

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI&ML)

PRESENTS A TECHNICAL MAGAZINE



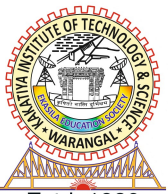
# Intelligent Spectrum

ISSUE - 1  
July-2025

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NAAC-'A' Grade Institute



**KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE**

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506015, TELANGANA, INDIA

काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६०१५, तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

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Assistant Professor, Department of CSE (AI&ML)

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Assistant Professor, Department of CSE (AI&ML)

*Research & Development Coordinator :*

**Dr. A. Kiran Mayee**

Associate Professor, Department of CSE (AI&ML)

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Assistant Professor, Department of CSE (AI&ML)

**B. Praneetha**



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## Principal Message

It gives me immense pleasure that the Department of Computer Science and Engineering (AI&ML) is coming up with their second issue of their Magazine “Intelligent Spectrum”. I appreciate the enthusiastic effort made by the Editorial board, staff and the students to bring out this issue and all the hard work they put in.

We believe in working hard to foster a culture that is always focused on doing what is best for students and ensuring that they have a positive educational experience that will transform them into good engineers and good human beings.



## HoD Message

We are elated to release the second issue of newsletter of Department of Computer Science and Engineering (AI&ML), January 2025. In our newsletters, we periodically publish all the important events, activities of the students and faculty. The unique feature of this magazine is that its designed and developed by our students. I thank all contributors including faculty, staff members and students for their valuable inputs.



# Department Profile



## About the Department

The Department of Computer Science and Engineering (AI&ML), established in 2024, offers cutting-edge undergraduate programs in Artificial Intelligence & Machine Learning (AI & ML) and Data Science (DS). With an intake of 180 students in AI & ML and 120 in Data Science, the department is committed to shaping future-ready professionals. Our curriculum is industry-relevant, supported by state-of-the-art AI & ML laboratories, and delivered by expert faculty actively engaged in research. Students benefit from strong internship and placement support, ensuring a smooth transition into the professional world. Career opportunities span roles such as AI Engineer, Data Scientist, Machine Learning Specialist, Data Analyst, Software Developer, and Research Associate, across sectors including tech, healthcare, finance, and automation. The department also offers Minor Degree programs in AI, ML, and DS for students from other branches, encouraging interdisciplinary learning and innovation.



# KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

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काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६०१५, तेलंगाना, भारत

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(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

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## Vision & Mission of Department

### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI&ML)

#### Vision

Attaining centre of excellence status in various fields of Computer Science and Engineering (AI & ML) by offering worth full education, training and research to improve quality of software services for ever growing needs of the industry and society.

#### Mission

- 1 Practice qualitative approach and standards to provide students better understanding and profound knowledge in the fundamentals and concepts of computer science with its allied disciplines.
- 2 Motivate students in continuous learning to enhance their technical, communicational, and managerial skills to make them competent and cope with the latest trends, technologies, and improvements in computer science to have a successful career with professional ethics.
- 3 Involve students to analyze, design and experiment with contemporary research problems in computer science to impact socio-economic, political and environmental aspects of the globe.

The Department of Computer Science and Engineering(AI & ML), which has a fine blend of renowned as well as Experienced and dynamic personalities as faculty, is involved in providing quality education at Undergraduate (UG). The syllabi of the courses are continuously updated and the laboratories modernized to reflect the rapid changes in technology and Industries.

The Department has strong Industry interaction and has been involved in development of state-of-art products for Industry. It has extensive fabrication, calibration and testing facilities for carrying out industry sponsored research and consultancy projects.



## Program Outcomes (POs): B. Tech.

PO 1	Engineering Knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO 2	Problem Analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO 3	Design / Development of Solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO 4	Conduct Investigations of Complex Problems	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO 5	Engineering Tool Usage	Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO 6	The Engineer and The World	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)
PO 7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO 8	Individual and Collaborative Team work:	Function effectively as an individual, and as a member or leader in diverse / multi-disciplinary teams.
PO 9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	Project Management and Finance:	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multi-disciplinary environments.
PO 11	Life-Long Learning	Recognize the need for, and have the preparation and ability for I independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological



## Program Educational Objectives (PEOs): B. Tech.

PEO 1	Technical Competence	Continue develop technical skills within and across disciplines in electronics and communication engineering for productive and successful career maintaining professional ethics.
PEO 2	Successful Career:	Develop and exercise their capabilities to demonstrate their creativity in engineering practice and team work with increasing responsibility and leadership.
PEO 3	Soft Skills and Life Long Learning	Refine their knowledge and skills to attain professional competence through lifelong learning such as higher education, advanced degrees and professional activities.

## Program Specific Outcomes (PSOs): B. Tech.

PSO 1	Sustainable Software Solutions	Apply the fundamentals of computer science and engineering along with artificial intelligence and machine learning knowledge to develop and maintain high-quality sustainable software solutions that address real-world complex engineering problems
PSO 2	Societal Impact through AI and ML	Design, configure, and implement AI and machine learning applications that benefit society and promote development by continuously adapting to the latest advancements and updates in the field.

# List of Faculty

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI&ML)

**Dr. S. Narasimha Reddy**

Professor, Head of the Department  
(w.e.f. 05-01-2022)

No.	Name	Qualification Specialization	Designation / Affiliation	Research Area
1	Dr. S. Narasimha Reddy	M.Tech., Ph.D.	Professor	Computer Vision and Image Processing (AI&ML)
2	S. Naga Raju	M.Tech. (Ph.D.)	Assoc. Prof.	Machine Learning
3	Dr. A. Jothi Prabha	M.Tech., Ph.D.	Assoc. Prof.	Machine Learning and Deep Learning
4	Dr. A. Kiranmayee	M.Tech., Ph.D.	Assoc. Prof.	Machine Learning
5	Dr. K. Vinay Kumar	M.Tech., Ph.D.	Asst. Prof.	Data Mining
6	Dr. B. Hanumanthu	M.Tech., Ph.D.	Asst. Prof.	Data Science
7	I. Sai Rama Krishna	M. Tech. (Ph.D.)	Asst. Prof.	Natural Language Processing
8	Dr. M. Sujatha	M.Tech., Ph.D.	Asst. Prof.	Data Science
9	R. Swetha	M. Tech. (Ph.D.)	Asst. Prof.	Machine Learning
10	E. Rajitha	M. Tech. (Ph.D.)	Asst. Prof.	Computer Science & Engineering
11	M. Hithasri	M. Tech.	Asst. Prof.	Machine Learning, Data Science, Internet of Things (IoT)
12	D. Haritha	M. Tech. (Ph.D.)	Asst. Prof.	Network Security, Internet of Things (IoT)
13	M. Rama Rao	M. Tech.	Asst. Prof.	Computer Vision and Image Processing
14	V. Prashanthi	M. Tech.	Asst. Prof.	Data Mining
15	B. Ramji	M. Tech. (Ph.D.)	Asst. Prof.	Machine Learning
16	Dr. M. Rajesh	M. Tech., Ph.D.	Asst. Prof.	Machine Learning, Big Data, Bioinformatics
17	K. Shiva Kumar	M. Tech. (Ph.D.)	Asst. Prof.	Machine Learning, Deep Learning
18	V. Ramu	M. Tech. (Ph.D.)	Asst. Prof.	Machine Learning and Deep Learning
19	B. Kalyan	M. Tech.	Asst. Prof.	Bioinformatics, Internet of things (IoT)
20	A. Ramya Kumari	M. Tech.	Asst. Prof.	Machine Learning
21	T. Rajitha	M. Tech.	Asst. Prof.	Machine Learning
22	K. Venkateshwara Rao	M. Tech. (Ph.D.)	Asst. Prof.	Cloud Computing
23	M. Akhila	M. Tech.	Asst. Prof.	Machine Learning
24	S. Sankeerth	M. Tech.	Asst. Prof.	Machine Learning
25	K. Chandar	M. Tech. (Ph.D.)	Asst. Prof.	Machine Learning
26	T. Swetha	M. Tech.	Asst. Prof.	Machine Learning
27	P. Sravan	M. Tech. (Ph.D.)	Asst. Prof.	Machine Learning
28	B. Rajitha	M. Tech. (Ph.D.)	Asst. Prof.	Cloud Computing, Machine Learning
29	R. Praneetha	M. Tech.	Asst. Prof.	Machine Learning
30	R. Vijay Kumar	M. Tech.	Asst. Prof.	Machine Learning
31	P. Swathi	M. Tech.	Asst. Prof.	Machine Learning
32	S. Divya	M. Tech.	Asst. Prof.	Machine Learning



# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI&ML)

SUMSHODINI'24 (18<sup>th</sup>-19<sup>th</sup>, October, 2024)

## LIST OF TECHNICAL EVENTS

### ABOUT THE HOST DEPARTMENT:

The Department of Computer Science & Engineering (CSE(AI&ML)) was established in the year 1981 in Kakatiya Institute of Technology & Science (KITS) Warangal. Presently, the department is offering B. Tech Programme in CSE (AI&ML).

