JIS COLLEGE OF ENGINEERING
NAAC 'A' Accredited Autonomous Institution
Affiliated to MAKAUT

DEPARTMENT OF ELECTRICAL ENGINEERING
NBA TIER-I ACCREDITED

TECHPULSE

ANNUAL MAGAZINE

A LOOK INTO...

AI IN 2024

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| 2023-2024

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From The Principal's Desk

Prof.(Dr.) PARTHA SARKAR
Principal
JIS College of Engineering

It gives me immense pleasure to present this edition of our technical magazine, a true reflection of the innovative spirit and intellectual curiosity that defines our esteemed institution. As a NAAC A-graded engineering college, we take pride in nurturing young minds that strive for excellence and contribute to the ever-evolving world of technology. This magazine stands as a testament to the hard work, creativity, and determination of our students and faculty.

Our college continues to foster a culture of research, innovation, and academic rigor, ensuring that our students are well-equipped to meet the challenges of the future. I encourage all readers to explore the diverse topics presented within these pages, as they showcase not only the technical prowess of our students but also their ability to think critically and creatively.

I am confident that this publication will inspire and ignite the passion for knowledge and progress that will drive our students to new heights. I extend my heartfelt congratulations to all contributors and look forward to seeing the continued success of our college in shaping the engineers of tomorrow.

From The HOD's Desk

DR. ALOK KUMAR SRIVASTAV
HOD, Department of Electrical Engineering

The growth of the nation largely depends on its youth, their attitude and creativity. Institute like JISCE, Kalyani are here to create innovative technocrats who can contribute significantly towards upliftment of the people of the country. We, at Electrical Engineering Department are committed to fulfill this dream of the country by producing world class Engineers.

As HOD of this department, I endeavor to transform them into creators of technology with good human values & commitment to our great nation. I request all my faculty members, staff and students to work tirelessly towards developing solutions which are useful for socio-economic growth of the nation.

THE EDITORIAL

OUR EDITORIAL JOURNEY

Welcome to TechPulse, a yearly magazine of the department of Electrical Engineering at JIS College of Engineering. Every edition is a medium through which the ingenuity and hard work of the students of this esteemed institute are valued. This year's edition- "AI in 2024" is yet another representation of the same. The students throughout the session have strived for excellence, they have put their best foot forward and made every event a huge success throughout the academic session 2023-24. And so, compiling the student's colossal effort into a few pages wasn't an easy task and wouldn't have been possible without the wonderful core team of TechPulse 2023-24.

It has been a wonderful journey working for the magazine, more so an unparalleled learning experience.

The editorial offers its sincere thanks to Dr. Alok Kumar Shrivastav, HOD, dept. of EE, for entrusting us with this honorous responsibility. We are veritably grateful to Mr. Partha Das and Mrs. Gargi Roy, Asst. Professor of dept. of EE, for being a constant source of motivation and support. This year's magazine brings you the concept of Artificial Intelligence (AI). Dive into our feature articles exploring how AI has affect the world of engineers and it's aspects. Join us on a journey into the future where Electrical Engineering meets the digital world like never before.

Cheers!
Team TechPulse

MEET THE TEAM
(FACULTY EDITOR)

MRS. GARGI ROY

ASSISTANT PROFESSOR,
DEPARTMENT OF
ELECTRICAL ENGINEERING

PARTHA DAS

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STUDENT EDITOR

Soham Sarkar
B.Tech, EE, 1st Year

Souhardya Mitra
B.Tech, EE, 1st Year

Ankur Roy
B.Tech, EE, 2nd Year

IT IS AN HONOR TO BE A PART OF THE EDITORIAL TEAM AND I HOPE OUR EFFORTS DO JUSTICE TO THE SAME. THIS EDITION WILL SURELY BE A REMINDER OF THE WONDERFUL YEARS WE'VE SPENT AT JISCE. EACH MEMBER OF THE TEAM HAS CONTRIBUTED TO A PIVOTAL ROLE IN MAKING TECHPULSE A SUCCESS. WE HOPE OUR READERS INDULGE IN REMINISCENCE OF THEIR TIME AND TAKE AWAY VALUABLE KNOWLEGE FROM THIS EDITION. THE TEAM MAY CHANGE BUT THE LEGACY CONTINUES.

Vision of the Department (DV)

To impart technical knowledge, develop skills for research and innovation and prepare graduates with a great human value to meet the industry and societal needs.

Mission of the Department (DM)

DM 1 - To impart quality engineering education with holistic development and to produce engineers, technologists, scientists and citizens who will contribute meaningfully to the growth and development for future generation of the country.

