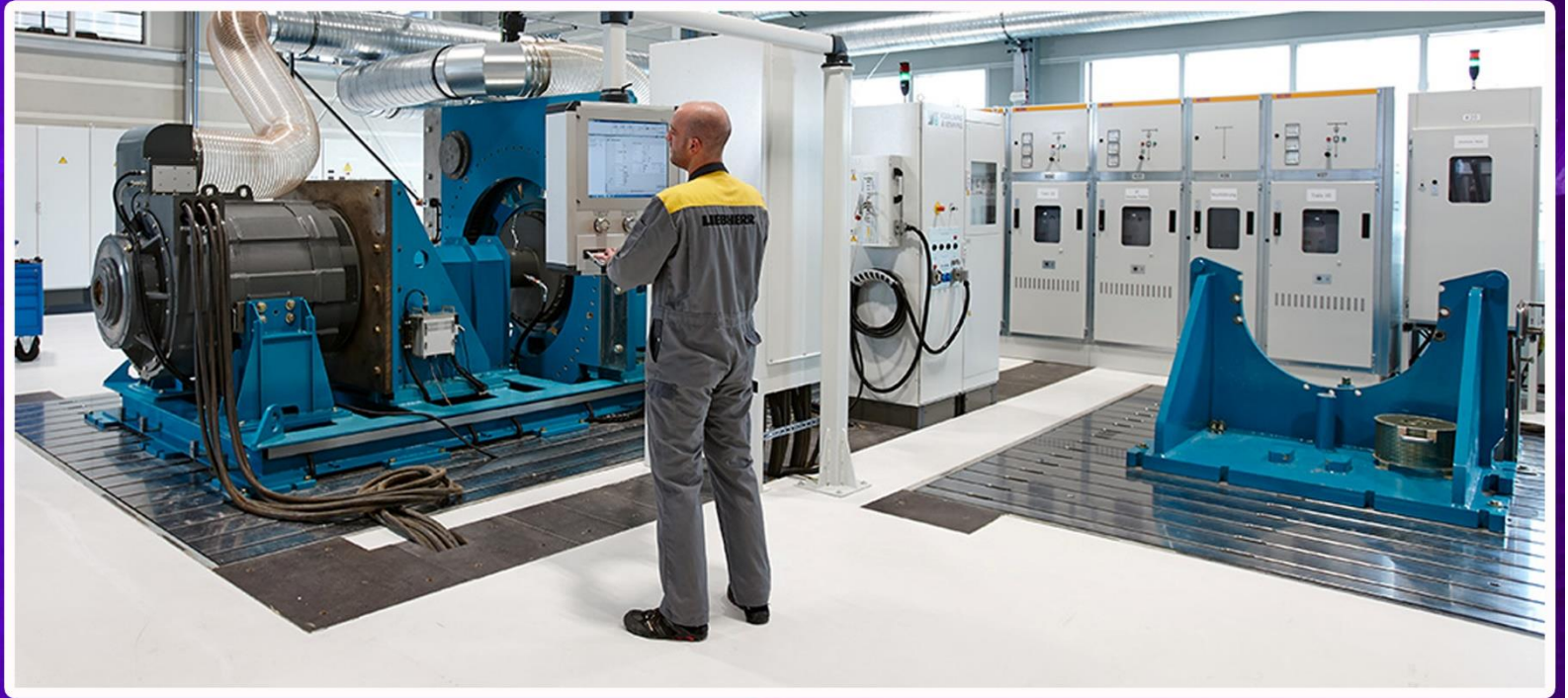
IGNITE

Department of Electrical and Electronics Engineering



TECHNICAL MAGAZINE

Volume 12 Issue 1
2024-2025

Gnanamani College of Technology

Accredited by NAAC 'A' Grade and NBA

NH-7, A.K.Samuthiram, Pachal-PO, Namakkal-637 018, Tamil Nadu.
www.gct.org.in

Gnanamani College of Technology
Gateway to Great Life !
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AUTONOMOUS

IGNITE

Technical magazine

It is to provide a platform for the students, teachers, technical as well as non-technical staff of the college to express their work, ideas, views, opinions, etc. related to science and technology. They provide a platform for faculty and students to publish articles, share technical expertise, and highlight achievements, ultimately driving awareness of recent trends and enhancing technical skills.

Editorial Board

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Gnanamani College of Technology
(Approved By AICTE & Affiliated to Anna University, Chennai)
Accredited By NAAC "A" Grade & NBA
NH-7, A Samuthiram, Pachal (P.O.), Namakkal - 637018
Department of Mechanical Engineering

GNYANAMANI EDUCATIONAL INSTITUTIONS

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

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

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

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

GNANAMANI COLLEGE OF TECHNOLOGY

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

The institution is rendering noble service to the youths in rural and urban areas.

