



PRAMANA

-A Promise of knowledge

By

**Electronics and Communication Engineering
Department**

**G.Narayanamma Institute of
Technology and Science for Women**

APRIL, 2024

VOLUME - II ISSUE - II

Message from The Principal



Dear Readers,

It is my privilege to extend a heartfelt welcome to you as we explore the captivating realm of Electronics and Communications Engineering through the pages of "Pramana - A Promise of Knowledge." As the Principal, I take immense pride in witnessing the dedication and ingenuity of our faculty, researchers, and students who continue to push the boundaries of innovation in this dynamic field. "Pramana" serves as a testament to our collective commitment to advancing knowledge and fostering excellence in Electronics and Communications Engineering.

In this issue, you will discover a plethora of thought-provoking articles, research papers, and insights that encapsulate the breadth and depth of our discipline. From groundbreaking research in semiconductor technology to cutting-edge developments in telecommunications, each contribution exemplifies the spirit of inquiry and discovery that defines our community.

I commend the efforts of the editorial team, authors, and reviewers who have contributed to making this edition of "Pramana" a resounding success. Your passion and dedication serve as a beacon of inspiration for us all. Together, let us continue to push the boundaries of innovation, create meaningful impact, and shape a brighter future for generations to come.

With warm regards,
Dr K. Ramesh Reddy,
Principal, GNITS

Message from Head of the Department



Dear Esteemed Readers,

It is with great pleasure that I extend my warmest greetings to you through the pages of "Pramana - A Promise of Knowledge," dedicated to the vibrant domain of Electronics and Communications Engineering. As the Head of the Department, I am honored to witness the remarkable contributions and advancements made by our faculty, researchers, and students in this ever-evolving field. "Pramana" serves as a testament to our commitment to fostering excellence in education, research, and innovation within Electronics and Communications Engineering. In this edition, you will find a treasure trove of insights, discoveries, and breakthroughs that reflect the diversity and dynamism of our discipline. From the fundamentals of circuit design to the complexities of

wireless communication systems, each article offers a glimpse into the exciting frontier of ECE.

I commend the dedication and hard work of our contributors, whose expertise and passion shine through the pages of this publication. Their research not only expands the boundaries of knowledge but also inspires future generations of engineers and scholars to push the envelope of innovation even further.

I encourage you to immerse yourself in the wealth of knowledge presented in this edition and to engage actively in the discourse surrounding Electronics and Communications Engineering. Let us harness the power of technology to create a brighter, more connected future for all.

Thank you for your continued support and enthusiasm for "Pramana - A Promise of Knowledge." Together, let us embark on a journey of discovery and innovation that will shape the future of ECE and beyond.

With warm regards,
Dr. K. Ragini,
Professor and Head, ECE Department, GNITS

Editor in Chief's Message



Welcome to another enriching edition of "Pramana - A Promise of Knowledge" Vol. 2, Issue 2, where we delve into the dynamic realm of Electronics and Communications Engineering.

In this fast-paced world, where technological advancements are the norm, our dedication to providing insightful and cutting-edge content remains unwavering. Through "Pramana" we aim to be your trusted companion, navigating through the ever-evolving landscape of ECE, bringing you the latest research, trends, and innovations. As we embark on this journey together, let us celebrate the vibrancy and ingenuity that define the field of Electronics and Communications Engineering. From the smallest integrated circuits to the vast networks connecting the world, ECE continues to shape the way we live, work, and communicate.

In this edition, our esteemed contributors share their expertise and perspectives on a wide range of topics, from semiconductor technologies to wireless communications,

from signal processing to embedded systems. Whether you're a seasoned professional, an aspiring student, or simply a curious mind, there's something here for everyone.

As Editor-in-Chief, I am immensely proud of the dedication and passion that our team puts into curating each issue of "Pramana" It is our privilege to serve as a platform for knowledge exchange and intellectual discourse, fostering collaboration and innovation within the ECE community.

I invite you to immerse yourself in the articles, engage with the content, and join us in our pursuit of knowledge and excellence. Together, let us explore the boundless possibilities that Electronics and Communications Engineering offer, and together, let us fulfil the promise of discovery.

Thank you for being a part of the "Pramana" family.

Warm regards,

Dr Swapna Raghunath

Editor in Chief, Pramana - A Promise of Knowledge

ECE Department, GNITS

Co-Editor's Message



Dear Readers,

After a great success of the first two issues of the ECE Technical magazine I am delighted to announce the publication of the volume-2 issue-2 of "PRAMANA - A Promise of Knowledge," a erudite periodical of the department of Electronics and Communication. The G. Narayanamma College of Engineering offers a unique chance to students to hone their learning abilities with the aid of an extraordinary publication. This magazine serves as a distinguished platform for the exhibition of the students' literary proficiency and innovative ideas, whilst affording the faculty and students alike, the opportunity to delve into a diverse range of topics, and thereby raise the bar in their respective pursuits. "PRAMANA - A Promise of Knowledge"

exemplifies the arduous work, unmitigated dedication, and substantial contributions of students and instructors alike. My heartfelt appreciation to all our editorial team members for their invaluable support in actualizing this project. My gratitude to each and every author whose insightful articles constitutes a prominent feature of this magazine. Your invaluable contributions to the journal have been a labour of love requiring an immense amount of time and effort. I wish everyone all the best in their future scholarly endeavours. We request every student to show the same enthusiasm in further magazines also. Thank you.

Warm regards,

P. Lavanya,

Co-editor, Pramana – A Promise of Knowledge,

ECE, GNITS.

The Editorial Board



N. Manognya Bharathi
ECE-A,3/4



G. Kusumanjali
ECE-A,2/4.



B. Siri Chandana
ECE-B,3/4.



Aabha Ratansingh Dixit
ECE-B,2/4



Sreenidhi Karra
ECE-C,3/4.