DM 2 - To promote interdisciplinary research work and opportunity to work in a team through collaborative research and project work to meet the future challenges for society.

DM 3 - To inculcate professional ethics focus on excellence in curricular, co-curricular and extracurricular activities and moral responsibility for a better society

Program Educational Objectives (PEO)

PEO 1. Graduates will have initiate their careers in industry, government and private sector, research organizations or become an entrepreneur

PEO 2. Graduates will pursue higher education in electrical engineering or other fields of their comfort

PEO 3. Graduates will work in a team with leadership quality, show ethical values, express with effective communication, concern to environment and commitment to safety and development of society in the field they choose to pursue

WHAT IS AI ?

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions), and self-correction. Specific applications of AI include expert systems, natural language processing (NLP), speech recognition, and machine vision.

Types of Artificial Intelligence:

- **Narrow AI (Weak AI):** AI systems that are designed and trained for a specific task. Virtual personal assistants, like Siri and Alexa, are forms of narrow AI.

- **General AI (Strong AI):** A type of AI that can understand, learn, and apply intelligence to solve any problem, much like a human can. General AI does not exist yet and is a major goal of AI research.

- **Artificial Superintelligence (ASI):** A level of intelligence that surpasses human intelligence in all aspects. This is a theoretical concept and a subject of much debate and speculation.

Key Aspects of Artificial Intelligence:

- **Machine Learning:** A subset of AI involving the use of algorithms and statistical models to enable machines to improve at tasks with experience. Examples include neural networks, decision trees, and support vector machines.

- **Natural Language Processing (NLP):** This involves the interaction between computers and humans using natural language. It enables computers to understand, interpret, and generate human language. Examples include language translation, sentiment analysis, and chatbots.

- **Robotics:** AI is often used in robotics to give machines the ability to perform tasks autonomously. Examples include manufacturing robots, self-driving cars, and drones.

- **Computer Vision:** This allows machines to interpret and make decisions based on visual data from the world. Examples include facial recognition, object detection, and medical image analysis.

- **Expert Systems:** These are AI programs that mimic the decision-making abilities of a human expert. They use a set of rules derived from human experts to solve specific problems within a certain domain.

- **Deep Learning:** A subset of machine learning involving neural networks with many layers (hence "deep"). This is used for more complex tasks like image and speech recognition.

AI is used in various applications such as healthcare, finance, entertainment, customer service, and many other fields to improve efficiency, accuracy, and productivity.

Souhardya Mitra

B.Tech, EE, 1st Year

THE FUTURE OF AI: TRENDS & PREDICTION

The future of AI is poised to bring significant advancements and transformations across various sectors. Here are some key trends and predictions for the future of AI:

1. **Enhanced Machine Learning and Deep Learning:**

- **Improved Algorithms:** Continuous advancements in algorithms will lead to more efficient and powerful machine learning models.
- **Automated Machine Learning (AutoML):** Tools that automate the end-to-end process of applying machine learning to real-world problems will become more prevalent, making AI more accessible.

2. **Integration with IoT:**

- **Smart Devices:** AI will enhance the functionality of Internet of Things (IoT) devices, leading to smarter homes, cities, and industries.
- **Predictive Maintenance:** AI-driven predictive analytics will help in maintaining machinery and infrastructure, reducing downtime and costs.

3. **AI in Healthcare:**

- **Personalized Medicine:** AI will enable more personalized treatment plans based on individual genetic profiles and health data.
- **Early Diagnosis:** AI-powered diagnostic tools will improve early detection of diseases, leading to better outcomes.

4. **Natural Language Processing (NLP) and Understanding:**

- **Conversational AI:** More sophisticated chatbots and virtual assistants will provide human-like interactions.
- **Language Translation:** Real-time and more accurate language translation capabilities will break down communication barriers.

5. **AI Ethics and Governance:**

- **Regulation:** Increased focus on developing ethical guidelines and regulations to ensure responsible AI use.
- **Bias Mitigation:** Efforts to reduce bias in AI models to promote fairness and equality.

6. **AI in Education:**

- **Personalized Learning:** AI-driven educational tools will tailor learning experiences to individual student needs and pace.
- **Administrative Efficiency:** Automation of administrative tasks will allow educators to focus more on teaching.

7. **AI in Business and Finance:**

- **Automation:** AI will drive further automation of business processes, enhancing efficiency and reducing costs.
- **Fraud Detection:** Improved AI algorithms will enhance the ability to detect and prevent fraud in real-time.

The future of AI holds immense potential to revolutionize multiple aspects of society, driving innovation, efficiency, and improved quality of life. However, it will also require careful consideration of ethical implications and proactive management of potential risks.

