BEHARA
COLLEGE OF ENGINEERING AND TECHNOLOGY
Approved by AICTE NEW DELHI & Affiliated to JNTU-GV, Vizianagaram
88th Division, Narava, GVMC, Visakhapatnam, Andhra Pradesh 530027, India
e-mail: beharaenggclg@gmail.com, principal@beharaengg.edu.in www.bcet.in Ph: 9666637234

# Summary Report – Faculty Development Programs (FDPs)/SDPs/Seminars

**Institution Name:** Behara College of Engineering and Technology
**Academic Year:** 2024–2025
**Department:** Computer Science and Engineering
**Mode of Delivery:** Online/ Offline

| S. No. | Title of FDP | Dates | Duration | No. of Participants | Mode |
|---|---|---|---|---|---|
| 1 | Java Full Stack AI | 2nd Dec 24 – 22nd Dec 24 | 15 Days | 78 | Online |
| 2 | Cyber Security | 24th December 25 | 1Day | 126 | Online |
| 3 | AI Tools | 17th Feb 25 to 21st Feb 25 | 15Days | 84 | Online |
| 4 | Digital Marketing | 12th Feb 25 to 5th Mar25 | 15Days | 128 | Online |
| 5 | Technovate for India | 4th Dec 25 | 1Day | - | Offline |

| Total FDPs/SDPs/S Conducted | Total Participants | Coordinators |
|---|---|---|
| 5 | 416 | Mr Ch NarayanaRao, Mrs KSP Keerthi |

**Submitted by:**

Mr Ch NarayanaRao
FDP Coordinator
Computer Science and Engineering
Behara College of Engineering and Technology

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# Report

# Of

# Faculty Development Program

# on

# JAVA FULL STACK USING REACT JS AND AI

## 2nd December 2024 to 22nd December 2024




# FDP Brochure

**Schedule:**

**Day 1-3:** Introduction to Java with React JS
- Java Basics Recap: Object-Oriented Programming (OOP) concepts, classes, objects, inheritance, and polymorphism.
- React JS Overview: Introduction to React components, JSX, props, and state.
- Setting Up Environment: Install JDK, Node.js, and create a basic React app.

**Day 4-6:** Java with Spring Boot & REST APIs
- Spring Boot Setup: Introduction to Spring Boot, creating your first REST API.
- Connecting with React: Fetching data from Java Spring Boot APIs in React.
- State Management in React: Using Context API and Hooks.

**Day 7-9:** Advanced Java Features & AI Introduction
- Java Advanced Concepts: Streams, Lambda expressions, and multithreading.
- AI Basics: Introduction to AI, Machine Learning (ML), and their significance in web development.
- Integrating AI APIs: Using AI/ML APIs in Java (e.g., TensorFlow, Google AI APIs).

**Day 10-12:** React JS with AI Integration
- React with AI: Integrating AI libraries in React (e.g., TensorFlow.js).
- Real-time AI in React: Implementing basic AI tasks like image recognition or NLP in React.
- UI/UX for AI Applications: Designing user interfaces for AI-powered applications.

**Day 13-15:** Project Implementation
- Java-React AI Project: Develop a full-stack AI-powered application, combining Java (Spring Boot) with React and AI features.
- Testing and Debugging: Unit testing in Java, React testing with Jest, and AI model validation.
- Deployment: Deploying the full-stack AI application using Docker or cloud services.

## 1. Introduction

The **Java Full Stack with React JS & AI** Faculty Development Program was conducted from **2nd December 2024 to 22nd December 2024**. This program aimed to enhance faculty members' technical skills in emerging areas of web development and Artificial Intelligence (AI). The course provided hands-on experience in Java Full Stack Development, React JS, and the integration of AI technologies, equipping faculty with the necessary tools to better integrate these concepts into their teaching curriculum.

The program also sought to foster a collaborative environment where faculty could share knowledge and experiences related to modern software development practices.

## 2. Objectives of Faculty Development Program

- Equip faculty with expertise in Java Full Stack Development, React JS, and AI.
- Develop practical knowledge of integrating AI capabilities into web applications.
- Enhance faculty's ability to teach the latest technologies and incorporate them into their courses.
- Encourage faculty to stay updated with current industry trends and advancements in web development and AI.
- Foster collaboration among faculty members from various departments, facilitating interdisciplinary learning.

## 3. Faculty Development Program Details

- **Program Duration:** 2nd December 2024 to 22nd December 2024
- **Mode of Delivery:**Online
- **Number of Participants:**78
- **Target Audience:** Faculty members from the Computer Science, Information Technology, and related departments.

### Module Breakdown

1. **Introduction to Full Stack Development**
    - Overview of Full Stack Development and its significance in modern applications.
    - Introduction to backend development using Java (Spring Boot framework).
    - Frontend development using React JS for dynamic web applications.
    - Integrating Java backend with React JS frontend.
2. **React JS Deep Dive**
    - Detailed exploration of React components, hooks, and state management.
    - Building user interfaces with reusable components.
    - Hands-on sessions with React JS libraries and tools.
3. **Artificial Intelligence in Web Development**
    - Introduction to AI concepts, including machine learning and neural networks.
    - Practical implementation of AI algorithms in web applications (e.g., recommendation systems, AI-driven chatbots).
    - Using AI libraries with Java and React JS to add intelligent features.

4. **Project Development**
    - Participants worked on real-world projects that combined Java Full Stack and AI technologies.
    - Emphasis on team-based learning and collaborative problem-solving.
    - Mentorship sessions for project guidance.

## 4. Impact of Faculty Development Program

- **Improvement in Teaching Competencies:** Faculty members have reported a significant improvement in their confidence and competency in teaching Java Full Stack development, React JS, and AI. They are now more equipped to integrate these technologies into their courses and offer students relevant, up-to-date content.
- **Increased Engagement with Industry Trends:** The program helped faculty stay abreast of current industry trends in web development and AI, enabling them to bring in real-world examples into the classroom.
- **Positive Feedback on Hands-On Approach:** The interactive, hands-on nature of the course was highly appreciated. Participants found the practical sessions particularly valuable for reinforcing theoretical concepts.
- **Collaboration and Networking:** The program encouraged networking between faculty from various departments, creating opportunities for collaboration on interdisciplinary projects that combine AI, web development, and other technologies.
- **Project Outcomes:** The final projects developed by participants featured innovative applications of AI within full stack environments. These projects will serve as models for future student projects and could be incorporated into the curriculum.

## 5. Challenges Faced

- **Time Constraints:** Due to the extensive nature of the program, some faculty members expressed difficulty in balancing their existing workload with the program schedule.
- **Technical Challenges:** Some participants faced challenges with setting up the development environments for Java, React JS, and AI tools.
- **Pace of Content Delivery:** A few faculty members found the pace of advanced topics in AI to be slightly fast. More focused sessions could have been beneficial.

## 6. Future Goals and Plans

- **Follow-Up Sessions:** Organize refresher workshops and advanced sessions to address areas where faculty required further support, particularly in AI and advanced JavaScript techniques.
- **Collaborative Projects:** Encourage faculty members to integrate the skills learned during the program into cross-disciplinary projects with students and other faculty members.
- **Online Resources:** Develop and provide faculty with access to a dedicated portal or resource center with recorded lectures, reading materials, and tools used during the program.
- **Regular Industry Interactions:** Invite industry experts to conduct guest lectures and webinars to keep faculty updated on the latest developments in web development and AI technologies.



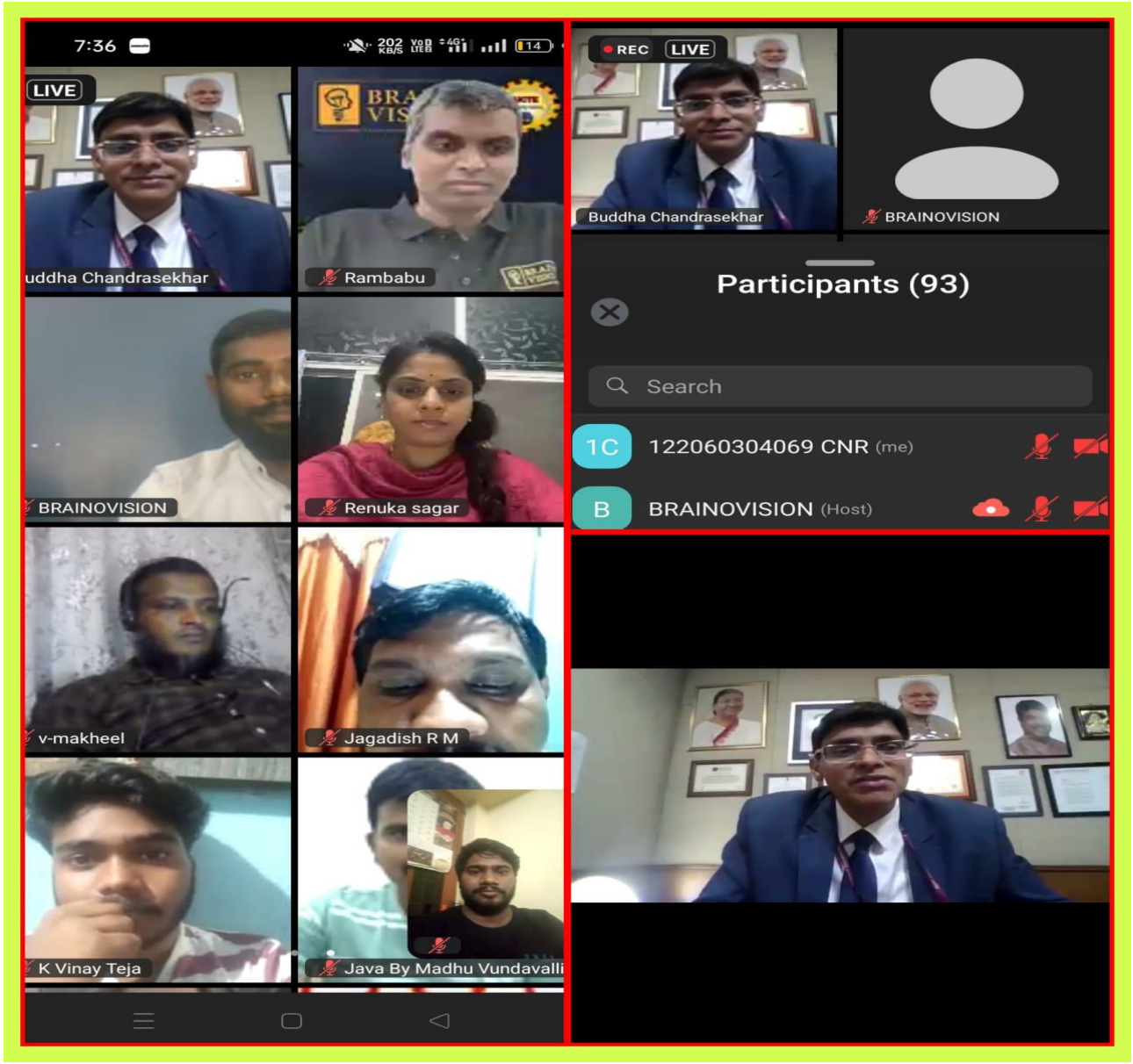




**Sample Certificate**

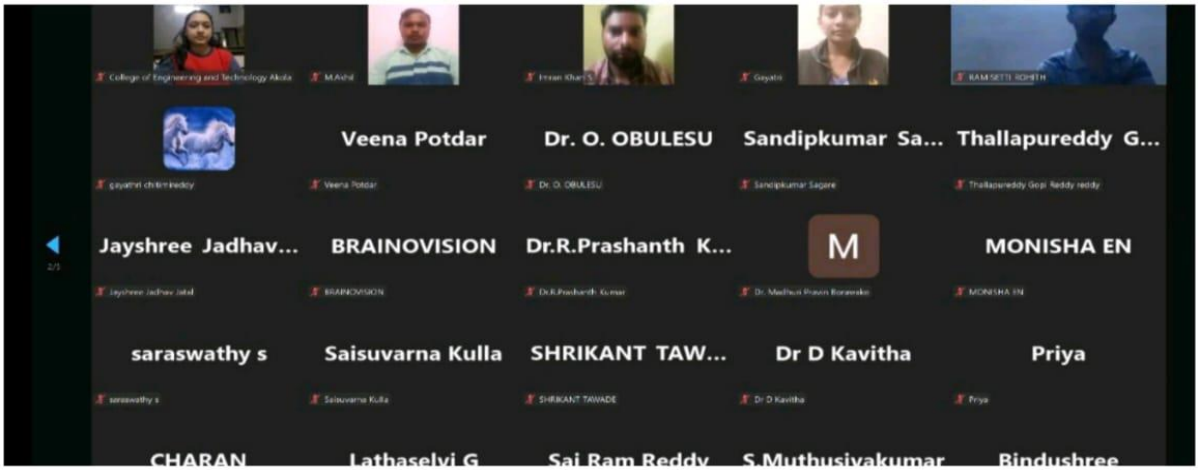
# Glimpse of FDP






| AGENDA - VALEDICTORY OF STTP | | | |
|---|---|---|---|
| **START TIME** | **END TIME** | **DURATION** | **ACTIVITY** |
| **7:00PM** | 07:05 PM | 05 MIN | **1. Gathering & Event start** |
| 07:05 PM | 07:07 PM | 02 MIN | 2. Program Introduction |
| 07:07 PM | 07:10 PM | 3 MIN | 3. About Brainovision |
| 07:10 PM | 07:15 PM | 5 MIN | 4. Introduction about Host colleges |
| 07:15 PM | 07:20 PM | 14 MIN | 5. Cash Prizes and Internships |
| 07:20 PM | 07:30 PM | 2 MIN | 6. Chief Guest Speech |
| 07:32 PM | 07:40 PM | 2 MIN | Brainovision CEO/ Vice President Speech |
| 07:40 PM | 07:42 PM | 15 MIN | About our STTP |
| 07:42 PM | 08:05 PM | 25 MIN | Host College's authorities speeches |
| 08:05 PM | 08:10 PM | 5 MIN | ABOUT CERTIFICATES |
| 08:10 PM | 08:15 PM | 5 MIN | Vote of Thanks |







