



ART3FACTS

Chronicles of Technology, Talent, Innovation and
Inspiration

DEPARTMENTAL MAGAZINE



DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

9th

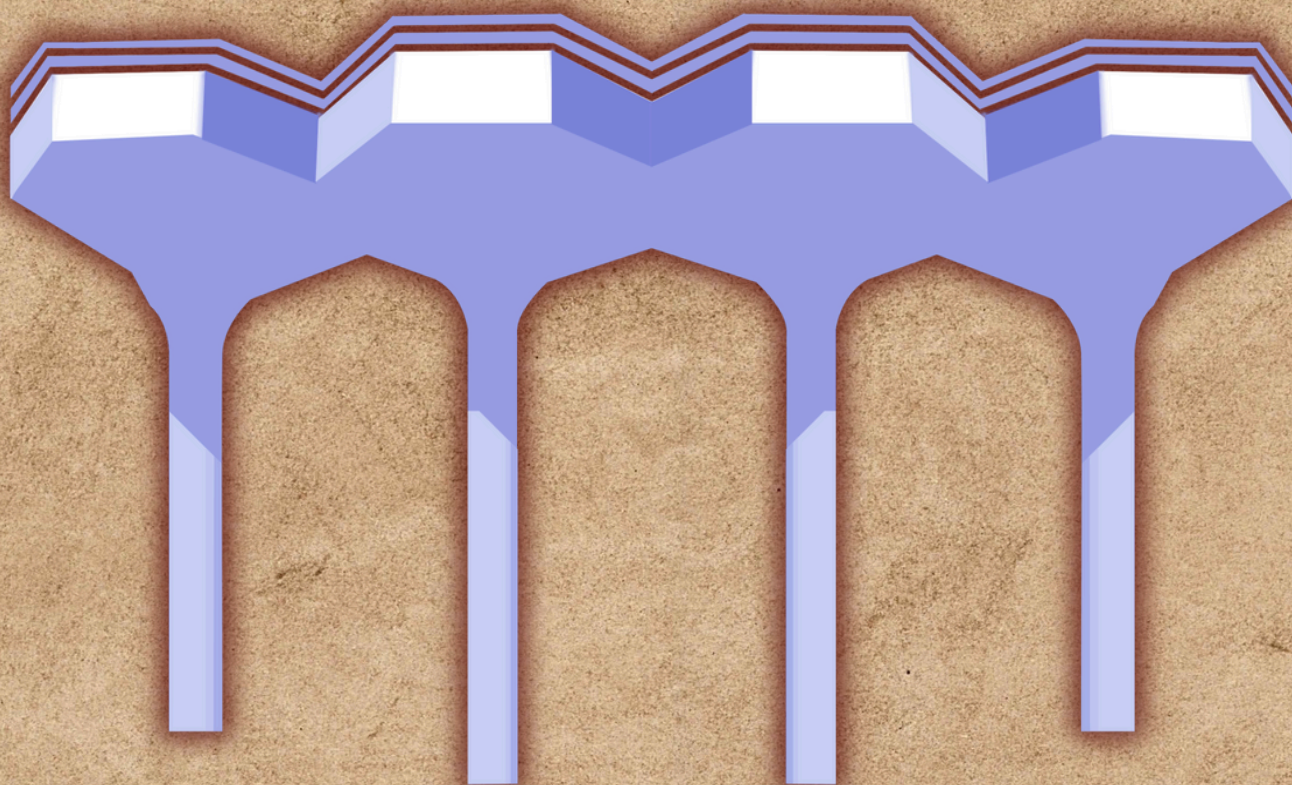
EDITION
2024



ART3FACTS

CHRONICLES OF TECHNOLOGY, TALENT, INNOVATION AND
INSPIRATION

TECHNO-CULTURAL MAGAZINE NINTH EDITION



DEPARTMENT OF ELECTRONICS
&
COMMUNICATION ENGINEERING



HALDIA INSTITUTE OF TECHNOLOGY
HALDIA, PURBA MEDINIPUR-721657(WB)

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ABOUT

About Institute

Haldia Institute of Technology (An Institute of ICARE, Haldia, Approved by AICTE, and affiliated to MAKAUT) began its journey in the year 1996. It is the first private and accredited academic institution catering technical education in West Bengal. The institute has an enclave campus of 43 acres of land having an administrative block of 3332 square meters with nine academic blocks having an area of around 20350 squares. There are 12 NBA accredited B. Tech courses and 5 M.Tech and MCA,MBA courses with 5200 student strength.

Haldia Institute of Technology is accredited by the National Assessment and Accreditation Council (NAAC) with an "A" grade, valid up to September 2021. Haldia Institute of technology ranked "163" among engineering colleges in India by the National Institutional Ranking Framework (NIRF) in 2020

Department of Electronics & Communication Engineering

The Department of Electronics & Communication Engineering was established in 1998. National Board of Accreditation (NBA) accredited it in 2004,2007, 2018 and subsequently in 2007. Presently, the department has an intake capacity of 180 student for the B. Tech course. It also offers MTech in Microelectronics and VLSI Design since 2005 with intake capacity 18 students. The department has several well-equipped laboratories for the students as well as for researchers. It has a departmental Library, which contains text/reference books, more than 500 titles. The department of Electronics and communication stands by the vision "To produce dynamic human resources of global standards by imparting quality teaching, carrying out research and technology development in the emerging areas of Electronics & Communication Engineering".

The department also strives to produce electronics and communication engineers having strong theoretical foundation, good design experience and exposure to research and technology development in frontier areas of electronics and communication engineering. And also, to create competent professionals who can work as an individual or in a group with effective communication and leadership skills meeting the requirements of multi-cultural global environments and to help the student be a successful and responsible engineer for the betterment of mankind by inculcating social and ethical values in professional engineering program.

Presently, The Head of the Department is **Prof. (Dr.) Chanchal Kumar De** (2017-present).

Former Head of the Department(s):

1. Mr. Santi Prasad Maity (1998-2001)
2. Mr. Goutam Lohar (2001-2005)
3. Mr. Asim Kumar Jana (2005-2009)
4. Dr. Sunandan Bhunia (2009-2015)
5. Dr. Jaydeb Bhaumik (2015-2017)



Prof. (Dr.) Subrata Mondal

Principal
Haldia Institute of Technology, Haldia,
Purba Medinipur

MESSAGE FROM PRINCIPAL

I'm glad to hear that in september 2024, the Department of Electronics and Communication Engineering will release the nineth issue of "iArtefacts," its yearly journal of technology and culture.

Science and technology innovation is a deeply philosophical topic. A clogged mind is incapable of thinking clearly until it is unburdened by cultural taste. "Education is the manifestation of perfection already in man" according to Swami Vivekananda. Therefore, even if we make an attempt to provide education that keeps pace with technological innovation, it would be ineffective if it weren't complemented by something that mirrored the perspectives of our younger generation. Here, technocultural magazine can play a significant function in helping them express their ideas and perspectives in order to make it flawless.

"iArtefacts" has numerous features that will enable numerous positive qualities. not just in our younger generation but in everyone who is a part of this action. Additionally, it will work to instil confidence, ingenuity, and originality in each of them.

This magazine represents a turning point in our development because it lets our imaginations run free and gives life to our ideas and desires. It releases a wide range of creative abilities, from writing to editing to even magazine design. So getting the magazine to publish is almost like a dream.

I'd want to thank the entire "i-Artefacts" team and the authors who contributed for their efforts in turning this dream into a reality



Dr. Anjan Mishra

Registrar
Haldia Institute of Technology, Haldia,
Purba Medinipur

MESSAGE FROM REGISTRAR

We strived to develop our youth for the advancement of the nation during the era of rapid technical improvement and the information revolution, and we dedicated two decades to this effort. We constantly supported the pupils' development along the way with patronage, criticism, sympathy, and guidance. With these activities, Haldia Institute of Technology has evolved into a hub for purposeful education. It is an honour for me to communicate how pleased I am with the Department of Electronics and Communication Engineering's production of the techno-cultural print journal "iArtefacts."

The entire faculty and staff at the Institute are focused on continuous improvement while keeping in mind the institute's mission statement that students are the primary drivers of technology. In addition to instruction and learning, we have a solid inheritance, This institute is emerging as a trend-setter in the heart of West Bengal, offering a good mix of academic and co-curricular activities. I urge all the stake holders to make the most of the multiple opportunities, for self-development as well as the development of the Institute and the society as a whole. Please make the best use of all the facilities that are available. Please try to maintain a balance between academic and co-curricular activities. Enjoy yourselves by all means, but always remember the need for self- discipline, moral values and a sense of responsibility.

The mastery of mind cannot be termed complete unless the hidden potentials beyond the books are harnessed, nourished and properly shaped. The objective of all cultural events and programs at our Institute had always been focused on the same. I am sure that the initiative taken by the Department of Electronics and Communication Engineering, will definitely make our effort towards the achievement of the vision of our Institute stronger. I extend my best wishes to the faculty members and students involved of the magazine "i-Artefacts". At our Institute, the goal of all cultural events and programmes has always been the same. I have no doubt that the initiative taken by the Department of Electronics and Communication Engineering will significantly strengthen our efforts to realise our Institute's mission. To the faculty members and students working in the journal "i-Artefacts," I send my best wishes.



Prof. (Dr.) Chanchal Kumar De

Head,
Dept. of Electronics & Communication Engineering
Haldia Institute of Technology, Haldia,
Purba Medinipur

MESSAGE FROM THE HEAD OF DEPARTMENT

I feel ecstatic to introduce our Department of Electronics and Communication Engineering, Haldia Institute of Technology is coming out with the seventh edition of the departmental magazine “i-Artefacts”. In fact, the Glory of a department depends on the caliber and achievements of the students, teachers, and staff.

A magazine carries the contributions reflecting the ethos and aspirations of each and every individual of a department. “i-Artefacts”, the magazine strives to change information into knowledge and innovative ideas, to enhance critical thinking to cultivate the right ways that will equip all of us to stay competent in our respective fields of study and research.

"i-Artefacts" has numerous features that will enable numerous positive qualities not just in our younger generation but in everyone who is a part of this action. Additionally, it will work to instill confidence, ingenuity, and originality in each of them.

Moreover, ‘i-Artefacts’ means something observed in a scientific investigation or experiment that is not naturally present but occurs as a result of the preparative or investigative procedure and in connection to the name of the magazine; I solemnly believe that the Electronics and Communication Engineering fraternity will certainly impart a shape to this tiny magazine to embark the meaning of the same in the days to come.

It is my pleasure to congratulate the entire team 'i-Artefacts' who have made untiring efforts to make this magazine possible. I extend my warm wishes towards the success of this edition of the magazine.