The college is accredited by the NAAC and NBA (CSE, ECE, EEE, and Mechanical). The college has grown in a short span of 18 years with 12 UG Courses namely Agricultural, Artificial Intelligence and Data Science, Bio-Medical, Biotechnology, Chemical, Computer Science, Electrical and Electronics, Electronics and Communication, Food Technology, Mechanical, Information Technology and Pharmaceutical Technology.

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

INSTITUTE VISION

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

INSTITUTE MISSION

We facilitate our students

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

The Electrical and Electronics Engineering Department was started in the year 2006 and accredited by NBA in 2019. It offers B.E. with 60 student intake, M.E. – PED, M.E.—EST and Ph.D.in Full time and Part time modes. The department has 12 Curriculum Laboratories and 2 Industry supported labs providing 8 Value added courses and a Centre of Excellence – IOT Laboratory. Anna University recognized Research & Development Centre with 2 Ph.D., Supervisors and 4 Doctorates is fully functioning in the department since 2015. The faculty of the department have published more than 190+ reputed journal publications, 4 Patents and have received a project grant of 15 Lakh. The Department has 2 Professional Societies namely ISTE and IEI.

The Department of Electrical and Electronics Engineering (EEE) is committed to excellence in teaching, learning, research, and innovation. The department offers a strong academic foundation combined with practical exposure in emerging areas such as power systems, power electronics, electric vehicles, renewable energy, control systems, embedded systems, IoT, and VLSI. With well-qualified faculty, modern laboratories, and industry interaction, the department strives to produce competent engineers with professional ethics and social responsibility.

VISION

- Providing quality education for the sustainable development in the field of Electrical and Electronics Engineering to meet the global standards and to produce socially responsible engineers with ethical and moral values.

MISSION

- Imparting the quality technical education through state of the art infrastructure and modern tools.
- Making the students as professionals with ethical values, economical, ecological and social upliftment.
- Extending the sustainable knowledge through research and entrepreneurship for the benefits of humanities.

PROGRAM EDUCATIONAL OBJECTIVES

Graduates of Electrical and Electronics Engineering will

PEO-1: Have strong foundation in mathematics, science, and engineering fundamentals and advanced concepts towards their successful career in industries, research and entrepreneur.

PEO-2: Analyze, design and implement various electrical, electronics and interdisciplinary projects, addressing the industrial and social needs.

PEO-3: Have effective communication and leadership skills with ethical values.

PROGRAM SPECIFIC OUTCOMES

Graduates of the program will be able to

PSO-1: Attain in-depth knowledge and design skills in Electrical Power Systems, Electrical Drives, Power Electronics and Control, Electronics and Digital Electronics.

PSO-2: Acquire specialized skills in Solar Power Applications, High Voltage Engineering and competency for competitive examinations.

PROGRAM OUTCOMES

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

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

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

Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

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

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

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

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

A Individual and team work:
Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.

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

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

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

MANAGEMENT PROFILE

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

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

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

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

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

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

CHAIRMAN'S MESSAGE

It gives me immense pleasure to express that our Electrical and Electronics Engineering release the department magazine for the academic year 2024-25 highlighting the various activities and budding talents of the students on this special occasion. I value the emerging ability and the endowment of the students in their articles, poems, drawing etc., which bloom out their young talents and skills. I appreciate our magazine committee for their venture in bring out this memorable edition.

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

Dr. T. Aranganal

CHAIRPERSON'S MESSAGE

1 am glad to know that our Gnanamani College of Technology is leading a step forward by releasing the magazine 2024-2025. This magazine would be a common platform for the students to express their hidden talents and creativity. My hearty wishes to the Principal, staff members and students for the completion of this IGNITE.

Wishing you all success in their Academic Endeavours.