The institute to its credit is first in the country to offer a B.Tech. programme in Artificial Intelligence & Data Sciences stream. Keeping in view of present industry requirements in the area of Embedded systems, IoT and AIML, B. Tech. (AI&ML) programme was started in the year 2019. It is an advanced branch of engineering which deals with the application of scientific knowledge in artificial intelligence and data sciences. The objective of the AI&ML programme is to create engineers capable of solving real-world problems which require computation, communication and control by utilizing the most efficient combination of hardware and software. B.Tech (AI&ML) curriculum is designed with a futuristic perspective so that the AI&ML students are equipped in advance to tackle any challenge that might arise from the new age industry 4.0 revolution.

The students fared well in national level competitive exams like GRE, CAT, GATE, TOFEL etc., and most of them are pursuing their higher studies in premier and prestigious institutions like IITs, NITs, IIMs and many reputed Universities abroad.

The students of the department conduct various programs in the students Association, "Computer Science and Engineering AI&ML Association" every week, which is scheduled as a part of academic program. This includes activities like Group discussions, JKC activities, Mock interviews, and many other activities which help students to excel in their soft skills and organizing capabilities.

### TECHNICAL EVENTS:

1. Workshop: Ethical Hacking
2. Paper Presentation
3. Chatbot Builder
4. Tech 'IT' Out
5. Echo Tech
6. Open Minds
7. Logic X
8. Tech Escape Room
9. Someone Among Us
10. Inno Vibe
11. Jarvis
12. AI Tools

### WORKSHOP: "ETHICAL HACKING"

As part of SUMSHODINI'24, on behalf of the department, the students of B. Tech. (CSE (AI&ML)) in association with ISTE student Chapter and Technical Club, KITSW are organized a technical workshop - "ETHICAL HACKING" on 18th October, 2024. The primary objective of the workshop was to provide participants

- |   |   |
|---|---|
| * Ethical Hacking concepts                      | * Footprinting, scanning, and enumeration |
| * System hacking and vulnerability exploitation | * Web application security                |
| * Cryptography and encryption                   |   |

### Takeaways:

- \* Hands-on experience
- \* Industry insights
- \* Certificate of Participation

Venue: Block-VII, CVIP LAB - I & II

Faculty In charge:

Sri. I. Sai Rama Krishna

Sri B. Ramji

Sri K. Shiva Kumar

Registration Fee: Rs. 800/- per head

Number of Participants: 63





### Event Name: **PAPER PRESENTATION**

'PAPER PRESENTATION' is a technical event in which there is individual competition, and the main motto is to bring students out of stage fear and improve their communication skills. And the winners will be declared based on their presentation skills.

Venue: **Block-VII, ML LAB-II**

Faculty In charge:

**Dr. A. Jyothi Prabha**

**Dr. A. Kiranmayi**

Registration Fee: 50/- per head

Number of Participants: 11

Organized by:

**A. Tejaswini**

**P. Sriteja**

**N. Pragna**

**V. Usha Sree**

Cash prize:

1st: 250/-

2nd: 150/-

Winner Details:

1st: Ch. Rishith, 3rd year-CSE

Govt Polytechnic College

2nd: K. Charan Teja - B24CI015

G. Nandini - B24IT030



ISTE KITSE STUDENTS CHAPTER (AP106) & TECHNICAL CLUB SAC  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI & ML)  
PRESENTS  
**PAPER PRESENTATION**  
REGISTRATION FEE: 50/-  
19 OCTOBER 2024

**ORGANIZERS**

A. Tejaswini (8019274309)  
N. Pragna (9182515436)  
P. Sriteja (6304351985)  
V. Usha Sree (6281948476)

Winners Are Awarded With Merit Certificates And Cash Prizes  
Certificates Will Be Issued For All Participants

ONLINE PAYMENTS: 6304351985

STUDENT COORDINATOR: J.SRUJAN (7093086487)  
VICE PRESIDENT: P.V.S. SAI RAM (8125473026)  
ISTE VICE PRESIDENT: K.SATHVIKA (8125473026)  
HEAD OF THE DEPARTMENT: DR. S. NARASIMHA REDDY (9550069520)  
FACULTY COORDINATORS: SRI L. SAI RAMA KRISHNA (9490455121)  
SRI K. SHIVA KUMAR (9160703982)  
SRI B. RAMJI (9866878871)

### Event Name : **CHATBOT BUILDER**

Chatbot building is an exciting event at SUMSHODINI'24 Technical Fest where participants will dive into the world of AI by designing a custom chatbot using datasets of their choice.

This hands-on experience offers a unique opportunity to learn the fundamentals of natural language processing, data training, and user interaction design.

Participants will gain practical AI skills, collaborate with peers, enhance problem-solving abilities, and showcase their chatbot creations, leaving with a deeper understanding of chatbot architecture, coding basics, and real-world applications to empower their innovation in the tech landscape.

Venue: Block VII, ML-II.

Faculty In charge:

**Dr. K. Vinay Kumar**

**K. Venkateshwar Rao**

Registration Fee: 100/- per head

Number of Participants: 33

Organized by:

**P. Varshini**

**G. Gnanadeep**

**K. Nichyutha**

**S. Sri Vidhya**

**K. Vaishnavi**

**K. Mythili**

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ISTE KITSW STUDENTS CHAPTER (APO16) & TECHNICAL CLUB SAC KITSW  
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)  
presents  
**CHATBOT BUILDER**

Registration Fee : 100/- per head

**Organizers**

P. Varshini - 9398873343  
G. Gnanadeep - 9705045597  
K. Nichyutha - 8886224656  
S. Sri Vidhya - 9505113448  
K. Vaishnavi - 7337578252  
K. Mythili - 7013048332

Certificate's will be issued for all participants.

Student Coordinator: J.Srujan 7093086487  
ISTE Vice-president: K.Sathvika 8125473026  
Faculty Coordinators: Sri. L. Sai Rama Krishna - 9490455121  
Sri. K. Shiva Kumar - 9160103982  
Sri. B. Ramji - 9866878871  
Head Of The Department(AIML): Dr.S.Narasimha Reddy 9550069520





## Event Name: **TECK 'IT' OUT**

Tech 'IT' Out at SUMSHODINI'24 brings an engaging tech event where Participants will be given a code that produces an error. They must correct the code by selecting the right option from a list, then in the next fun round, images will hint at a song, and participants need to guess the song based on the clues. Finalists will race through a maze, solving puzzles that involve missing code snippets, movie dialogues, names, and songs.

Venue: Block VII, CVIP - II.

Faculty In charge:

Ms. M. Hithasri

Smt. V. Prashanthi

Registration Fee: 90 per head

Number of Participants: 55

Event organizers:

V. Ashreetha

Md. Shahbaaz

V. Harshith

G. Srikethan Reddy

B. Sirivalli

CASH PRIZE DETAILS:

1st Prize: 800/-

2nd Prize: 500/-

3rd Prize: 300/-

WINNERS DETAILS:

1st Winner:

V. Namrutha-B23AI038

R. Thanmai-B23AI004

2nd Winner:

M. Hansika Rao-B23AI118

V. Vinuthna -B23AI069

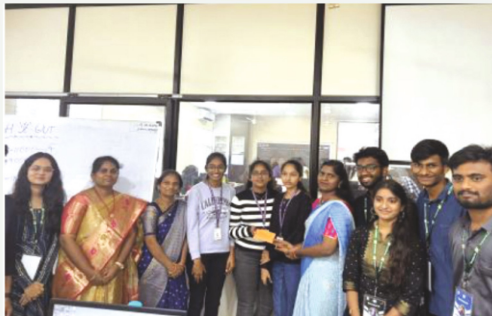
G. Bhuvanasri-B23AI098

3rd winner:

Y. Rohith-B24AI130

Sumith Kumar-B24CN017

SAI SHASHANK RAJ MARAM-B24AI185



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ISTE KITSW STUDENTS CHAPTER (AP016) & TECHNICAL CLUB SAC KITSW  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AI & ML)

presents

# Tech 'It' Out

ROUND-1  
JUMBLE CODE  
QUEST

ROUND-2  
PICTURE PERFECT MELODY

ROUND-3  
ESCAPE LOGIC

ORGANIZERS

V. Ashreetha  
(8096144535)

Md. Shahbaaz  
(8688906184)

V. Harshith  
(7675832858)

B. Sirivalli  
(8555936089)

G. Srikethan Reddy  
(9676166852)

On 19th October, 2024  
**ENTRY FEE PER HEAD-100/-**

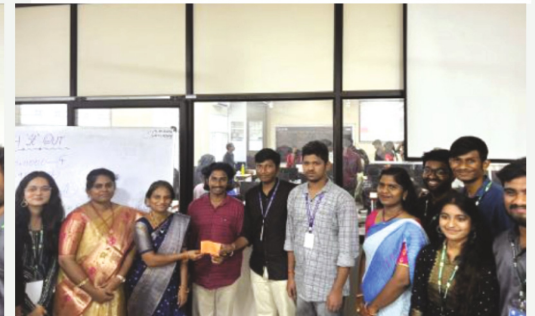
Phone Pay:  
8096144535

CASH PRIZE:   
Certificates Will Be Issued  
For All participants

STUDENT COORDINATOR: J. SRUJAN 7093086487

ISTE VICE PRESIDENT: K. SATHVICA 8125473026

FACULTY COORDINATORS: HEAD OF THE DEPARTMENT:  
SRI L. SAI RAMA KRISHNA 9490455121  
SRI K. SHIVA KUMAR 9665876871  
SRI B. RAMJI 9866876871



## Event Name: **ECHO TECH**

TECH FUSION, promising an unforgettable experience with your friends

ROUND 1: TECHSPLIT GUESS-The participants are divided into teams. In this round, an image or a series of images representing parts of a technical word will be displayed. The team need to piece together the meaning of the images to guess the full technical term.