Dibyendu Chowdhury

Assistant Professor (ECE)
Haldia Institute of Technology, Haldia,
Purba Medinipur

EDITOR'S NOTE

We are going to publish a printed Magazine after the pandemic covid-19. I Dibyendu Chowdhury, Assistant Professor Dept. of ECE at Haldia Institute of Technology and I feel grateful to be an editor of this Magazine from faculty side since 2017. I have a challenge to give the time to publish this Magazine due to other activities of the department and institute. I along with my editorial team members have spent a lot of time to make this Magazine stand out.

So here you have “iARTEFACTS”, the long-awaited magazine of the ECE department for the “AN OBJECT MADE BY HUMAN HAND”. This magazine gives an insight into the different hobbies of students, their creativity and activities. This magazine is a platform that exhibits the literary skills and innovative ideas of teachers and students. “iARTEFACTS” presents the hard work and dedication of students and the contributions of teachers.

I would like to thank all my editorial team members for helping me to this through. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns, and special insights with fellow beings that have made this magazine possible.

Thank you all!!

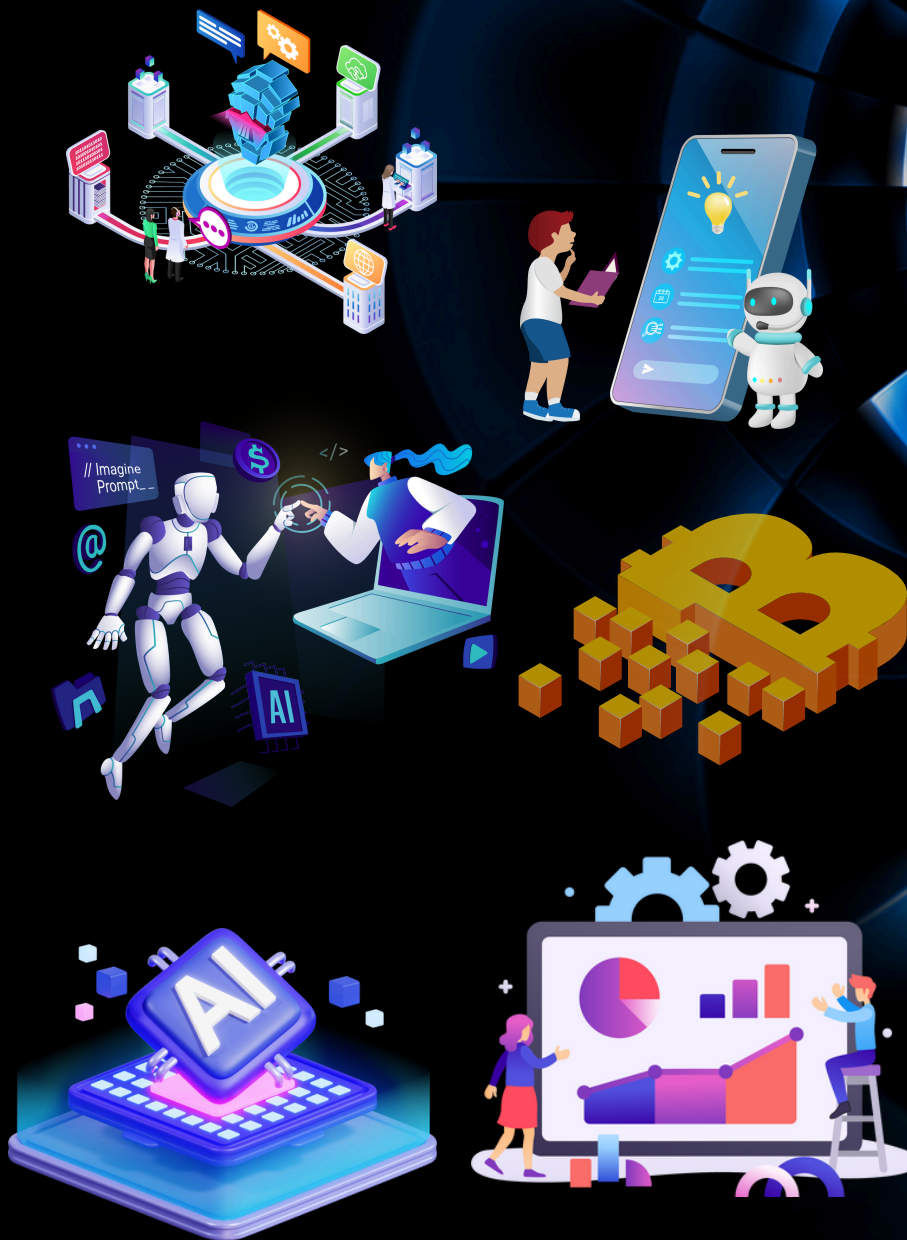
STUDENT EDITORS NOTE

Storytelling is an art of sharing ideas that humans have mastered over the course of time, the impact it brings in the formation of culture and societies can be seen through the extraordinary narratives of great minds. It involves constant observation and lots of creativity to make the process interesting and informative at the same time. Making a subtle balance over the use of technical jargons and the ideas we attempt to share with our audience, we embark on making this magazine interactive and easy to comprehend. In this digital version we have put dynamic content to provide the best reading experience. Believing in the best and maintaining the highest standards is what has been our legacy. We have given our best to uphold this.

As a reader you will feel a dopamine rush while going through the recent advances in communications, electronics, automation, robotics and future end technologies. And while diving into the literature section you will embrace the remarkable efforts of our peers at HIT expressing their heart through beautiful words and pictures. We have thoroughly put visual illustrations and the emotions we share with our readers. And this endeavor would not have been complete without a rewind through the achievements of ECE department and the glimpses of some memorable moments we have lived together. The entire process of publication has been a great learning experience for us. Building from scratch gave us the flexibility to work and improve our content at each step and share ideas throughout.

This bottom-up approach of ours to complete this project made us deliver every bit of this magazine as original ideas of our team members. Our strength lies in the size of our team contributing with a common goal to build something great, whose efforts have made this journey an easy ride. We invite our readers to share their views and remarks on our social media instances and make this endeavor an ongoing journey until we are back again with another version of your favourite “iArtefact”.

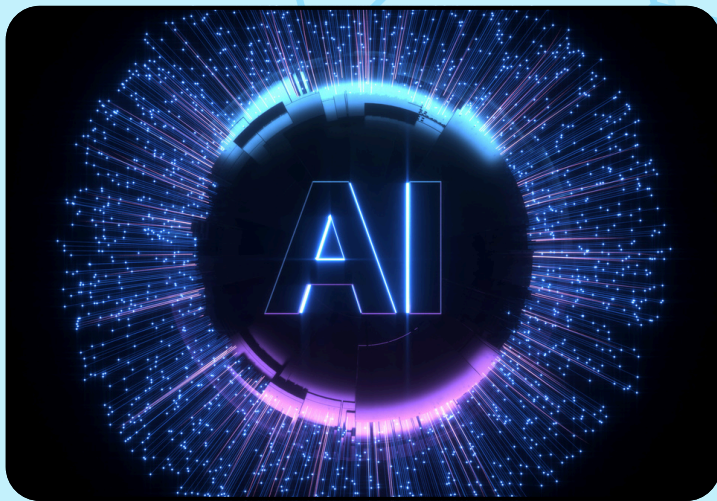
TECH TRENDS



ARTIFICIAL INTELLIGENCE



ARTIFICIAL INTELLIGENCE (AI) IS THE FIELD OF COMPUTER SCIENCE DEDICATED TO CREATING SYSTEMS THAT CAN PERFORM TASKS THAT WOULD TYPICALLY REQUIRE HUMAN INTELLIGENCE.



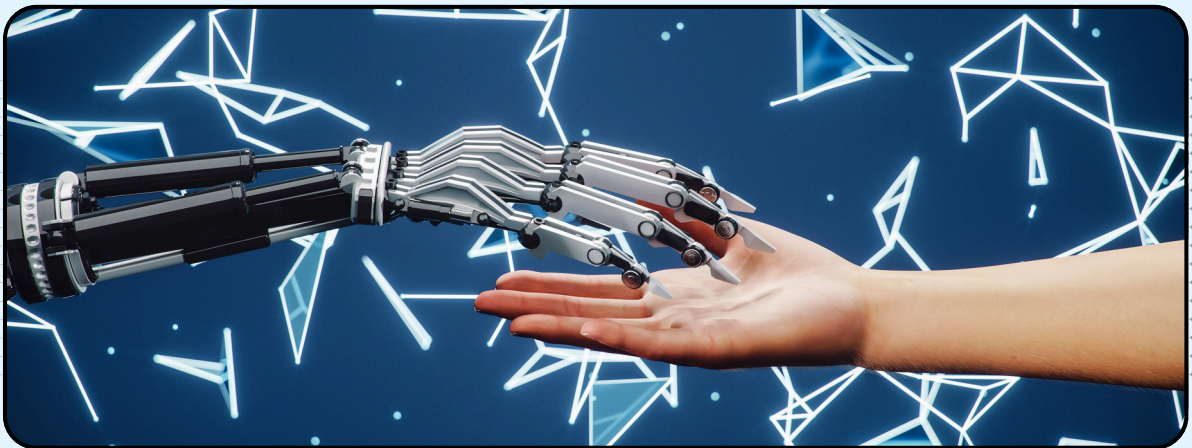
THESE TASKS ENCOMPASS A WIDE RANGE OF ACTIVITIES, INCLUDING PROBLEM-SOLVING, DECISION-MAKING, UNDERSTANDING NATURAL LANGUAGE, PERCEPTION, AND EVEN CREATIVITY. AT ITS CORE, AI SEEKS TO REPLICATE AND SOMETIMES ENHANCE HUMAN COGNITIVE ABILITIES USING MACHINES. THIS INVOLVES DEVELOPING ALGORITHMS AND MODELS THAT ENABLE COMPUTERS TO LEARN FROM DATA, RECOGNIZE PATTERNS, AND MAKE DECISIONS BASED ON THAT INFORMATION.

AI HAS SEEN SIGNIFICANT ADVANCEMENTS IN RECENT YEARS, DRIVEN BY IMPROVEMENTS IN COMPUTATIONAL POWER, THE AVAILABILITY OF LARGE DATASETS, AND BREAKTHROUGHS IN ALGORITHMS.



THESE ADVANCEMENTS HAVE LED TO THE DEVELOPMENT OF AI APPLICATIONS THAT PERMEATE VARIOUS ASPECTS OF OUR LIVES, FROM VIRTUAL ASSISTANTS ON OUR SMART-PHONES TO SOPHISTICATED ALGORITHMS POWERING RECOMMENDATION SYSTEMS, AUTONOMOUS VEHICLES, MEDICAL DIAGNOSIS TOOLS, AND MORE.

