Applications of digital filters :
Digital filters help in shaping frequency response of audio signals by audio equalization and eliminating noise. Gaussian filters are used in image processing to improve image quality by smoothening images and reducing noise. Modulation and demodulation techniques also use digital filters. Since they help in detecting abnormalities and analyse signals, it is also used in medical field in ECG, EEG, EMG, etc.

Conclusion :
Using digital filters, it becomes easy to analyse any signal and use it for further advancement in various fields with high accuracy and precision.

" भगवान से भी बढ़कर जो हैं "

भगवान से भी ऊँचा,
है अगर दर्जा किसीका,
जिनके लिए मैं जीता हूँ,
वो हैं मेरे माता-पिता।

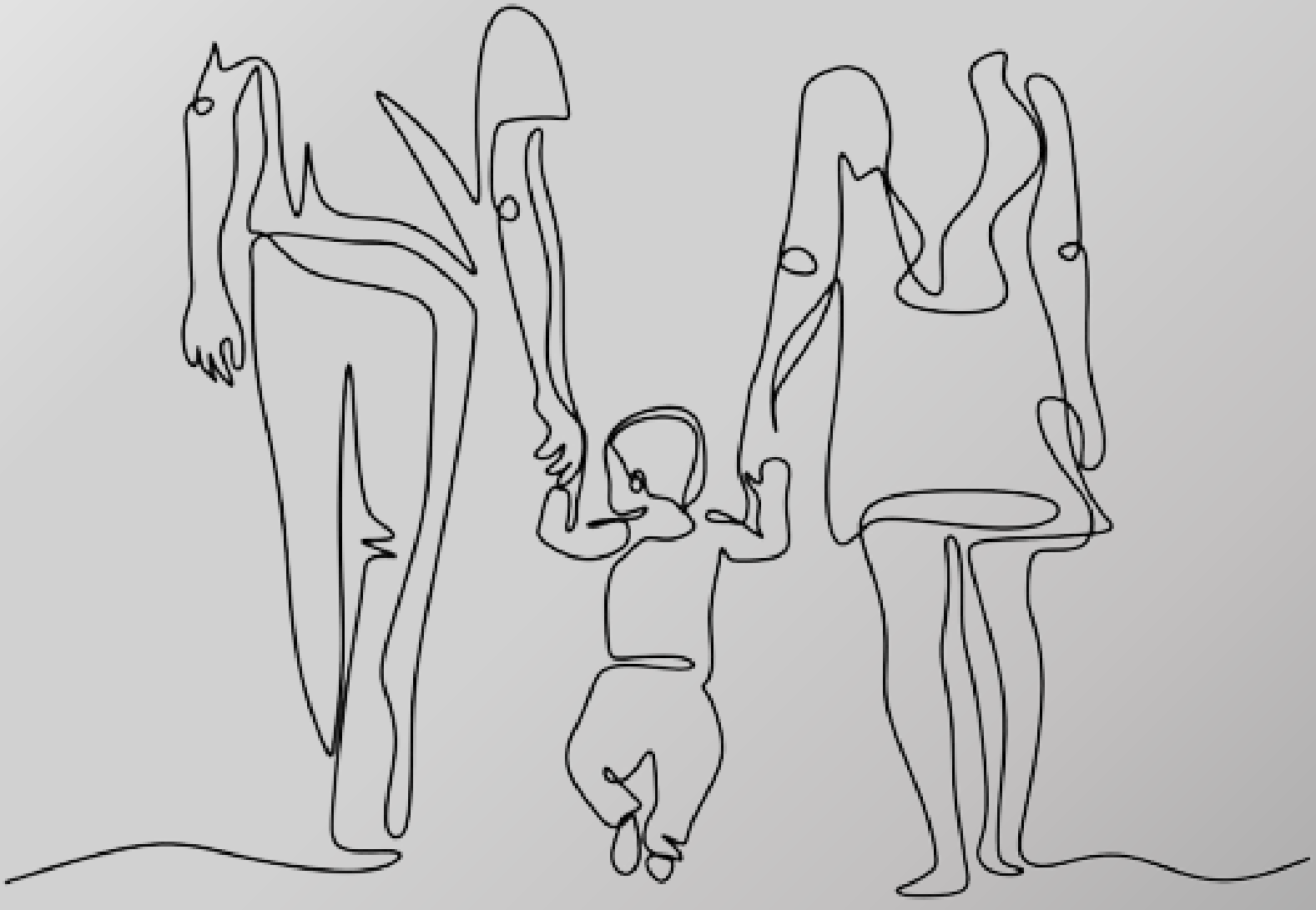
जिन्होंने पाल पोसकर मुझे बड़ा किया,
जिन्होंने गिरने पर मुझे खड़ा किया,
गलती पर डाटकर कुछ सिखा दिया,
काबिलियत का असली रास्ता दिखा दिया,
ऐसे निस्वार्थ नर और कोई नहीं,
ब्लकि मेरे माता-पिता हैं।