Tmt.P.Malaleena

VICE CHAIRPERSON'S MESSAGE

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

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

Ms. Madhuvanthinie Arangannal

CAO'S MESSAGE

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

Dr.P.Premkumar

PRINCIPAL'S MESSAGE

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

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

Dr. T.K. Kannan

HOD'S MESSAGE

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

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

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

Dr. J.Chandramohan

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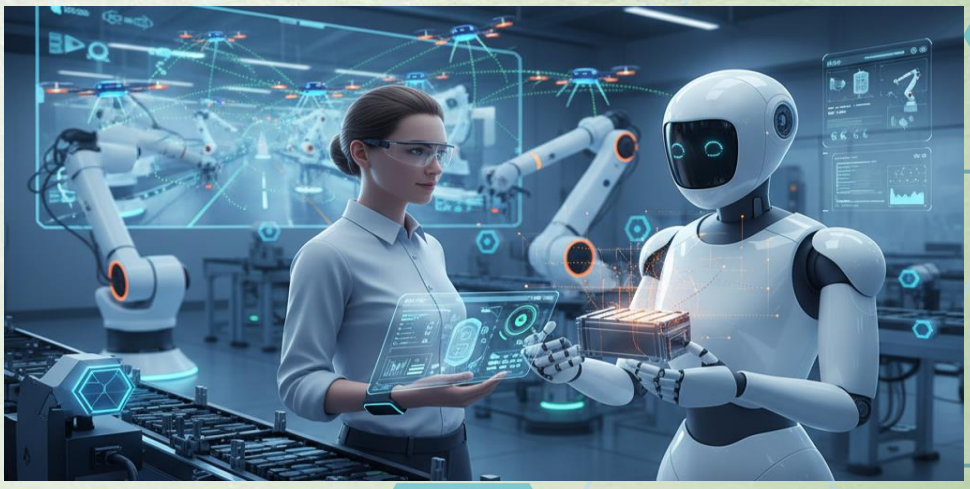
Tech Knowledge

Humanoid Robots

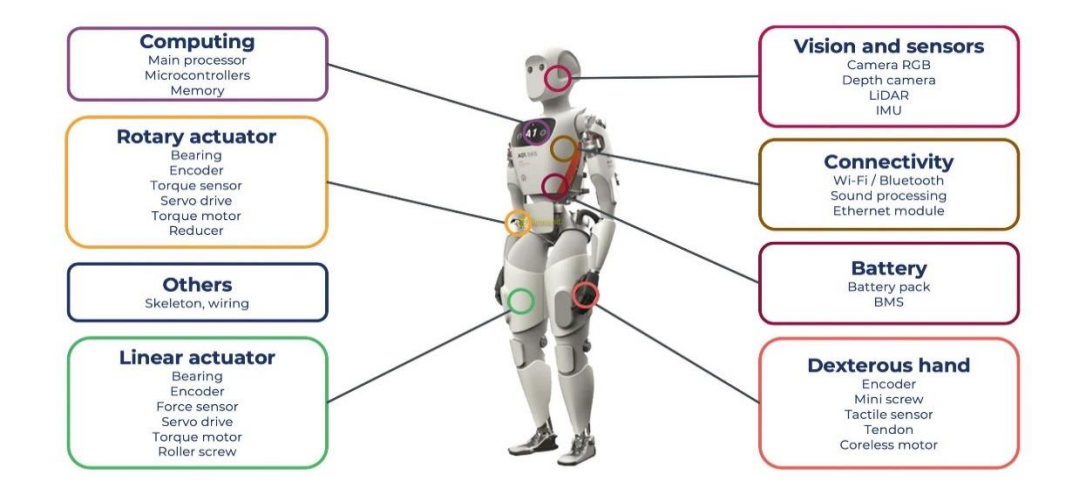
For a service robot to serve travelers at an airport or for a social robot to live with a human partner at home, it is vital for robots to possess the ability to empathize with human partners and express congruent emotions accordingly. We conducted a systematic review of the literature regarding empathy in interpersonal, virtual agents, and social robots research with inclusion criteria to analyze empirical studies in a peer-reviewed journal, conference proceeding, or a thesis. Based on the review, we define empathy for human–robot interaction (HRI) as the robot's (observer) capability and process to recognize the human's (target) emotional state, thoughts, and situation, and produce affective or cognitive responses to elicit a positive perception of humans. We reviewed all prominent empathy theories and established a conceptual framework that illuminates critical components to consider when designing an empathic robot, including the empathy process, outcome, and the observer and target characteristics. This model is complemented by empirical research involving empathic virtual agents and social robots. We suggest critical factors such as domain dependency, multi-modality, and empathy modulation to consider when designing, engineering, and researching empathic social robots.



Interest in empathic robots is growing in academia and industry. Softbank's Pepper is designed to understand a human's mood and respond accordingly, which requires both emotion

recognition and an expression engine. The long-awaited social robot Jibo was released in the market in 2018 with a range of social skills, including identifying family members and calling by names, telling jokes, and dancing. While interacting with such robots may certainly be entertaining, it is still early to say that state-of-the-art commercialized robots can empathize with humans.