Prepared By Mr Ch NarayanaRao
Head of the Department
Dept of CSE

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# Report

# of

# One Day Professional Development Program on

# "Introduction to Machine Learning for Cyber Security"

**Date of Event:** 24th December, 2024
**Duration:**2 PM to 4:00 PM
**Location:** Online
**Organized By:** Behara College of Engineering and Technology, Visakhapatnam, Andhra Pradesh in association with Pencil Bitz

**Target Audience:** Professionals and Researchers in Cyber Security, IT Specialists, Data Scientists, Faculty and Students

**Program Type:**Professional Development Program - workshop




**Program Brochure**




**Sample Certificate**

## 1. Introduction

The One Day Professional Development Program on "Introduction to Machine Learning for Cyber Security" was organized to provide a comprehensive understanding of how machine learning (ML) techniques are being applied to enhance the security landscape in the digital age. As cyber threats grow increasingly sophisticated, the application of machine learning in cybersecurity is a cutting-edge solution to enhance threat detection, response, and prevention mechanisms.

The event aimed at equipping professionals with the foundational knowledge required to integrate machine learning concepts into their cybersecurity practices.

## 2. Objectives of the Program

The primary objectives of the program were as follows:

- To introduce the concept of machine learning and its importance in the field of cybersecurity.
- To explain various machine learning algorithms and their applications in threat detection and risk management.
- To discuss real-world case studies where machine learning has significantly improved cybersecurity protocols.
- To provide hands-on experience in applying machine learning algorithms to cybersecurity problems.
- To foster collaboration among professionals, enhancing knowledge sharing and networking.

## 3. Key Topics Covered

### Session 1: Introduction to Machine Learning

**Speaker:**Sir MohitTiwari, Assistant Professor, BVCE Delhi.

**Overview:** The session provided a foundational understanding of machine learning, including definitions, history, and types of machine learning—supervised, unsupervised, and reinforcement learning. The speaker highlighted the growing relevance of machine learning in solving complex problems, particularly in the cybersecurity domain.

### Machine Learning Algorithms in Cyber Security

- **Overview:** This session focused on different ML algorithms such as decision trees, k-nearest neighbors (KNN), support vector machines (SVM), and neural networks. The focus was on how these algorithms are used for anomaly

detection, malware analysis, intrusion detection systems (IDS), and phishing attack detection.

**Real-World Applications of Machine Learning in Cyber Security**

- **Overview:** In this session, the speaker discussed case studies where ML techniques were successfully implemented in real-world cybersecurity scenarios. Examples included:
    - Automated malware detection using deep learning models.
    - Predictive analytics for identifying vulnerabilities before they are exploited.
    - Behavioral analysis to detect insider threats or unusual activities.

**Challenges in Machine Learning for Cyber Security**

- **Overview:** This session addressed the limitations and challenges faced when integrating machine learning into cybersecurity practices, including issues related to data quality, model interpretability, adversarial attacks, and real-time processing.

**4. Key Takeaways**

- **Machine Learning's Impact on Cybersecurity:** Machine learning is crucial for detecting emerging threats, automating threat responses, and improving overall system security.
- **Hands-On Experience:** Participants gained practical exposure to applying machine learning algorithms to real-world cybersecurity problems.
- **Emerging Trends:** The integration of artificial intelligence (AI) and machine learning is rapidly evolving, with future trends pointing towards more intelligent, adaptive systems capable of handling dynamic threats.
- **Networking:** The event provided an excellent opportunity for professionals from diverse backgrounds to interact, share ideas, and discuss challenges in cybersecurity.

**5. Participant Feedback**

Feedback from the participants was overwhelmingly positive. Attendees appreciated the well-rounded approach of the program, which combined theoretical knowledge with practical exercises. They found the real-world examples particularly helpful in understanding how machine learning is being applied in modern cybersecurity systems.

Key highlights from the feedback include:

- **Engagement:** Participants appreciated the interactive nature of the sessions.
- **Content Relevance:** Many noted that the content was highly relevant to current trends in the cybersecurity industry.
- **Instructor Expertise:** The instructors were praised for their depth of knowledge and the clarity with which complex topics were explained.

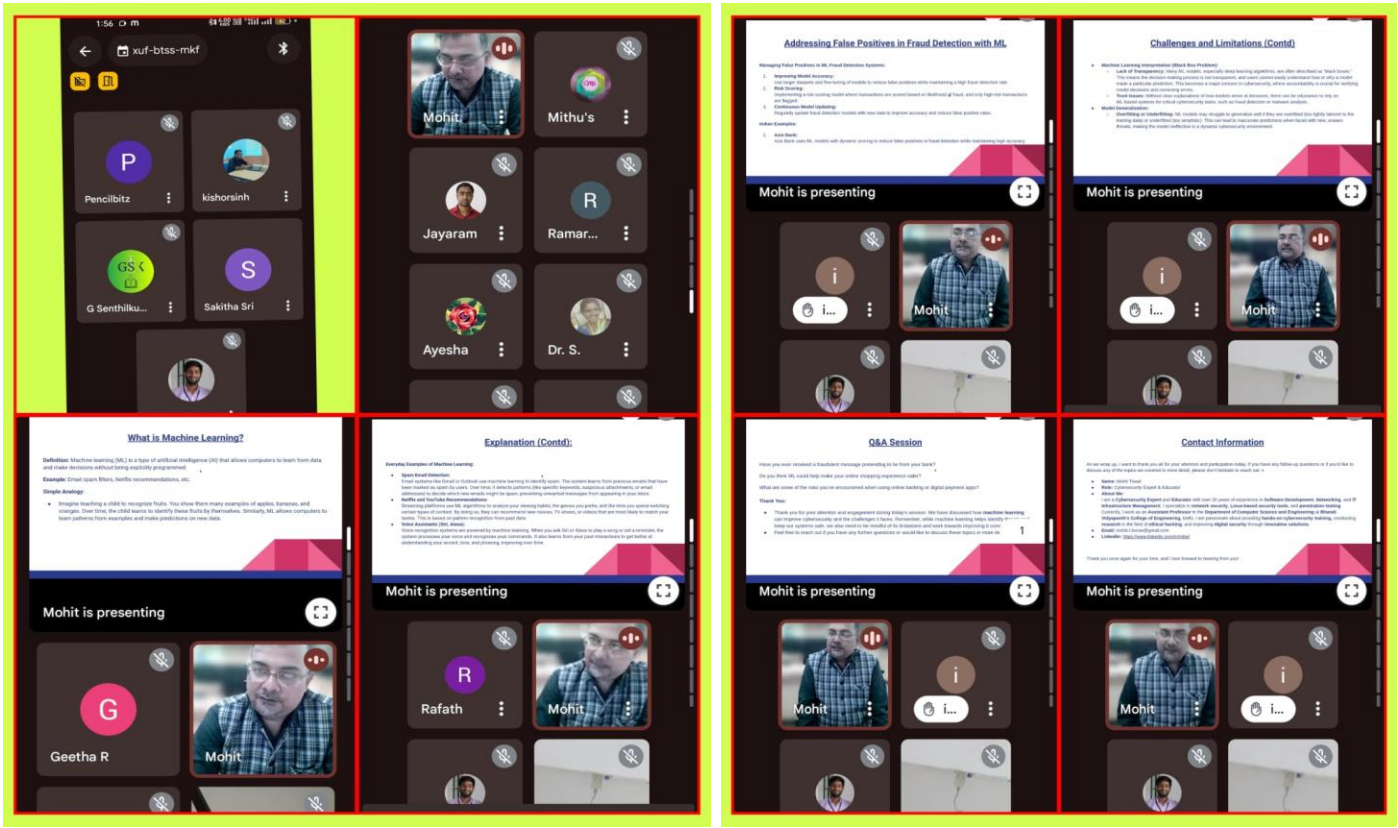
## 6. Conclusion

The One Day Professional Development Program on "Introduction to Machine Learning for Cyber Security" successfully achieved its objectives by providing participants with valuable insights into the intersection of machine learning and cybersecurity. Attendees left with a stronger understanding of how machine learning can be leveraged to improve security measures and how to begin applying these techniques in their own work.

The event also laid the groundwork for future workshops and training programs on more advanced topics in machine learning and cybersecurity.

Youtube link: https://www.youtube.com/watch?v=MeI5ohY59kE&t=50s

workshop Glimpse



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# Report on National Level

# Faculty Development Program (FDP)

# on

# AI Tools

**Organized by Behara College of Engineering and Technology in Collaboration with BrainOVision**

**Date:** 17th Feb 2025 to 21st Feb 2025

**Venue:** Online Platform Zoom and YouTube

## 1. Introduction

A National Level Faculty Development Program (FDP) on **AI Tools** was organized by **Behara College of Engineering and Technology**, in collaboration with **BrainOVision**, with the objective of enhancing the skills and knowledge of faculty members in the domain of Artificial Intelligence (AI) and its practical tools. This FDP aimed to equip educators with emerging technological competencies to integrate AI effectively in teaching, research, and innovation.

## 2. Objectives of the FDP

- To provide in-depth knowledge of the latest AI tools and their applications.
- To enable faculty members to adopt AI-driven solutions in pedagogy.
- To promote research and development activities involving AI in academics.
- To create awareness of real-world AI applications and industry trends.

## 3. Collaborating Partner: BrainOVision

**BrainOVision** is a leading EdTech company focusing on bridging the gap between academia and industry by offering advanced training programs, internships, and certifications in cutting-edge technologies such as AI, Machine Learning, IoT, and Data Science.

## 4. Program Schedule & Topics Covered

The FDP was conducted over [insert duration — e.g., 5 days] and included both theoretical and practical sessions. Experts from academia and industry conducted the sessions on the following topics:

- Introduction to Artificial Intelligence and its Scope
- AI Tools for Teaching and Research
- Natural Language Processing (NLP) Tools
- Computer Vision and Image Processing
- AutoML Platforms (e.g., Google AutoML, Microsoft Azure ML)
- Prompt Engineering and Generative AI (e.g., ChatGPT, Bard)
- Hands-on Workshops with AI Toolkits
- Integration of AI Tools in Curriculum and Assessment
- Ethics in AI and Responsible AI Use

## 5. Participants

The FDP witnessed active participation from over **84 faculty members** from various institutions across India. Participants represented diverse disciplines including Engineering, Computer Science, Management, and Sciences, showcasing the multidisciplinary interest in AI.

## 6. Resource Persons

The program was facilitated by industry experts and academic professionals including:

- **N NarayanaSwamy** Senior Technical Head BrainOVision,
- **Pratap Chandra** Data Scientist
- And other eminent speakers

## 7. Outcomes of the FDP

- Participants gained hands-on experience with several AI tools.
- Faculty members expressed increased confidence in integrating AI into their teaching practices.
- The FDP encouraged interdisciplinary collaborations and research ideas.
- Participants received e-certificates upon successful completion.

## 8. Feedback and Evaluation

A post-FDP feedback survey indicated a high level of satisfaction among the participants, particularly in terms of content relevance, delivery, and practical exposure. Suggestions were noted for organizing advanced sessions and AI-focused research workshops in the future.