ONE OF THE MOST PROMISING AREAS WITHIN AI IS DEEP LEARNING, A SUBSET OF MACHINE LEARNING INSPIRED BY THE STRUCTURE AND FUNCTION OF THE HUMAN BRAIN'S NEURAL NETWORKS. DEEP LEARNING MODELS, PARTICULARLY NEURAL NETWORKS WITH MANY LAYERS, HAVE DEMONSTRATED REMARKABLE CAPABILITIES IN TASKS SUCH AS IMAGE AND SPEECH RECOGNITION, NATURAL LANGUAGE PROCESSING AND CHESS AT A SUPERHUMAN LEVEL.



HOWEVER, AI ALSO FACES SIGNIFICANT CHALLENGES AND ETHICAL CONSIDERATIONS. CONCERNS ABOUT JOB DISPLACEMENT DUE TO AUTOMATION, BIASES IN AI SYSTEMS, DATA PRIVACY, AND THE POTENTIAL FOR MISUSE OF AI-POWERED TECHNOLOGIES ARE JUST A FEW OF THE COMPLEX ISSUES THAT RESEARCHERS AND POLICY MAKERS GRAPPLE WITH. DESPITE THESE CHALLENGES, THE POTENTIAL BENEFITS OF AI ARE IMMENSE.

-Dr. Himadri Sekhar Das

ANDROID

PAST, PRESENT & FUTURE

SUJAL KR SINGH
23/ECE/164



Imagine a world where you hold a universe in the palm of your hand. A universe that connects you to millions, a universe that sings, dances, plays, informs, and even makes you laugh. This universe is no figment of imagination, but a reality known as Android.

Born from the alliance of technology giants, Android is a mobile operating system that has revolutionized our digital experience. It's the heartbeat of countless smartphones and tablets across the globe, pulsating with possibilities.

From the highest peaks to the deepest oceans, Android connects us all, transcending boundaries of geography, language, and culture. It's not just an operating system, it's a digital companion that makes our lives easier, richer, and more fun.



THE DAWN OF ANDROID

The Idea of android initially aimed to develop an operating system for digital cameras, it was 2003 when Android Inc. an American technology company started the proceedings for Android. However, the project pivoted to become a smartphone operating device in 2004, and in 2005 Google acquired Android Inc. for the further developments



ANDROID TODAY

So, as we fast forward to the present day, Android has become the most used OS in smartphones. The latest plus of Android is its Android 14.0 which was released on October 4, 2023. Android Studio, the official Integrated Development Environment (IDE) for Android app development, provides app builders with a plethora of tools and features to create dynamic layouts, write better code, build flexible systems, and test applications on a variety of Android devices.

LOOKING AHEAD : THE FUTURE OF ANDROID

The future of Android looks promising with continuous improvements and new features being added. The first Developer Preview of Android 15 was released on February 16, 2024. This version aims to improve productivity, produce superior media experiences, minimize battery impact, maximize smooth app performance, and protect user privacy and security.

Android 15 also brings enhancements for working across different devices and form factors, including tablets, foldables, and flippables⁶. It provides tooling and libraries to help apps take advantage of the latest advances in AI⁶. Furthermore, Android 15 integrates new features like partial screen sharing, allowing users to share or record just an app window rather than the entire device screen.



In conclusion, Android has come a long way since its inception and continues to evolve, offering exciting possibilities for developers and users alike. As we look forward to the future, we can expect Android to continue leading the way in mobile technology.

CRYPTO CURRENCY

- MD SAJIM ANSARI
22/ECE/104



A cryptocurrency is a digital or virtual currency secured by cryptography, which makes it nearly impossible to counterfeit or double-spend. Most cryptocurrencies exist on decentralized networks using blockchain technology—a distributed ledger enforced by a disparate network of computers. cryptocurrency can be traced back to the late 20th century with the concept of digital currencies.

However, the modern era of cryptocurrency began with the creation of Bitcoin, created in 2009 by an anonymous person or group known as Satoshi Nakamoto, was the first cryptocurrency. Since then, thousands of other cryptocurrencies have been developed, each with its own features and purposes. Bitcoin introduced the groundbreaking concept of a decentralized digital currency, operating on a peer-to-peer network without the need for intermediaries like banks.

The cryptocurrency market experienced significant growth and volatility over the years, with prices reaching new highs and experiencing dramatic crashes. Regulatory scrutiny also increased as governments around the world grappled with how to regulate this emerging asset class.

Despite challenges, cryptocurrencies gained popularity and adoption, with an increasing number of businesses and individuals using them for various purposes, including investments, remittances, and as a means of payment. the present status of cryptocurrency is dynamic and subject to change due to various factors such as market trends, regulatory developments, technological advancements, and investor sentiment.

However, some general insights based on the trends up to that point:

Market Capitalization: The total market capitalization of the cryptocurrency market had grown significantly, reaching hundreds of billions to over a trillion dollars. Bitcoin remained the largest cryptocurrency by market capitalization, followed by Ethereum and several other major cryptocurrencies.

Adoption and Acceptance: Cryptocurrency adoption continued to expand, with more businesses, institutions, and individuals showing interest in cryptocurrencies for various purposes, including investment, payments, and as a hedge against inflation.

Institutional Investment: Institutional adoption of cryptocurrencies increased, with notable investments from hedge funds, asset managers, and publicly traded companies. Some institutional investors began allocating a portion of their portfolios to cryptocurrencies as part of their investment strategy.

Regulatory Developments: Regulatory scrutiny of cryptocurrencies intensified in many jurisdictions as governments sought to establish frameworks to regulate the industry. Regulatory clarity remained a key concern for market participants, as regulations could impact the legality, taxation, and trading of cryptocurrencies.

Technological Advancements: The cryptocurrency ecosystem continued to evolve technologically, with ongoing developments in blockchain scalability, interoperability, privacy, and security. New consensus mechanisms, layer-2 solutions, and decentralized finance (DeFi) applications emerged, expanding the capabilities and use cases of cryptocurrencies.

Volatility: Cryptocurrency markets remained highly volatile, with prices experiencing significant fluctuations over short periods. Price volatility remained a characteristic feature of the cryptocurrency market, attracting traders and investors seeking profit opportunities but also posing risks.

Environmental Concerns: Environmental sustainability became a growing concern within the cryptocurrency community, particularly regarding the energy consumption associated with proof-of work (PoW) consensus mechanisms used by some cryptocurrencies like Bitcoin. This led to discussions and initiatives aimed at promoting greener alternatives and increasing energy efficiency in cryptocurrency mining.

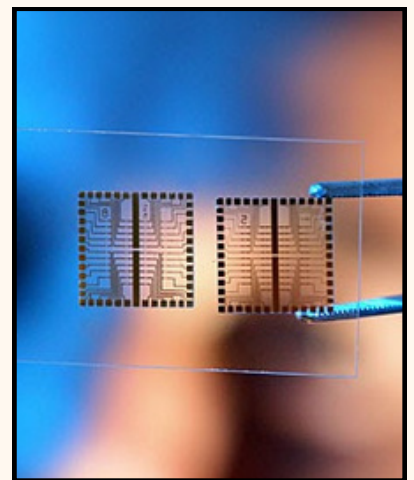
While these trends offer insights into potential directions for the future of cryptocurrency, it's essential to recognize the inherent uncertainty and volatility of the cryptocurrency market. The future of cryptocurrency will likely be shaped by a combination of technological advancements, regulatory developments, market dynamics, and societal factors, making it important for stakeholders to stay informed and adaptable in navigating this evolving landscape.

BIOCHIPS

THE FIRST BIOCHIP WAS INVENTED BY AN AMERICAN COMPANY NAMELY [AFFYMETRIX](#), AND THE PRODUCT OF THIS COMPANY IS GENECHIP (DNA MICROARRAYS). THESE PRODUCTS COMPRISE THE NUMBER OF INDIVIDUAL DNA SENSORS USED FOR SENSING DEFECTS. BIOCHIP PLAYS AN ESSENTIAL ROLE IN THE FIELD OF BIOLOGY RESEARCH LIKE SYSTEMS BIOLOGY AS WELL AS DISEASE BIOLOGY WHILE THE NUMBER OF CLINICAL APPLICATIONS IS RISING. IT IS A SET OF MICROARRAYS WHICH ARE PLACED ON A STRONG SURFACE OF A SUBSTRATE TO ALLOW THOUSANDS OF REACTIONS TO BE PERFORMED IN LESS TIME. THE DEVELOPMENT OF BIOCHIP MAINLY INCLUDES THE COMBINATION OF MOLECULAR BIOLOGY, BIOCHEMISTRY, AND GENETICS. BIOCHIPS ARE USED FOR ANALYZING ORGANIC MOLECULES CONNECTED WITH A LIVE ORGANISM. THIS ARTICLE DISCUSSES WHAT IS BIOCHIP, TYPES, BIOCHIPS AND THEIR USES, DISADVANTAGES, AND ITS APPLICATIONS.

WHAT IS A BIOCHIP?

A BIOCHIP IS A SET OF DIMINISHED MICROARRAYS THAT ARE PLACED ON A STRONG SUBSTRATE THAT ALLOWS MANY EXPERIMENTS TO BE EXECUTED AT THE SAME TIME TO OBTAIN A HIGH THROUGHPUT IN LESS TIME. THIS DEVICE CONTAINS MILLIONS OF SENSOR ELEMENTS OR BIOSENSORS. NOT LIKE MICROCHIPS, THESE ARE NOT ELECTRONIC DEVICES. EACH AND EVERY BIOCHIP CAN BE CONSIDERED AS A MICROREACTOR THAT CAN DETECT A PARTICULAR ANALYTE LIKE AN ENZYME, PROTEIN, DNA, BIOLOGICAL MOLECULE OR ANTIBODY. THE MAIN FUNCTION OF THIS CHIP IS TO PERFORM HUNDREDS OF BIOLOGICAL REACTIONS IN A FEW SECONDS LIKE DECODING GENES (A SEQUENCE OF DNA).



COMPONENTS OF BIOCHIPS

THE BIOCHIP COMPRISES TWO COMPONENTS NAMELY THE **TRANSPONDER** AS WELL AS **READER**.

TRANSPONDER

TRANSPONDERS ARE TWO TYPES' NAMELY ACTIVE TRANSPONDER AND PASSIVE TRANSPONDER. THIS IS A PASSIVE TRANSPONDER WHICH MEANS THAT IT DOESN'T CONTAIN ANY OF ITS OWN ENERGY OR BATTERY WHEREAS IN PASSIVE, IT IS NOT ACTIVE UNTIL THE OPERATOR ACTIVATES IT BY GIVING IT A LOW ELECTRICAL CHARGE. THIS TRANSPONDER CONSISTS OF FOUR PARTS SUCH AS ANTENNA COIL, COMPUTER MICROCHIP, GLASS CAPSULE, AND A TUNING CAPACITOR.