We feel similar emotions as others, which is sometimes a result of understanding others' thoughts and feelings. Empathy involves "an affective response more appropriate to someone else's situation than to one's own". Empathy considers the other's affective state and situation, which leads to cooperation, prosocial behavior, altruism, and a positive relationship. It seems critical for robots to empathize with human partners, that is, recognize human emotional states, thoughts, and situations, and behave accordingly in order to live with human partners at home, to help with their mental or health-related problems, or to assist their daily activities.

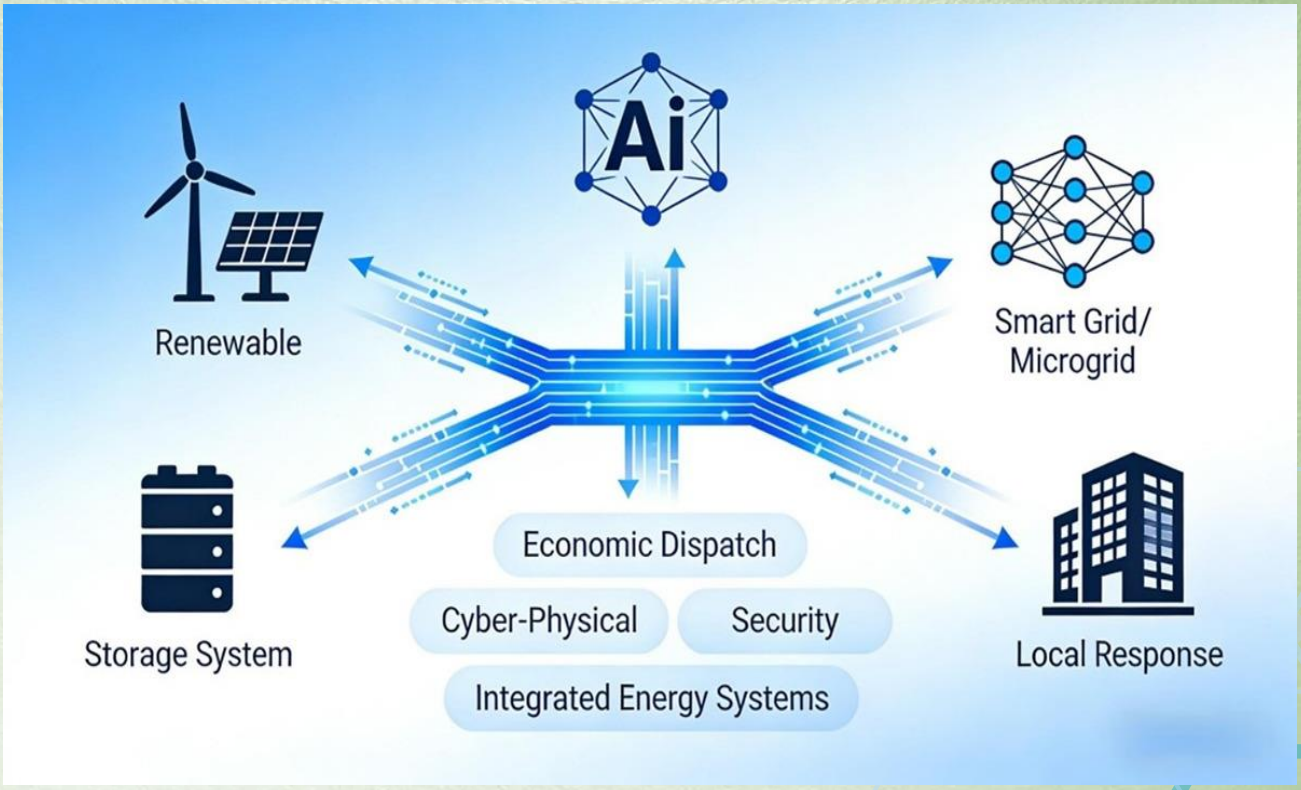


Researchers of human–robot interaction (HRI) have recently started exploring different aspects of empathy (for a survey, read). The current state of research is far from achieving full-fledged empathetic capability, but recent progress in social and developmental psychology, neuroscience, and virtual agent research have highlighted research directions for empathic social robots. A general design guideline for empathic robots will be provided to inform designers about the elements required to engineer empathic robotics.