ROUND 2: PIC TUNE-The participants are divided into teams. The team will be shown a series of images that represents the theme, lyrics, or key visuals from popular song. The challenge for each team is to guess the song title based on the image shown within a limited time.

ROUND 3: SNIP QUIZ -Snip Quiz is an engaging trivia game that tests your knowledge in Coding Category. Players answer choice questions, aiming for the highest score

Venue: **Block VII, CVIP-I.**

Faculty In charge:

Dr B. Hanumanthu

Registration Fee: Per head - 70/-

Number of Participants: 33

ORGANISERS:

P. Deekshitha, A. Sharvika, B. Srija, K. Rohan Adithya

CASH PRIZE DETAILS:

1st Prize: 400/-

2nd Prize: 200/-

WINNERS DETAILS:

1st Prize:

M. Rakshitha B24AI165

Pallavi B24CS309

G. Samhitha B24CI062

2nd prize:

C. Srimai B24DS008

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ISTE KITSW STUDENTS CHAPTER (AP016) & TECH CLUB SAC KITSW  
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI & ML) PRESENTS

# ECHO TECH

Registration fee : 75/-  
(per head)

19th october

Round 1 :  
TechSplit Guess

Round 2 :  
PicTune

Round 3:  
Snip Quiz

ORGANIZERS :

P. Deekshitha  
7386926895

A. Sharvika  
9392752711

B. Srija  
8179341030

K. Rohan Adithya  
8897357478

STUDENT COORDINATOR: J. SRUJAN 7093086487

ISTE VICE PRESIDENT: K. SATHVICA 8125473026

HEAD OF THE DEPARTMENT: DR. S. NARASIMHA REDDY 95500 69520

FACULTY COORDINATORS: SRI L. SAI RAMA KRISHNA 94904 55121  
SRI K. SHIVA KUMAR 96658 76871  
SRI K. SHIVA KUMAR





Event Name: **OPEN MINDS**

Open Minds-an interactive workshop where you'll learn to showcase your coding skills and technical expertise effectively.

Master Your GitHub Profile and Resume.

1. GitHub Profile-Your GitHub profile should reflect your coding skills, problem-solving abilities, and contributions to real-world projects.
2. Resume-Your resume should complement your GitHub profile by detailing your work experience, education, and technical skills

Venue: Block VII, ML-I.

Faculty In charge: T. Rajitha, N. Haritha

Registration Fee: Per head - 99/-

Number of Participants: 34

ORGANISERS: K. Sai Siddhartha, S. Gunadeep

CASH PRIZE DETAILS:

1st Prize: 300/-      2nd Prize: 200/-      3rd Prize: 100/-

WINNERS DETAILS:

1st: Suhruday-B23IN006,      Sravan-B24DS067L

2nd: Sai kruthi-B23IN088

3rd: Abdul Khadar-B24AI024,      Meghana-B24CS156

1st Winners:



2nd Winner:



EVENT NAME: **LOGIC X**

Logic-X-SUMSHODINI'24 is a vibrant and engaging event designed to blend the excitement of coding challenges with fun-filled general games and quizzes.

Round 1: Round one is purely based on your logical thinking and general knowledge.

Round 2: Round two is a fun gaming round in which the questions are only related to movies, music, and memes.

Round 3: Round three is a C based word puzzle you will be given few very basic c-language questions and you need to answer them.

Venue: Block VII, Room No 309.

Faculty In charge:

R. Swetha

A. Ramya Kumari

Registration Fee: Per head - 80/-

Number of Participants: 33

ORGANISERS:

Sai Abhi

Akshar

Sindhu

Prudhivini

CASH PRIZE DETAILS:

1st Prize: 300/-

2nd Prize: 200/-

3rd Prize: 100/-

WINNERS DETAILS:





## Event Name: **TECH ESCAPE ROOM**

Tech Escape Room, where a team of 6 members will participate and put their skills to the test by answering technical questions in a race against time! In each of the 3 rounds, teams must give their answers to the host within a specific time limit, and those who are too slow will be filtered out.

**REASONING AND PUZZLES (Round 1):** Kick off the challenge with brain-teasing puzzles and reasoning tasks. Teams must work together to solve logic puzzles, providing their answers to the host and staying within the time limit to avoid elimination.

**CODE CRACKING (Round 2 and Round 3):** The final rounds will focus on outputs of code snippets and programming-related tasks. Teams must debug or complete code, submit their answers to the host, and race against the clock to claim victory!

**Venue:** Block VII, Room No 309.

**Faculty In charge:**

Smt. D. Haritha

**Registration Fee:** Per head - 50/- **Number of Participants:** 15

**ORGANISERS:**

S. Sri Vidhya, K. Nichyutha, Ch. Akshitha, G. Gnanadeep

**CASH PRIZE DETAILS:**

**1st Prize:** 200/- **2nd Prize:** 100/-

**WINNERS DETAILS:**

**1st-** Shiva Krishna Reddy-B22AI067, Vikas- B22CS165

**2nd-** Nandika- B24DS051, Dhevarshini-B24DS008



## Event Name: **SOMEONE AMONG US**

Someone Among Us-Experience a unique twist on the popular game, where participants dive into a thrilling adventure of mystery and excitement.

- Crewmate or Imposter? Will you be working together to earn points or outsmarting everyone as the hidden imposter?

- Unique Codes & Tasks: Navigate through challenges with your assigned codes and showcase your strategic thinking.

**Venue:** Inside Campus.

**Faculty In charge:**

Dr S. Raghu

Sri. M. Rajesh

**Registration Fee:**

Per head - 50/-, Team of 2 -80/-

**Number of Participants:** 20

**ORGANISERS:**

G. Thrivik Raj

G. Gnanadeep

D. Pranay Saketh

B. Shiva Shankar Reddy

**WINNERS (TIE GAME):**

T. Abhinay Chand-B24CE023-150/-

K. Deva -B24AI006-150/-



## Event Name: **INNOVIBE**

Inno Vibe is the ultimate multi-round event that brings together tech brilliance, fun, and a touch of magic

**Round-1: PICTORIA-** It is purely based on your business skills and product making challenges.

**Round-2: WHISPER CHANTS-** A game which consists of a lot of fun. And test your skills of communication.

**Round-3: IMAGENI-** It is on your editing skills

**Venue:** Block VII, Room No 309.

**Faculty In charge:** Sri. V. Ramu, Sri. B. Kalyan

**Registration Fee:** Per head - 50/- **Number of Participants:** 52

**ORGANISERS:** Sai Charith, Karthik, Deepak, Vyshnavi, Ashritha, Praneetha

**CASH PRIZE DETAILS:** **1st Prize:** 500/- **2nd Prize:** 300/-

**WINNERS DETAILS:** **1st-** Sharath Chandra, B24DS003

G. Kethan, B24DS001, B. Sai Pranay, B24DS009, A. Rohith B24DS

Ram Charan B24DS056

**2nd-** Navya B24ME028,

V. Kavya B24ME004, V.N.S. Dhanya, B24ME037, Akshitha B24ME046

**1st Prize:** 500/- **2nd Prize:** 300/-

**WINNERS DETAILS:** **1st-** Sharath Chandra, B24DS003

G. Kethan, B24DS001, B. Sai Pranay, B24DS009,

A. Rohith B24DS023, Ram Charan B24DS056





### Event Name: JARVIS

JARVIS, a multi-round, action-packed event as part of SUMSHODHINI'24 where your brains, tech skills, and gaming instincts will be put to the ultimate test.

**Round 1: MOVIE MASHUP**-This round is all about testing your pop culture knowledge, which include hints related to movie titles, actors, famous dialogues, or even songs. The task is to guess the correct answers based on these clues.

**Round 2: TECH WHIZ**-In this round, participants will face a series of word puzzles and technical questions. The puzzles will be related to important technical concepts, terminologies, or trends in fields like AI, Machine Learning, and other areas of Computer Science.