READER

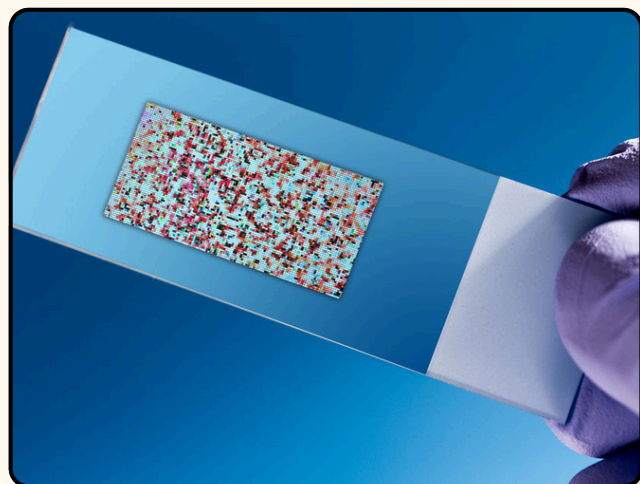
THE READER COMPRISES OF A COIL NAMELY "EXCITER" AND IT FORMS AN ELECTROMAGNETIC FIELD THROUGH RADIO SIGNALS. IT OFFERS THE REQUIRED ENERGY ($<1/1000$ OF A WATT) TO ACTIVATE THE BIOCHIP. THE READER CARRIES A RECEIVING COIL FOR RECEIVING THE ID NUMBER OR TRANSMITTED CODE SENT BACK FROM THE EXCITED IMPLANTED BIOCHIP.

TYPES OF BIOCHIPS

THERE ARE THREE TYPES OF BIOCHIPS AVAILABLE NAMELY **DNA MICROARRAY**, **MICROFLUIDIC CHIP**, AND **PROTEIN MICROARRAY**.

DNA MICROARRAY:-

A DNA MICROARRAY OR DNA BIOCHIP IS A SET OF TINY DNA SPOTS FIXED TO A STRONG SURFACE. A RESEARCHER UTILIZES TO CALCULATE THE EXPRESSION LEVELS FOR A LARGE NUMBER OF GENES. EVERY DNA MARK COMPRISES PICOMOLES OF PARTICULAR GENES WHICH ARE TERMED AS PROBES. THESE CAN BE A SHORT SEGMENT OF A GENETIC MATERIAL UNDER HIGH RIGIDITY SITUATIONS.



USUALLY, PROBE-TARGET HYBRIDIZATION IS NOTICED AND COUNTED BY RECOGNITION OF FLUOROPHORE OR CHEMILUMINESCENCE LABELED TARGETS TO DECIDE THE RELATIVE QUANTITY OF NUCLEIC ACID SERIES IN THE TARGET. INNOVATIVE ARRAYS OF NUCLEIC ACID WERE MACRO ARRAYS ABOUT 9 CM X 12 CM AND THE INITIALLY AUTOMATED ICON BASED ANALYSIS WAS PUBLISHED IN THE YEAR 1981.

MICROFLUIDIC CHIP:-

MICROFLUIDIC BIOCHIPS OR LAB-ON-A-CHIP ARE A CHOICE TO USUAL BIOCHEMICAL LABORATORIES AND ARE TRANSFORMING SEVERAL APPLICATIONS LIKE DNA ANALYSIS, MOLECULAR BIOLOGY PROCEDURES, PROTEOMICS WHICH IS KNOWN AS THE STUDY OF PROTEINS AND DIAGNOSTIC OF DISEASES (CLINICAL PATHOLOGY). THESE CHIPS ARE BECOMING MORE COMPLEX BY USING 1000'S OF COMPONENTS, BUT THOSE COMPONENTS ARE DESIGNED PHYSICALLY CALLED AS BOTTOM-UP FULL-CUSTOM PLAN, WHICH IS A VERY LARGE WORKFORCE.

PROTEIN MICROARRAY:-

A PROTEIN MICROARRAY OR PROTEIN CHIP METHOD IS USED TO FOLLOW THE ACTIONS AS WELL AS CONNECTIONS OF PROTEINS, AND TO FIND OUT THEIR FUNCTION ON A LARGE SCALE. THE MAIN ADVANTAGE OF PROTEIN MICROARRAY IS THAT WE CAN TRACK A LARGE NUMBER OF PROTEINS IN PARALLEL. THIS PROTEIN CHIP COMPRISES OF A SURFACE FOR SUPPORTING LIKE MICROTITRE PLATE OR BEAD, NITROCELLULOSE MEMBRANE, THE GLASS SLIDE. THESE ARE AUTOMATED, RAPID, ECONOMICAL, VERY SENSITIVE, CONSUMES LESS QUANTITY OF SAMPLES. THE FIRST METHODOLOGY OF PROTEIN CHIPS WAS INTRODUCED IN ANTIBODY

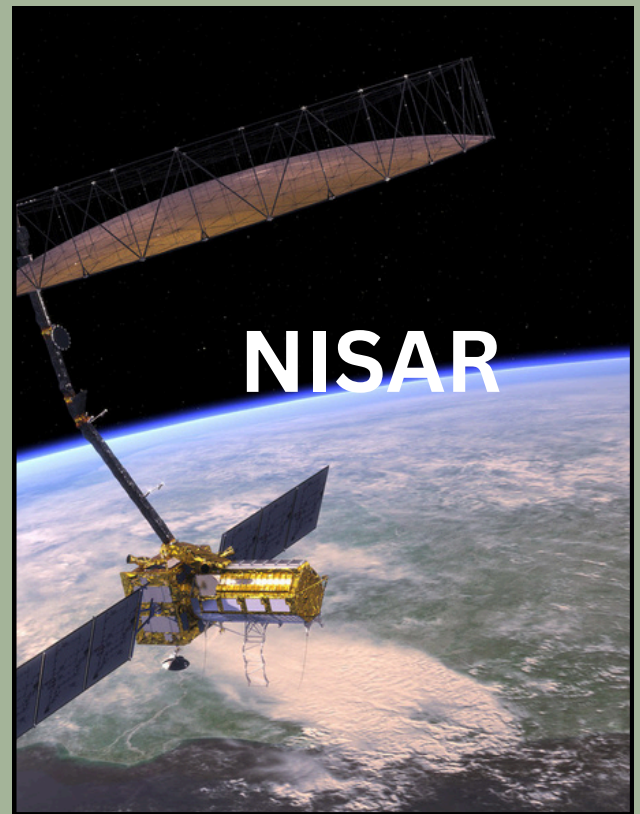
MICROARRAYS OF SCIENTIFIC PUBLICATION IN THE YEAR 1983. THE TECHNOLOGY BEHIND THIS CHIP WAS QUITE EASY TO DEVELOP FOR DNA MICROARRAYS, WHICH HAVE TURNED INTO THE MOST GENERALLY USED MICROARRAYS.

-NASIR HUSSAIN
22/ECE/112

NISAR MISSION:

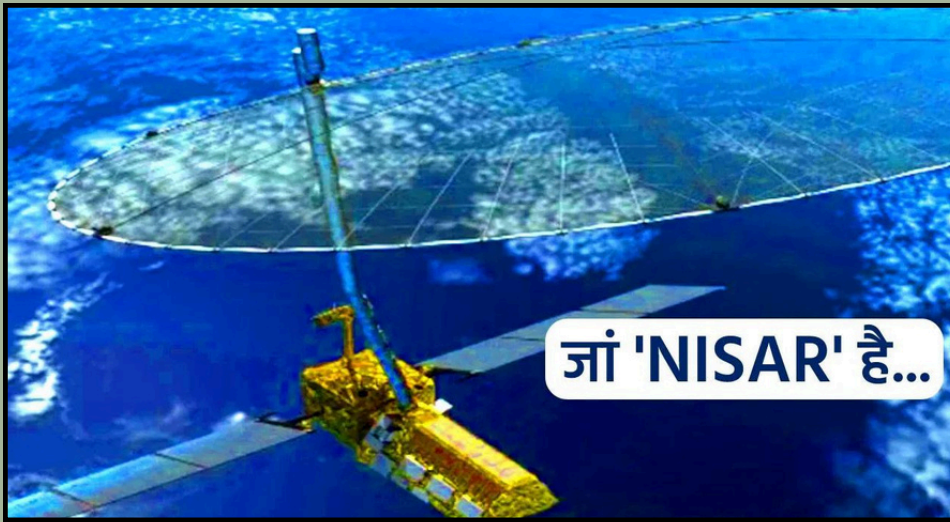
A JOINT NASA-ISRO EFFORT TO TRACK EARTH'S CHANGES

THE NASA-ISRO SYNTHETIC APERTURE RADAR (NISAR) SATELLITE IS A COLLABORATIVE EARTH-OBSERVING MISSION DEVELOPED BY NASA AND ISRO, SLATED FOR LAUNCH IN 2024 FROM THE SATISH DHAWAN SPACE CENTRE IN INDIA. NISAR WILL FEATURE DUAL L-BAND AND S-BAND SYNTHETIC APERTURE RADARS (SAR), UTILIZING ADVANCED SWEEP SAR TECHNIQUES TO ACHIEVE HIGH-RESOLUTION IMAGING OVER EXTENSIVE AREAS, CAPABLE OF MAPPING THE ENTIRE GLOBE EVERY 12 DAYS. THIS MISSION MARKS THE FIRST DUAL-FREQUENCY RADAR IMAGING EFFORT, COMBINING NASA'S L-BAND SAR SYSTEM AND ISRO'S S-BAND SAR PAYLOAD, BOTH UTILIZING A 12-METER DIAMETER COMMON DEPLOYABLE REFLECTOR ANTENNA. THE SATELLITE WILL PROVIDE CRITICAL DATA TO ENHANCE OUR UNDERSTANDING OF DYNAMIC EARTH PROCESSES AND MONITOR CHANGES IN ECOSYSTEMS, ICE MASSES, VEGETATION BIOMASS, SEA LEVEL, GROUNDWATER, AND NATURAL HAZARDS SUCH AS EARTHQUAKES, TSUNAMIS, VOLCANOES, AND LANDSLIDES.



THE NISAR SATELLITE'S PAYLOAD, MOUNTED ON THE INTEGRATED RADAR INSTRUMENT STRUCTURE (IRIS), INCLUDES A LARGE DEPLOYABLE MESH REFLECTOR AND A NINE-METER BOOM DEVELOPED BY NASA'S JET PROPULSION LABORATORY (JPL). ISRO IS RESPONSIBLE FOR PROVIDING THE SPACECRAFT BUS, LAUNCH SERVICES, AND MISSION OPERATIONS. THIS INTEGRATED OBSERVATORY WILL UTILIZE ITS HIGH REPEAT CYCLE AND EXTENSIVE SWATH CAPABILITIES TO OFFER FULL-POLARIMETRIC AND INTERFEROMETRIC OPERATION MODES, ENABLING DETAILED SURFACE DEFORMATION MEASUREMENTS THROUGH REPEAT-PASS INSAR TECHNIQUES. THE MISSION'S DESIGN AIMS TO CATER TO BOTH NATIONAL NEEDS AND THE GLOBAL SCIENTIFIC COMMUNITY, PROMOTING EXTENSIVE STUDIES IN GEOSCIENCES AND OTHER RELATED FIELDS.