K.SATHEESHKUMAR, AP/EEE

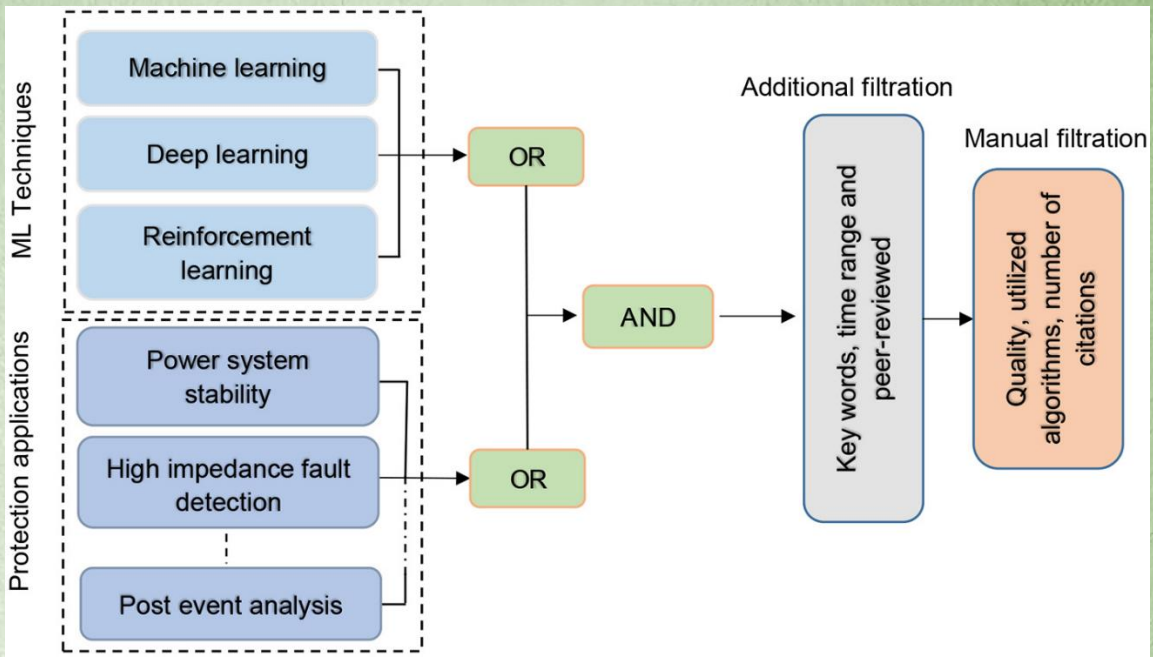
Artificial Intelligence and Machine Learning in Electrical Systems

Artificial Intelligence (AI) has become a transformative force in electrical engineering, enabling intelligent automation and data-driven decision-making across various applications. Traditional electrical systems relied heavily on predefined algorithms and human intervention. However, AI introduces adaptive learning capabilities, allowing systems to analyze vast amounts of data, identify patterns, and optimize operations in real time. One of AI's core strengths in electrical engineering is pattern recognition. AI algorithms, particularly deep learning and neural networks, can detect anomalies in electrical circuits, predict power system failures, and improve signal processing efficiency.



For instance, in power grid management, AI-driven models analyze historical and live data to predict fluctuations in electricity demand, ensuring optimal energy distribution. Additionally, self-learning models enhance electrical automation. AI-powered control systems continuously learn from operational data, refining their responses to environmental changes. This is particularly useful in smart grids and industrial robotics, where AI dynamically adjusts voltage levels, energy consumption, and operational parameters based on real-time inputs. AI also plays a crucial role in fault diagnosis and predictive maintenance, reducing downtime and improving

system reliability. By analyzing sensor data from electrical components, AI can foresee equipment failures before they occur, allowing engineers to implement preventive measures.



ML algorithms such as supervised, unsupervised, and reinforcement learning play crucial roles in electrical system optimization. Machine Learning (ML) has become a fundamental component in electrical engineering, allowing systems to improve efficiency, predict outcomes, and automate decision-making. Unlike traditional deterministic models, ML algorithms learn from historical data, sensor inputs, and real-time environmental factors to refine electrical processes. The three primary types of ML – Supervised learning, Unsupervised learning, and Reinforcement learning – play distinct roles in optimizing electrical systems

Dr.M.MALARVIZHI, PROF/EEE

Drones in agriculture

Drones, also called Unmanned Aerial Vehicles (UAV), have witnessed a remarkable development in recent decades. In agriculture, they have changed farming practices by offering farmers substantial cost savings, increased operational efficiency, and better profitability. Over the past decades, the topic of agricultural drones has attracted remarkable academic attention. We therefore conduct a comprehensive review based on bibliometrics to summarize and structure existing academic literature and reveal current research trends and hotspots. We apply bibliometric techniques and analyze the literature surrounding agricultural drones to summarize and assess previous research. Our analysis indicates that remote sensing, precision agriculture, deep learning, machine learning, and the Internet of Things are critical topics related to agricultural drones. The co-citation analysis reveals six broad research clusters in the literature. This study is one of the first attempts to summarize drone research in agriculture and suggest future research directions.