**Round 3: ROBOT SOCCER**-The final round is a game of robot soccer, where participants will go head-to-head with an AI-controlled opponent. Teams will have to control a virtual robot on the soccer field, dodging obstacles, striking the ball, and scoring goals.

**Venue:** Block VII, CVIP-I.

### Faculty In charge:

Sri. S. Nagaraju, Smt. E. Rajitha

Registration Fee: Per head - 100/-

Number of Participants: 53

### ORGANISERS:

MD. Asthma T. Tejaswini, K. Shreeja,

Y. Naga Tharun, K. Sai Siddhartha

### CASH PRIZE DETAILS:

1st Prize: 750/- 2nd Prize: 500/- 3rd Prize: 300/-

### WINNERS DETAILS:

1st: MD. SAMEER-B24CS159

BALU EAPTHI- 22004-ME-019

EDLA SAIPRASAD REDDY- B24CS168

BAJJURI VIGNESH-B24CS138

2nd: RAMPALLY CHARAN- B24CS152

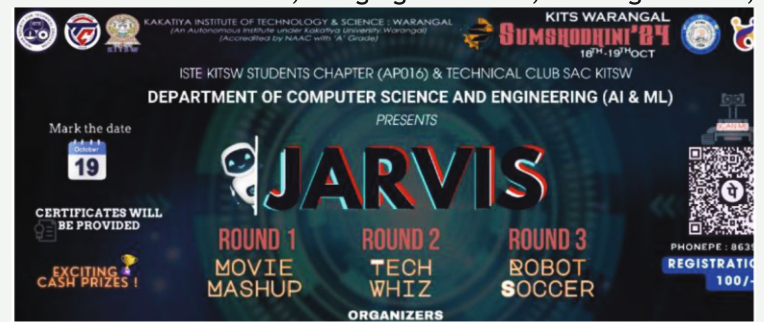
SIDDHARTHAMALYALA-B24CS167

T. SREESHANK RAO- B24CS144

3rd: THALLASUMUKH-B24CS173

SINGARAPU SHASHIVARDHAN-B24CS146

MADIPEDDI RITHEESH- B24CS142



### EVENT NAME: AI TOOLS

AI TOOLS, a free event open to all, where participants will be introduced to a wide range of AI tools used across industries today. This session will provide hands-on experience and insights into how tools in machine learning, natural language processing, computer vision, and more can be applied in real-world scenarios. At the end of the event, participants will receive an e-certificate to recognize their involvement and learning.

**Venue:** Block IV, Room No 230.

### Faculty In charge:

Sri. M. Rajesh

Registration Fee: 0/-

Number of Participants: 64

### ORGANISERS:

P. Rahul



Swayam NPTEL faculty list CSE (AI&ML) 2024

No.	Faculty Name	Designation	No. of Course Enrolled	Year	Completed / Outgoing	Course Name
1	Dr. S. Narasimha Reddy	Professor	1	2024	Completed	Introduction to Machine Learning - IITKGP
2	Dr. S. Narasimha Reddy	Professor	1	2024		Introduction to Machine Learning (8 Weeks)
3	Dr. S. Narasimha Reddy	Professor	2	2024		1. Joy of Computing using Python 2. Introduction to Machine Learning
4	Dr. K. Vinay Kumar	Asst. Professor	1	2024		Cloud Computing
5	Dr. B. Hanmanthu	Asst. Professor	1	2024		Introduction to Industry 4.0 and Industrial Internet of Things
6	Dr. B. Hanmanthu	Asst. Professor	1	2024		Programming in Java
7	Dr. M. Sujatha	Asst. Professor	2	2024		1. Data Structures and Algorithms using Java 2. Introduction to Machine Learning
8	Smt. Revoori. Swetha	Asst. Professor	2	2024		Introduction to machine learning
9	Smt. Revoori. Swetha	Asst. Professor	2	2024		Introduction to internet of Things
10	Smt. E. Rajitha	Asst. Professor	1	2024		Introduction to internet of Things
11	Smt. E. Rajitha	Asst. Professor	2	2024		1. Programming, Data Structures And Algorithms Using Python(8 WEEKS) 2. The Joy of Computing using Python
12	Dr. S. Raghu	Asst. Professor	1	2024	Ongoing	Social Networks
13	Dr. Mothe Rajesh	Asst. Professor	1	2024	Completed	Big Data Computing
14	Sri V. Ramu	Asst. Professor	1	2024	Completed	Introduction to Operating Systems
15	Rami. Kalyan Barla	Asst. Professor	1	2024	Completed	Introduction to Internet of Things
16	Ramya Kumari Aitha	Asst. Professor	2	2024	Completed	Database Management System(completed),Problem Solving through C
17	Ramya Kumari Aitha	Asst. Professor	2	2024	Completed	Database management system, problem solving through programming in c
18	Dr. K. Vinay Kumar	Asst. Professor	1	2024	Completed	Cloud Computing

Swayam NPTEL student details 2024

S. No	Student Name	Roll No	semester and section	Branch	Number of courses Enrolled	Year	Completed	Course Names
1	SHIVA KRISHNA REDDY BURRA	b22ai067	5 SEM 2 SECTION	CSM2	1	2024	Yes	Data Base Management System
2	MUKKA SURYA TEJA	b22ai073	5 SEM 2 SECTION	CSM2	1	2024	Yes	Data Base Management System
3	UPPALA SUNNY SOUMITH	b22ai074	5 SEM 2 SECTION	CSM2	1	2024	Yes	Data Base Management System
4	PULLABHOTLA LAXMI SAI VAISHNAVI	b22ai076	5 SEM 2 SECTION	CSM2	1	2024	Yes	Introduction to Machine Learning
5	T AKSHAYA	b22ai082	5 SEM 2 SECTION	CSM2	1	2024	Yes	Introduction to Machine Learning
6	MOHAMMED FARHANUDDIN	b22ai098	5 SEM 2 SECTION	CSM2	1	2024	Yes	Data Base Management System
7	YELIGETI HARIPRIYA	b22ai100	5 SEM 2 SECTION	CSM2	1	2024	Yes	Introduction to Machine Learning
8	NIKHITHA RAPELly	b22ai105	5 SEM 2 SECTION	CSM2	1	2024	Yes	Introduction to Machine Learning
9	MOHAMMAD ASMA	b22ai087	5 SEM 2 SECTION	CSM2	1	2024	Yes	Introduction to Industry 4.0 and Industrial Internet of Things
10	NAVYA CHALLAGURUGULA	b22ai110	5 SEM 2 SECTION	CSM2	1	2024	Yes	Programming in Java
11	SRIVIDYA KANDIKONDA	b22ai095	5 SEM 2 SECTION	CSM2	1	2024	Yes	The Joy Of Computing Using Python
12	PARUSU HARSHITHA	b22ai116	5 SEM 2 SECTION	CSM2	1	2024	Yes	The Joy Of Computing Using Python
13	AKSHITHA CHURUKANTI	b22ai070	5 SEM 2 SECTION	CSM2	1	2024	Yes	The Joy Of Computing Using Python
11	JEGGA REBAKAH SHARON	b22ai097	5 SEM 2 SECTION	CSM2	1	2024	Yes	Programming in Java
12	KATAKAM SHREEJA	B22AI084	5 SEM 2 SECTION	CSM2	1	2024	YES	The Joy of Computing Using Python

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<a href="#">create a revision</a>	<div><div>Contact Journal</div><div>ADM: Harper, Sophie</div><div>Major Revisions (02-Jun-2025)</div><div>Due on: 30-Jun-2025</div></div>	JES-114681	Machine Learning-Enabled Optimization of a Graphene Coated Terahertz Metasurface for Isoquercitrin Biosensing <a href="#">View Submission</a>	24-May-2025	02-Jun-2025

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## MEDICAL DATA SET IMPLEMENT USING ML MODELS

A. Ramya Kumari <sup>1</sup>, B.Kalyan <sup>2</sup>, T.Ramakrishna <sup>3</sup>, N. Haritha <sup>4</sup>, T.Kalyani <sup>5</sup>

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### Abstract

The rapid advancement of Machine Learning (ML) has revolutionized healthcare by enabling more accurate predictions, diagnoses, and personalized treatments based on medical datasets. This research aims to explore the implementation of ML models within medical datasets to improve decision-making processes and clinical outcomes. By analyzing a range of medical data, including patient demographics, lab results, and imaging data, this paper evaluates various ML models, such as decision trees, support vector machines, and deep learning algorithms, to identify patterns and predict disease outcomes. The study emphasizes the preprocessing of medical data, feature selection, and model optimization techniques to ensure high performance and reliability of predictions. Key performance indicators, including accuracy, precision, recall, and F1 score, are used to evaluate the models' effectiveness. This paper contributes to the growing body of research on AI-driven healthcare solutions, offering valuable insights into the applicability and challenges of deploying ML models in medical environments. The findings suggest that while ML can significantly enhance diagnostic accuracy, data privacy and ethical considerations must be carefully addressed for widespread adoption.