DURING THE MISSION'S THREE-YEAR SCIENCE OPERATIONS PHASE, NISAR WILL FOCUS ON PROVIDING SPATIALLY AND TEMPORALLY CONSISTENT DATA THAT CAN HELP DISENTANGLE COMPLEX PHENOMENA LIKE ECOSYSTEM DISTURBANCES, ICE SHEET COLLAPSES, AND NATURAL DISASTERS. THE SATELLITE WILL MONITOR ANNUAL CHANGES IN COASTAL REGIONS, BATHYMETRY ALONG DELTAIC AREAS, AND SHORELINE EROSION AND ACCRETION. IT WILL ALSO OBSERVE SEA ICE CHARACTERISTICS AROUND INDIA'S ANTARCTIC POLAR STATIONS AND CAN DETECT AND TRACK MARINE OIL SPILLS, OFFERING CRUCIAL DATA FOR PREVENTIVE MEASURES. NISAR'S PRECISION INTERFEROMETRIC ORBITS WILL ALLOW MAPPING DEFORMATIONS ON THE EARTH'S SURFACE WITH MILLIMETER ACCURACY, VITAL FOR UNDERSTANDING SEISMIC AND VOLCANIC ACTIVITIES.



NISAR'S DATA WILL BE OPENLY ACCESSIBLE, PROMOTING INFORMED DECISION-MAKING FOR DISASTER MITIGATION AND RESOURCE MANAGEMENT. THIS MISSION EXEMPLIFIES INTERNATIONAL COOPERATION IN SPACE TECHNOLOGY, LEVERAGING THE STRENGTHS OF BOTH NASA AND ISRO TO ADDRESS GLOBAL CHALLENGES AND ADVANCE OUR SCIENTIFIC KNOWLEDGE. BY PROVIDING UNPRECEDENTED DATA ON EARTH'S SURFACE CHANGES, NISAR WILL AID IN BETTER MANAGING NATURAL RESOURCES AND HAZARDS, SUPPORTING EFFORTS TO UNDERSTAND AND MITIGATE THE IMPACTS OF CLIMATE CHANGE. THE SUCCESS OF THIS MISSION WILL UNDERScore THE VALUE OF COMBINING EXPERTISE AND RESOURCES ACROSS BORDERS TO ACHIEVE SIGNIFICANT SCIENTIFIC AND SOCIETAL BENEFITS.

ADITYA PRAKASH
20-ECE-012

BLACKHOLES

THE HIDDEN MYSTERY OF THIS UNIVERSE

-SHIVAM KUMAR GUPTA
23/ECE/139



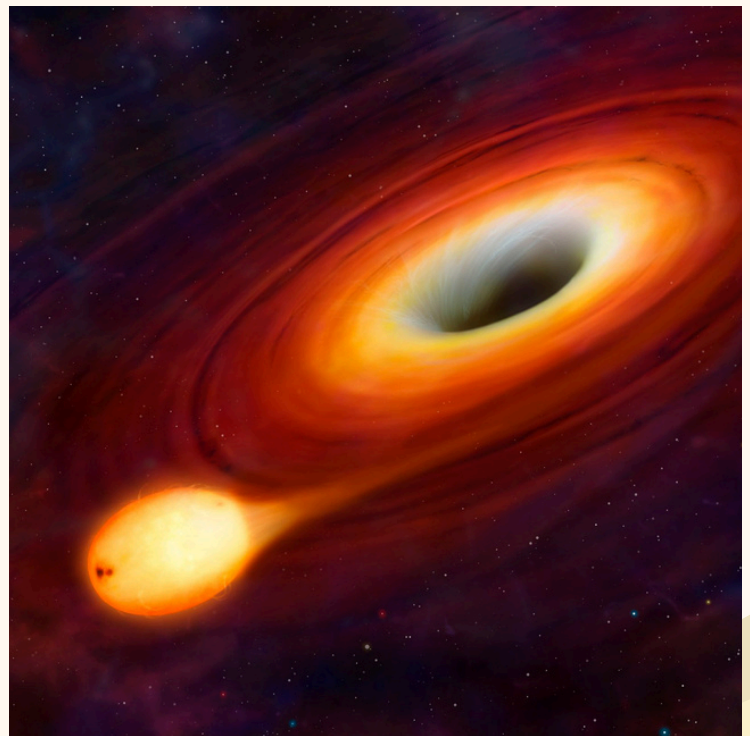
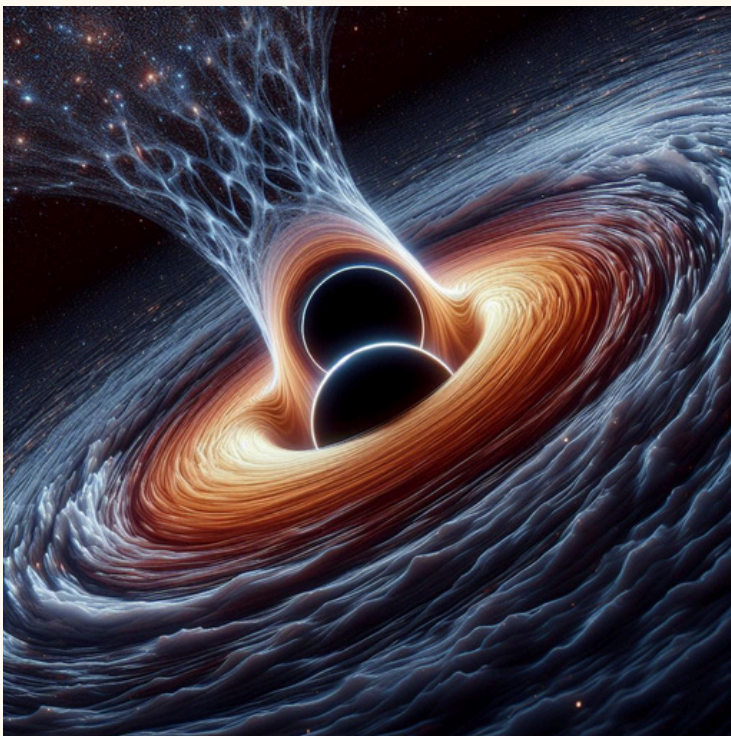
Have you ever gazed up at the night sky and pondered the mysteries that lie beyond our reach? Among the countless wonders of the cosmos, black holes stand out as some of the most intriguing and enigmatic phenomena. These cosmic entities, with their immense gravitational pull and ability to warp space and time, have captured the imagination of scientists and stargazers alike.

UNRAVELING THE MYSTERIES OF BLACK HOLES

At the heart of every galaxy, lurking in the depths of space, black holes silently await discovery. But what exactly are these mysterious objects, and how do they challenge our understanding of the universe? Scientists have long grappled with the paradoxes presented by black holes – from their infinite density to their event horizons, where even light cannot escape.

RECENT DISCOVERIES AND BREAKTHROUGHS

In recent years, advancements in technology and observational techniques have allowed researchers to peer deeper into the secrets of black holes. From capturing the first-ever image of a black hole's event horizon to detecting gravitational waves rippling through space-time, these discoveries have revolutionized our understanding of these cosmic giants.



NEW FRONTIERS IN BLACK HOLE RESEARCHS

As we stand on the brink of a new era in astrophysics, scientists are pushing the boundaries of knowledge to unlock the mysteries of black holes. From studying the behavior of matter as it spirals into these cosmic behemoths to exploring the connections between black holes and the evolution of galaxies, each new revelation brings us closer to unraveling the enigma of these celestial phenomena.



EMBRACING THE UNKNOWN

As our aim of the journey is to dive deeper into the realm of black holes, we are faced with more questions than answers. Yet, it is this very sense of wonder and curiosity that drives us to explore the unknown, to seek out the truths hidden within the vast expanse of the cosmos. With each discovery, we inch closer to unraveling the mysteries of black holes and gaining a deeper insight into the workings of the universe.

Shivam Kumar
23/ECE/139



MENTAL HEALTH

Mental wellness, or good mental health, encompasses feelings, thoughts, and interactions that allow individuals to enjoy life and effectively manage difficult situations. It involves emotional and spiritual well-being while respecting the importance of culture, equity, social justice, relationships, and personal dignity (Centre for Health Promotion, University of Toronto, 1997).

Without mental wellness, individuals may struggle to reach their full potential or participate actively in everyday life. Mental health issues cover a broad range, from enhancing emotional well-being to treating and preventing mild to severe mental illness, including suicide prevention.

Mental illnesses affect all Canadians indirectly through the experiences of family members, friends, or colleagues. Twenty percent of Canadians will personally encounter a mental illness in their lifetime, and more than 70% of adults with mental health problems began showing symptoms during childhood or early adolescence.

Mental wellness is closely linked to physical health. Youngsters with good mental health are more likely to engage in healthy behaviors, such as regular exercise and balanced nutrition. Poor mental health can lead to neglect of physical health, substance abuse, and other risky behaviors.

Promoting mental wellness in young people is crucial for their immediate well-being and their long-term success and happiness.

-ALKA TIWARI
20/ECE/017

YOUTH CENTRAL



Youth Central is the epicenter of fresh ideas and unbridled enthusiasm.



Youth Central

Next Gen Leaders

Future Trailblazers

IN THE VIBRANT REALM OF YOUTH CENTRAL, THE HEARTBEAT OF THE FUTURE RESONATES.

শিক্ষা (Education).