B.Sree Manaswini
ECE-C,2/4

INDEX

1. Empowering women in technology: celebrating the contributions of Indian women in stem.	2
2. Electronics & communication: reality meets sci-fi	2
3. Breaking boundaries: The epic saga of women, from battle queens to contemporary mavericks.	3
4. Sudha Murthy: A teacher, chairperson of Infosys Foundation	4
5. Women Leading the Way: The Rise of female tech leaders	5
6. Drug Recommendation System in Medical Emergencies using Machine Learning	5
7. Deep Brain Stimulation (DBS)	6
8. Precision farming for a sustainable future	7
9. Exploring the frontiers of space: a journey through Satish Dhawan Space Centre (SDSC) – shar	8
10. PALS Residential Student Workshop (RSW)	9
11. PALS innoWAH 2023-24	10
12. Role of IoT in Changing Industries: A Simple Guide to Manufacturing, Agriculture, and Logistics	10
13. The Microwave Technology	11

1. EMPOWERING WOMEN IN TECHNOLOGY: Celebrating the Contributions of Indian Women in STEM.

In recent years, there has been a growing recognition of the invaluable contributions made by women in the fields of science, Technology, Engineering, and Mathematics (STEM). Indian women, in particular, have



emerged as trailblazers and innovators, breaking barriers and shattering stereotypes in traditionally male-dominated fields. This research article aims to celebrate the achievements of Indian women in technology and shed light on their remarkable journeys and contributions.

Tessy Thomas:

Dubbed as the Missile Woman of India, Tessy Thomas has carved a niche for herself in the aerospace engineering domain. As the project director for the Agni-IV missile at the Defence Research and Development Organisation (DRDO), she played a pivotal role in spearheading the development of India's indigenous ballistic missile systems. Her groundbreaking work has not only bolstered India's defence capabilities but also inspired countless young women to pursue careers in aerospace engineering.

Dr. Sudha N. Murthy:

Dr. Sudha N. Murthy stands as a beacon of inspiration in the field of computer science and artificial intelligence. As an accomplished computer scientist and academician, she has made significant contributions to research and education. Serving as the Director of the Software Engineering Research Centre at the International Institute of Information Technology, Bangalore, Dr. Murthy has been instrumental in advancing the frontiers of technology and fostering innovation in the IT sector.

Dr. Rohini Godbole:

Renowned theoretical physicist Dr. Rohini Godbole has made noteworthy contributions to the field of particle physics. Her research endeavours have focused on fundamental aspects of quantum field theory and the

exploration of the Standard Model of particle physics. Dr. Godbole's scholarly pursuits have earned her international acclaim and recognition, paving the way for advancements in theoretical physics.

Dr. Kiran Mazumdar-Shaw:

Dr. Kiran Mazumdar-Shaw stands as a towering figure in the biotechnology industry, revolutionizing healthcare and pharmaceuticals through innovation and entrepreneurship. As the founder and chairperson of Biocon Limited, she has played a pivotal role in leveraging biotechnology to address critical healthcare challenges and improve access to affordable treatments. Dr. Mazumdar Shaw's visionary leadership has propelled Biocon to the forefront of the global biotech arena.

The achievements of these remarkable women exemplify the immense talent, creativity, and resilience present in the Indian STEM community. Their groundbreaking contributions have not only advanced scientific knowledge and technological innovation but have also paved the way for greater inclusivity and diversity in the tech industry. As we celebrate the accomplishments of Indian women in technology, let us continue to champion their efforts and support the next generation of STEM leaders.

Sriharsha Choppari
22251A1707
II year.



2. ELECTRONICS & COMMUNICATION: Reality Meets Sci-Fi (Science fiction).



Imagine your phone shrunk to the size of a grain of rice, or cars driving themselves while you nap.

Electronics and communication engineering are making these sci-fi dreams reality, but how?

Communication is also evolving. Imagine beams of light carrying data at lightning speed, or ultra-secure, instantaneous communication using the mind-bending rules of quantum mechanics.

But with great power comes great responsibility. Engineers must consider ethical concerns like data privacy and AI misuse. The future lies not just in tech, but in bridging the gap between engineers, designers, and ethicists to ensure technology serves humanity.

So, buckle up! The future of electronics and communication is here, and it's more exciting than you ever imagined.

AI and IoT: Imagine a smart home system that adjusts lights based on your mood or a city that uses AI to predict and prevent crime.

LiFi: LiFi could be used in hospitals to avoid interference with medical equipment or in airplanes for faster in-flight internet.

Quantum Communication: Imagine transferring financial transactions in an instant with unbreakable security or communicating with astronauts on Mars without delay.

The future of ECE is brimming with possibilities. It's a future where reality surpasses science fiction, but only if we harness technology responsibly. By combining cutting-edge advancements with ethical considerations, ECE can create a brighter future for all.

Forget bulky phones and clunky cars. Electronics and communication engineering (ECE) are shrinking devices, smartening machines, and beaming information at light speed.

But wait, there's more! ECE isn't just about cool gadgets. It's about using technology responsibly. Think data privacy, AI ethics, and making sure tech serves humanity, not the other way around.

So, buckle up! The future of ECE is fast, smart, and connected, and it's just getting started. Remember, the human touch is still crucial, so let's navigate this exciting future together!

Khandesh Gayathri
22251A0444
II year.



3. BREAKING BOUNDARIES:

The Epic Saga of Women, From Battle Queens to Contemporary Mavericks.