**Keywords:** Machine Learning (ML), Medical Data Analysis, Predictive Modeling, Precision and Recall, Healthcare Applications.

### 1. Introduction

The role of Machine Learning (ML) in healthcare has garnered increasing attention in recent years as it holds significant potential to transform the way medical professionals diagnose and treat diseases. ML techniques allow for the analysis of vast amounts of medical data, which traditionally would be too complex for manual analysis. These datasets, which include patient demographics, medical histories, laboratory test results, and imaging data, are rich with valuable insights that can greatly enhance clinical decision-making. In this context, ML techniques such as supervised learning, unsupervised learning, and deep learning are leveraged to uncover hidden patterns, predict disease outbreaks, and assist in personalized treatment strategies [1][2].

The ability to predict patient outcomes with a high degree of accuracy is of critical importance in healthcare. Machine learning algorithms have been shown to excel in pattern recognition, enabling them to classify medical conditions based on patient data. For



## Image classification uncertainty in deep learning finding techniques

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**Abstract**—Deep learning has revolutionized image classification tasks, yet uncertainty quantification remains a critical challenge impacting model reliability and decision-making processes. This paper presents a comprehensive survey of contemporary techniques for assessing and managing uncertainty in deep learning-based image classification. We examine Bayesian inference methods, ensemble learning, Monte Carlo dropout, and calibration techniques that enhance model confidence estimation. The study evaluates these methods on benchmark datasets, highlighting their strengths and limitations in practical applications. The results underscore the importance of uncertainty-aware models in improving robustness and trustworthiness, paving the way for safer deployment in real-world scenarios.

**Keywords:** Image classification, uncertainty, deep learning, Bayesian.

### 1. INTRODUCTION

Image classification using deep learning has achieved remarkable success across various domains such as medical imaging, autonomous driving, and security systems [1], [2]. Despite these advancements, the inherent uncertainty in model predictions remains a significant barrier to deploying these systems in safety-critical environments [3]. Uncertainty arises due to limited data, model approximations, and the complexity of real-world inputs, which can lead to overconfident and incorrect decisions [4].

Quantifying uncertainty in deep neural networks has therefore become an active area of research. Bayesian neural networks offer a principled framework by incorporating probability distributions over model parameters, providing uncertainty estimates alongside predictions [5].

However, their computational complexity limits their practical use in large-scale applications. Alternative methods such as Monte Carlo dropout and deep ensembles have emerged as scalable techniques to approximate Bayesian inference and capture model uncertainty effectively [6], [7].

Moreover, calibration techniques aim to align predicted probabilities with true correctness likelihoods, improving the interpretability and reliability of confidence scores [8]. This paper provides a systematic review of these approaches, evaluating their effectiveness in enhancing image classification reliability by managing uncertainty. By addressing this challenge, deep learning models can be better equipped for real-world deployment where decision confidence is paramount.

### 2. LITERATURE REVIEW

Deep learning models, particularly convolutional neural networks (CNNs), have shown extraordinary performance in image classification tasks [9]. However, these models often produce overconfident predictions that lack reliable uncertainty estimates, which can be detrimental in critical applications such as medical diagnosis or autonomous driving [10]. Consequently, the research community has directed significant efforts toward developing techniques that quantify and manage uncertainty in deep learning-based image classification.

One prominent approach to uncertainty estimation involves Bayesian neural networks (BNNs), which incorporate distributions over model parameters instead of fixed values [11]. This probabilistic modeling allows BNNs to capture epistemic uncertainty arising from limited data and model capacity. Early work by Blundell et al. [12]

## ORIGINAL RESEARCH ARTICLE

# Enhancing swimming pool hygiene: A robotic approach to debris removal and water quality monitoring

**Hemalatha Senthilmahesh<sup>1\*</sup>**, **Kiran Mayee Adavala<sup>2</sup>**,  
**Thilagam Thangamariappan<sup>3</sup>**, **Pullela S. V. V. S. R. Kumar<sup>4</sup>**, **Ramesh Tumaati<sup>5</sup>**,  
**and Muthuvairavan Pillai Nagappan<sup>6</sup>**

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**Abstract:** The World Health Organization has underscored swimming as a significant exercise for attaining health, and it is also recognized as a competitive sport in many nations. Individuals across all age groups choose swimming as a means to enhance their fitness levels. Maintaining the cleanliness of the swimming pool is imperative to prevent the spread of waterborne diseases. Despite regular weekly or monthly maintenance, cleanliness is often compromised due to service provider limitations. In the contemporary landscape, artificial intelligence technologies are progressively assuming roles where human providers fall short. This article proposes the integration of ethical robots to augment cleaning services both within and around swimming pools. These waterproof robots are designed to navigate within the pool environment, efficiently collecting debris and waste into their attached receptacles. The deployment of such ethical robotics marks a significant advancement in swimming pool maintenance, promising enhanced efficiency and hygiene standards. This work presents the design and implementation of an autonomous swimming pool cleaning robot, integrating multiple functional units: Power, sensor, wireless communication, motor, and water quality monitoring. After the power is on, the robot starts calibrating its sensors and establishes a connection with a remote human-machine interface to transmit the initial operational status. By utilizing advanced image processing algorithms, specifically color moments, the robot identifies and classifies floating debris while continuously monitoring water quality parameters. When debris is detected, the robot calculates its trajectory based on X and Y coordinates, adjusting its movement accordingly to collect the debris with a salvage net. It incorporates ultrasonic sensors for obstacle detection, employing a threshold-based avoidance algorithm to navigate around obstacles effectively. The cleaning process is repeated until the pool is cleared, after which the robot returns to its charging station, powering down non-essential systems in preparation for the next cycle. This study highlights the efficiency and effectiveness of robotic automation in pool maintenance, demonstrating significant advancements in the integration of robotics, sensor technology, and real-time data communication. The findings contribute valuable insights into future developments in robotic cleaning systems and their applications in various environments.

**Keywords:** Robotic pool cleaning; Autonomous maintenance; Obstacle handling; Battery optimization; Underwater visibility; Environmental factors; IoT integration; Real-time monitoring





# Artificial Intelligence-Enhanced Terahertz Metasurface Biosensor for Breast Cancer Biomarker Detection

Jothi Prabha Appadurai<sup>1</sup> · Kumaravel Kaliaperumal<sup>2</sup> · Jacob Wekalao<sup>3</sup> · Amuthakkannan Rajakannu<sup>4</sup>

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## Abstract

This study reports a biosensor engineered for the label-free detection of breast cancer biomarkers, leveraging surface plasmon polaritons in a metal–insulator–metal configuration. The sensor architecture integrates gold-coated rectangular resonators and silver-coated square resonators atop a graphene-functionalized circular base further enhanced by a surrounding array of MXene-coated hemispherical ring resonators on a SiO<sub>2</sub> substrate. Finite element simulations using COMSOL Multiphysics demonstrates a resonant frequency window between 0.738 and 0.742 THz, delivering a sensitivity of 500 GHzRIU<sup>-1</sup> a figure of merit (FOM) of 5.208 RIU<sup>-1</sup>, a quality factor (Q) of 7.729, and a detection limit of 0.401 RIU. The sensor exhibits a strong linear dependence of resonance frequency on refractive index ( $R^2=0.988$ ), and design optimization guided by machine learning—specifically polynomial regression—achieves predictive accuracies approaching 100%. These findings position the proposed device among the most sensitive THz biosensors and underscore its promise for non-invasive, real-time breast cancer diagnostics.

**Keywords** Terahertz metasurface sensor · Breast cancer detection · Surface plasmon polaritons · Metal–insulator–metal waveguide · Graphene-MXene hybrid structure

## Introduction

In recent decades, the field of nanophotonics has undergone transformative advancements, with surface plasmon polaritons (SPPs) emerging as a pivotal platform at the intersection of photonics and electronics at the nanoscale [1].

SPPs are electromagnetic excitations that propagate along the interface between a dielectric and a metallic medium, characterized by their capacity to confine electromagnetic fields to subwavelength dimensions—well below the diffraction limit of light [2]. This exceptional confinement has fundamentally reshaped strategies for manipulating light and enabled new paradigms in optical sensing and device miniaturization [3]. The utility of SPPs spans a wide spectrum of photonic technologies, including ultra-compact waveguides, plasmonic modulators, high-sensitivity biochemical sensors, and nanoscale optical filters [4]. These applications exploit the intrinsic properties of SPPs, such as intense near-field enhancement, sub-diffraction spatial localization, and acute sensitivity to perturbations in the surrounding dielectric environment [5]. As the demand escalates for compact, high-performance optical components across sectors such as telecommunications, lab-on-chip diagnostics, and environmental monitoring, SPP-enabled platforms offer a compelling route toward achieving advanced photonic functionality within significantly reduced device footprints.