শিক্ষণ কী?- এই কথাটি বললেই প্রথমে যে মনীষির কথা আমাদের মাথায় আসে তিনি হলেন "স্বামী বিবেকানন্দ", তিনি বলেন শিক্ষা হচ্ছে মানুষের অন্তর্নিহিত। মহত্ত্ব, দেবত্ব বা ভাবত্বের বহিঃপ্রকাশ। বিভিন্ন মনীষিগণ তাদের বিভিন্ন বইতে বিভিন্নভাবে ব্যাখ্যা করেছেন। কিন্তু সেইসব সংজ্ঞাগুলো কে একটু আলাদা করে রেখে, যদি সাধারণ অর্থে ভেবে দেখি তাহলে একটা কথা বলতে হয়; শারীরিকভাবে বাঁচতে গেলে যেমন খাদ্য, বস্ত্র, বাসস্থান তেমনই মানসিক ভাবে বাঁচতে গেলো দরকার 'শিক্ষা, মানসিক ভাবে বাঁচার অক্সিজেন হল শিক্ষা, EDUCATION IS THE RECONSTRUCTION OR RE-ORGANIZATION OF EXPERIENCE. অভিজ্ঞতার পূর্ণগঠন অর্থাৎ শিক্ষার মাধ্যমেই আমরা বিভিন্ন পরিস্থিতির মুখোমুখি হই, সেখান থেকে বেরোনের উপায় ও সমাধান খুজতে পারি। বলা হয়, প্রতিটি শিশুর প্রথম শিক্ষক তার 'মা', 'মায়ের কোল থেকে বেরিয়ে যখন পুরো দুনিয়ার সঙ্গে ধীরে ধীরে যোগাযোগ বেড়ে ওঠে এই শিক্ষার পরিধির বিস্তার ঘটে। এইভাবে মানুষ তার শিক্ষার ভাণ্ডারের ধীরে ধীরে বৃদ্ধি করে। শিক্ষা পুঁথিগত হয় না চারপাশের পারিপার্শ্বিক সমস্ত কিছু থেকেই আমরা শিক্ষা অর্জন করি। শিক্ষা হলো তা যার সংস্পর্শে এসে মানুষ সভ্যতার অগ্রগতি ঘটাচ্ছে, দূর হচ্ছে বিভিন্ন কুসংস্কার, কু-প্রথা যেমন বাল্যবিবাহ, সতিদাহ-প্রথা ইত্যাদি। শিক্ষা হলো মানুষের সেই পরিচয়, যা একজন ব্যক্তিকে অন্য জনের থেকে আলাদা করে তোলে, ভাবতে শেখায় একজনকে অপর জনের থেকে আলাদাভাবে।

-Nabanita Aich

23/ECE/84

স্বপ্নপ্রেমিক

তুমি আসবে বলে বলেছিলে;
এলে না কেন আজ?
তোমার হাত ধরে হাঁটতে যেতাম
ভিক্টোরিয়া, রবীন্দ্র সরোবর....
হাঁটতে হাঁটতে হয়তো হারিয়ে যেতাম
অন্য কোনো মায়াবী জগৎ;
তোমার কোলের স্নিগ্ধ ছায়ায়
হয়তো বা ঘুমিয়েই পরতাম।
ঘুমিয়ে পড়তাম
কোনো নির্জন গঙ্গার ঘাটে
কেন তুমি এলে না আজ
ঝালমুড়ি কিংবা ফুচকার বাহানায়
তুমি কেন গরহাজির
আমার স্বপ্নতে?
কেন তুমি নিরুত্তর থাকো
আমার প্রশ্নতে?
এসব কথা লিখছি শুধু
কল্পনায় দিয়ে পাড়ি।
বাস্তবে তুমি অন্য কারোর
আমার সঙ্গে আড়ি।
বাস্তবে তুমি কার সঙ্গে
জানতে চাইনা আমি.;
আমার কল্পনাতে রাতের স্বপ্নে
শুধু তুমি আর আমি।
বাস্তবে তোমাকে হারানোর
দুঃখ যাবে মিটে ;
যখন তুমি ধরা দেবে
আমার স্বপ্নতে।

-AYAN RAKESH
(22/ECE/062)

I NEED YOU



**"SOMETIMES I'M WALKING ON RAINBOWS....
SOMETIMES I'M LOOKED UNDERGROUND!!
BUT IF I HEAR YOU SAY"
IT'S ALL OKEY"**

**THERE'S NOTHING COMPARES WITH THAT SOUND.....
I'M LOST BUT NOW I'M FOUND;
"I CARE ABOUT A LOT OF THINGS I GUESS
I TRY AND TRY JUST TO DO MY BEST!!
BUT IF IT'S NOT RIGHT WITH YOU"
THERE'S NOTHING I CAN DO.....
I'M LOST BEFORE I BEGIN;
GOD HELP THE SHAPE THAT I'M IN"- -**

**"GOD HELP THE SHAPE THAT I'M IN...
GOD HELP THE SHAPE THAT I'M IN....
JUST COME BACK TO ME;
I'LL DO ALL GOOD I CAN DO;
IT'S JUST THAT I NEED YOU..."**

**"SOMETIMES I'M SHAMBLING THROUGH MY DAY
AND THERE'S NOT LIGHT UPON THE WAY
THERE'S NOTHING I CAN SEE"
IT'S DARK AS CAN BE ---
HOLD MY HAND AND SEE ME THROUGH;
I'M LOST IT I DON'T HAVE YOU".....**

-Srinjayee Santra

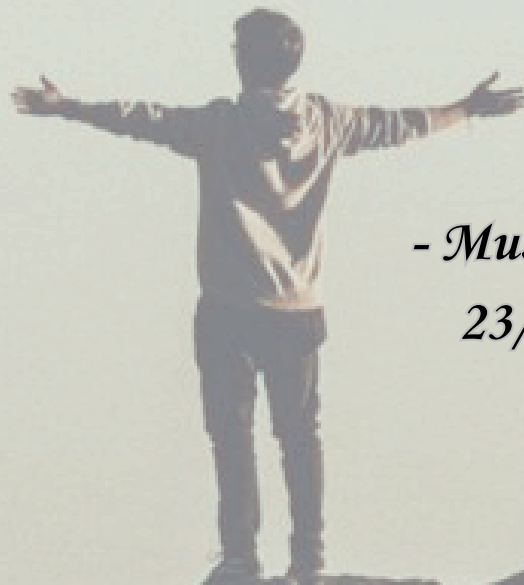
23-ECE-159

NEW JOURNEY

*A journey from childishness to adulthood,
A journey from home to hostel,
A journey of college life is beginning,
A new journey.*

*A little nervous, but excited,
A little sad, still smiling,
A little scared, still confident,
Word aren't enough to explain this emotion,*

*When you bid your parents a goodbye and enter into a new life.
Where strangers become homies in just few hours,
Where family is not near but just a call away,
A new journey.*



*- Muskan Sureka
23/ECE/083*

RAIN

As this cloudy sky disappears...
And the bright and clear sky appears...
May our love too!

As the birds who ran away and got lost in this mist...
And they start to fly their homes after the sunshine...
May our love too!

As the birds who shouted in this thunder...
And they begin chirping sweetly after the rain...
May our love too!

As the kids who ran away to their homes, getting frightened by this thunder...
And they ran out of their homes to see this beautiful rainbow...
May our love too!

As the flowers blew away by the strong winds...
And some of them stood amidst it to see the sunshine, to have a blossom...
May our love too!

As the soil that ran off cut the land to the rivers...
And some stood behind, smelling like heaven, giving the true essence of staying behind
May our love too!

And the season passed
As after all this destruction caused...
And still not a single remain of it...

People grew, farms grew, and even new flowers grew, who stood behind saw the
sunshine, saw the birds chirping, saw kids dancing in this sweet sunlight after long
darkness...

Everyone came out to enjoy this essence after the rain, some enjoyed the rain too.

MAY OUR LOVE TOO.

- Shivam Kumar Gupta
23/ ECE /138

Hope That Takes A Big Change In You !!

THE PROFESSOR BEGAN HIS CLASS BY HOLDING UP A GLASS WITH SOME WATER IN IT. HE HELD IT UP FOR ALL TO SEE AND ASKED THE STUDENT,

“HOW MUCH DO YOU THINK THIS GLASS WEIGHS ? ”

“50GMS!”..... “100GMS!” “125GMS ”..... THE STUDENTS ANSWERED.

“I REALLY DON’T KNOW UNLESS I WEIGH IT ,

“SAID THE PROFESSOR , “BUT , MY QUESTION IS.

WHAT WOULD HAPPEN IF I HELD IT UP LIKE THIS FOR A FEW MINUTES” ?

..... ‘NOTHING’.....THE STUDENTS SAID. ‘OK WHAT WOULD HAPPEN IF I HELD IT UP LIKE FOR AN HOUR ?’ THE PROFESSOR ASKED.

‘YOUR ARM WOULD BEGIN TO ACHE , SAID ONE OF THE STUDENTS

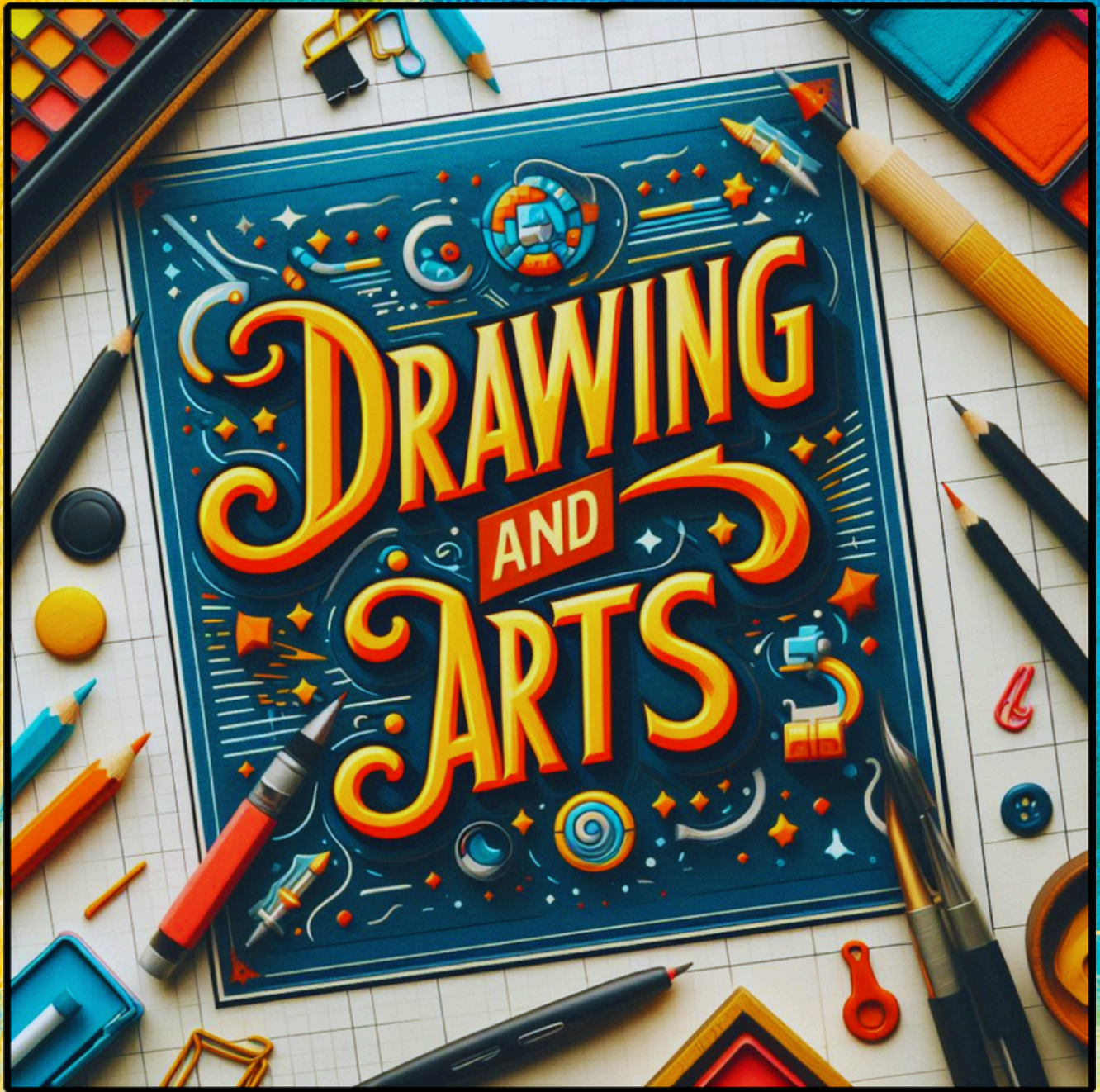
“YOU ARE RIGHT. NOW WHAT HAPPEN IF I HELD IT FOR A DAY? ” “YOUR ARM.COULD GO NUMB ; YOU MIGHT HAVE SEVERE MUSCLE STRESS AND PARALYSIS AND HAVE TO GO TO HOSPITAL FOR SURE ! “..... VENTURED ANOTHER STUDENT AND ALL THE STUDENTS LAUGHED. “VERY GOOD . BUT DURING ALL THE DID THE WEIGHT OF THE GLASS CHANGE ? “ASKED THE PROFESSOR . ‘NO’..... WAS THE ANSWER