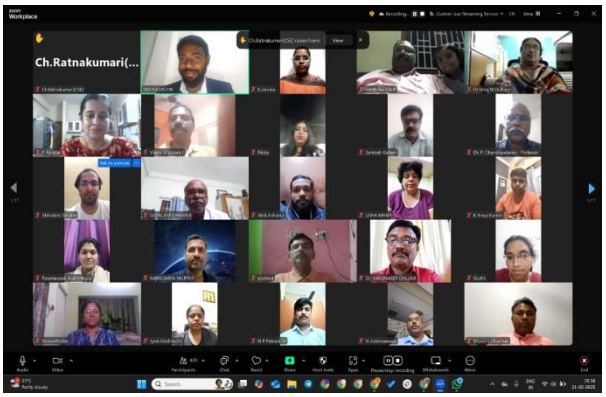
## 9. Conclusion

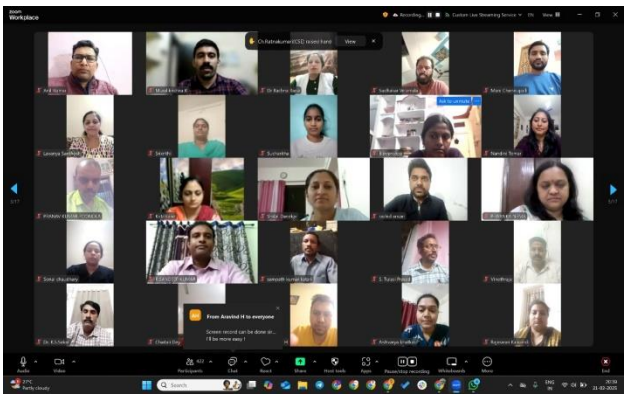
The Faculty Development Program on AI Tools, in collaboration with BrainOVision, was a resounding success. It served as a significant step toward empowering faculty with future-ready skills and contributed to the ongoing digital transformation in education. The organizing committee extends heartfelt gratitude to all participants, speakers, and collaborators who made this event possible.

## 10. Organizing Committee

- **FDP Coordinator**: Mr Chokkpu NarayanaRao
- **Convener**: Dr V Sridhar Patnaik, Principal
- **Organizing Team**: Mrs KSP Keerthi

## <u>Glimpse of FDP</u>









BRAIN O VISION

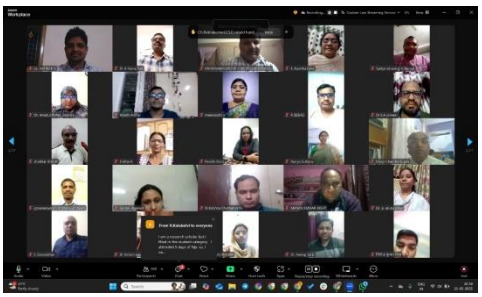
**N. NARAYANA SWAMY**

Senior Technical Head.

**Resource Person**

(5+ Years Experience | | 100% Hands-On teaching)

- N. Narayana Swamy is Technical Manager at Brainovision Solutions India Pvt. Ltd., with expertise in AI tools and application development. With a strong background in emerging technologies, he plays a pivotal role in designing and implementing AI-driven solutions that enhance business processes and improve automation.
- With a passion for innovation, he specializes in AI applications, machine learning models, cloud computing, and software development. His technical leadership ensures the seamless integration of AI technologies into real-world applications, driving efficiency and scalability.
- Swamy is actively involved in mentoring teams, conducting workshops, and staying updated with the latest advancements in AI and software development. His contributions help organizations harness the power of AI for smarter decision-making and enhanced user experiences.



Prepared by HOD - CSE

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**REPORT**

**ON**

**STUDENT DEVELOPMENT PROGRAM (SDP)**

**Title:** 30-Hour Student Development Program on Digital Marketing
**Collaborating Partner:** EXCELR
**Organized by:** Behara College of Engineering and Technology
**Duration:** 12th Feb 2025 to 5th Mar 2025(2 Hours)
**Total Hours:** 30 Hours
**Venue:** Online – Zoom & YouTube
**Target Audience:** Undergraduate Students (All Disciplines)

## 1. Introduction

In alignment with the growing demand for digital skills in the current job market, Behara College of Engineering and Technology organized a 30-hour Student Development Program (SDP) on **Digital Marketing**, in collaboration with **EXCELR**, a reputed industry leader in professional training and certification.

This program aimed to enhance students' practical knowledge in digital marketing and empower them with employable skills such as SEO, SEM, content marketing, social media strategy, and data analytics tools related to marketing.

## 2. Objectives of the Program

- To introduce students to core concepts and tools in Digital Marketing.
- To equip students with hands-on experience in SEO, Google Ads, and social media marketing platforms.
- To build real-time project experience through case studies and live assignments.
- To enhance career readiness and improve employability.

## 3. Program Structure and Curriculum

**Total Duration:** 30 Hours (2 Hours/Day for 15Days)

| Day | Topics Covered | Methodology |
|---|---|---|
| Day 1 | Introduction to Digital Marketing, Website Structure, and Basics of HTML | Lecture + Demo |
| Day 2 | Search Engine Optimization (SEO) – On-Page and Off-Page Techniques | Hands-on + Case Study |
| Day 3 | Google Ads (SEM), Display Ads, YouTube Ads | Interactive Workshop |
| Day 4 | Social Media Marketing – Facebook, Instagram, LinkedIn Strategies | Live Campaign Demo |
| Day 5 | Email Marketing, Affiliate Marketing, Influencer Strategy | Group Activity |
| | And so on.. | |
| Day 15 | Web Analytics (Google Analytics), Project Presentation & Feedback | Project Evaluation |

## 4. Resource Persons

The sessions were delivered by experienced trainers from **EXCELR**, including:

- **Mr. Mayur** Senior Digital Marketing Trainer
- **Mr B Pradeep Kumar Suject Matter Expert** Digital Marketing Specialist

## 5. Student Participation

- **Total Participants:** 128
- **Departments Represented:** [e.g.,B.Tech BBA, B.Com, BCA, BA, etc.]
- **Attendance Rate:** [ 90% overall participation]

All students were encouraged to participate in daily assignments, and a mini-project was undertaken as part of the evaluation.

## 6. Assessment & Certification

Participants were assessed based on:

- Attendance and active participation
- Performance in quizzes and assignments
- Final project presentation

**Certificates of Completion** were awarded jointly by Behara College of Engineering and Technology and **EXCELR** to students who completed the program requirements.

## 7. Outcomes and Feedback

- **Improved Technical Skills:** Students developed a strong foundation in digital marketing tools and strategies.
- **Project Exposure:** Teams presented creative marketing plans and ad campaigns.
- **Career Orientation:** Several students expressed interest in pursuing internships and certifications in digital marketing.

**Feedback Summary:**

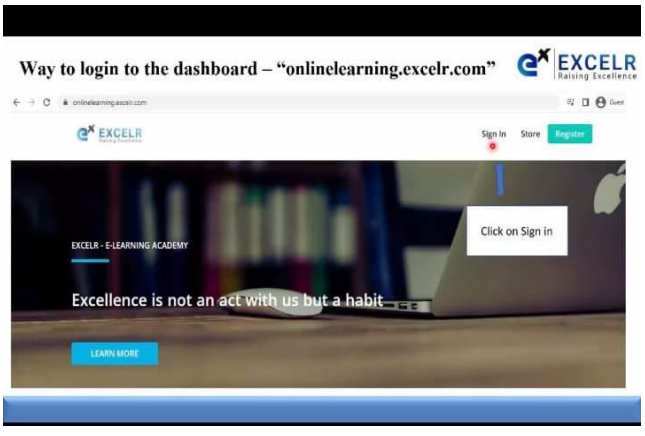
- 92% rated the program as “Excellent” or “Very Good”.
- Students appreciated the industry-oriented content and practical approach.

## 8. Conclusion

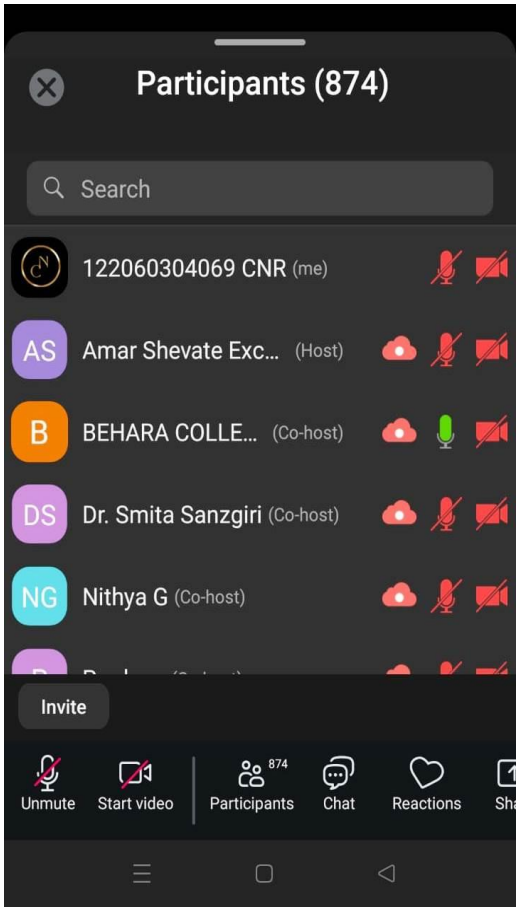
The SDP on Digital Marketing proved to be a valuable initiative in preparing students for digital economy careers. The collaboration with **EXCELR** brought industry expertise into the classroom, aligning well with academic and career development goals.

## Glimpse of SDP









**Prepared by HOD - CSE**

**Collaboration Guest Details for Student Development Program***

***Guest Details: ***

1. *Full Name* **Dr V Sridhar Patnaik**

2. *Profile Photo*



3. *Email Address* beharaenggclg@gmail.com

4. *Contact Number* **9949638777 & 6303211772**

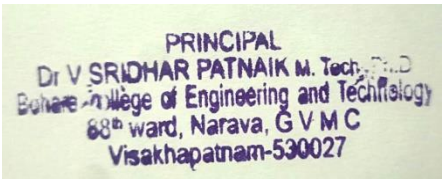
5. *Short Profile* : Dr. V. Sridhar Patnaik is presently serving as the Principal at Behara College of Engineering and Technology, Visakhapatnam. With 20 years of experience in academics as well as administration, he is a renowned professor, educationist, and motivator. Dr. Patnaik has actively participated in several conferences and workshops and has contributed papers and research publications to a number of national and international journals.

6. *Designation* **Principal**

7. *Department* **Mechanical Engineering**

***To Proceed with Digital Certificates for Participants, We Require: ***

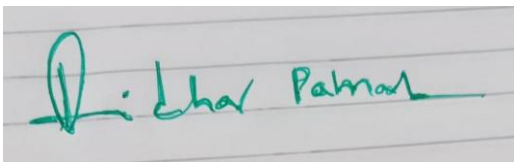
1. *Name of the Principal (or Authorized Person) * Dr V Sridhar Patnaik
2. *College or Department Stamp* (PNG file)







3. *Authority Signature* (PNG file):



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# REPORT

# ON

# THE ONE DAY SEMINAR ON

# "Technovate for India: Igniting Ideas, Empowering Futures"

## HELD ON 4th December 2024

## Venue: Novotel, Visakhapatnam

TALROP PRESENTS

TECHNOVATE FOR INDIA

AN INITIATIVE BY THE TIMES OF INDIA

**Event:** TFI Andra Pradesh Edition

**Venue:** Novotel Visakhapatanam Varun

**Date:** 4th December 2024

**Time:** 11.00 am onwards

| Technovate for India – Andra Pradesh Edition | |
|---|---|
| **Time** | **Itinerary** |
| 11.00 AM | Inaugural Address<br>**Mr. Saikanth Varma IAS**<br>(CEO, Andhra Pradesh Economic Development Board) |
| 11.10 AM | Keynote Address<br>**Mr. Prem Kumar Vislawath**<br>(Co-founder and CEO, Marut Drones) |
| 11.30 AM | Fireside Chat<br>**Mr. Prem Kumar Vislawath**<br>With<br>**Ms. Swati Bharadwaj**<br>(Business Editor, The Times of India) |
| 11.45 AM | Special Address<br>**Mr. Jones Joseph** (Director & COO, Talrop)<br>**Mr. Ajeesh Satheesan** (Director & CMO, Talrop) |
| 12.00 AM | Expert Talk<br>**UX Anudeep**<br>(UX Mentor and UX Designer at a top MNC |
| 12.30 PM | Ideathon |
| 1.00 PM | Prize Distribution |

One day Seminar was conducted on Ideathon at Novotel Hotel on 4th December 2024 by Times of India – Powered by telrop. The faculty and students from Behara College of Engineering Technology (VI) Narava Visakhapatnam has participated in the program has shared some views with the Organizers. One of our faculty members won a prize for innovation in the QUIZ. This one day seminar has given much wider exposer and experience to our students. A team consisting of four students has given a presentation on "Andhra Pradesh's smaller cities and towns have many tech-savvy individuals skilled in software development, product design & graphic design, but they often lack a dedicated platform to find work. How could we create a marketplace that connects IT freelancers from these areas with potential clients, ensuring local talent finds opportunities without needing to relocate? For this problem statement our students came up with a solution" to compete with nearly 20 teams. Finally our students got participation certificates