Among the various plasmonic architectures explored for sensing applications, metal–insulator–metal (MIM) waveguides have garnered significant attention owing to their

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# Hybrid TDR-MI Based Wireless Sensor Network for Underground Water Pipeline Leakage Detection and Localization Using Pressure Residuals and Classifiers

Ramdas Vankdothu<sup>1</sup> · Hanumanthu Bhukya<sup>2</sup> · Raghu Ram Bhukya<sup>2</sup>

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## Abstract

The pipeline leakage detection and leak localization trouble is a highly demanding and dangerous issue. Underground pipelines are critical for transporting enormous fluid volumes (e.g., water) across extended distances. Not only would solving this issue save the nation a great deal of money and resources, but it will also save the environment. However, because of the harsh climatic conditions below earth, current leak detection systems are not enough for monitoring subterranean pipelines. To address these issues, this study suggests a hybrid wireless sensor network for monitoring subterranean pipelines that is based on magnetic induction and time domain reflectometry (TDR). TDR is installed in this instance below a wireless sensor network that is based on MI. TDR significantly reduces the time needed for inspection while accurately locating the leak. Based on MI technology, we provide a wireless sensor network for inexpensive, real-time leak detection in subterranean pipelines. Through the integration of data from several sensor types located within and around subterranean pipes, MISE-PIPE detects leaks. Ad-hoc WSNs are employed in pressure measurement. (WDNs) is a popular subject that has drawn attention from scholars lately. Since leak localisation has a significant influence on the human population and the economy, time and accuracy are essential components. A broad leak localisation technique is proposed using statistical classifiers operating in the residual space. Classifiers are trained using leak data from every node in the network, accounting for demand uncertainty, noise from sensor preservatives, and leak size. After localising and identifying leaks, all monitoring data is sent to the CH using the K-means clustering technique, which performs two vital tasks: optimum clustering, extending the Network Lifetime, and maintaining Quality of Service. The K-Means technique is used to optimise the clustering process. The K-means clustering technique is used to transfer all monitoring data to the CH for the purpose of pipeline leak identification and localisation. Unlike the current underground pipeline monitoring system, our proposed Hybrid TDR-MI-based wireless sensor network allows precise real-time leak identification and localisation.

**Keywords** Time domain reflectometry · Magnetic induction · MISE PIPE · Ad-hoc sensor network · K-means clustering · Pipeline leakage detection and leak localization

## ORIGINAL ARTICLE

# Crop Disease Detection by Deep Joint Segmentation and Hybrid Classification Model: A CAD-Based Agriculture Development System

Raghuram Bhukya<sup>1</sup>  | Shankar Vuppu<sup>2</sup> | A Harshvardhan<sup>3</sup> | Hanumanthu Bukya<sup>4</sup> | Suresh Salendra<sup>5</sup>

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Correspondence: Raghuram Bhukya ([vuppu.shankar1@gmail.com](mailto:vuppu.shankar1@gmail.com))

Received: 5 October 2024 | Revised: 21 November 2024 | Accepted: 2 December 2024

**Keywords:** crop disease | deep learning | filtering | fusion score | segmentation

## ABSTRACT

Precise detection of crop disease at the early stage is a crucial task, which will reduce the spreading of disease by taking preventive measures. The main goal of this research is to propose a hybrid classification system for detecting crop disease by utilising Modified Deep Joint (MDJ) segmentation. The detection of crop diseases involves five stages. They are data acquisition, pre-processing, segmentation, feature extraction and disease detection. In the initial stage, image data of diverse crops is gathered in the data acquisition phase. According to the work, we are considering Apple and corn crops with benchmark datasets. The input image is subjected to pre-processing by utilising the median filtering process. Subsequently, the pre-processed image under goes a segmentation process, where Modified Deep Joint segmentation is proposed in this work. From the segmented image, features like shape, colour, texture-based features and Improved Median Binary Pattern (IMBP)-based features are extracted. Finally, the extracted features are given to the hybrid classification system for identifying the crop diseases. The hybrid classification model includes Bidirectional Long Short-Term Memory (Bi-LSTM) and Deep Belief Network (DBN) classifiers. The outcome of both the classifiers is the score, which is subjected to an improved score level fusion model, which determines the final detection results. Finally, the performance of the proposed hybrid model is evaluated over existing methods for various metrics. At a training data of 90%, the proposed scheme attained an accuracy of 0.965, while conventional methods achieved less accuracy rates.

## 1 | Introduction

Farming plays a pivotal role in a nation's economy, and is the primary source of livelihood for nearly two-thirds of the population in a developing country (Yadav et al. 2021; Chen

et al. 2021). The demand for crops is gradually increasing with the increasing population (Tirkey, Singh, and Tripathi 2023; Badhan Mazumder, Khan, and Uddin 2023). Meanwhile, the techniques involved in farming are increasing drastically, but the yield is not sufficient. There are some man-made and natural

**Abbreviations:** 2D BWT, two-dimensional biorthogonal wavelet transform; AISA, automatic image segmentation algorithm; ANN, artificial neural network; Bi-LSTM, bidirectional long short-term memory; BNND, branched neural network for disease classification; BWT, biorthogonal wavelet transform; CNN, convolutional neural network; ComNet, compact network; DBN, deep belief network; DCNN, deep convolutional neural network; DenseNet, densely connected convolutional network; DJ, Deep Joint; DL, deep learning; DT, decision tree; FAO, food and agricultural organisation; FC, fully connected; HSV, hue saturation value; IMBP, improved median binary pattern; IoT, internet of things; ITK-Net, image-text knowledge assistance; k-NN, K-nearest neighbour; MBP, median binary pattern; MCFN, multi-context fusion network; MCLD, multi-crops leaf disease; MDJ, modified Deep Joint; ML, machine learning; MSE, mean square error; RBM, restricted Boltzmann machines; ResNet, residual network; rf, random forest; RGB, red green blue; RNN, recurrent neural network; SVM, support vector machine; UN, United Nation; VGG, visual geometry group; XAI, explainable artificial intelligence.



## Review Article

# Feature Dimensions of Artificial Intelligences Challenges and Techniques - A Survey

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**Abstract** - Artificial Intelligence (AI) is rapidly transforming sectors such as healthcare, education, and public services, contributing new solutions that advance efficiency, management, and overall outcomes. However, despite its vast potential, AI adoption faces numerous challenges, including ethical concerns (e.g., algorithmic bias), data privacy issues, and integration difficulties with legacy systems. This paper provides a comprehensive survey of AI applications across these sectors, analyzing over 60 recent studies from 2019 to 2024 after the PRISMA methodology. The study identifies key factors influencing successful AI implementation by highlighting sector-specific challenges and shared barriers. The PRISMA framework was applied for systematic paper selection, including inclusion and exclusion criteria, screening, and data extraction, ensuring that only relevant, high-quality studies were reviewed. These experimental results reveal that the AI models consistently outperform state-of-the-art techniques in critical domains, including medical diagnosis, personalised education, and public service optimisation. This hybrid approach, which combines Convolutional Neural Networks (CNNs) with Recurrent Neural Networks (RNNs), outperforms existing models by addressing challenges in data preprocessing, model architecture, and hyperparameter optimisation. Additionally, the paper explores the future of AI and its integration with up-and-coming technologies such as quantum computing, blockchain, and the metaverse while providing strategies to overcome legal, cultural, and infrastructural barriers to AI adoption. These findings offer actionable insights for researchers, practitioners, and policymakers, emphasising the need for both technical innovation and ethical considerations in AI growth and execution.

**Keywords** - Artificial Intelligence, ChatGPT, CNN, RNN, and GenAI.

## 1. Introduction

When Human-Computer Interaction (HCI) [1] was introduced into the tech industry, it paved the way for developing man-machine interfaces designed to assist human needs. This shift led to new devices based on inventors' and developers' knowledge. Over time, the focus of this knowledge has evolved to emulate human brain functions, giving rise to Artificial Intelligence (AI) [2]. AI aims to mimic human cognitive processes, making decisions based on scenarios provided by the environment. Extensive research in AI has spanned diverse domains, including healthcare, education, and research applications while incorporating advanced technologies such as Generative AI to enhance human-computer interaction. AI has driven innovation across sectors, addressing healthcare, education, and public services challenges. The healthcare sector, in particular, faces significant challenges, particularly in emergencies where assistance is often inadequate. Initially, AI was introduced to assist older people in healthcare. Still,

it has since expanded to improve public health practices [3] using AI and Machine Learning (ML) algorithms, enhancing areas such as drug discovery [4], early disease detection [5], and patient image analysis for surgery [6]. AI's reach is not confined to healthcare; it has also expanded into education, where it is applied to Information and Communication Technology (ICT) [7], chatbots [8], and medical education [9]. AI has also revolutionised research article preparation [10] [11] [12] [13] [14] [15], and Generative AI [16] [17] [18]. Moreover, AI leverages modern technologies such as machine learning [19], neural networks [20], deep learning [21], and big data [22] to provide extensive services to society. Applications of AI span across areas like pollution reduction [23] and IoT-enabled sensors [8] and have reached government sectors [24], industries [25], and aerospace [26].