“ THEN WHAT CAUSED THE ARM ACHE AND THE MUSCLES STRESS ? THE STUDENTS WERE PUZZLED “WHAT SHOULD I DO NOW TO COME OUT OF A PAIN ? ASKED THE PROFESSOR AGAIN. “PUT THE GLASS DOWN ! “ SAID ONE OF THE STUDENTS EXACTLY ! “SAID THE PROFESSOR .LIFE PROBLEMS ARE SOMETHING LIKE THIS HOLD IT FOR A FEW MINUTES IN YOUR HEAD AND THEY SEEM OK .THINK OF THEM FOR A LONG TIME AND THEY BEGIN TO ACHE.

HOLD IT EVEN LONGER AND THEY BEGIN TO PARALYZE YOU . YOU WILL NOT BE ABLE TO DO ANYTHING IT’S IMPORTANT TO THINK OF THE CHALLENGES OR PROBLEM IN YOUR LIFE EVEN MORE IMPORTANT IS TO ‘ PUT THEM DOWN ‘ AT THE END OF EVERYDAY BEFORE YOU GO TO SLEEP.....

THAT WAY , YOU ARE NOT STRESSED AND CAN HANDLE AND CAN HANDLE ANY ISSUE , ANY CHALLENGE THAT COMES YOUR WAY !

-Aditi Raj
23/ECE/011



“Painting is poetry that is seen rather than felt, and poetry is painting that is felt rather than seen.”