TIMES TECHIES

THE TIMES OF INDIA

TALROP PRESENTS

TECHNOVATE FOR INDIA

AN INITIATIVE BY THE TIMES OF INDIA

CERTIFICATE

OF PARTICIPATION

This is to certify that Mr. /Ms. P. DINESH KUMAR of

BEHARA COLLEGE OF ENGINEERING & TECHNOLOGY College

has participated in the case competition contest @ **Technovate for India Conclave**

held on 4th NOV 2024, at NOVOTEL - VIZAG

Jones Joseph
Director & COO
Talrop

Ajay Iyer
Senior Vice President
The Times of India


TIMES TECHIES

THE TIMES OF INDIA

TALROP PRESENTS

TECHNOVATE FOR INDIA

AN INITIATIVE BY THE TIMES OF INDIA

CERTIFICATE

OF PARTICIPATION

This is to certify that Mr. /Ms. M. Devi Sri Prasad of

BEHARA COLLEGE OF ENGINEERING AND TECHNOLOGY College

has participated in the case competition contest @ **Technovate for India Conclave**

held on 4th Nov. 2024, at NOVOTEL- VIZAG

Jones Joseph
Director & COO
Talrop

Ajay Iyer
Senior Vice President
The Times of India


TIMES TECHIES

THE TIMES OF INDIA

TALROP PRESENTS

TECHNOVATE FOR INDIA

AN INITIATIVE BY THE TIMES OF INDIA

CERTIFICATE

OF PARTICIPATION

This is to certify that Mr. /Ms. J. LEELAKSHINI of

BEHARA COLLEGE OF ENGINEERING & TECHNOLOGY College

has participated in the case competition contest @ **Technovate for India Conclave**

held on 4th NOV 2024, at NOVOTEL - VIZAG

Jones Joseph
Director & COO
Talrop

Ajay Iyer
Senior Vice President
The Times of India


TIMES TECHIES

THE TIMES OF INDIA

TALROP PRESENTS

TECHNOVATE FOR INDIA

AN INITIATIVE BY THE TIMES OF INDIA

CERTIFICATE

OF PARTICIPATION

This is to certify that Mr. /Ms. GOKINA DINESH of

BEHARA COLLEGE OF ENGINEERING & TECHNOLOGY College

has participated in the case competition contest @ **Technovate for India Conclave**

held on 4th NOV 2024, at NOVOTEL VIZAG

Jones Joseph
Director & COO
Talrop

Ajay Iyer
Senior Vice President
The Times of India




Glimpses of One Day Seminar on "Technovate for India: Igniting Ideas, Empowering Futures" held on 4th December 2024.

# Christ (Deemed to be) University

## Department of AI & Data Science

CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE | DELHI NCR | PUNE

This is to certify that

*Garbham Srikanth*

from

*Behara College Of Engineering And Technology*

has participated in the **FIVE DAYS ONLINE FACULTY DEVELOPMENT PROGRAMME** on **"ADVANCES IN AI FOR HEALTHCARE"** from 5th to 9th January 2026, organised by the Department of AI and Data Science, Christ (Deemed to be) University, Kengeri Campus, Bangalore.

Dr. Michael Moses T,
Head of Department

Dr. Mary Anita E A,
Associate Dean

aitam
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

# CERTIFICATE OF PARTICIPATION

This is to certify that

SASIREKHA U

**Assistant Professor, BEHARA COLLEGE OF ENGINEERING AND TECHNOLOGY, has Successfully Participated in One Week (6 Day) Online Faculty Development Program on *"AI and IoT for Next Generation Smart Healthcare Systems (AINGS-2025)"* Organized by Department of Electronics and Communication Engineering from 15-12-2025 to 20-12-2025.**

| Dr. Kiran Kumar Patro | Dr. V. Ashok Kumar | Dr. A. S Srinivasa Rao | Prof. V. V. Nageswara Rao |
|---|---|---|---|
| Coordinator | Convener | Principal | Director |

*AITAM / ECE / 2025 / 4081*

# BEHARA COLLEGE OF ENGINEERING & TECHNOLOGY

APPROVED BY AICTE NEW DELHI & AFFILIATED TO JNTU-GV, VIZIANAGARAM
88TH WARD, GVMC, VISAKHAPATNAM, ANDHRA PRADESH 530027

Proud Member of nasscom

BRAIN O VISION
Brain O Vision Solutions India Pvt. Ltd.

# CERTIFICATE

## OF PARTICIPATION

PROUDLY PRESENTED TO

## U SASIREKHA

for successfully completing the
Faculty Development Program (**FDP**) on

**"GENERATIVE AI"**

held from **4th August 2025** to **8th August 2025**,
organized by **Brainovision Solutions India Pvt. Ltd.**,
in collaboration with **AICTE (All India Council for Technical Education)**
and hosted by

**BEHARA COLLEGE OF ENGINEERING & TECHNOLOGY**

Your active participation reflects a strong commitment to advancing academic excellence and integrating cutting-edge AI technologies in pedagogy.

ID:FDP25-BOV-BHR-010

**Ganesh Nagu Doddi**
Founder & CEO
Brainovision Solutions India Pvt. Ltd

**Mrs K.S.P.Keerthi**
**Assistant Professor**
**Computer Science and Engineering**

**Mr Ch. Narayana Rao**
**Associate Professor & HOD**
**Computer Science and Engineering**

**Dr V. Sridhar Patnaik**
**Principal**

**Dr Chandrasekhar Buddha**
Chief Coordinating Officer – AICTE
All India Council for Technical Education

ISSUED DATE:09-08-2025

ATAL/2025/1759198213

# ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

**Nelson Mandela Marg, Vasant Kunj, New Delhi -110070**

## AICTE Training and Learning (ATAL) Academy

# *Certificate*

*It is certified that* ***Dr. Devi Bandaru, Associate Professor*** *of* ***Behara Engineering college*** *has successfully participated & completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on* ***Semiconductors for Smart Systems: Applications in IoT, AI and Next-Gen Devices*** *at* ***SHREE SATHYAM COLLEGE OF ENGINEERING AND TECHNOLOGY*** *from* ***06/10/2025*** *to* ***11/10/2025.***

Sujatha V
Professor Level (AICTE Institute), Coordinator
**SHREE SATHYAM COLLEGE OF ENGINEERING AND TECHNOLOGY**

Dr. Sunil Luthra
Director & Bureau Head
**Training and Learning Bureau, AICTE**

ATAL/2025/1764686909

# ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

**Nelson Mandela Marg, Vasant Kunj, New Delhi -110070**

## AICTE Training and Learning (ATAL) Academy

# *Certificate*

*It is certified that* ***Mr. SIVA PRASAD, Assistant Professor*** *of* ***BEHARA COLLEGE OF ENGINEERING TECHNOLOGY*** *has successfully participated & completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on* ***Innovative Trends in Data Science and Electric Mobility: IPR Opportunities and Challenges*** *at* ***BIRLA INSTITUTE OF TECHNOLOGY,MESRA ,OFF CAMPUS DEOGHAR*** *from* ***08/12/2025*** *to* ***13/12/2025.***

[redacted]

Deep Shekhar Acharya
Assistant Professor Level (AICTE Institute), Coordinator
**BIRLA INSTITUTE OF TECHNOLOGY,MESRA ,OFF CAMPUS DEOGHAR**

Dr. Sunil Luthra
Director & Bureau Head
**Training and Learning Bureau, AICTE**

Certificate No: ICT-1908/25

# National Institute of Technical Teachers Training and Research Chandigarh

MINISTRY OF EDUCATION, GOVERNMENT OF INDIA

## Certificate



*This is to certify that*

**GARBHAM SRIKANTH**

**BEHARA COLLEGE OF ENGINEERING AND TECHNOLOGY, NARAVA, VISAKHAPATNAM ANDHRA PRADESH**

*Participated in the AICTE Recognized Faculty Development Programme*

**on**

**Drone Assembly, Fundamentals, and Applications**

*Conducted by*

**Electronics and Communication Engineering Department**

**from**

**30/06/2025 to 04/07/2025 (One Week)**

**at**

**NITTTR, Chandigarh**

Coordinator

Director

# VIGNAN's INSTITUTE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

(Approved by AICTE & Affiliated to JNTU-GV) Accredited by NAAC with 'A+' Grade NBA For UG Programmes of EEE, ECE, CSE & IT

Kapujaggarajupeta, Visakhapatnam

NBA NATIONAL BOARD OF ACCREDITATION CSE | IT | EEE | ECE

A+ ACCREDITED WITH GRADE NAAC

*Certification of Participation*

## INTELLIGENT TECHNOLOGIES AND COMPUTING PARADIGMS FOR THE FUTURE

This is to certify that **SASIREKHA U**

from **18th August to 24th August 2025**

has completed One Week International Short Term Training Program-(ISTTP) on INTELLIGENT TECHNOLOGIES AND COMPUTING PARADIGMS FOR THE FUTURE organized by the Department of Computer Science & Engineering and Information Technology, Vignan's Institute of Engineering for Women (A), Visakhapatnam.

Convenor
Dr. E. Laxmi Lydia

Principal
Dr. B. Arundhati

# NPTEL-AICTE
# Faculty Development Programme

(Funded by the MoE, Govt. of India)



*This certificate is awarded to*

**U SASIREKHA**

*for successfully completing the course*

## Introduction to Machine Learning

*with a consolidated score of* **55** %

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

**(Jul-Oct 2025)**

Roll No: NPTEL25CS91S472402330

Duration of NPTEL course : 12 Weeks

The candidate has studied the above course through MOOCs mode, has submitted online assignments and passed proctored exams.
This certificate is therefore acceptable for promotions under CAS as per AICTE notifications dated 16th Nov, 2023, similar to other refresher / orientation courses.
**F.No. AICTE / RIFD / FDP through MOOCs / 2023**

# VIGNAN's INSTITUTE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)

(Approved by AICTE & Affiliated to JNTU-GV) Accredited by NAAC with 'A+' Grade NBA For UG Programmes of EEE, ECE, CSE & IT

Kapujaggarajupeta, Visakhapatnam

NBA NATIONAL BOARD OF ACCREDITATION CSE | IT | EEE | ECE

A+ ACCREDITED WITH GRADE NAAC

*Certification of Participation*

## INTELLIGENT TECHNOLOGIES AND COMPUTING PARADIGMS FOR THE FUTURE

This is to certify that **Jothsna Kunche**

from **18th August to 24th August 2025**

has completed One Week International Short Term Training Program-(ISTTP) on INTELLIGENT TECHNOLOGIES AND COMPUTING PARADIGMS FOR THE FUTURE organized by the Department of Computer Science & Engineering and Information Technology, Vignan's Institute of Engineering for Women (A), Visakhapatnam.

Convenor
Dr. E. Laxmi Lydia

Principal
Dr. B. Arundhati

# LEARNIX THRIVE

**Crafting Your innovation through Insight**

# CERTIFICATE

## OF PARTICIPATION

**Mrs.SASIREKHA U**

Computer science and Engineering

Behara college of Engineering and technology

has actively participated in Two Days National Level FDP on "**Robotics & Artificial Intelligence**" Organized by Learnix Thrive from 23rd August to 24th August, 2025.