### 1.1. The Need for AI across Sectors

The adoption of AI is rapidly expanding across various domains, fueled by its ability to automate



## ORIGINAL RESEARCH ARTICLE

# Enhancing swimming pool hygiene: A robotic approach to debris removal and water quality monitoring

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**Abstract:** The World Health Organization has underscored swimming as a significant exercise for attaining health, and it is also recognized as a competitive sport in many nations. Individuals across all age groups choose swimming as a means to enhance their fitness levels. Maintaining the cleanliness of the swimming pool is imperative to prevent the spread of waterborne diseases. Despite regular weekly or monthly maintenance, cleanliness is often compromised due to service provider limitations. In the contemporary landscape, artificial intelligence technologies are progressively assuming roles where human providers fall short. This article proposes the integration of ethical robots to augment cleaning services both within and around swimming pools. These waterproof robots are designed to navigate within the pool environment, efficiently collecting debris and waste into their attached receptacles. The deployment of such ethical robotics marks a significant advancement in swimming pool maintenance, promising enhanced efficiency and hygiene standards. This work presents the design and implementation of an autonomous swimming pool cleaning robot, integrating multiple functional units: Power, sensor, wireless communication, motor, and water quality monitoring. After the power is on, the robot starts calibrating its sensors and establishes a connection with a remote human-machine interface to transmit the initial operational status. By utilizing advanced image processing algorithms, specifically color moments, the robot identifies and classifies floating debris while continuously monitoring water quality parameters. When debris is detected, the robot calculates its trajectory based on X and Y coordinates, adjusting its movement accordingly to collect the debris with a salvage net. It incorporates ultrasonic sensors for obstacle detection, employing a threshold-based avoidance algorithm to navigate around obstacles effectively. The cleaning process is repeated until the pool is cleared, after which the robot returns to its charging station, powering down non-essential systems in preparation for the next cycle. This study highlights the efficiency and effectiveness of robotic automation in pool maintenance, demonstrating significant advancements in the integration of robotics, sensor technology, and real-time data communication. The findings contribute valuable insights into future developments in robotic cleaning systems and their applications in various environments.

**Keywords:** Robotic pool cleaning; Autonomous maintenance; Obstacle handling; Battery optimization; Underwater visibility; Environmental factors; IoT integration; Real-time monitoring



## Original Article

# A Comparative Analysis of Deep Learning Models in Diverse AI Healthcare Applications

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**Abstract** - This review article made the comparative analysis quantitatively evaluates four applications of deep learning in healthcare: tuberculosis detection in chest radiography, skin cancer classification, Electronic Health Record (EHR) analysis, and drug discovery. The studies exhibit distinct model architectures and metrics, with tuberculosis and skin cancer classification achieving AUC values of 0.99 and above 0.91, respectively, using CNNs optimized with transfer learning and data augmentation. EHR analysis, utilizing CNN and RNN hybrids, reports AUCs between 0.70 and 0.85 for tasks like disease progression and patient readmission, demonstrating the variability introduced by heterogeneous, sequential data. Drug discovery models employ RNNs for molecular sequence prediction, highlighting a conceptual framework rather than specific performance metrics. The findings indicate that image-based models excel in quantitative performance and scalability, while models for EHR and molecular data face challenges in standardization and interpretability. This analysis underscores the need for data harmonization and explainability to enhance the clinical readiness of deep learning across diverse healthcare domains.

**Keywords** - Deep Learning, Healthcare, Tuberculosis detection, Skin cancer classification, Electronic Health Records (EHR), CNNs, RNNs, Artificial Intelligence (AI).

## 1. Introduction

AI has transformed the healthcare sector by improving disease analysis, treatment scheduling, and patient care management. AI-powered solutions, especially deep learning models, have performed exceptionally well in medical imaging, predictive analytics, and precision medicine [1-3]. CNNs and RNNs have been highly effective in automating tasks like disease classification, drug discovery, and EHR analysis, minimizing human intervention while enhancing accuracy [4-6].

AI applications, including virtual health assistants, telemedicine, and robotic-assisted surgeries, continue to advance patient care and accessibility [7]. Despite these innovations, challenges remain in achieving scalable, interpretable, and clinically deployable AI models in healthcare settings [8, 9]. While numerous studies have

explored AI's role in healthcare, existing research primarily focuses on isolated applications of deep learning without an in-depth comparative evaluation of different models across diverse clinical use cases [10, 11].

Most studies assess the performance of AI models within specific domains, such as tuberculosis detection, skin cancer classification, or predictive analytics, but few provide a holistic analysis of how these models compare in terms of accuracy, generalizability, interpretability, and real-world feasibility [12].

Furthermore, deep learning models often face domain-specific limitations that affect their effectiveness and clinical adoption. One major challenge is the variability in medical data, as the performance of AI models heavily depends on the quality and quantity of training data. While image-based



# ENHANCED ROUTING PROTOCOL IN MOBILE AD HOC NETWORK FOR IMPROVING THE PERFORMANCE

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## ABSTRACT

Packet routing among the route path is a tedious task in Wireless Network and Creating an efficient route management system in wireless devices is a difficult task, particularly in Mobile Ad hoc Networks. Many studies are focused on offering efficient route management through the use of new algorithms and approaches. This article focuses on developing an upgraded routing protocol with route head support known as the Route Head based Routing Protocol (RHRP), which consists of three stages: route head forming, route prediction and packet forwarding. In the stage of route head , one node chosen and which takes the responsibility of packet forwarding , in route prediction stage the node decide the route path from the source node to the destination , and in the stage of packet forwarding flow the path to travel the packet to reach to the destination. The proposed RHRP was implemented in a network simulator and compared to existing routing protocols such as FLCH-AODV in terms of power analysis, end to end delay, energy consumption and connectivity analysis, the results shows that the proposed RHRP protocol is better. This proposed protocol also supports hidden and exposed node issues, buffer overflow, and energy optimization.

**Keywords:** MANET, Network Layer, Route Head, Routing Protocol, Route Head Routing Protocol

## 1. INTRODUCTION

Mobile Ad-hoc Networks (MANETs) [1] offer unique routing issues due to their dynamic and decentralized character. Traditional routing protocols built for wired networks are sometimes ineffective for MANETs due to variables such as node mobility, low bandwidth, and unpredictable communications links. As a result, specialized routing protocols [2] have been created to solve these issues and improve communication between mobile nodes. In the MANET protocol stack, the network layer's main job is to create routes between source and destination nodes [3]. Routing techniques

become difficult to handle when there is a divergence in packet delivery, such as misrouting or excessive floating, which can cause a network collapse. Furthermore, ineffective packet transfer degrades wireless communication performance in addition to wasting energy.

Including internal battery consumption is essential to ensuring consistent communication. When Mobile Ad-hoc Networks (MANETs) are used in disaster management scenarios, a dead battery can make communication impossible. In order to reduce this risk and increase battery longevity, efficient power management strategies are essential. Several routing protocols have been put forth to



# PROPOSAL OF ENHANCING WATER SAFETY- AN AUTONOMOUS ROBOT FOR DROWNING PREVENTION

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## ABSTRACT

This paper presents the development of an advanced image recognition robot, dubbed the "drowning robot," designed to identify individuals at risk of drowning using state-of-the-art hardware and software. The primary aim of the project is to enhance water safety. The system leverages powerful computing platforms, such as the NVIDIA Jetson and Intel NUC, paired with high-resolution cameras and specialized sensors to capture and process real-time video data. By employing image processing technologies like OpenCV and deep learning models such as YOLO (You Only Look Once), the robot can detect human figures and unusual movements in aquatic environments. Operating autonomously, the robot offers a reliable solution for emergency response scenarios and can connect to cloud services for further verification. Key performance metrics, including FLOPS, latency, and frames per second (FPS), are assessed to ensure optimal processing speed for quick detection and action. This cutting-edge technology represents a major advancement in both robotics and safety engineering, with the potential to significantly improve rescue operations during drowning incidents and provide timely alerts to enhance public safety.