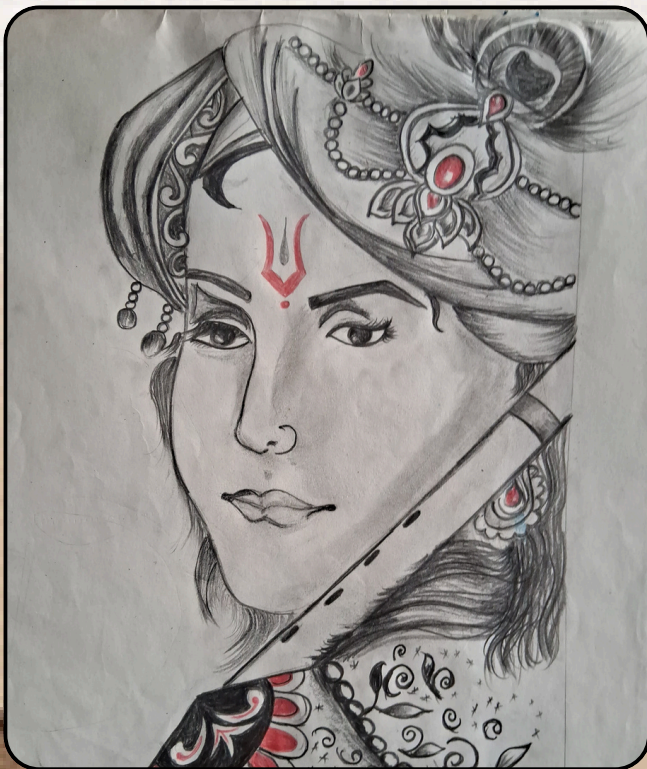
– Leonardo da Vinci



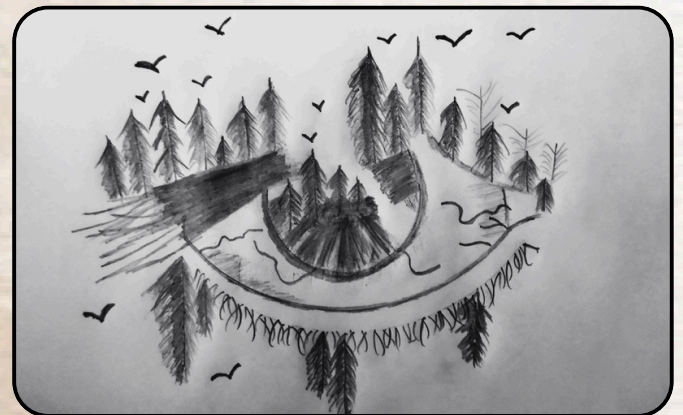
TAMALI MAHAPATRA
23/ECE/174



ANNAPURNA GUPTA
23/ECE/025



ARNAB SAMANTA
23/ECE/039



Md SHADMAN
23/ECE/080



SIMRAN PATEL
23/ECE/144



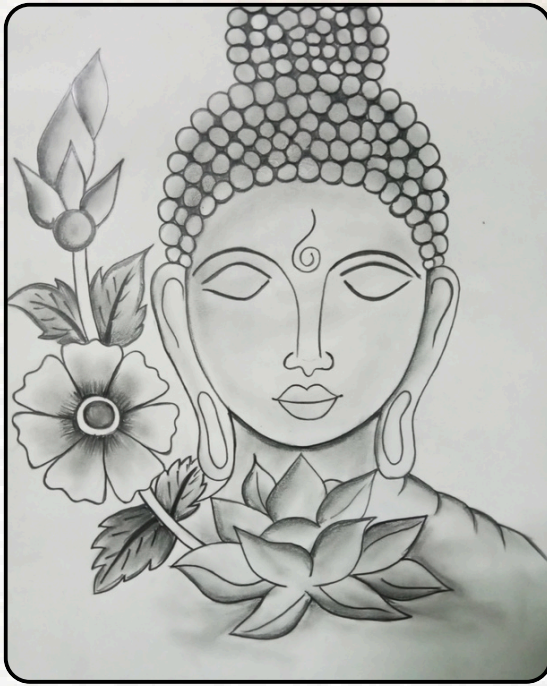
SONALI SRIVASTAVA
23/ECE/154



MUSKAN SUREKHA
23/ECE/083



ANUSHKA GOSWAMI
23/ECE/031



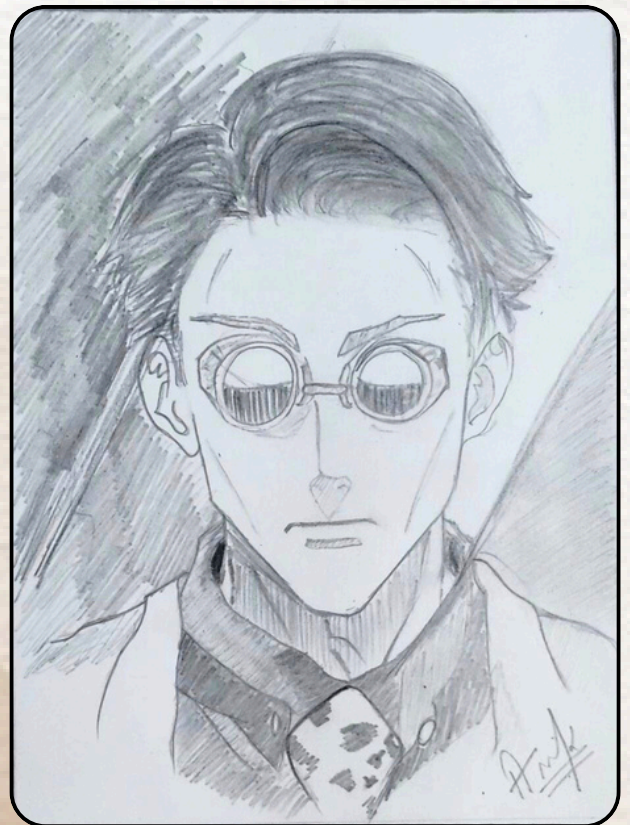
JUTHIKA MAITY
23/ECE/67



NANDINI KUMARI
23/ECE/086



SRIJITA MAJI
23/ECE/159



ANIK KAPAT
23/ECE/019



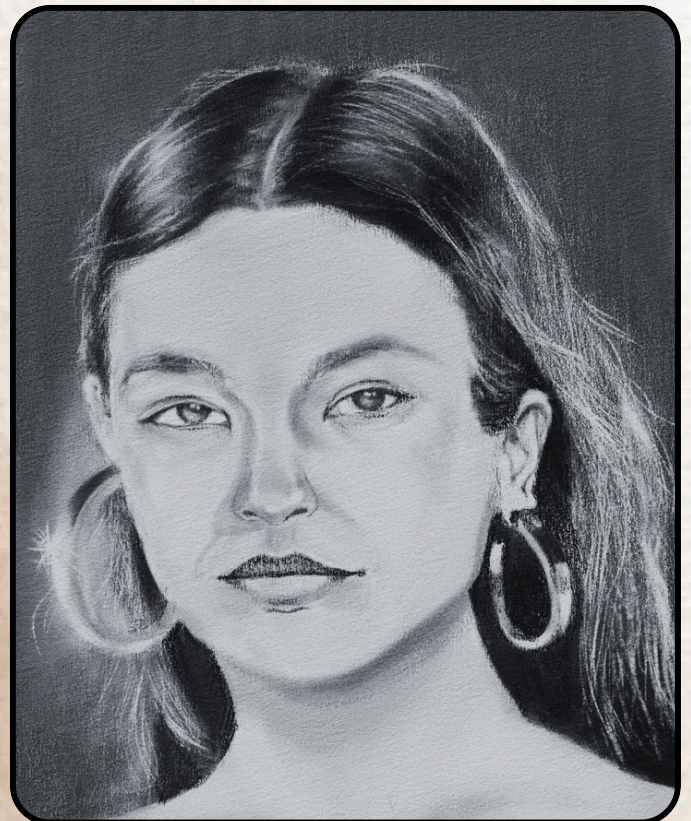
ARNAB SAMANTA
23/ECE/039



FALAK FATIMA
23/ECE/053



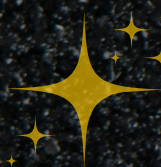
JUTHIKA MAITY
23/ECE/067



HARSH KUMAR
23/ECE/059



PICTURE PERFECT

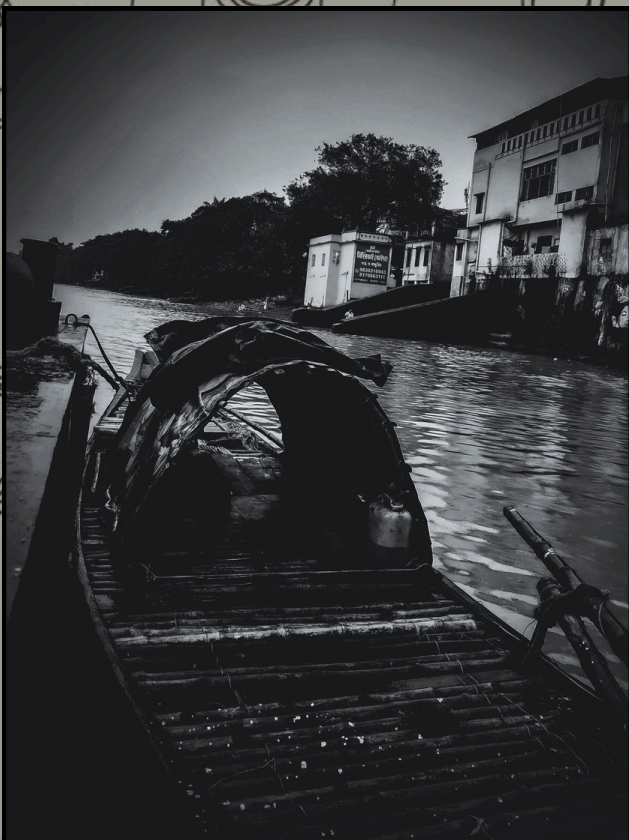




SUJAL KUMAR SINGH
23/ECE/164



NITESH KUMAR
22/ECE/118



ARIJIT DUTTA
22/ECE/54



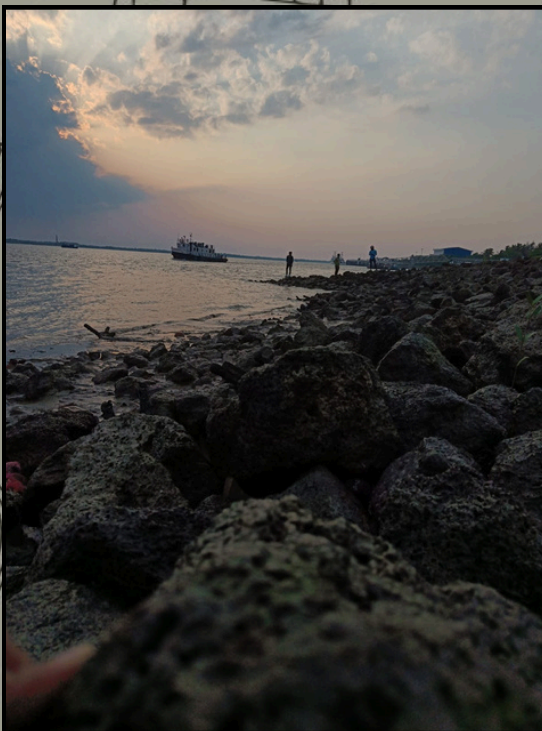
TAMALI MAHAPATRA
23/ECE/174



SHUBHAM RANJAN
22/ECE/166



ANSHU PANDEY
23/ECE/027



SHUBHAM CHATTERJEE
22/ECE/165



NITESH KUMAR
22/ECE/118



HARSH KUMAR
23/ECE/059



SRINJAYEE SANTRA
23/ECE/159





WALL MAGAZINE



iARTEFACTS

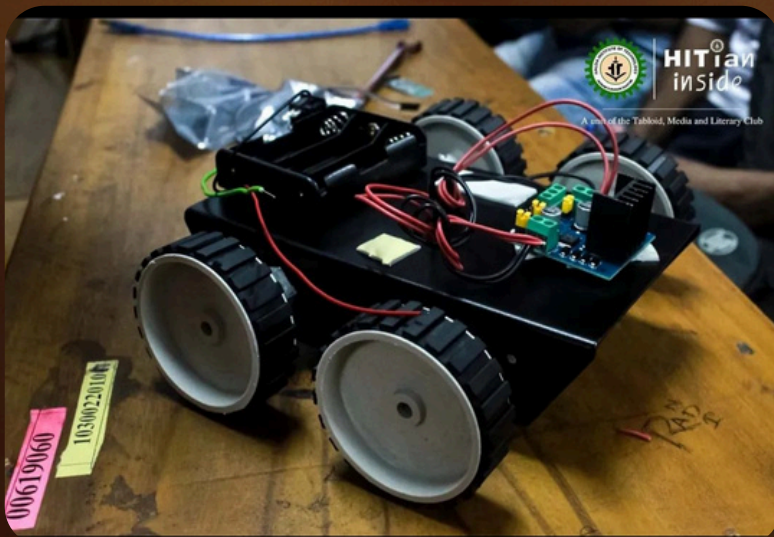
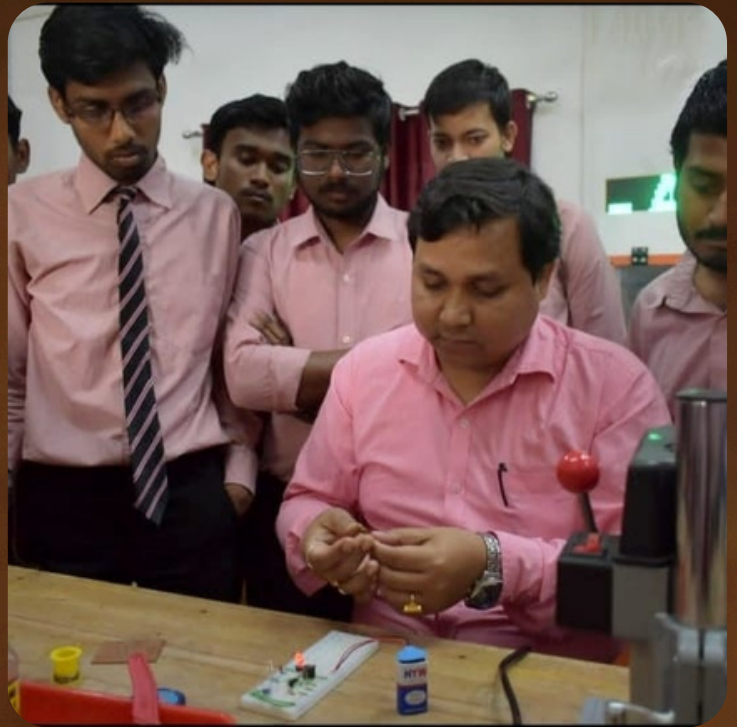
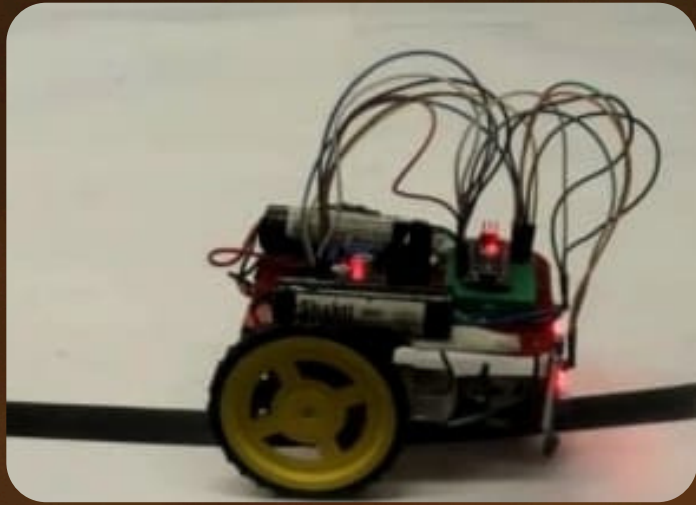


IETE

TEACHER'S DAY



WORKSHOPS



ANNUAL CULTURAL MEET



SPORTS



TECH FEST



CULTURAL FEST



TEAM iARTEFACTS



Debalina
Chakaraborty



Rohit Kumar



Anupama Mondal



Satyam Singh
Rajput



Shristi Raj



Nupur Raj



Aditya Prakash



Ankit Kumar



Alka Tiwary



Aditi Anand



Sandhya Rani



Shweta Kumari



Durgesh Kumar
Roy



Suman Saurav



Sanjeev Kumbhakar



Ankrit
Samanta



Dibakar Bera



Priya Shaw



Anish Raj



Nitish Kumar

TEAM iARTEFACTS



Aryajeet
Ghosh



Sampriti Dhal



Priya Das



Pratyush Das



Raj Deepak



Manish Kumar



Deepak Kumar
Pandey



Shanu Kumar



Gaurav Srivastva



Bhashkar Kumar



Anshu Kumar



Anupam Pandey



Krishna jee



Shivani Kumari



Kumari Sanjana



Arijit Dutta



Shubham Chatterjee



Nasir Hussain



Ayan Rakesh



Rishabh Kumar

TEAM iARTEFACTS



Satyam Kumar



Ravi Prakash



Nitesh Kumar



Farhan Alam



Ayush Raj



Prashant Kumar



Priyanka Dutta



Abhishek Kumar



Juthika Maity



Anshu Kumar
Pandey



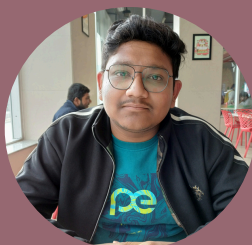
Md. Shadman



Sujal Kumar Singh



Akash Kumar Bag



Abhinaba Patra



Shivam Kumar Gupta



Annapurna Gupta



Tamali Mahapatra

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- Demonstrator Ira Samanta
- Demonstrator Asim kuila
- Demonstrator Sunetra Maity
- Demonstrator Parswati Banerjee Instructor

**"An equation for me has no
meaning unless it expresses a
thought of God."**



SRINIVASA RAMANUJAN

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