The journey of women from ancient warrior queens like Rani Lakshmi bai of Jhansi to modern icons such as Malala Yousafzai and PV Sindhu reflects a remarkable evolution in the status and role of women in society. From challenging gender norms and leading armies to breaking barriers in sports and politics, women have overcome obstacles and shattered stereotypes to assert their equality and influence. In this article, we explore the diverse contributions of women throughout history and celebrate their ongoing journey towards equality and empowerment.

Ancient Warriors and Queens:

Throughout history, women like Rani Lakshmi bai of Jhansi and Rani Rudrama Devi of Kakatiya dynasty in medieval India have shown extraordinary courage and leadership on the battlefield.

These warrior queens defied societal expectations and led their kingdoms with valour and resilience, challenging traditional gender roles and paving the way for future generations of women leaders.

Modern Icons and Trailblazers:

In the modern era, women continue to break barriers and inspire change in all spheres of life. From political leaders like Indira Gandhi, the first female Prime Minister of India, to activists like Malala Yousafzai, who advocates for girl's education and human rights. Women's participation in sports has also been a catalyst for change, challenging stereotypes and promoting gender equality. Athletes like Serena Williams have not only excelled in their respective sports but have also become symbols of empowerment and resilience. Their achievements on the field demonstrate that women are equally capable of competing at the highest level and serving as role models for future generations.

Equality in Marriage and Parenthood:

Women like Mary Kom, who continued to pursue their athletic careers even after becoming mothers, exemplify the idea that marriage and motherhood do not hinder a woman's freedom or ambitions. By balancing family life with professional pursuits, these women defy traditional norms and inspire others to strive for equality and fulfilment in all aspects of life.

The journey of women from ancient warrior queens to modern icons reflects a remarkable evolution in attitudes and perceptions towards gender equality and empowerment. Through resilience, determination, and trailblazing leadership, women have overcome obstacles and shattered stereotypes to assert their equality and influence in society. As we celebrate their achievements and honour their legacies, let us continue to strive for a

world where women and men are truly equal in all aspects of life, paving the way for a brighter and more inclusive future for generations to come.

Thanniru Jyothi
21251A0461
III Year.



4. SUDHA MURTHI: A Teacher, Chairperson of The Infosys Foundation.



Sudha Murthy, also known as Sudha Murthy, is an Indian author, philanthropist, and social worker known for her contributions to literature and society. Sudha Murthy is an Indian educator, author, philanthropist and former chairperson of the Infosys foundation. Murthy was awarded the Padma Shri, the fourth highest civilian award in India, for social work by the Government of India in 2006. She is married to the co-founder of Infosys, N.R. Narayana Murthy. Later in 2023, she was awarded the Padma Bhushan, the third highest civilian award in India. Sudha Murthy began her professional career in computer science and engineering. She is a member of the public health care initiatives of the Gates Foundation. Murthy is best known for her philanthropy and her contribution to literature in Kannada and English.

Early Life and Education: Sudha Murthy was born on August 19, 1950, in Shiggaon, Karnataka, India. She completed her Bachelor of Engineering in Electrical and Electronics from B.V.B. College of Engineering & Technology, Hubli. An educated atmosphere in the family instilled in her a passion to do something

extraordinary at an early age. Sudha Murthy's brother Srinivas Kulkarni is a renowned astronomer who received the Dan David Prize in 2017. Her early life experiences and affinity for her grandmother became the foundation for some of her books.

Sudha Murthy's childhood is often characterized by simplicity and a fire to learn. Sudha Murthy's education has a major role to play in shaping her as a successful author, even though her educational path was more technical. Her hard work and commitment are clear from the fact that she emerged as a topper during her bachelor's and master's degrees.

Career: After completing her education, Sudha Murthy became the first female engineer to be hired at India's largest auto manufacturer, Tata Motors (formerly TELCO), in Pune, India. She later joined the philanthropic arm of Tata Group, the Tata Trusts. Sudha Murthy is a prolific writer in multiple languages, primarily English and Kannada. She has written numerous novels, short stories, children's books, travelogues, and non-fiction works. Her writing often reflects her experiences, observations, and values, addressing themes such as social issues, Indian culture, and human relationships. Sudha Murthy has always been an advocate of women's rights and a pioneer in the development of education. Once she wrote to Tata Motors, also known as Telco about their men-only policy, and for that, she was called to an interview and later became the first female engineer to be employed in India. Her position at Telco was important in redefining the company's job policies.

Major Achievements: Sudha Murthy's education and her work in various domains have led her to win many awards. She has received numerous awards for her academic excellence. In the year 2019, IIT Kanpur awarded her an Honorary Doctor of Science degree.

Philanthropy: Sudha Murthy is actively involved in philanthropic activities through the Infosys Foundation, a non-profit organization established by her husband, N.R. Narayana Murthy, co-founder of Infosys Technologies Limited. The foundation works in areas such as healthcare, education, rural development, and arts and culture, with a focus on empowering marginalized communities and improving quality of life.

Recognition and Awards: Sudha Murthy's contributions to literature and social service have been widely recognized. She has received several awards and honours, including the Padma Shri, one of India's highest

civilian honours, for her distinguished service in the field of literature and education.

Personal Life: Sudha Murthy is married to N.R. Narayana Murthy, the co-founder of Infosys, one of India's largest IT services companies. They have two children, Akshata and Rohan Murthy. Despite her family's significant wealth, Sudha Murthy maintains a modest lifestyle and is known for her humility and down-to-earth nature. Sudha Murthy continues to inspire millions of people, both in India and around the world, through her writing.

A. Sushritha
22251A04G3
II Year.



5. WOMEN LEADING THE WAY: The Rise of Female Tech Leaders.



In the fast-paced world of technology, the presence of women in leadership positions is not only essential for diversity and inclusion but also for driving innovation and shaping the future of the industry.