Ankit Sinha

B.Tech, EE, 1st Year

ARTIFICIAL INTELLIGENCE IN HEALTHCARE

AI in healthcare is transforming the industry by improving diagnostics, treatment, patient care, and operational efficiency. Here are some of the key applications and potential future developments of AI in healthcare:

1. **Diagnostics**

- **Medical Imaging:** AI algorithms can analyze medical images (X-rays, CT scans, MRIs) with high accuracy, aiding in the early detection of diseases such as cancer, cardiovascular diseases, and neurological disorders.
- **Pathology:** AI can assist pathologists in examining tissue samples, identifying abnormalities more quickly and accurately.
- **Genomics:** AI helps in analyzing genomic data, identifying mutations, and understanding genetic disorders, paving the way for personalized medicine.

2. **Treatment**

- **Personalized Medicine:** AI analyzes patient data to tailor treatments to individual genetic profiles and lifestyle factors, improving treatment efficacy and reducing adverse effects.
- **Drug Discovery:** AI accelerates drug discovery by predicting how different compounds will interact with targets, identifying potential new drugs faster than traditional methods.
- **Robotic Surgery:** AI-powered robots assist surgeons with precision and control in minimally invasive surgeries, reducing recovery times and improving outcomes.

Challenges and Considerations:

- **Data Privacy and Security:** Ensuring the privacy and security of patient data is critical, requiring robust cybersecurity measures and compliance with regulations.
- **Ethical Concerns:** Addressing biases in AI algorithms and ensuring that AI is used ethically in decision-making processes is crucial.
- **Integration with Existing Systems:** Seamless integration of AI with existing healthcare systems and electronic health records (EHRs) is necessary for effective implementation.
- **Regulatory Approval:** AI applications must undergo rigorous testing and obtain regulatory approval to ensure safety and efficacy.

Future Trends:

- **AI-Driven Predictive Healthcare:** Advanced AI models will predict diseases before they manifest, allowing for preventive measures and early interventions.
- **AI in Telemedicine:** AI will enhance telemedicine by providing diagnostic support, patient monitoring, and personalized treatment plans remotely.
- **Augmented Reality (AR) and Virtual Reality (VR):** AI-powered AR and VR applications will be used for training medical professionals, planning surgeries, and providing patient education.
- **Holistic Health Management:** AI will integrate data from various sources, including genetic, environmental, and lifestyle factors, to provide comprehensive health management plans.

AI's integration into healthcare holds immense potential to improve patient outcomes, increase the efficiency of healthcare delivery, and reduce costs. As AI technologies continue to evolve, they will play an increasingly vital role in shaping the future of healthcare.

Ankur Roy

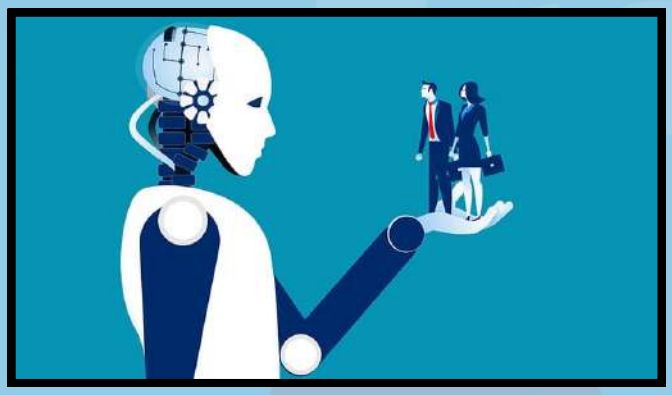
B.Tech, EE, 2nd Year

AI AND EMPLOYMENT

AI is transforming the employment landscape by automating routine tasks, creating new job opportunities, and changing the nature of existing roles.

Job Automation:

- **Routine and Repetitive Tasks:** AI can automate tasks that are routine and repetitive, such as data entry, invoice processing, and customer service inquiries. This can increase efficiency and reduce human error.
- **Manufacturing and Logistics:** Robots and AI-driven systems are increasingly used in manufacturing and logistics to handle tasks such as assembly, quality control, and inventory management.



Economic and Social Impact:

- **Productivity Gains:** AI can lead to significant productivity gains, potentially boosting economic growth. Companies can produce more with the same or fewer resources, leading to increased profitability.
- **Income Disparity:** There is a risk that AI could exacerbate income disparity if the benefits are not evenly distributed. High-skill, high-wage jobs may become more plentiful, while low-skill, low-wage jobs could be reduced.
- **Job Displacement:** Certain sectors and roles may see job displacement due to AI. Workers in fields such as telemarketing, data entry, and routine manufacturing are particularly vulnerable to automation.