मेरे रोने पर जिन्होंने मुझे हसा दिया,
मेरे हसने पर जिन्होंने मेरे साथ हँस लिया,
मुझे ढेर सारे तौफे और अनन्य प्यार दिया,
बात बात पर जिन्होंने मुझे पुचकार दिया,
ऐसे महानतम नर और कोई नहीं,
ब्लकि मेरे माता-पिता हैं।

मेरे लिए जिन्होंने कभी कोई कसर नहीं छोड़ी,
जो दुखी हो गए जब चोट लगी मुझे थोड़ी,
जिन्होंने मुझे इतने अच्छे संस्कार दिए,
जिन्होंने मेरे लिए इतने कष्ट सहन किए,
ऐसे भगवान समान नर और कोई नहीं,
ब्लकि मेरे माता-पिता हैं।

प्यारे मम्मी पापा मैं आपसे बहुत प्यार करता हूँ।
बस आपसे दूर न चला जाऊँ इस बात से डरता हूँ।
मैं अपनी तरफ से पूरी कोशिश करूँगा,
आपके जीवन में खुशियाँ मैं अवश्य भरूँगा।
आप दोनों को कुछ हो गया तो जी नहीं पाऊँगा,
आप दोनों मेरे लिए सबकुछ हो बस इतना कहना चाहूँगा।

~ पीयूष मारू (23BEC146)



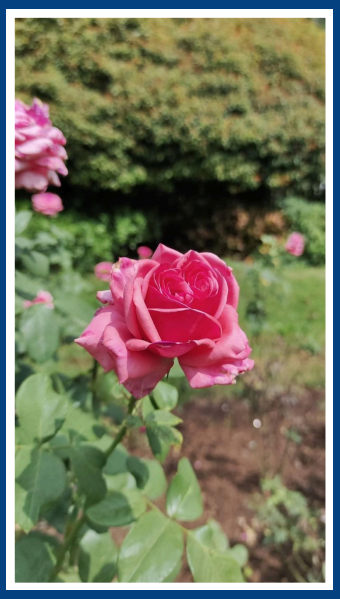
SNAPS &

Diya Thakkar (22BEC039)

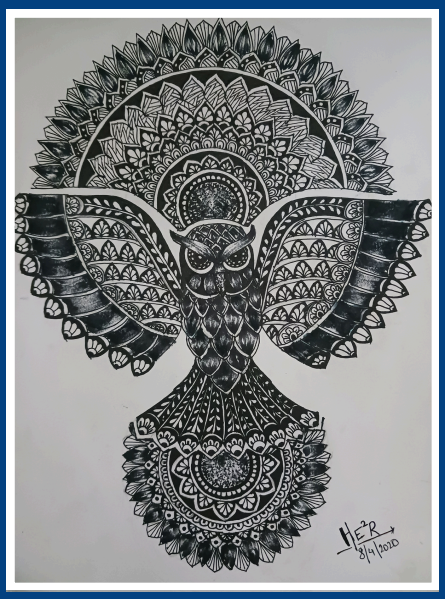
STROKES

Darsh Kelaiya (22BEC022)

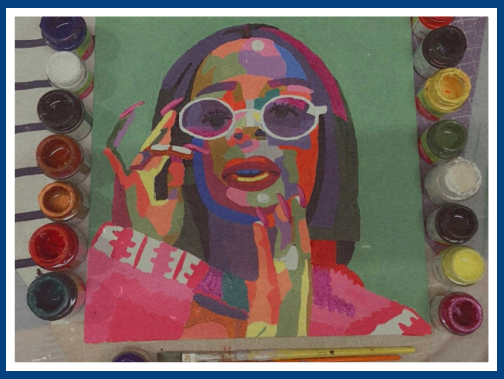
Vedanti Patel
(21BEC095)

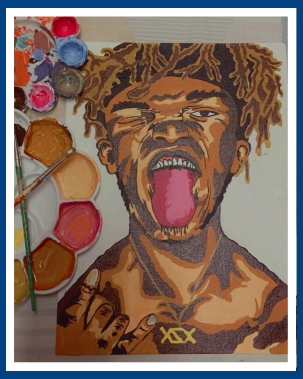


Diya Thakkar
(22BEC039)



Heer Mehta
(22BEC048)





Bansri Choxi (22BEC021)

Kevin Andani (21BEC008)

Vedanti Patel (21BEC095)

Darsh Kelaiya (22BEC022)

Meet the Design Team!

Kevin Andani
21BEC008

Vedanti Patel
21BEC095

Het Patel
22BEC050

Kaival Prajapati
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Notes

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NIRMA UNIVERSITY
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NAAC ACCREDITED 'A+' GRADE