24 August, 2025

**DATE**

**CEO of Learnix Thrive**

VISAKHA
INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Approved by AICTE NEW DELHI & Permanently Affiliated to JNTUGV, Vizianagaram
88th Division, Narava, GVMC, Visakhapatnam, Andhra Pradesh 530027, India
E-mail: vietvsp@gmail.com www.viet.edu.in Ph: 9959617471 / 76 / 77

# PARTICIPATION CERTIFICATE

THIS CERTIFICATE IS PRESENTED TO

## GARBHAM SRIKNTH

From **Visakha institute of engineering and technology** Has Participated And Successfully Completed The One Week National Level Online **Faculty Development Programme** On **"ADVANCED EMBEDDED AND VLSI TECHNOLOGIES FOR SPACE BORNE SYSTEMS AND COMPUTATIONAL INTELLIGENCE"** From 18th To 23rd Dec 2025 Organized By The Department Of Electronics And Communication Engineering, **VISAKHA INSTITUTE OF ENGINEERING & TECHNOLOGY**

**HOD-ECE**

**PRINCIPAL**

ATAL/2025/1736340677

# ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

**Nelson Mandela Marg, Vasant Kunj, New Delhi -110070**

## AICTE Training and Learning (ATAL) Academy

# *Certificate*

*It is certified that* ***Mrs. K.S.P KEERTHI, Assistant Professor*** *of* ***Behara College of Engineering and Technology*** *has successfully participated & completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on* ***Research Advancements in Machine Learning for Engineering Applications*** *at* ***SASI INSTITUTE OF TECHNOLOGY & ENGINEERING*** *from* ***20/01/2025*** *to* ***25/01/2025.***



Lakshminarayana Janjanam
Associate Professor Level (AICTE Institute), Coordinator
**SASI INSTITUTE OF TECHNOLOGY & ENGINEERING**



Dr. Sunil Luthra
Director & Bureau Head
**Training and Learning Bureau, AICTE**

ATAL/2025/1737818904

# ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

**Nelson Mandela Marg, Vasant Kunj, New Delhi -110070**

## AICTE Training and Learning (ATAL) Academy

# *Certificate*

*It is certified that* ***Mrs. K.S.P KEERTHI, Assistant Professor*** *of* ***Behara College of Engineering and Technology*** *has successfully participated & completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on* ***EXPLORING AI USING IBM WATSON AND GOOGLE COLAB*** *at* ***GURUKULA KANGRI VISHWAVIDYALAYA HARIDWAR*** *from* ***03/02/2025*** *to* ***08/02/2025.***

[redacted]

Mayank Aggarwal
Professor Level (AICTE Institute), Coordinator
**GURUKULA KANGRI VISHWAVIDYALAYA HARIDWAR**

Dr. Sunil Luthra
Director & Bureau Head
**Training and Learning Bureau, AICTE**

ATAL/2025/1737014644

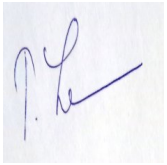
# ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

**Nelson Mandela Marg, Vasant Kunj, New Delhi -110070**

## AICTE Training and Learning (ATAL) Academy

# *Certificate*

*It is certified that* ***Mrs. K.S.P KEERTHI, Assistant Professor*** *of* ***Behara College of Engineering and Technology*** *has successfully participated & completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on* ***Quantum Computing*** *at* ***KARUNYA INSTITUTE OF TECHNOLOGY AND SCIENCES*** *from* ***10/02/2025*** *to* ***15/02/2025.***



T Jemima Jebaseeli
Associate Professor Level (AICTE Institute), Coordinator
**KARUNYA INSTITUTE OF TECHNOLOGY AND SCIENCES**



Dr. Sunil Luthra
Director & Bureau Head
**Training and Learning Bureau, AICTE**

# PBR VISVODAYA INSTITUTE OF TECHNOLOGY & SCIENCE

**(AUTONOMOUS)**

(Affiliated to J.N.T.U.A, Approved by AICTE and Accredited by NAAC)

**KAVALI – 524201, S.P.S.R Nellore Dist., A.P., India.**

VIT-AP UNIVERSITY

## CERTIFICATE OF PARTICIPATION

This certificate is presented to

# K.S.P.KEERTHI

of

## Behara College of Engineering and Technology

for the successful completion of one week Faculty Development Program (FDP) on "**OBE & NEP 2020**", during 10th to 14th June 2024, jointly organized by **Internal Quality Assurance Cell - IQAC**, **PBR VITS**, Kavali and **VIT-AP University**, Amaravathi.

**Eminent Speakers**

*Dr. P S Rama Sreekanth, Director, RAAC, VIT-AP  * Dr. Chandu D S, Asst. Director, RAAC, VIT-AP

Co-Coordinator, IQAC

Coordinator, IQAC

# BEHARA

## COLLEGE OF ENGINEERING AND TECHNOLOGY

Approved by AICTE NEW DELHI & Affiliated to JNTU-GV, Vizianagaram
88th Division, Narava, GVMC, Visakhapatnam, Andhra Pradesh 530027, India
e-mail: beharaenggclg@gmail.com www.bcet.in

# CERTIFICATE

## OF PARTICIPATION

**THIS CERTIFICATE IS PRESENTED TO**

**K.S.P.KEERTHI**
**ASSISTANT PROFESSOR**
**BEHARA COLLEGE OF ENGINEERING AND TECHNOLOGY**

has successfully participated in a One-Day Professional Development Program on 'Introduction to Machine Learning for Cyber Security,' organized by the Department of Computer Science and Engineering, Behara College of Engineering and Technology, in collaboration with Pencil Bitz on 24th December 2024

**Mr. Ch NarayanaRao**
Associate Professor & HoD
Computer Science and Engineering

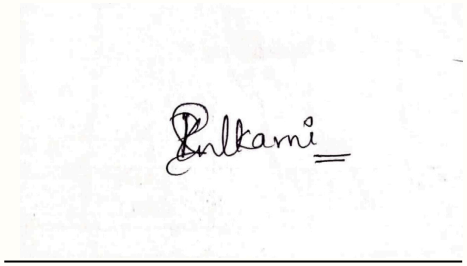
**Dr V Sridhar Patnaik**
Principal

**Sangeetha Subramaniam**
Founder & CEO Pencil bitz

# PES UNIVERSITY

## INTERNATIONAL FDP
## ON
## 'HIGHER EDUCATION IN AN AI CENTERED WORLD'

This is to certify that **K.S.P.KEERTHI** has participated in the International FDP organized by the Faculty of Management & Commerce in association with Centre of Excellence - Centre for Sustainability and Business - PES University - Bengaluru - India on 17th September 2024.



**Pavan Kulkarni**
**Director - Centre for Sustainability & Business**
**PES University**



**Dr.Shailashree Haridas**
**Dean - Faculty of Management & Commerce**
**PES University**

# AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

## (AUTONOMOUS)

NAAC Accredited with A+ grade, Permanently affiliated to JNTU-GV

Tamaram (V), Makavarapalem, Anakapalle Dist, Pin-531113.

## PARTICIPATION CERTIFICATE

This is to Certify that **K.S.P.KEERTHI, ASSISTANT PROFESSOR , CSE** of ***Behara College of Engineering and Technology*** has participated in One-Week Online Faculty Development Program on "**Next-Generation IoT: The Convergence of Designing Robust and Scalable Applications**" organised by the Department of Electronics and Communication Engineering, Avanthi Institute of Engineering and Technology (A), Makavarapalem from 02-12-2024 to 07-12-2024.

| Dr. C.P.V.N.J.Mohan Rao | Dr. E.Govinda | Dr. R.Prasad Rao |
|---|---|---|
| Co- Patron | Co-Ordinator | Co- Coordinator |

# Certificate Of Participation

**Awarded To**

## K S P Keerthi

Participated in 5 Days International Faculty Development Program on
**Gen-AI and Prompt Engineering Using Microsoft Co-Pilot**
organized by BNM Institute of Technology Bangalore (BNMIT) – Karnataka,
D.Y. Patil Agriculture and Technical University Talsande – Maharashtra,
and Marwadi University Rajkot - Gujarat in Collaboration with ExcelR Edtech Pvt. Ltd.
**Date:** 16th Sep to 20th Sep 2024.

**Dr. S Y Kulkarni**
Principal
BNM Institute of Technology

**Dr. Rajendrasinh B Jadeja**
Principal
Marwadi University

**Prof. (Dr.) K. Prathapan**
Vice Chancellor
D Y Patil Agriculture and Technical University

**Ram Tavva**
CEO,
ExcelR Edtech Pvt. Ltd.

Cert No: EXCELR-FDP-79464/26092024

# ANDHRA LOYOLA COLLEGE (AUTONOMOUS), VIJAYAWADA

## Department of Business Administration

# CERTIFICATE OF PARTICIPATION

This certificate is proudly presented to

***K.S.P.KEERTHI,***

***Assistant professor ,***

***Behara College of Engineering and Technology ,***

has attended the Faculty Development Programme on **"AI Tools and Techniques for Research"** organized by the **Department of Business Administration & IQAC, Andhra Loyola College,** from 9th to 13th December, 2024

| Dr.B.R.Kumar | Dr.A.Madhuri | Rev.Fr.Dr.G.A.P.Kishore,SJ |
|---|---|---|
| Coordinator | Convener | Principal |

# MOHAN BABU UNIVERSITY

Sree Sainath Nagar, Tirupati – 517 102

Cert No: AWS-FDP-137

## Certificate of Participation

This is to certify that Mr. / Ms. / Dr. **K.S.P. KEERTHI, Assistant Professor, Behara College of Engineering and Technology** has actively participated and successfully completed One Week Virtual Hands-on Faculty Development Program on "**Cloud Computing Using AWS**" organized by Mohan Babu University, Tirupati in collaboration with APSSDC, Guntur from 08-07-2024 to 13-07-2024.

Dr. B.M. Sathish
Dean, SOE&C

Dr. K. Ramani
Convener

NXT WAVE™

# Certificate of Appreciation

VERIFIED ACHIEVEMENT

Issued to

## K.S.P.KEERTHI

Assistant Professor

has played an instrumental role executing the workshop 'AI for Students: **Build Your Own Generative AI Model'** conducted by **AI expert and IIT Delhi alumnus, Mr. Trivikrama.**
The workshop is designed to equip students with skills essential in the AI era.

Issue Date:7/13/2024

Rahul A
CEO, NxtWave

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

(UGC - AUTONOMOUS INSTITUTION)

Madanapalle - 517325, Annamayya Dist., Andhra Pradesh, India

## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE)

INSTITUTION'S INNOVATION COUNCIL (Ministry of Education Initiative)

# CERTIFICATE OF PARTICIPATION

**This is to certify that**

**Mrs.K.S.P.KEERTHI,Asst. Professor**

Behara College of Engineering and Technology

**has completed Five Days National Level Online Faculty Development Programme on "Artificial Intelligence & Data Analytics " from 16.09.2024 to 20.09.2024 organized by Department of Computer Science & Engineering (Artificial Intelligence) Madanapalle Institute of Technology & Science , Madanapalle - 517325.**

**Dr. S. Sathya**
**Co - ordinator**

**Dr. K. Chokkanathan**
**Head of the Department**

**Dr. C. Yuvaraj**
**Principal**

BEHARA
COLLEGE OF ENGINEERING AND TECHNOLOGY
Approved by AICTE NEW DELHI & Affiliated to JNTU-GV, Vizianagaram
88th Division, Narava, GVMC, Visakhapatnam, Andhra Pradesh 530027, India
e-mail: beharaenggclg@gmail.com, principal@beharaengg.edu.in www.bcet.in Ph: 9666637234

Human-like AI
ANUVADINI

BRAIN O VISION
Brain O Vision Solutions India Pvt. Ltd...

# CERTIFICATE

of participation

ID: NFDP-BBH010

This certificate is proudly awarded to

## KANTHIMAHANTI SUMA PURNIMA KEERTHI

has successfully Participated in the
One Week National Level **Faculty Development Program** on **AI Tools organized** by

## Behara College of Engineering and Technology

in association with
**Brainovision Solutions India Pvt Ltd**
in collaboration with
**All India Council For Technical Education (AICTE)**
During the period of **17th to 21st February 2025.**
We commend your dedication to enhancing your knowledge with **AI TOOLS**.

**Mr Chokkapu NarayanaRao**
**Associate Professor & HOD**

**Dr V Sridhar Patnaik**
**Principal**

**GANESH NAGU DODDI**
*Founder & CEO*
*Brainovision Solutions India Pvt. Ltd.*

**Dr. BUDDHA CHANDRASEKHAR**
Chief Coordinating Officer- AICTE
All India Council for Technical Education

**Periyar Maniammai Institute of Science & Technology**

( Deemed to be university ) , Vallam , Thanjavur

Pantech e Learning
DIGITAL LEARNING SIMPLIFIED

# CERTIFICATE OF COMPLETION

Cert No **PMPSFDP1464**

## FACULTY DEVELOPMENT PROGRAMME

proudly presented to

## Mrs.K.S.P.KEERTHI

**BEHARA COLLEGE OF ENGINEERING AND TECHNOLOGY**

for successful participation and completion of

**ONE WEEK NATIONAL LEVEL FACULTY DEVELOPMENT PROGRAMME on**

**RECENT ADVANCEMENTS IN AI & IOT - INDUSTRY PERSPECTIVE**

organised by Department of Computer Applications ,

**Periyar Maniammai Institute of Science & Technology (PMIST)**, Vallam,

Thanjavur in association with Pantech Solutions

during the Period 25/11/2024 - 30/11/2024.

| Dr. G. Preethi | Mr. M. Anand | Dr. D. Ruby | Dr. D. Maghesh Kumar | Mr.Senthilkumar.M R |
|---|---|---|---|---|
| Co- Convenor, AP(SG) , PMIST | Co- Convenor, AP(SG) , PMIST | HoD/CA, PMIST | Dean / FCSA, PMIST | Director - Technical , Pantech Group |

Pantech e Learning
DIGITAL LEARNING SIMPLIFIED

# CERTIFICATE OF PARTICIPATION

BEHARA EDUCATIONAL INSTITUTIONS
Narava, Visakhapatnam

This is to certify that

## KANTHIMAHANTI SUMA PURNIMA KEERTHI

has actively participated

in **1 Week Faculty Development Programme** on **Business Intelligence using Python**
from **19 May to 23 May 2025**, Organized by Department of Computer Science and Engineering,
**Behara College of Engineering and Technology** in association with **Pantech e Learning.**

**M R Senthil Kumar**
Director, Pantech e-Learning Pvt. Ltd.

**Dr. v. Sridhar Patnaik**
Principal, BCET

**Ch NarayanaRao**
HOD CSE, BCET

Human-like AI
ANUVADINI

BRAIN O VISION
Brain O Vision Solutions India Pvt. Ltd.