The Importance of Female Leadership

The presence of women in leadership positions brings a diverse range of perspectives, experiences, and insights to the table. Research has shown that companies with gender-diverse leadership teams are more innovative, resilient, and profitable. By tapping into the full talent pool and harnessing the unique strengths of women leaders, tech companies can gain a competitive edge in today's rapidly evolving market.

Trailblazers and Role Models:

From pioneers like Grace Hopper, the "queen of code," to contemporary leaders like Ginni Rometty, former

CEO of IBM, women have played instrumental roles in shaping the tech industry. These trailblazers serve as inspiration and role models for aspiring female leaders, proving that success knows no gender. By amplifying their stories and celebrating their achievements, we can inspire the next generation of women to pursue leadership roles in tech with confidence and determination.

Breaking Barriers and Overcoming Challenges:

Despite progress, women in tech still face numerous challenges on their path to leadership, including gender bias, stereotypes, and unequal opportunities. However, many women have defied the odds, persevered in the face of adversity, and risen to the top of their fields. Through resilience, determination, and a commitment to excellence, these trailblazing women are breaking barriers and paving the way for future generations of female leaders in tech.

Creating a Culture of Inclusion:

Building a more inclusive tech industry requires a concerted effort to dismantle systemic barriers and foster a culture of inclusion. Companies must implement policies and practices that promote gender diversity, equity, and inclusion at all levels of the organization. This includes offering leadership development programs, mentorship opportunities, and support networks for women in tech. By creating an environment where women feel valued, supported, and empowered to succeed, tech companies can cultivate the next generation of female leaders.

Looking to the Future:

As we look to the future, the rise of female tech leaders offers hope and inspiration for a more equitable and inclusive industry. By championing diversity, fostering leadership talent, and creating pathways for advancement, we can harness the full potential of women in tech to drive innovation, drive growth, and shape a better future for all.

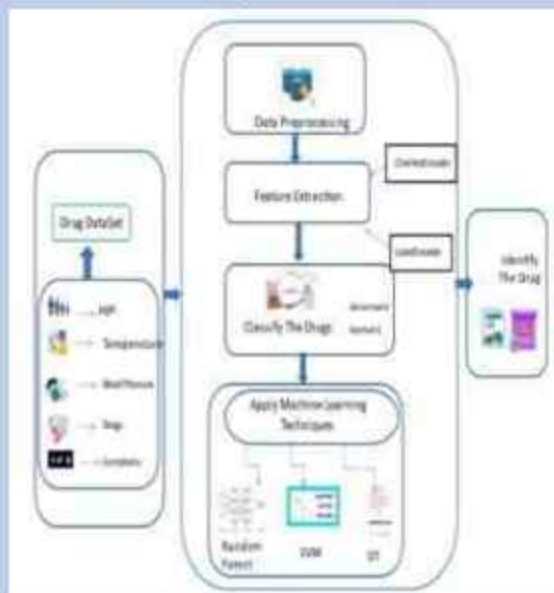
Together, let us continue to empower women to lead the way and make their mark on the world of technology.

K. Preethi Chandra
22251A0442
II Year.



6. DRUG RECOMMENDATION SYSTEM IN MEDICAL EMERGENCIES USING MACHINE LEARNING

According to a National Center for Biotechnology Information (NCBI) article, approximately 99,000 individuals succumb each year due to a lack of prompt medical attention. Many health severities occur because of a lack of immediate health consultancy and the right amount of drug dosage intake. In the situation of Covid-19 Pandemic, where the entire medical community faced unprecedented emergencies, a tragic consequence emerged with individuals losing their lives due to the unavailability of prompt medical attention. The situation was exacerbated by the fact that some individuals, faced with limited access to healthcare resources, resorted to self-medication without proper consultation. In such situations, the drug recommendation system played a crucial role in mitigating the adverse effects of self-medication and supporting individuals in managing their health more effectively.



In the era of Machine Learning (ML), recommender systems are like smart assistants that can make more accurate, precise, and reliable clinical predictions while using less resources. These systems use less energy and time to provide reliable suggestions for healthcare decisions. Drug recommendation systems provide precise information at any time while improving the performance, integrity, and privacy of patient data in the decision-making process. The essence of a medicine recommendation system lies in furnishing patients with trustworthy information regarding their prescribed medications, including dosage recommendations and

potential adverse effects. Within the realm of recommender systems, decision tree algorithms stand out for their ability to produce the most accurate results. The decision tree algorithm offers a structured and interpretable framework, allowing healthcare professionals to make informed decisions quickly. This process involves tailoring drug recommendations based on a comprehensive analysis of the patient's symptoms, blood pressure, diabetes status, temperature, and other relevant parameters.

There are Three stages that make up the medication recommender system's process using Machine Learning.

1. Drug Dataset
2. Data Pre-processing
3. Apply Machine Learning Algorithm (Decision Tree Algorithm)

The decision tree algorithm is a versatile machine learning method used for both classification and regression tasks. The drug model predicts the most suitable medication, the dosage model predicts the appropriate dosage, and the side effect model anticipates potential side effects.

This advanced technology facilitates a more informed and efficient decision-making process for medical professionals and patients alike.

The drug recommendation system emerges as a crucial tool, providing timely and safe medication recommendations for patients. This capability becomes particularly invaluable when rapid decisions need to be made, ensuring that patients receive appropriate and effective treatments.

Amrutha Kothakapu
21251A04H9
III Year.