Future Trends:

- **AI-Augmented Workforce:** The future will likely see a highly AI-augmented workforce, where humans and AI systems work together seamlessly to achieve greater productivity and innovation.
- **Gig Economy:** AI platforms could further boost the gig economy, creating more opportunities for freelance and contract work but also raising questions about job security and benefits.
- **Remote Work:** AI tools for collaboration, productivity, and remote monitoring will make remote work more feasible and efficient, potentially leading to more flexible work arrangements.

AI's impact on employment is complex and multifaceted. While it presents challenges, such as job displacement and skill gaps, it also offers opportunities for innovation, productivity gains, and the creation of new job categories. Adapting to these changes will require proactive measures in education, policy, and business practices.

Sudip Mukherjee

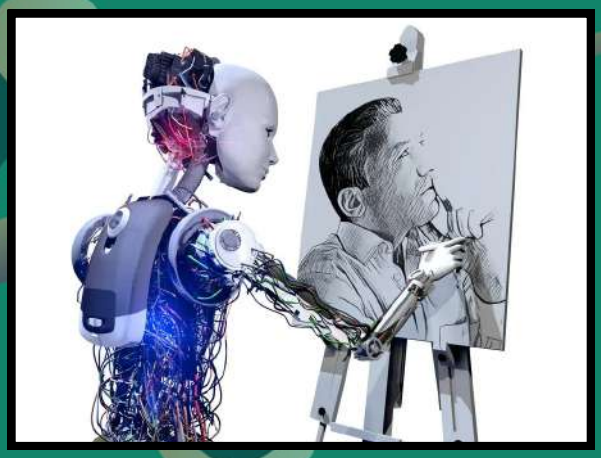
B.Tech, EE, 2nd Year

ARTIFICIAL INTELLIGENCE IN ART

AI is making significant strides in the world of art, influencing creation, curation, and consumption.

AI in Art Creation:

- **Generative Art:** AI algorithms, particularly those based on neural networks, can generate original artworks. Tools like GANs (Generative Adversarial Networks) create new images, styles, and designs that blend or completely depart from existing artistic norms.
- **Style Transfer:** AI can apply the style of one image to another. For instance, an AI can take a photograph and render it in the style of famous painters like Van Gogh or Picasso.
- **Music Composition:** AI composes music by learning from existing compositions. Tools like OpenAI's MuseNet can create music in various styles and genres, blending elements from different periods and influences.
- **Writing and Poetry:** AI can assist in writing stories, poems, and scripts.



GPT-3 and similar models generate coherent and creative text, offering new tools for writers and poets.

- **Interactive Installations:** AI-powered interactive installations respond to viewer input, creating a dynamic and engaging art experience. These installations can use data such as movement, voice, and environmental changes to alter the artwork in real time.

Future Trends:

- **Increased Collaboration:** Future art projects will likely see more collaboration between AI and artists, blending human intuition and creativity with machine efficiency and innovation.
- **Adaptive Art:** AI will enable adaptive and evolving artworks that change over time based on viewer interaction, environmental factors, and other inputs.
- **AI Curated Experiences:** Entire art exhibitions curated by AI, offering personalized art experiences based on individual visitor preferences and behaviors, could become more common.
- **AI in Film and Animation:** AI will increasingly be used in film and animation for tasks such as scriptwriting, scene generation, and character animation, enhancing storytelling possibilities.

AI is both a tool and a medium, expanding the horizons of what is possible in art. It challenges traditional notions of creativity and authorship, offering new opportunities and posing new questions for artists and audiences alike.

Udayan Kumar Nath

B.TEch, EE, 3rd Year

IS ARTIFICIAL INTELLIGENCE GOOD OR BAD?

Artificial Intelligence (AI) is a rapidly evolving technology that has the potential to transform many aspects of our daily lives. AI has already been applied to many areas, including healthcare, finance, education, and transportation, and it has the potential to bring significant benefits to society. However, like any technology, AI has its pros and cons, and it is important to consider both sides of the argument.

AI and robotics can open doors for people living with physical disabilities. We've seen the promise of assistive robot arms and mobile wheelchairs helping elderly adults regain independence, autonomous vehicles increase mobility, and rehabilitation robots help children gain the ability to walk. The promise of this technology is a higher quality of life for everyday users

AI is a powerful tool that can easily be misused. In general, AI and learning algorithms extrapolate from the data they are given. If the designers do not provide representative data, the resulting AI systems become biased and unfair. For example, if you train a human detection algorithm and only show the algorithm images of people with blonde hair, that system may fail to recognize a user with brown hair (e.g., brown hair = not a human). In practice, rushed applications of AI have resulted in systems with racial and gender biases. The bad of AI is a technology that does not treat all users the same.