# Certificate of Faculty Participation

## NATIONAL LEVEL SHORT TERM TRAINING PROGRAM -2K24

On JAVA Full Stack with React JS & AI

**Proudly Presented to** **ID: NSTTP-BOF-380**

## K.S.P. KEERTHI

Organized by Behara College of Engineering & Technology,
In Association with Brainovision Solutions India Pvt. Ltd., Hyderabad, Telangana.
and All India Council for Technical Education(AICTE).
During the period Dec 2nd- Dec 22nd, 2024.
"Congratulations and best wishes on your remarkable achievement!"

**Ganesh Nagu Doddi**
Founder & CEO
Brainovision Solutions India Pvt. Ltd

BRAIN O VISION SOLUTIONS INDIA PVT. LTD. HYDERABAD

**Dr.Buddha Chandrasekhar**
Chief Coordinating Officer - AICTE
All India Council for Technical Education

# Institute for Excellence in Higher Education, Bhopal, Madhya Pradesh, India

## Two Days National Webinar on

Innovative Research Methodologies & Best Practices - 26th & 27th June 2024

# *Certificate of Participation*

**This is to certify that Prof./Dr./Mrs./Ms./Mr. K.S.P.KEERTHI, Assistant Professor, Behara College of Engineering and Technology has participated in Two day National Webinar on Innovative Research Methodologies & Best Practices organized by IQAC, IEHE Bhopal on 26th-27th June 2024**

**Dr. Manoj Ughade**
**Organizing Secretary**

**Dr. Ram Milan Singh**
**Convener**

**Dr. Anuj Hundet**
**Coordinator IQAC**

**Dr Pragyesh Kumar Agrawal**
**Director**

Elite

# NPTEL ONLINE CERTIFICATION

(Funded by the MoE, Govt. of India)

Skill India
कौशल भारत - कुशल भारत



*This certificate is awarded to*

**KANTHIMAHANTI SUMA PURNIMA KEERTHI**

*for successfully completing the course*

## Research Methodology

*with a consolidated score of* **77** %

| | | | |
|---|---|---|---|
| Online Assignments | 25/25 | Proctored Exam | 52/75 |

*Total number of candidates certified in this course:* **4905**

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Centre for Outreach and Digital Education, IITM

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This is to certify that

**Kanthimahanti Suma Purnima Keerthi , Assistant Professor ,**

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| Mr. P. Lakshmana Rao | Dr. T.Naresh | Dr. A. S Srinivasa Rao | Prof. V. V. Nageswara Rao |
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This is to certify that

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of

**Behara College of Engineering and Technology, Andhra Pradesh**

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Abhay Jere

**Dr. Abhay Jere**
Chief Innovation Officer
MoE's Innovation Cell

Dipan Sahu

**Mr. Dipan Sahu**
Assistant Innovation Director
MoE's Innovation Cell

**Date:** 21-01-2026 **IIC ID:** IC202431051 **E-certificate No:** IA/Foundation/1083107

Certificate Id : VNRVJIETBB0443

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*Of Participation*

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*Conducted by*

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**at**

**NITTTR, Chandigarh**

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SASIREKHA U

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Manvendra Pratap Singh
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PROF.(DR)HIMMATSINH RAJPUT
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J. Padmavathi

**Mrs. J.Padmavathi**
**Assoc.Professor & HOD**

**Mr.Ch.S.V.Satyanarayana**
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ASSOCIATE PROFESSOR ,BEHARA COLLEGE OF ENGINEERING AND TECHNOLOGY, VISAKHAPATNAM

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This is to certify that **Ms SEERAPU NIKITHA** of **BEHERA Engineering College,Visakhapatnam**, Andhra Pradesh has participated in the Six days Online Faculty Development Programme on "Applications of Mathematics in Engineering and Sciences" organized by Department of Humanities and Sciences, **Sri Venkateswara Institute of Science & Technology, Kadapa,** held from **14th - 19th October 2024**

| Dr. C. Mallikarjuna Reddy | Prof. A. Chandra Obula Reddy | Prof. C. Raja Gopal Reddy | Er. R. Sai Saran Reddy |
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| (Dr. Y. Aditya) | (Dr. A. Ganapathi Rao) | (Dr. R.L. Naidu) | (Dr. H.P. Rani) | (Dr. C.L.V.R.S.V. Prasad) |
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Dean, International Relations and Outreach
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**Aug-Oct 2024**

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**ISBN NO: 978-93-6674-749-1**
**Year of Allotment of ISBN: 2025**

**Editor-in-Chief**

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at **Behara college of engineering and technology**

for successfully completing the training in a

Five Day Faculty Development Program on

**"ARTIFICIAL INTELLIGENCE APPLICATIONS IN ECE AND EEE"** conducted by

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on 05.03.2025 - 11.03.2025

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# A study of a single-layer porous journal bearing under turbulent conditions with Newtonian lubrication

**Siva Prasad Mattaparthi[1], Anil Singh[2*], Shaik Mozammil[3]**

Department of Mechanical Engineering

C. V. Raman Global University, Bhubaneswar, Odisha

*Corresponding author: anilsingh0191@gmail.com

**Abstract:**

*The goal of this numerical study is to examine how well a porous journal bearing system functions when subjected to turbulent flow conditions. The finite element method is used to solve the Reynolds equation that governs the flow of Newtonian lubricant in the clearance space of porous journal bearings. The performance has been numerically simulated using Constantinescu's turbulent lubrication theory. Bearings operating under turbulent flow conditions produce a greater value of minimum fluid film thickness, according to numerical simulation results. Academics and bearing designers should find this study useful.*

**Keywords:** Reynolds equation; Finite element method; Porous bearing system; Turbulent Regime.

## 1. Introduction

The ability of the lubricant to permeate through numerous pores plays a vital role in ensuring a uniform pressure distribution over the journal surface in porous fluid film bearing systems. Owing to this characteristic, such bearings outperform conventional recessed bearings. The foundational work in this area was first reported by Cameron and Morgan [1], who developed a theoretical framework to analyze the lubrication behavior of porous journal bearings under hydrodynamic conditions. Subsequently, Cameron et al. [2] extended this research in 1962 by investigating porous metal bearings operating under hydrodynamic lubrication. Cusano [3] theoretically analyzed the static performance characteristics of finite porous bearing systems, taking into account the influence of permeability parameters. Murti [4] conducted a theoretical investigation on porous journal bearing systems operating with varying permeability parameters. Later, Rouleau and Rhodes [5] studied the influence of the permeability parameter on the performance of porous journal bearings using the Darcy equation, considering permeability values in the range of 0.001 to 0.1. Howarth [6] conducted both computational and experimental studies on porous journal bearings designed for circular thrust bearing applications. In a theoretical investigation, Chattopadhyay et al. [7] analyzed the stability of a rigid rotor supported by a porous hydrostatic bearing system. Turbulent lubricant flow is typically observed under conditions of high journal speed, low lubricant viscosity (as in the case of liquid metals, water, or synthetic lubricants), and large bearing clearance. Hashimoto et al. [8] further examined the wear characteristics of hydrodynamic journal bearings operating under both turbulent and laminar flow conditions. Taylor [9] was the first to introduce the concept of turbulent flow between concentric cylinders and provided a mathematical formulation to assess the stability of journal bearings. Subsequently, Wilcock [10] experimentally examined the effects of turbulence in fluid film bearings and observed a significant improvement in load-carrying capacity and a reduction in frictional drag losses.

The present study therefore aims to investigate the effect of turbulent flow conditions on the performance characteristics of single-layer porous journal bearing. The numerical results obtained from this work are expected to provide valuable insights for researchers and practicing engineers in the field.

## 2. Modelling

The non-dimensional modified Reynolds equation regulating the Newtonian lubricant in the clearance space of a single-layered porous journal bearing system is expressed as follows [2,3,8]:

$$\frac{\partial}{\partial \alpha}\left[\left(\frac{\bar{h}^3}{G_\alpha \bar{\mu}}+\frac{\Psi}{\bar{\mu}}\right)\frac{\partial \bar{p}}{\partial \alpha}\right]+\frac{\partial}{\partial \beta}\left[\left(\frac{\bar{h}^3}{G_\beta \bar{\mu}}+\frac{\Psi}{\bar{\mu}}\right)\frac{\partial \bar{p}}{\partial \beta}\right] = \frac{\Omega}{2}\frac{\partial \bar{h}}{\partial \alpha}+\frac{\partial \bar{h}}{\partial \bar{t}} \quad (1)$$

### 2.1 Fluid film thickness:

In non-dimensional form, the expression for fluid film thickness is as follows:

$$\bar{h} = 1 - \bar{X}_j \cos\alpha - \bar{Z}_j \sin\alpha \quad (2)$$

### 2.2 Finite element formulation

The modified Reynolds equation (1) was solved using the Galerkin finite element method (FEM). The fluid flow

domain was discretized into four-node isoparametric quadrilateral elements. A linear relationship between the variation in fluid film pressure and the corresponding element area was assumed.

$$\bar{p} = \sum_{j=1}^{n^e} N_j \bar{p}_j$$

The following system-level equation is derived from (1) by applying Galerkin's orthogonality condition:

$$[\bar{F}_{ij}]^e\{\bar{P}_j\}^e = \{\bar{Q}_j\}^e + \Omega\{\bar{R}_{Hj}\}^e + \bar{X}_j\{\bar{R}_{Xj}\}^e + \bar{Z}_j\{\bar{R}_{Zj}\}^e \quad (3)$$

Here

$$[\bar{F}_{ij}]^e = \iint_{A^e}\left[\left\{\frac{\bar{h}^3}{G_\alpha \bar{\mu}} + \frac{\Psi}{\bar{\mu}}\right\}\left(\frac{\partial N_i}{\partial \alpha}\frac{\partial N_j}{\partial \alpha} + \frac{\partial N_i}{\partial \beta}\frac{\partial N_j}{\partial \beta}\right)\right] d\alpha d\beta$$

(3a)

$$\{\bar{Q}_j\}^e = \oint_{\Gamma^e}\left\{\frac{\bar{h}^3}{G_\alpha \bar{\mu}} + \frac{\Psi}{\bar{\mu}}\right\}\left(\frac{\partial \bar{p}}{\partial \alpha} n_\alpha + \frac{\partial \bar{p}}{\partial \beta} n_\beta\right) N_i \, d\Gamma - \frac{\Omega}{2}\oint_{\Gamma^e} N_i \bar{h} \, n_\alpha d\Gamma \quad (3b)$$

$$\{\bar{R}_{Hj}\}^e = \frac{1}{2}\iint_{A^e} \bar{h}\frac{\partial N_i}{\partial \alpha} d\alpha d\beta \quad (3c)$$

$$\{\bar{R}_{Xj}\}^e = \iint_{A^e} N_i \cos\alpha \, d\alpha d\beta \quad (3d)$$

$$\{\bar{R}_{Zj}\}^e = \iint_{A^e} N_i \sin\alpha \, d\alpha d\beta \quad (3e)$$

where,(i, j = 1,2,3,4). and$n_\alpha$ ,$n_\beta$ are the respectively in the cosines direction.