7. DEEP BRAIN STIMULATION (DBS).



Deep Brain Stimulation (DBS), often referred to as the brain pacemaker, has transitioned from a mere scientific exploration to a highly effective clinical

remedy for movement disorders. However, there's a dearth of research on the impact of 5G mobile phone

antenna radiation on adult patients fitted with DBS devices. An EM solver can be used to construct a model, integrating a 5G/4G patch antenna, a realistic human head, and DBS models. Subsequently, the specific absorption rate (SAR) is accessed across various layers of head tissues under varying distances between the mobile phone and the human head, alongside the temperature fluctuations of both the head and the DBS under antenna exposure for 30 minutes. According to a study, at a frequency of 3500 MHz, the electromagnetic radiation from the phone to the patient's head generally surpassed that at 2400 MHz. Notably, at 3500 MHz, the SAR value exhibited an inverse relationship with the distance between the phone and the head. Specifically, at a distance of 1 cm, the maximum SAR value of 1.132 W/kg was observed in the skin layer of the head with implanted DBS. Additionally, the greatest temperature increase occurred in the brain layer at 2400 MHz and a distance of 1 cm, reaching 0.2148 °C. While all SAR values and temperature increases remained within the limits set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) of 2 W/kg and +1 °C respectively, it is advisable for patients with DBS implants to maintain a safe distance when using mobile phones.

Dr. P. SAI SPANDANA,
Assistant professor,
ECE, GNITS.



8. PRECISION FARMING FOR A SUSTAINABLE FUTURE.

The world population is growing at a rate of 1.05% per annum which apparently necessitates the increase in food production. Agriculture is undeniably the strongest influencer of global economy. 67% of the world's populace is involved in agriculture and it accounts for 39.4% of the. The Precision Farming Market has been valued at 5147.6 million USD in 2020 and is estimated to reach 10491.45 million USD by 2026. Unfortunately, the growth driven by agriculture and improvement in economic status is hampered by natural disasters, climatic changes, pests and avian intruders. The food safety is jeopardised due to the indiscriminate use of synthetic pesticides and fertilizers, threatening the lives

of the farmers, the health of the consumers and the planet at large by generating unsustainably high levels of land, water and air pollution. On an average, one third of the agricultural produce is wasted in the form of post-harvest loss. Therefore, the primary challenge of agricultural scientists is to increase the quantity of agricultural produce without causing a stress on the environment and maintaining a good soil ecosystem. Addressing the loss of food in the pre-harvest, harvest and post-harvest phases is vital to enhance food and nutrition safety in an environmentally sustainable way. Precision farming aims to address each of these significant concerns with the insightful use of modern technologies. The availability, accessibility, compatibility and simplicity of use offer multiple advantages of using microcontrollers for measurement and control. Internet of Things (IoT) integrates the microcontrollers with sensors and auxiliary components. IoT converges multiple technologies, artificial intelligence, real-time analytics, sensors with embedded systems for automation of farm equipment. It offers the additional advantage of privacy and security of information. IoT can be applied with positive results for automation of greenhouses, monitoring of climate, crop and cattle.

Precision farming is an intuitive concept of farm operation and management which employs the state of the art technologies like telecommunications, robotics, satellite imaging, drones, Internet of things, microcontrollers and a wide array of sensors. It is a precise farm and crop specific approach which optimizes the utility of the farm inputs and generates greater yields, cuts down the losses and produces a superior quality crop as compared to traditional farming methods. The economic policy-making process has evolved in the recent years to include provisions for Precision farming. Precision farming has been identified as a thrust area by the United States Knowledge Initiative on Agriculture (KIA). Internet of Things (IoT) is applied to precision farming for providing customized farming solutions with the use of real time sensors and softwares to collect, organize, process, analyse, manipulate and store agricultural and environmental data and share it with various farming appliances and systems over the internet. Tailored solutions to farming can be made possible with IoT and variable rate fertilizer and pesticide applicators can be autonomously operated to achieve optimal use nutrients and chemicals on the crop. IoT is a smart system with an approach to integrate all the agricultural operations from sensing to acting to optimize performance and quality of produce. IoT can collect data on soil nutrition, temperature, humidity, wind direction and speed, crop growth, crop yield, extent of pest infestation and weed growth to name a few. IoT provides the farmers with the convenience to remotely

monitor the soil and environmental parameters as well as control the farm. The collected data can be processed to analyse the crop situation and consequently take informed decisions on the course of action to reduce loss and improve the quality and quantity of the produce with minimal human intervention.

Challenges in Adopting Precision Agriculture

Precision agriculture apparently requires large capital investment for setting up IoT architecture and sensor network, causing a huge financial burden to the average farmer. Operating and maintaining highly advanced equipment, gathering and analysing vast quantities of data necessitates technological knowledge and training. Rural areas suffer from internet connectivity problem which is a vital component of cloud based computing in Precision farming. Mechanical breakdown of autonomous farm equipment or IoT sensor malfunction will result in severe crop damages. If the irrigation sensors fail, plants would be either under watered or overwatered. Power outages in cold storage units will compromise food freshness and safety. The involvement of network connected technologies, data analytics and remote sensing make Precision agriculture vulnerable to cyber hacking, theft of confidential and reputation damage.

Government Initiatives to Promote Precision Farming

The increasing demand for food, climatic changes, advancement in smart technologies and government initiatives to enhance food production the principal factors propelling the adoption of precision farming. Competitive and non-competitive grant programs initiated by the US government, under Agriculture and Food Research Initiative (AFRI), shortlist the best Precision agriculture proposals from various institutions and organization. Governments are offering loans to farmers at reduced interest rates and easy repayment options to encourage capital investments on technologically advanced equipment and infrastructure for Precision farming. Indian government's initiative since 2016, Precision Agriculture for Development (PAD), provides access to reliable advisory information to farmers regarding Precision Agriculture, which benefitted over a million farmers by September 2020. PAD set up a two way communication between PAD personnel and farmers for dissemination of vital information and to refine the advisory content to improve the services. National Agricultural Innovation Project (NAIP) has sanctioned a budget of 285 million USD for innovations in agricultural technology. Presently, there are 17 Precision Farming Development Centres (PFDCs) spread all over India for training a huge number of farmers on precision farming and offer infrastructural and operational support. Private sector companies have established around 1200 'e-choupals'

all over India, equipping the farmers with information on market prices, adoption of scientific practices, weather and crop disease forecasts.