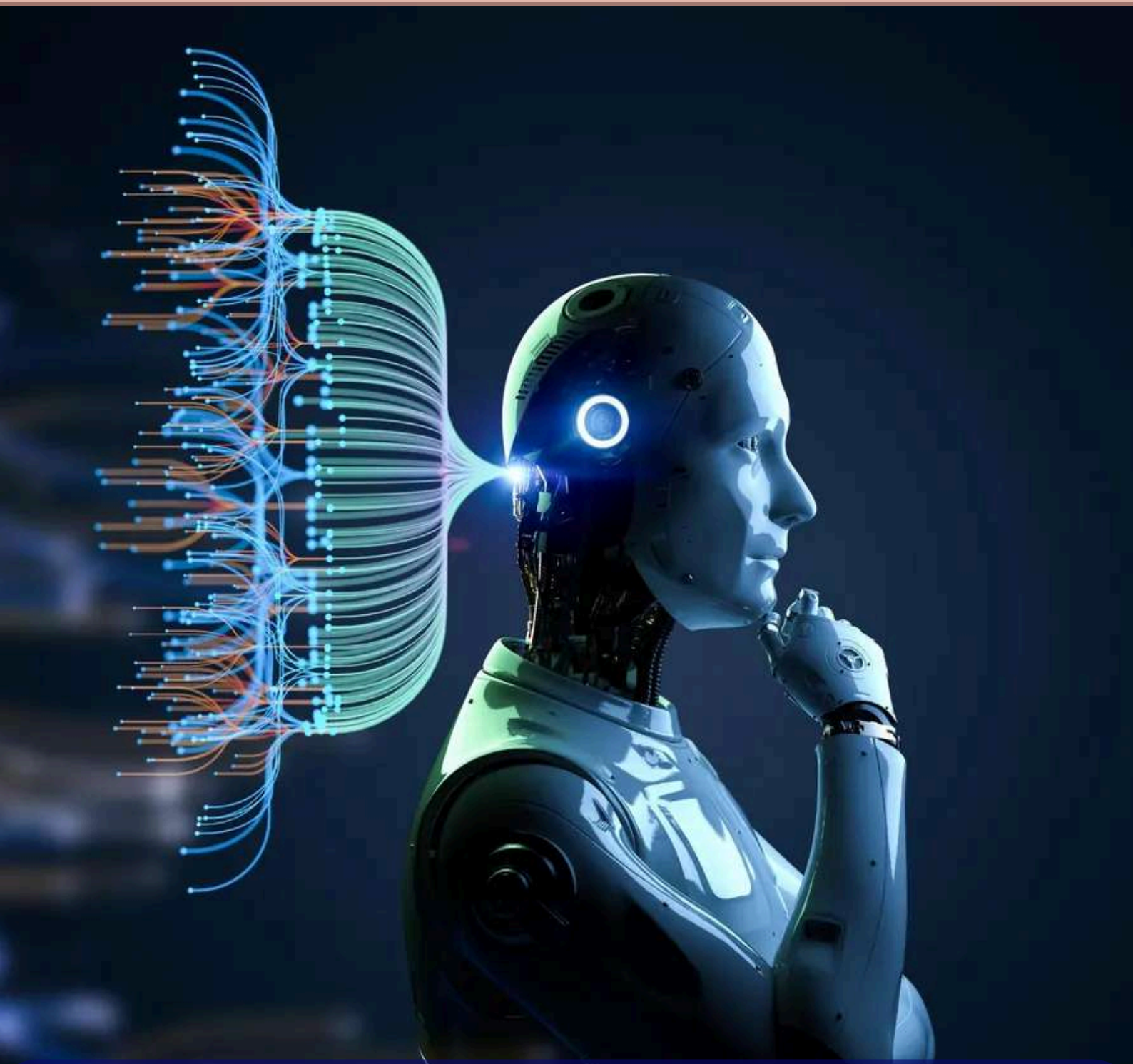
AI is neither inherently good nor bad. It is a tool that can be used for both beneficial and harmful purposes, depending on how it is developed and used. It is important to approach AI with caution and responsibility, ensuring that it is developed and used in an ethical and transparent manner.

Sattick Chanda

B.Tech, EE, 3rd Year

DELVE INTO THE FUTURISTIC WORLD OF...

ARTIFICIAL INTELLIGENCE IN 2020



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