**Keywords:** *Drowning Detection, Robotics, YOLO, OpenCV, Object Detection, Surveillance Technology*

## 1. INTRODUCTION

Swimming is an essential kind of exercise because it has so many health advantages for people of all ages. It offers a full-body workout that strengthens muscles, increases flexibility, and improves cardiovascular health without putting undue strain on the joints. It also helps people who suffer from long-term illnesses like asthma, arthritis, and heart disease. Moreover, swimming has been linked to better mental health since it releases endorphins, which lower tension and anxiety, and encourages relaxation through rhythmic motions. Drowning is the most serious risk associated with swimming. For children ages 1-4 in the United States, drowning is the most common injury-related death cause, and for those aged 5-14, it is the second most common. Residential pools are the site of most of these incidents [1], but uncontrolled currents and

inadequate monitoring also pose a risk in natural water bodies such lakes and rivers. Between 2020 and 2022, the number of unintentional drowning deaths rose, underscoring the necessity of efficient preventative measures including swimming instruction and water safety awareness campaigns. Another risk factor for events involving swimming is substance abuse. The necessity of sober swimming techniques is highlighted by the CDC's report that drugs or alcohol were implicated in 20% of drowning occurrences. The environment might also affect the hazards; for example, swimming in rivers or the ocean can be riskier because of strong currents and waves. Providing access to swimming instruction, raising knowledge of water safety, and putting in place safety precautions like life jackets and round-the-clock monitoring are some of the steps taken to lessen these hazards. Swimming safety



## Innovative Machine Learning Strategies for Enhancing Cybersecurity Resilience in IoT Environments

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### ABSTRACT

This research investigates the incorporation of machine learning ML models in improving cybersecurity resilience for the Internet of Things (IoT) ecosystem. Since cyberattacks against IoT are on the rise, this paper investigates the efficacy of ML algorithms such as Decision Trees, Random Forests, and K-Means Clustering on common IoT attacks, DDoS (Distributed Denial of Service), spoofing, and data injection. The research builds these models on a simulated set-up with the help of widely accessible data sets and modeling tools such as Node-RED and NS3 and then validates them to check their detection rates, false positive rates, and performance in terms of system performance under such attack scenarios. It shows very high detection rates, especially for DDoS attacks (95%) and very low false positives (3%-5%). It was found that DDoS attacks had the highest increase in system latency compared to other attacks while spoofing and data injection also contributed to increasing latency but to a lesser extent. The results underscore the promising role of ML in enhancing IoT security and emphasize the need for frequent model updates and fine-tuning to address dynamic cyber risks in real-time situations. It provides a comprehensive analysis and insights into the effective use of ML models for real-time IoT security and to formulate an efficient approach for scalable IoT security solutions.

**Keywords:** IoT Cybersecurity, Cybersecurity, Machine Learning, Cyber-attack, Random Forest, IoT System.

### 1. INTRODUCTION

The growth of IoT devices in recent years has very much added to the complexity of cybersecurity now and in the future. ML strategies are a valuable tool used to strengthen the resilience of IoT systems against advanced cyber-attacks. A major innovation is the use of unsupervised learning-based anomaly detection algorithms to detect deviations from mean device behaviors. They can monitor an ever-streaming flow of information generated by IoT devices, and within seconds, recognize





# Development of Advance Machine Learning (ML) Strategies for Enhanced Mobile Robot Control

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## Abstract:

Recently the demand for intelligent robotic systems has been increasing in many fields, necessitating advanced machine learning (ML) strategies to make mobile robot control more effective. This study deals with building robust ML-based methods to enhance the key features of a vehicle, including but not limited to navigation, complexity avoidance, and object detection in various functional settings. The methodology presents problem definition and dataset acquisition, simulating synthetic data (from both Gazebo and Webots) and real data collected from LiDAR, camera, and IMU sensors to provide robustness and generalization. It will also require data pre-processing techniques such as Kalman filtering and feature extraction to clean the data and reduce noise before sending it to the model for training. This study implements task-specific ML models using Random Forests and Deep Neural Networks for classification tasks and adopts reinforcement learning methods such as Deep Q-Networks (DQN) to make more on-the-fly decisions. Train and validate using the TensorFlow and Py-Torch frameworks and optimize hyperparameters for the best possible results. The details are tested in simulation and validation datasets, and the winners are implemented in real controlled environments while measuring metrics such as accuracy, precision, recall, and F1 score. This study demonstrates phenomenal results with real-world applications, including excellent performance in obstacle avoidance (98% success), navigation (95%), object recognition (90%), and low response times (0.40-0.55 seconds) across a variety of environments. Energy efficiency and adaptability are also included in the study, with feedback loops generating incremental improvements in dynamic task performance. This work highlights the promise of ML-enabled mobile robot systems, addressing obstacles such as noise, irregular training data, and continuous variation in the deployment environment. The system performs very well in accuracy and adaptability but could perform better in terms of energy efficiency and detection of complex objects, which is an area for future optimization. These results lay the groundwork for future advancements with ML approaches in robotic applications focused on scalability, efficiency, and online learning.

## Keywords:

Mobile Robot, Machine Learning, Reinforcement Learning, Supervised Learning, Robotic.



# A Machine Learning Framework For Predictive Waste Management Optimization In Smart Cities

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## Abstract

Urban waste generation is rising rapidly worldwide (2.01 billion tonnes in 2016 to an expected 3.8 billion tonnes by 2050). Traditional waste collection methods struggle to handle this growth efficiently. We propose a comprehensive AI-driven framework combining Internet of Things (IoT) sensors, data analytics, and machine learning (ML) to predict waste generation and optimize collection routes in smart cities. Our layered architecture uses real-time bin-level data (fill levels, location, usage patterns) to forecast waste volumes via regression models (e.g. XGBoost, random forests, neural networks) and adjust collection schedules dynamically. We validate the framework with an open Smart Bin dataset and simulated city scenarios. The best ML model (XGBoost) achieves a root mean squared error (RMSE) of 4.10 tonnes on test data, outperforming linear regression and random forest (Table 1). Dynamic route optimization using these predictions reduces collection distance and fuel consumption by over 30%, consistent with prior studies. We discuss design details (sensors, data pipeline, ML algorithms), present evaluation results (tables and graphs), and highlight deployment challenges (data quality, privacy, scalability). The proposed framework significantly improves waste management efficiency and sustainability in smart city deployments.

## Keywords

Smart city; waste management; machine learning; Internet of Things; predictive analytics; route optimization; IoT sensors; resource optimization.

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## INTRODUCTION

Rapid urbanization and population growth are exerting immense pressure on city infrastructure, notably waste management systems [1]. Smart cities leverage ICT and IoT to address such challenges, aiming for resilient, efficient, and sustainable urban environments. According to UN Sustainable Development Goal 11, cities must become inclusive, safe, and sustainable through innovation. Machine learning (ML), a subset of AI, is pivotal in this transformation [2]; it enables data-driven resource management, improves service efficiency, and reduces environmental impact (e.g. by optimizing energy use, traffic flow, and waste collection). Waste management, a critical concern in smart cities, has unique difficulties: global waste is projected to reach 3.40 billion tonnes by 2050 [2], implying doubling of urban waste compared to population growth. High-income countries currently generate far more waste per capita (up to 4.54 kg/person-day) than low-income regions [3], but the fastest growth is in developing cities. Traditional waste collection (fixed schedules, manual routing) is increasingly unsustainable under rising volumes. Many cities report open dumping or inefficient landfilling for over 33% of waste [4]. Smart waste management employs IoT sensors (e.g. ultrasonic fill-level sensors in bins), cloud analytics, and ML predictions to transform this paradigm [5]. By predicting when bins will fill and optimizing routes accordingly, cities can reduce unnecessary trips (cutting distance by ~30%) and achieve significant cost/fuel savings [6]. This paper presents a detailed ML framework for predictive waste management in



# Cluster-based routing protocols through optimal cluster head selection for mobile ad hoc network

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## ABSTRACT

Mobile ad hoc networks (MANETs) operate without fixed infrastructure, with mobile nodes acting as both hosts and routers. These networks face challenges due to node mobility and limited resources, causing frequent changes in topology and instability. Clustering is essential to manage this issue. Significant research has been devoted to optimal clustering algorithms to improve cluster-based routing protocols (CBRP), such as the weighted clustering algorithm (WCA), optimal stable clustering algorithm (OSCA), lowest ID (LID) clustering algorithm, and highest connectivity clustering (HCC) algorithm. However, these protocols suffer from high re-clustering frequency and do not adequately account for energy efficiency, leading to network instability and reduced longevity. This work aims to improve the CBRP to create a more stable and long-lasting network. During cluster head (CH) selection, nodes with high residual energy or degree centrality are chosen as CH and backup cluster head (BCH). This approach eliminates the need for re-clustering, as the BCH can seamlessly replace a failing CH, ensuring continuous cluster maintenance. The proposed modified cluster-based routing protocol (MCBRP) evaluated network simulator 2 (ns2) demonstrates that MCBRP is more energy-efficient, selecting optimal CH and balancing the load to enhance network stability and longevity.

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## 1. INTRODUCTION

Wireless networks serve as essential communication infrastructures that facilitate connectivity without the reliance on wired materials or cables. They offer pervasive communication capabilities, enabling continuous connectivity through portable devices that require access points or base stations. While conventional wireless networks necessitate stable infrastructure, mobile ad hoc networks (MANETs) provide a decentralized alternative where wireless nodes communicate directly without fixed access points. These