SOWMIYA.C
IV YEAR

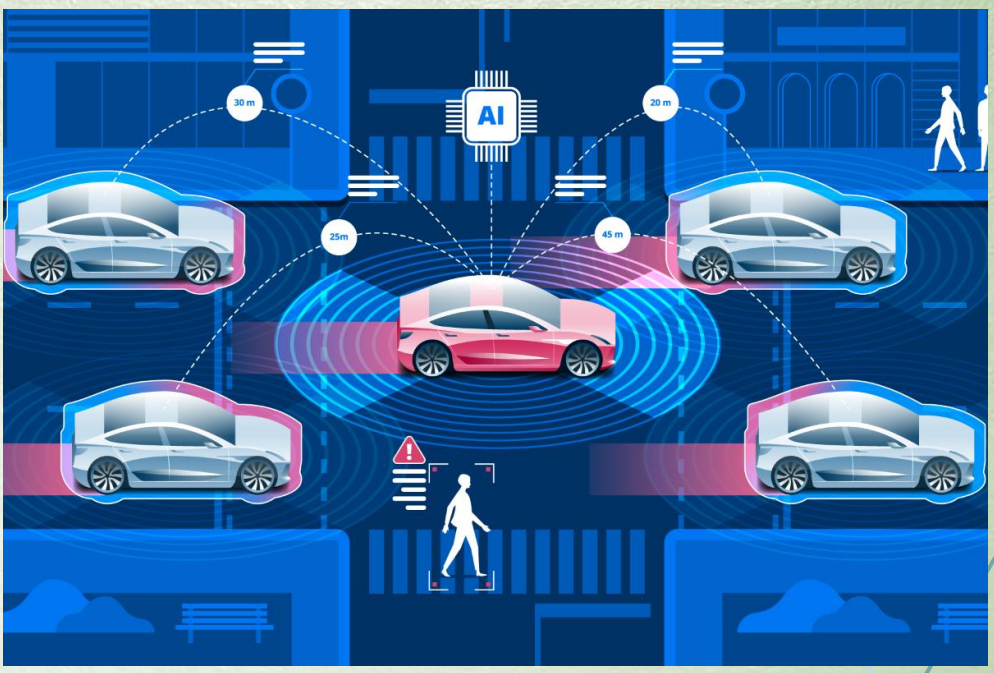
Industrial Automation

Industrial automation refers to the automation of industrial processes by means of modern computer-assisted technology. Industrial automation systems are used for condition monitoring, control applications, and the mobile workforce. The opportunities for wireless communication within the industrial automation market are growing at a rapid rate for several reasons. One reason is the available access to difficult locations and hazardous areas in the plant, and another is the recent ratifications of standards designed with industrial automation requirements in mind. The use of wireless technologies in industrial automation enables easier access to more information related to the process and the equipment used in the process. Wireless technology also provides flexibility regarding scalability as it is easier to extend a network with more sensors than using wired technologies. Mobility is another attractive feature that makes it easier to reconfigure a network by moving sensors to different positions when the application process is altered. Wireless communication technology also offers a cost-effective way to use temporary installations to fine-tune a process during a few months or collect statistical data and then remove the installation. A wireless localization application makes it possible to find and track inventory, valuable assets, and workers that are moving inside and outside of the plant. However this technology faces challenges from related technologies such as batteries and security.

DHANUSH.K
III YEAR

Autonomous Vehicles

The automotive industry is one of the most important industries in Europe. This industry is responsible for 14% of total production and capital investment in the European manufacturing sector. The following rise of driverless vehicles is going to have a major impact on businesses and professionals. Automated vehicles could replace corporate fleets for deliveries or transporting employees, for example. And workers could gain productive hours in the day by working instead of driving during daily commutes. Innovations in this field are also poised to completely change the car insurance industry by reducing accidents - a new report predicts that accidents will drop by 80% by 2040. The interconnection and synchronization of radar and ultrasonic sensors and optical cameras allow completely autonomous driving. This article deals with the description of autonomous cars, specifically their classification, technology, components, working, potential advantages and obstacles.