Dr. Swapna Raghunath
Professor,
ECE, GNITS.



9. EXPLORING THE FRONTIERS OF SPACE: A Journey Through Satish Dhawan Space Centre (SDSC) – SHAR.

Our visit to Satish Dhawan Space Centre (SDSC) - SHAR, the primary spaceport of the Indian Space Research Organisation (ISRO) located in Sriharikota, Andhra Pradesh on 14th March, 2024, provided an illuminating glimpse into the heart of India's space exploration endeavours. As aspiring engineers and enthusiasts, our visit aimed to gain firsthand insight into the operations, technologies, and achievements of this esteemed space centre.

We were first taken to the Mission Control Centre (MCC), nestled six kilometres away from the launch pads, where we were introduced to the nerve centre of launch operations. Here, engineers meticulously monitor and control every aspect of the launch process, ensuring the success and safety of each mission. The MCC's pivotal role in orchestrating launches was evident as we witnessed the coordination and precision required for mission success.

Our tour extended to the two orbital launch pads, where we gained a deeper appreciation for the complexities involved in spaceflight. From understanding the Sound Rocketing team's crucial role in weather monitoring to learning about historical milestones, such as the inaugural launch of India's first experimental operational satellite in 1971, our visit provided a comprehensive overview of SDSC - SHAR's rich legacy.

The visit offered insight into the diverse fleet of launch vehicles employed by SDSC - SHAR, including the Polar Satellite Launch Vehicle (PSLV), Geosynchronous Satellite Launch Vehicle Mark II (GSLV MK2), and GSLV Mark III (GSLV MK3). We learned about the distinct capabilities of each vehicle, from payload capacity to target orbits, underscoring India's versatility in space launch capabilities.

A highlight of our visit was learning about SDSC - SHAR's cutting-edge technological advancements, particularly in the realm of re-usable launch vehicles. We were fascinated by innovative approaches to managing heat energy during launches, including water suppression systems that mitigate the intense heat generated at liftoff.

Our tour provided insights into the intricate infrastructure required for assembling and launching rockets. We marvelled at the meticulous assembly process in the Solid-State Assembly (SSA) building and gained an understanding of the launch pad's capabilities and limitations based on payload weight.

The visit culminated with a tour of the Space Museum within the SHAR Project area, where we encountered a captivating array of rocket models and exhibits. Exploring the museum allowed us to appreciate the evolution of India's space program and the remarkable achievements that have shaped its trajectory.

Our visit to Satish Dhawan Space Centre (SDSC) - SHAR was an enriching experience that deepened our understanding of India's contributions to space exploration. From the intricate workings of the Mission Control Centre to the awe-inspiring sight of launch pads poised for liftoff, every aspect of our visit reaffirmed the significance of SDSC - SHAR in propelling India's space aspirations to new heights. We extend our heartfelt gratitude to the staff and personnel of SDSC - SHAR for their hospitality and for facilitating this insightful visit.

10. PALS RESIDENTIAL STUDENT WORKSHOP (RSW)

December 12th -14th at IIT Madras.



Faculty Dr R Swapna, Dr M. Vijaya Lakshmi and students Participating at PALS 2023 @IITMadras

The RSW, a three-day residential program held at IIT Madras, aims to foster students' creativity and problem-solving abilities. Its primary objective is to

encourage participants to analyze problems, devise innovative solutions, and construct a functional prototype. Emphasizing resource constraints, the program evaluates prototypes against predefined criteria.

Conducted by PALS, an educational initiative driven by volunteers from diverse IIT alumni. It was attended by 130 participants from across India and Nepal out of which 104 are students and 26 are faculty. Dr. Swapna Raghunath and Dr. M. Vijaya Lakshmi from the ECE department, alongside third-year ECE students S. Meghana Reddy, T. Venkata Lakshmi Prasanna, Sai Keerthana Kuppireddy, and Prathima Talluri attended this workshop from 12th to 14th December 2023.

On the morning of December 12th, we arrived at IIT Madras and were warmly welcomed amidst deer sightings. After freshening up, we attended the workshop inauguration addressed by Professor Shanti Pawan, the Dean of Academic Research at IITM. His insights were enlightening, setting the tone for the workshop's expectations. This was followed by a GATE awareness session by Dr. SM Shiva Nagendra, the Vice Chairman of the GATE Office, who encouraged us to pursue GATE.

We then delved into a session on System Thinking Sustainability by Dr. Aswin Mahalingam, a professor at IITM, who discussed the pillars of sustainability. Post this engaging session, we headed for lunch at the Himalaya Mess

The afternoon comprised a Design Thinking workshop led by Mr. Krishna Thiruvengadam, the CEO of dVerse Technologies Pvt Ltd. This involved team collaboration from diverse colleges to tackle given problem statements, which was quite exciting. This was followed by a Kinesthetics session led by Dr. Gargi Sandilya, a life coach and transformational workshop leader, emphasizing the importance of meditation and impactful daily practices.

Later, Dr. Sridhar, the Dean of Chennai Business School, conducted a Music Appreciation session, injecting fun and dance into the mix. We explored the campus, concluding the day's activities.

The subsequent morning began with teams formulating mini project statements, guided on their execution. A session by Prof. MS Shivakumar, former Dean of Students, enlightened us on innovative engineering thinking. We engaged in an aptitude testing game by Skill Angels, then visited CFI, witnessing cutting-edge technologies like 3-D printing and race car construction.