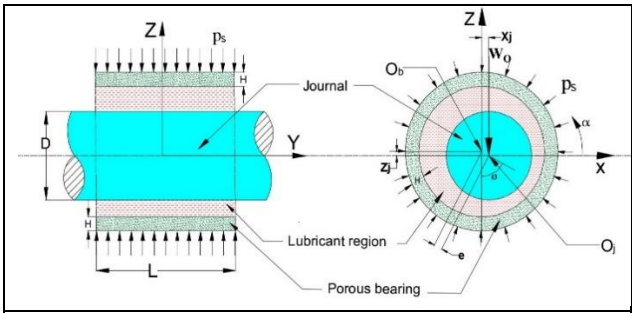



**Figure 1:** Schematic view of single-layered porous journal bearing

### 2.3 Performances characteristics:

Calculated static and dynamic performance parameters of a porous hybrid journal bearing are below:

***Resultant fluid film reaction*** $(\bar{F}_o)$***:***

$$\bar{F}_o = \sqrt{\bar{F}_{xo}^2 + \bar{F}_{zo}^2}$$

Here,

$$\bar{F}_{xo} = \iint_{\Omega^e} \bar{p} \cos\alpha \, d\alpha d\beta$$

$$\bar{F}_{zo} = \iint_{\Omega^e} \bar{p} \sin\alpha \, d\alpha d\beta$$

***Fluid film stiffness and damping coefficients*** $(\bar{S}_{ij}$ ***and*** $\bar{C}_{ij})$***:***

$\bar{S}_{ij} = -\frac{\partial \bar{F}_i}{\partial \bar{q}}$, and $\bar{C}_{ij} = -\frac{\partial \bar{F}_i}{\partial \dot{\bar{q}}}$ $(i = x, z;\ j = x, z;\ \bar{q} = \bar{X}_j, \bar{Z}_j;\ \dot{\bar{q}} = \dot{\bar{X}}_j, \dot{\bar{Z}}_j)$

$$\begin{bmatrix} \bar{S}_{xx} & \bar{S}_{xz} \\ \bar{S}_{zx} & \bar{S}_{zz} \end{bmatrix} = \begin{bmatrix} -\frac{\partial}{\partial \bar{X}_j}\iint_{\Omega^e} \bar{p} \cos\alpha \, d\alpha d\beta & -\frac{\partial}{\partial \bar{Z}_j}\iint_{\Omega^e} \bar{p} \cos\alpha \, d\alpha d\beta \\ -\frac{\partial}{\partial \bar{X}_j}\iint_{\Omega^e} \bar{p} \sin\alpha \, d\alpha d\beta & -\frac{\partial}{\partial \bar{Z}_j}\iint_{\Omega^e} \bar{p} \sin\alpha \, d\alpha d\beta \end{bmatrix}$$

$$\begin{bmatrix} \bar{C}_{xx} & \bar{C}_{xz} \\ \bar{C}_{zx} & \bar{C}_{zz} \end{bmatrix} = \begin{bmatrix} -\frac{\partial}{\partial \dot{\bar{X}}_j}\iint_{\Omega^e} \bar{p} \cos\alpha \, d\alpha d\beta & -\frac{\partial}{\partial \dot{\bar{Z}}_j}\iint_{\Omega^e} \bar{p} \cos\alpha \, d\alpha d\beta \\ -\frac{\partial}{\partial \dot{\bar{X}}_j}\iint_{\Omega^e} \bar{p} \sin\alpha \, d\alpha d\beta & -\frac{\partial}{\partial \dot{\bar{Z}}_j}\iint_{\Omega^e} \bar{p} \sin\alpha \, d\alpha d\beta \end{bmatrix}.$$

***Stability threshold speed margin*** $(\bar{\omega}_{th})$

$\bar{\omega}_{th}$ can be obtained in terms of $\bar{M}_c$ is expressed as:

$$\bar{\omega}_{th} = \left[\bar{M}_c / \bar{F}_o\right]^{1/2}$$

***Boundary Conditions:***

The boundary conditions used for a porous journal bearing system are given as:

$$\bar{p}\,(\alpha, \pm 1) = \bar{p}_1(\alpha, \pm 1, \bar{z}) = 0$$

$$\bar{p}_1(\alpha, \beta, 0) = \bar{p}\,(\alpha, \beta)$$

$$\bar{p}_1(\alpha, \beta, -1) = 1$$

## 3. Results and Discussion

This study determines the performance characteristics of porous hybrid journal bearings (PHJBs). A MATLAB-based source code was developed using the finite element method (FEM) to compute the performance parameters of the bearing system. The carefully selected operating and geometric parameters of the porous hybrid journal bearing used in this work are presented in Table 1, based on the published literature [1, 2, 4, 6–10].

**Table 1.** Geometric and Operating parameters of porous hybrid journal bearing [1,2,4,6,7, 8, 9,10].

| **Parameters** | **Value/Range** |
|---|---|
| Aspect ratio of bearing $\left(\lambda = \frac{L}{D}\right)$ | 1 |
| Sommerfeld number $(S_o)$ | 0.20-0.45 |
| Reynolds number $(R_e)$ | 5000 |
| Speed parameter $(\Omega)$ | 1.0 |
| Permeability parameter $(\Psi)$ | 0.005, 0.01 |

**Minimum fluid film thickness** $(\bar{h}_{min})$

The effect of laminar and turbulent flow conditions on the fluctuation of $\bar{h}_{min}$ with $S_o$ is shown in Fig. 2. As the Sommerfeld number $(S_o)$ increases, the value of $\bar{h}_{min}$ gets larger, as shown in Fig. 2. In addition, operating in turbulent flow conditions, the porous hybrid journal

bearing provides a larger value of $\bar{h}_{min}$ compared to laminar flow conditions.

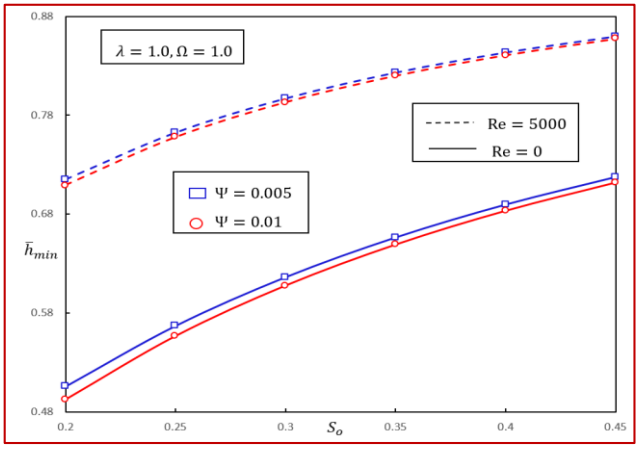



**Figure 2.** Variation of Minimum Fluid Film thickness $(\bar{h}_{min})$ with Sommerfeld number $(S_0)$

**Fluid film stiffness coefficient $(\bar{S}_{xx})$**

Fig. 3 shows that with an increase in the Sommerfeld number $(S_0)$, the value of $\bar{S}_{xx}$ decreases. It is also observed that $\bar{S}_{xx}$ reduces with the rise in permeability parameter from $\Psi = 0.005$ to $\Psi = 0.01$. Furthermore, the porous hybrid journal bearing operating under turbulent flow conditions exhibits higher $\bar{S}_{xx}$ values compared to those under laminar flow conditions.

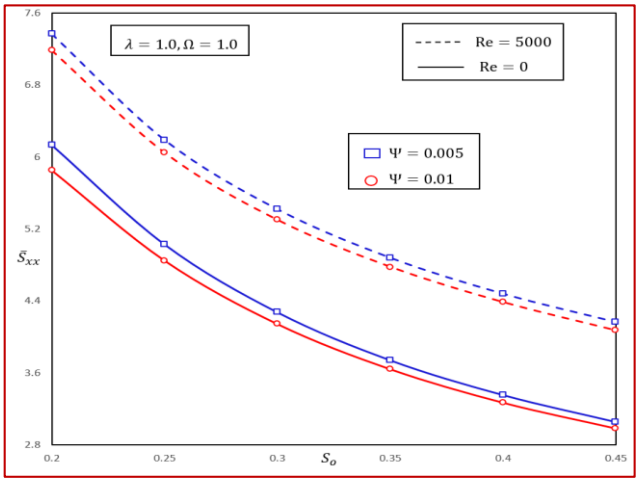



**Figure 3.** Variation of Fluid Film Stiffness Coefficient $(\bar{S}_{xx})$ with Sommerfeld number $(S_0)$

**Fluid film damping coefficient $(\bar{C}_{xx})$**

To assess the effect of laminar and turbulent flow conditions, the variation of $\bar{C}_{xx}$ with respect to the Sommerfeld number $(S_0)$ is presented in Fig. 4. As $S_0$ increases, the value of $\bar{C}_{xx}$ decreases. Moreover, bearings operating under turbulent flow conditions exhibit higher $\bar{C}_{xx}$ values compared to those under laminar flow conditions.

**Stability threshold speed margin $(\bar{\omega}_{th})$**

Fig. 5 illustrates the variation of $\bar{\omega}_{th}$ with the Sommerfeld number $(S_o)$ under both turbulent and laminar flow conditions. It can be observed that for a porous hybrid journal bearing operating in turbulent flow regime, $\bar{\omega}_{th}$ increases with the rise in $S_o$ for both permeability parameters ($\Psi = 0.005$ and $\Psi = 0.01$).

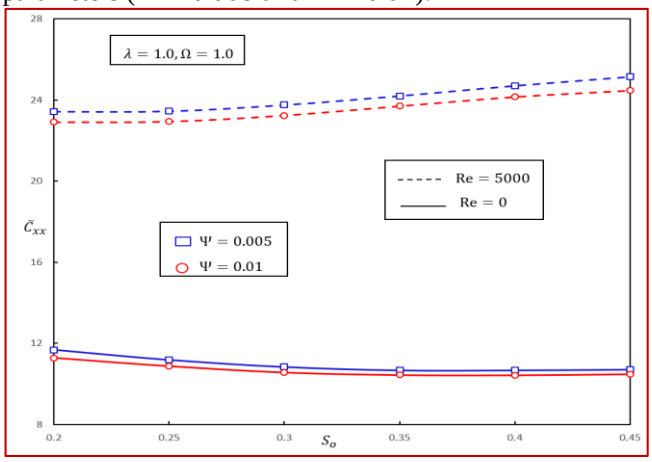



**Figure 4.** Variation of Fluid Film Damping Coefficient $(\bar{C}_{xx})$ with Sommerfeld number $(S_0)$

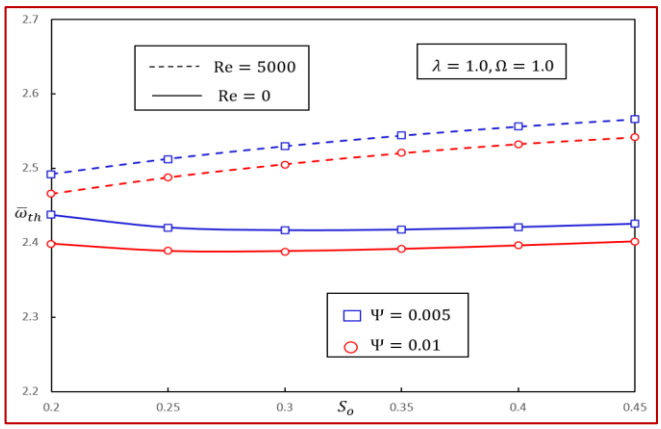



**Figure 5.** Variation of stability threshold speed $(\bar{\omega}_{th})$ with Sommerfeld number $(S_0)$.

## 4. CONCLUSION:

- As the Sommerfeld number $(S_0)$ increases, the value of $\bar{h}_{min}$ improves. Additionally, it is observed that the bearing operating under a turbulent flow regime exhibits a higher value of $\bar{h}_{min}$ compared to that under a laminar flow regime.
- For the bearing working under turbulent flow regime, the value of fluid film stiffness $(\bar{S}_{xx})$ gets increased with respect to laminar flow regime.
- Fluid film damping coefficient $(\bar{C}_{xx})$ is lower for a porous hybrid journal bearing operating under a laminar flow regime compared to that under a turbulent flow regime.

- The stability threshold speed margin ($\overline{\omega}_{th}$) increases when the porous journal bearing operates under a turbulent flow regime.

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2025 Second International Conference on Networks and Soft Computing (ICNSoC) | 979-8-3315-3844-6/25/$31.00 ©2025 IEEE | DOI: 10.1109/ICNSOC66817.2025.00137

# Hemangioma Medicinal Image Performance Assessment for effective segmentation using HIPI Architecture

1st Hemanth Kumar Vasireddi
*Dept of CSE*
*GITAM University*
Vishakhapatnam, INDIA
hvasired@gitam.edu

2nd Suganya Devi K
*Dept of CSE*
*NIT, Silchar*
Silchar, INDIA
suganya@cse.nits.ac.in

3rd Narayana Rao Ch
*Dept of CSE*
*Behara College of Engineering and Technology*
Vishakhapatnam, INDIA
narayanarao.chokkapu@gmail.com

4th Dr. Riju Bhattacharya
*Dept of CSE*
*GITAM University*
Vishakhapatnam, INDIA
rbhattac2@gitam.edu

***Abstract*—Hemangioma is a tumor caused by abnormal blood vessel development and is categorized into proliferation, involution, and plateau phases. The proliferation phase is the most critical and must be detected early after birth, as neglecting it can lead to complications like ulceration, vision loss, or life-threatening issues. To address this, a computer-aided diagnosis system is essential to determine whether treatment is needed to halt progression. This paper aims to develop a screening system that identifies the most suitable image modality for accurate hemangioma lesion segmentation. Existing methods mostly rely on photographic images and fail across other modalities. Motivated by this gap, we analyze multiple hemangioma image modalities using a big data framework. Our findings show that MRI images provide superior pixel intensity and segmentation accuracy, making them the most effective for diagnosing hemangioma lesions among the modalities studied.**

***Index Terms*—Hemangioma; lesion segmentation; Image modalities; Computer-aided-diagnosis; Map reduce; HIPI; HDFS**

## I. Introduction

The term Big Data refers to a problem that produces vast amounts of data from different sources like Ecommerce applications, Surveillance, Sensors, etc. A big challenge is the storage and processing of data generated from different heterogeneous sources. Traditional systems, such as RDBMS, were unable to address these issues because they were confined to a homogeneous type of data.