KIRUTHIKA.T

III YEAR

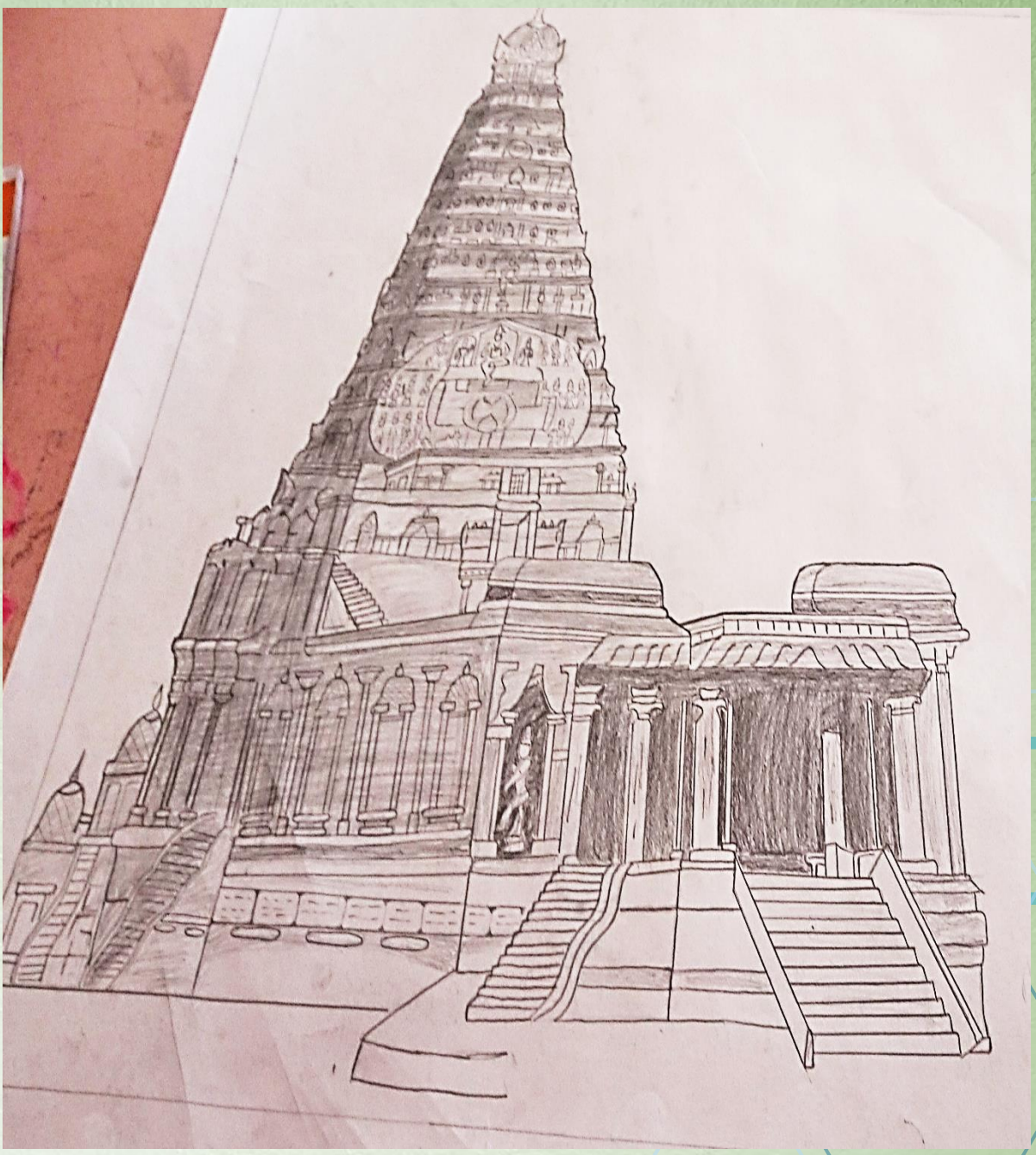
PENCIL ART

NATURE

THARUN A

IV YEAR

PRAGATHEESHWARAR TEMPLE - TANJORE



DINESH.R

II YEAR

REPUBLIC INDIA

AADHAVAN R

II YEAR

POEMS

பூமித்தாய் கண்ணீர்:

மரம் வெட்டி எறிந்தாய்,
மழை இல்லை என்றாய்!
நெகிழி குப்பை குவித்தாய்,
நிலம் நஞ்சானது என்றாய்!
சுவாசிக்கக் காற்றில்லை,
குடிக்கக் நீரூற்றில்லை...
இனியும் அழிப்பாயோ?
என்னை காத்திட நினைப்பாயோ?

M.KARTHIKA
II YEAR

இயற்கையின் பாடம்

கண்ணே நீ காண்!
நிழல் தரும் மரம்,
நித்தம் அருளும் மழையும்,
சுத்தமான காற்றும்,
நமக்கு இயற்கை தந்த சொத்து!
வளர்ப்போம் மரம்,
காப்போம் உயிர்!