Post dinner, we explored the vast collection at the central library and resumed project work. The next day, judges provided valuable insights during project evaluations. The valedictory ceremony, graced by Prof.

Shanti Pavan and Prof. Prathap Haridoss, witnessed the success of three teams, in which 3 of us were a part of. This experience taught us collaboration, networking, and innovative thinking, leaving an indelible mark on us.

Prizes Won

S. Meghana Reddy, T. Venkata Lakshmi Prasanna and Sai Keerthana Kuppireddy won Cash Prizes of Rs.500 each in Design Thinking Competition.

S. Meghana Reddy won a Medal for winning in the gaming competition by Skill Angels.

11. PALS innoWAH 2023-24

PALS is an educational initiative by volunteers from Alumni Fraternity of various IITs, for the benefit of students of engineering colleges. This initiative is supported by IIT Alumni Industry Interaction Centre (IITAC) and IIT Madras Alumni Charitable Trust (IITMACT). PALS offers a regular engagement with the students and faculty through a series of events conducted through out the year with various activities. It features various events such as insightful general and technical lectures, Industry visits, an Innovation Challenge Competition and interesting and enlightening Workshops and Seminars for students as well as for faculty.

The Objective of PALS is to enable the students to be "Industry Ready" and meet the expectations of the Industry, when they launch their career. The flagship event of PALS is innoWAH! And 2023-24 is the 13th year for PALS innoWAH. And the theme was "Startup Solutions for Sustainability Challenge". We, Poojitha Kolluru, Kavya Ryakala, Divya Pandi and Amrutha Shiny Kolapudi, the students of IV B. Tech Electronics and Communication Engineering (ECE) department along with our mentors Mr. C. Sridhar Babu & Mr. G. Krishna Kishore have taken part in PALS innoWAH 23-24. We have submitted the idea of "MOBILE CHARGING using SOLAR TRACKING SYSTEM" during the first round of innoWAH. Later on, PALS team has conducted few online sessions for helping us in improving our idea and implementation of the project. Then we made a Lean Business Canvas for our project. We have been selected for Pre-Finals which was scheduled on 17th February 2024 in KG Reddy College of Engineering and Technology for Hyderabad Cluster. Our team along with mentor Mr. G. Krishna Kishore have presented our prototype to the judges in the college.

We have been selected for finals which was in Chennai. From all the 3 clusters - Hyderabad, Chennai, Non-Chennai around 68 teams got selected for innoWAH finals. The innovation competition exhibition and finals is scheduled on, Saturday, 23rd March 2024 at The Terrace, IIT Madras Campus from 8am to 4pm. Our team along with mentor Mr. C. Sridhar Babu have reached IIT Madras and presented the prototype to the judges and other visitors in the exhibition. We have received few inputs to improve the project. Followed by Valedictory ceremony at 2:30pm and we all received participation certificates for the same.





**Poojitha Kolluru,
Kavya Ryakala,
Divya Pandi,
Amrutha Shiny Kolapudi**

12. ROLE OF IOT IN CHANGING INDUSTRIES: A Simple Guide to Manufacturing, Agriculture, and Logistics

The Internet of Things (IoT) is like giving everyday objects, from machines to plants, a voice and a brain. This article breaks down how IoT is shaking up industries like manufacturing, agriculture, and logistics by making things smarter and more connected.

IoT in Manufacturing Sector: Think of a smart factory as a giant brain with eyes and ears everywhere. Machines in these factories talk to each other through sensors, helping managers keep an eye on how things are running. If a machine is about to break down, it can send a message for help before it's too late. This helps factories run smoothly, saves money, and makes sure products are top quality.

IoT in Agriculture: Farmers are using IoT to be like nature's detectives. They use sensors to keep tabs on things like soil moisture and plant health. This helps them know exactly when to water their crops or

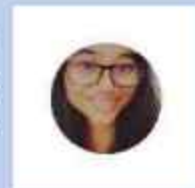
protect them from pests, almost like having a personal assistant for each plant. Drones and robots are also joining the farm crew, making tasks like planting and harvesting faster and more precise.

IoT in Logistics: Imagine being able to track your package on its journey from the warehouse to your doorstep. That's what IoT does for logistics. Trucks, ships, and packages all have sensors that talk to each other, letting companies know where everything is in real-time. This means fewer delays, happier customers, and less waste.

While IoT brings a lot of good stuff, it also brings some headaches. Keeping all this data safe and making sure different devices can talk to each other can be tricky. But with some smart planning and technology, these challenges can be overcome. Plus, as IoT grows, there will be more opportunities for new jobs and inventions that we can't even imagine yet.

IoT is like giving the world a big upgrade. It's making factories run smoother, helping farmers grow better crops, and making sure our packages get where they need to go on time. But it's not without its challenges. Still, as we tackle these problems, the possibilities for IoT to keep changing our world for the better are endless.

ManognyaBharathi.N
21251A0448
III Year



13. THE MICROWAVE TECHNOLOGY

Microwave technology is a modern technology that produces heat energy by the rapid movement and rotation of polar molecules by rubbing against each other. Microwave irradiation will induce thermal effects, electric field effects and other nonthermal effects in substances. The thermal effect may convert electromagnetic energy into thermal energy to generate heat. Nonthermal effects cause rotation and polarization of dipole molecules, which increases the frequency of collisions between molecules producing heat through friction and the heat transfer proceeds from the inside of the substance to the outside. Microwave technology offers many advantages in the preparation of food: appearance, flavour, and nutritional composition of products heated by microwave radiation, at a level of

quality that far exceeds conventional methods, while surface hardening of some products and other pitfalls can be avoided.

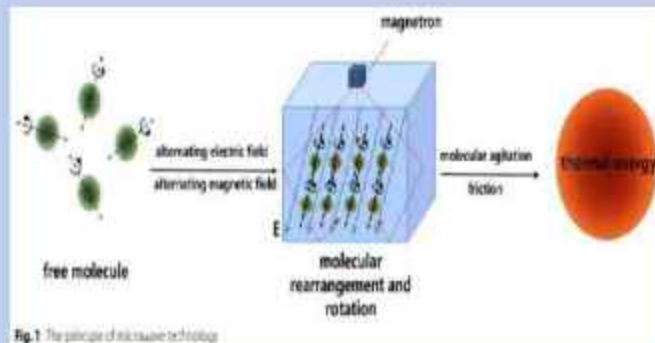


Fig.1 The principle of microwave technology

Principles of microwave technology

Microwaves do not generate heat, instead the heat is mainly generated by intermolecular frictional forces. During microwave radiation, polar molecules present in food (e.g., water) change from state of disorder to an ordered structure aligned in a particular direction. The structure changes as the frequency changes under the influence of an alternating electric field. The excited molecules move rapidly and the friction generated in these movements produce heat. Studies have shown that polar molecules can vibrate 2.45 billion times per second under microwave radiation at frequency of 2450 MHz, so materials can be heated, dried, or cured in a short amount of time. Heating with microwaves is often used to dry food. The operational principle is that the polarized molecules and frequent dipole interactions cause the water molecules to interact with other molecules and align in different directions under an electrical field. These forces cause the rate of internal water diffusion from the interior to the surface of the object to increase. In addition, the mechanical action and thermal effect increase the fluidity of the water which further accelerates the motion. The effect of microwave radiation on water molecules also provide energy in the water helping it to maintain the indoor temperature, driving water from the interior of the materials to the surface.

Factors influencing microwave technology

The heating effect of microwave technology is affected by a variety of factors, which can be divided into microwave factors and material factors. Microwave factors include microwave power, duration of exposures, radio frequency and power density. While material factors include dielectric properties, moisture, penetration depth and geometry. Many factors interact with each other to affect the microwave heating effect.

Modern application of microwave technology in pharmaceutical field

In recent years, microwave technology has attracted more and more attention in the pharmaceutical field due to its unique advantages, especially in the field of Chinese medicine processing. At present, it is mainly used in the synthesis of composite materials, chemical structure modification, as well as the drying, extraction, sterilization of Chinese medicinal materials. At the same time, it is also used in the treatment of traditional Chinese medicine wastewater. At the present time, as a new technology, microwave technology has been extended from food drying to medicine, materials, chemistry and other fields.

Microwave technology has the advantages of: (1) fast heating speed, ensure the quality of natural products is stable; (2) realize sterilization while heating, and avoid chemical pollution; (3) selective effect of polar bonds, local heating.

However, the use of microwave technology is still inadequate: (1) excessive microwave heating rate leads to the destruction of the internal structure of the sample; (2) rapid water loss causes the reaction to stay in an intermediate stage.



Safety analysis of microwave technology

In pharmaceutical field the safety of microwave technology has always been a concern of people. Different from the traditional heating method, microwave makes the polar molecules in the material vibrate at high frequency and generate heat by rapid friction. The whole reaction system is more violent, and there are more uncertainties in the production, leading to potential health risks. In the field of food, studies have found that microwave processing may produce toxic substances in food starch, or make the structure change to expose some more potentially toxic sites. For example, microwave heating will increase the content of α -dicarbonyl compounds, which lead to an increase in harmful glycosylation products. And because of the oxidation effect of microwave, microwave cooking has higher levels of cholesterol oxides than other cooking methods, which can also have negative effects on human health. Different from the food field, the pharmaceutical

field pays more attention to whether the quality and efficiency of drugs will be changed after the treatment of microwave technology, and whether the change can be controlled, especially in the processing of Chinese medicinal materials. Unlike chemical medicine, composition of Chinese medicinal materials is complicated.

**A Jayasree,
21251A04D2,
III Year**



VISION

Electronics and Communication Engineering Department envisions to develop high quality and technically competent Women Engineers who can address the growing challenges in the modern world with a keen sense of social responsibility.

MISSION

To provide:

- Knowledge Based Engineering Education (Quality)
- Analysis and Design Skills with Modelling Potential, Technical Competence
- Industry Compatibility and Women Empowerment with Societal Commitment
- Professional Career Growth with Values and Ethics

Program Outcomes (POs) – B.Tech. (ECE)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design & Development 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.

PO4: Investigation 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.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: Engineering & 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.

PO7: Environment & Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual & Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: Project management & 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.

PO12: 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.

Program Educational Objectives (PEOs)

PEO1:Imparting the knowledge of basic sciences , mathematics and programming skills in solving various Engineering problems pertaining to the field of Electronics and Communications.

PEO2:Training the students in analyzing , designing and imparting research based knowledge and acquainting them with modern scientific tools.

PEO3:Creating professional , ethical environment and to inculcate effective communication skills.

PEO4:Encouraging team work and interdisciplinary ideas benefiting the society.

PEO5:Motivating students to be independent with a desire for life long learning and adapt to the changing professional needs.

Program Specific Outcomes – B.Tech. (ECE)

PSO1: Research Activities : Develop abilities to successfully analyze, execute and synthesize hardware and software oriented mini- and technical major- projects in identified specializations and areas of interest, and enrich industry compatibility.

PSO2: Professional Outlook : Establish a good knowledge sharing network and peer connectivity through Professional Society Memberships, Conduct of seminars, Technical Events and Conference Paper Presentations, and earn prominence.