SWETHA.M
III YEAR

கோடையின் வெப்பம்

மலரே ஏன் இந்த மௌனம்
கோடையின் வெப்பம் தாலாமல்
நீர் ஓடையில் சென்றுவிட்டாயோ!
நீந்தி நீந்தி சுற்றியதால்
சற்று சோர்ந்து விட்டாயோ!
கோடையின் வாடையில் சிக்கிய
வாடா மலர் கூட வாடி போகலாம்!
ஆனால் என்றும் வாடாத மலர் நீ
அதை தேடாமல் இருத்தல் ஆகுமா?!.

R.MANIBALA
II YEAR

தாய்மை

தாயே நீ என்னைத் தனியாக உன் வயிற்றில்
மாயை நிறைந்த இந்த மாவுலகில் சுமந்தபடி
நடக்கப் படுக்க நல்லுணவைச் சாப்பிடவும் முடியாமல்
அடக்கம் நிறைந்தே அத்தனையையும் எனக்காக
துறந்தே வாழ்ந்தவள் நீ! துர்வாச முனிவரைப்போல்
இறப்புக்கும் பயப்படாமல் இனிதாய் எனை ஈன்றவள் நீ!
அடிவயிற்றுப் பாரத்தை அப்படியே குறைத்தாலும்
இடிஉதையை நல்கும்நான் இடுப்பில் சிலகாலம்
வீற்றிருந்து உன்சக்தியை வீணடித்து விளையாட
காற்றும் கண்ணும் என்மேல் கவலையுறப் படாமல்
போற்றியெனைப் பாதுகாத்த புனிதத்தாயே நானுனக்கு
சாற்றிக் கொடுத்ததெல்லாம் சங்கடங்கள்! சங்கடங்கள்!

PRADEEP B
II YEAR

BIOGRAPHY

Elon Musk

Elon Musk life story begins in South Africa, where he was born. Later, he went on to become an American entrepreneur who co-founded PayPal and established SpaceX, a launch vehicle and spacecraft manufacturer. He was also one of the original major investors in and the CEO of Tesla, an electric car company.

Elon Musk Early Life

Musk was born in Canada to a Canadian mother and a South African father. Musk grew up with his head stuck in books and computers. He was bullied by his classmates and often beaten up by class bullies as a little, timid youngster until he grew strong enough to defend himself during a growth spurt in his teens. He developed a video game at the age of 12 and sold it to a computer magazine. Musk left South Africa in 1988 after getting a Canadian passport because he refused to support apartheid through compulsory military duty and wanted to pursue the higher economic prospects offered in the United States. Musk travelled to Canada at the age of 17 to attend Queen's University and evade military service in South Africa. Musk got his Canadian citizenship the same year, partly because he thought it would be easier to get American citizenship that way. Musk moved to the United States in 1992 to study business and physics at the University of Pennsylvania. He earned an undergraduate degree in economics before continuing on to earn a second bachelor's degree in physics. Musk went to Stanford University in California to earn a Ph.D. in energy physics after leaving Penn. But that Ph.D couldn’t make it to Elon Musk Degrees since he walked out of Stanford after only two days to start his first firm.

Elon Musk Success Story

Musk joined engineers Martin Eberhard and Marc Tarpenning to help operate Tesla Motors in 2004, where he played a key role in the development of the world's first electric vehicle, the Tesla Roadster. Musk took over as CEO and product architect after Eberhard was fired from the company in 2007 due to a series of conflicts. Tesla has grown to be one of the most popular and desirable vehicle brands in the world under his leadership. Elon Musk's SpaceX has signed many high-profile contracts with NASA and the US Air Force to manufacture rockets and execute military missions. Musk has been vocal about his desire to work with NASA on a collaborative mission to deploy an astronaut to Mars by 2025. Elon Musk has always been a proponent of various space-age technologies, but it hasn't always been a smooth journey for him. He went on to become a small business owner and eventually the CEO of two creative firms after being bullied in school. But he made the decision to ascend from there and never settle for anything less.

Tesla, in addition to creating electric automobiles, has a strong presence in the solar energy sector, courtesy to its purchase of SolarCity. This clean-energy services company, which was founded in 2006, now develops two rechargeable solar batteries that are primarily used for stationary energy storage. The Powerwall is designed for residential backup power and off-grid use, whereas the Powerpack is designed for business or electric utility grid use.

PRIYA.C

III YEAR

Electricity is doing for the distribution of energy what the railroads have done for the distribution of materials.

Charles Steinmetz