Electronic multimedia in health care includes medical images generated through various modes of imagery, such as photographic images, CT scan, MRI and so on, for diagnostic reports, health insurance reports, medical and scientific research journals, laboratory experimental results, etc. by using every patient's records. The implementations that have been carried out in the past experiments will produce the results precisely as required, but may lag behind in the execution of distributed parallel computing. To solve this, we're working on a Hadoop environment which is an integration of HDFS and Map reduce. Hadoop distributed file system (HDFS) is used to store large volumes of medical images and Map reduce is a programming model that performs parallel distributed computing using a map and reduce functions. The Hadoop Image Processing Interface (HIPI) is a tool designed for the Hadoop framework, enabling parallel processing of medical images. It utilizes map and reduce functions to analyze images efficiently and stores the resulting output in the Hadoop Distributed File System (HDFS).

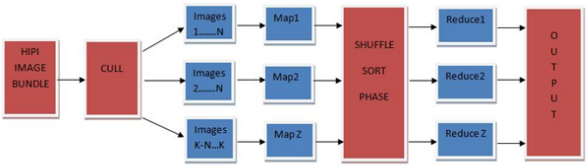



Fig. 1. HIPI Architecture

The Hadoop Image Processing Interface (HIPI) framework is utilized for managing and analyzing various image types, particularly those relevant to the segmentation of Hemangioma lesions [1]. It facilitates efficient and high-speed image processing through the integration of a mapping approach that functions within a distributed computing environment. HIPI provides an effective means to store extensive image datasets on the Hadoop Distributed File System (HDFS), ensuring both accessibility and support for distributed and parallel computation frameworks [2]. An overview of HIPI's operational structure is presented in Figure 1 .

HIPI primarily uses the HIPI Image Bundle (HIB), which consolidates multiple images into a single HDFS file. The

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DOI 10.1109/ICNSoC66817.2025.00137



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processing mechanism in HIPI enables selective extraction of images from HIB based on predefined criteria. The use of the Cull class within this stage allows for enhanced adaptability while also reducing the processing burden, as images are not fully decoded unless required [3]. Qualified images from the Cull stage are then assigned to specific map tasks, maximizing data locality—one of the significant benefits of the map-reduce paradigm. This approach is implemented using the HIBI input format class. Outputs generated by the map phase are forwarded to the reduce phase using the default map-reduce strategy, which includes a shuffle and sort step to reduce network overhead. Finally, the user-defined reduce tasks are executed in parallel, and the results are stored back into HDFS [4].

Different Image modalities utilized with Hemangioma lesion segmentation include Hemangioma photographic images, MRI images and CT scan images. Image segmentation in terms of photographic images requires pre-processing as an initial step [5], and prior to this photographic image Hemangioma was captured in different lighting conditions with a child in different positions [6]. For each image, the Hemangioma area affected will be extracted as the Area of Interest (ROI) and manually labeled as Hemangioma pixels and Non Hemangioma pixels by an expert in two groups [7] . The labeled images were used to evaluate the output using the required algorithms [8].

For another Hemangioma modality, CT image were taken as input by the proposed system architecture and implements an efficient segmentation [9]. A CT scanner has a rotating part with two main components: an X-ray tube on one side and a detector on the opposite side. Following the segmentation process, the appropriate evaluation of the ROI with the Hemangioma area will be taken out and the reducing phase for analysis will be carried out.

MRI is another mode of Hemangioma images and will process the images as inputs to the proposed architecture and perform Hemangioma lesion segmentation using the appropriate algorithm and an analysis is performed on the MRI images [10].

After processing all these different types of image modalities as inputs to the architecture, they were all evaluated and compared in terms of time of execution [11] by using the throughput as an efficient parameter and drawing the required conclusions. The other sections of the paper were mentioned as follows:
Section II mentions the methods relevant to the field of computer science for hemangioma lesion segmentation, Section III demonstrates the required system architecture for suggesting the better hemangioma lesion segmentation process for different image modalities. Section IV projects the results that will be generated on the basis of the proposed algorithm and the required conclusion and future work will be addressed in the final section.

## II. Related Work

Pedro G Alves et al. [12] proposed an Automated Evaluation Method (CAD) for clinicians to access treatment efficacy about lesion segmentation for patients. Their proposed work examines the automated segmentation of lesion in Infantile Hemangioma using deep learning methodologies and also tests Transfer learning techniques to benefit from the information acquired from other skin lesions for an efficient collection of training data.

Catalina Neghina et al. [13] proposed a method for automatic detection of Hemangioma regions using algorithm cascade: a self-organizing map (SOM) for the clustering of image pixels in classes followed by morphological operations required to minimize the number of classes into two, Hemangioma and Non-Hemangioma. They used FCM for comparison to assess the efficiency of their proposed algorithm, and were evaluated on 33 photographic images of Hemangioma.

Serban Oprisescu et al. [14] propose automatic segmentation of IH with an optimally selected color space, and illustrate an algorithm for automatic segmentation of the Hemangioma area using Maximum a posterior classification (MAP) method. Acting with discrete markov fields (MAP-markov) increases the performance of segmentation. The further improvement is carried out by eliminating the different non-Hemangioma pixels.

Alina Sultana et al. [15] proposed a CAD follow-up monitoring of lesions to automatically identify Hemangioma lesions, quantifying the lesion whether it is in the regression or proliferation process. They suggested several methods of image enhancement and tentative segmentation based on color.

Most of the work discussed in literature is on Hemangioma lesion segmentation which was conducted only on Hemangioma photographic images, very few of them has operated on the other Hemangioma image modalities such as MRI, CT etc. This motivation led to the extension of existing work by proposing an improved approach for segmenting Hemangioma lesions across various imaging modalities, ultimately identifying the most suitable modality for accurate lesion segmentation.

## III. Methodology

In this study, a dataset comprising 300 medical images related to hemangiomas was utilized, encompassing CT, MRI, and standard photographic formats. These images were processed using the Hadoop Image Processing Interface (HIPI). Each image was divided into two segments: the Region of Interest (ROI), which marks the location of the hemangioma tumor, and the Non-ROI, which, although not central to the tumor area, may still carry valuable contextual data. For this analysis, pixel intensity values were evaluated across the entire image, covering both ROI and Non-ROI regions.

### *A. Experimental Setup*

A pseudo-node configuration was deployed in the Hadoop environment to facilitate the storage and analysis of hemangioma-related images across different modalities. The



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master node was configured with an Intel Core i3-3210 CPU @3GHz, 4 GB RAM, and a 1 TB secondary storage unit. The environment was built on Ubuntu 16.04 with Java OpenJDK 1.8, Hadoop version 2.x, Gradle 2.10, and HIPI 2.1.0. By default, Hadoop replicates each data block three times across slave nodes.

### B. Distributed parallel computing in Hadoop

The following outlines the structured workflow for handling hemangioma image data in a distributed manner using Hadoop.

- Install a Hadoop 2.X distribution with all dependencies.
- Configure a system with a master node and three slave nodes for replication.
- Launch the Hadoop environment using the 'start-all.sh' script, and verify active processes using the jps command.
- To halt services, execute the 'stop-all.sh' script to end all running processes on the master node.

In this architecture, the master node serves as the central coordinator, distributing tasks to the slave nodes for parallel processing. Once tasks are completed by the slaves, acknowledgments are sent back to the master node. Communication occurs via the Remote Procedure Call (RPC) protocol, and system health is routinely checked every three seconds to ensure seamless synchronization. The Hadoop cluster typically includes components such as the Data Node, Name Node, Secondary Name Node, Resource Manager, and Node Manager, enabling distributed data handling and processing. The details of Master Node are shown in the Figure 2.

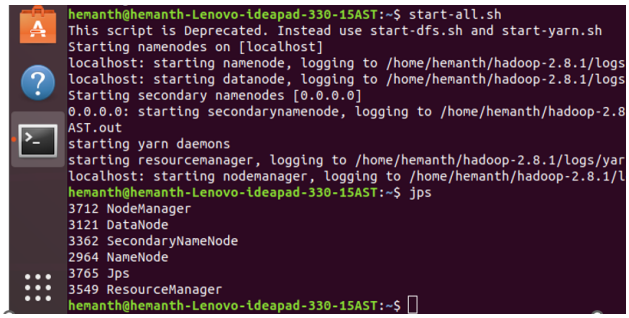



Fig. 2. Process Daemons in Master Node

Table I presents each Hadoop daemon along with its corresponding port number used for accessing related information within the Hadoop environment.

TABLE I
PORT NUMBER WITH PROCESS

| HADOOP | Process Name | RPC port | HTTP port |
|---|---|---|---|
| HDFS | Name Node (NN) | 8020 | 50070 |
| | Secondary Name Node (SNN) | —- | 50075 |
| | Data Node (DN) | —- | 50090 |
| Map-reduce | Job Tracker (JT) | 8021 | 50030 |
| | Task Tracker (TT) | —- | 50060 |

### C. Mathematical model for Image segmentation

Segmentation of images involves threshold definitions with a potential meaning that is used to define and separate the image from its original context. This can be accomplished by an image, where the image is considered to be a function of 2-D gray scale intensity level, with 'p' pixels where the gray pixel levels range from 1 to L. Amount of pixels denoted by fg, having gray level 'g'. The gray level 'g' probability function (P) in image with 'p' pixels is represented with Eqn 1.

$$P_g = \frac{f_g}{p} = \frac{Number\ of\ pixels\ at\ gray\ level\ g'}{Total\ number\ of\ pixels} \tag{1}$$

The definition of a bi-level threshold will be used to segment the target portion of the image area with image background. The pixel value will be divided into two class c1 and c2 respectively, so that the gray level ranges at first level from [1... t] and c2 consist of gray level ranging from [t+1.... L]. Minimum threshold value between 0-255 is determined using the formulae below for the minimum weighted class variance and considered as the threshold value for the segmentation represented in Eqns 2-8.

$$\sigma_w^2(t) = K1(t)\sigma_1^2(t) + K2(t)\sigma_2^2(t) \tag{2}$$

where

$$K1(t) = \sum_{i=1}^{t} p(i) \tag{3}$$

$$K2(t) = \sum_{i=t+1}^{L} p(i) \tag{4}$$

$$\mu_1(t) = \frac{\sum_{i=1}^{t} i \cdot p(i)}{K1(t)} \tag{5}$$

$$\mu_2(t) = \frac{\sum_{i=t+1}^{L} i \cdot p(i)}{K2(t)} \tag{6}$$

Then the variance is given by,

$$\sigma_1^2(t) = \sum_{i=1}^{t} [i - \mu_1(t)]^2 \cdot \frac{p(i)}{K1(t)} \tag{7}$$

$$\sigma_2^2(t) = \sum_{i=t+1}^{L} [i - \mu_2(t)]^2 \cdot \frac{p(i)}{K2(t)} \tag{8}$$



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where μ= Mean, $\sigma = variance, i - graylevel$

### *D. Proposed Approach for Selecting an Optimal Image Modality for Hemangioma Lesion Segmentation in a Hadoop Framework*

The primary goal of this model is to identify the most suitable image modality for segmenting hemangioma lesions, comparing photographic, CT, and MRI images. This is accomplished by analyzing pixel intensities from both the Region of Interest (ROI) and non-ROI areas. Initially, the model computes the average RGB values from images supplied to the HIB input. Among color models, RGB was selected due to the relevance of red channel intensity, which often corresponds to hemangioma pigmentation, making it a reliable indicator in most cases.

After the data is ingested into HDFS, the map function calculates the pixel intensity averages for each image with the help of mapper nodes. These intermediate results are passed to reducer nodes, which aggregate the pixel values and divide by the total count to compute the final average for each modality. This procedure is applied to all three image modalities. The modality that results in the highest average pixel value is recommended for improved segmentation of Infantile Hemangioma.

Map-Algorithm

```
class Mapper <InputKey, InputValue, OutputKey, OutputValue >
method map(InputKey key, InputValue value)
  try
    if (value not equals to NULL and the height>1 and the width>1 and numberOfBands = 3)
      p ← width
      q ← height
      ValD[] ← retrieve the pixel values from image
      AvgD[] ← {0, 0, 0}
      for i = 0 to q do
        for j = 0 to p do
          compute average values for each pixel
        end for
      end for
      store computed averages in AvgD
      compute total number of pixels
      send end result to reducer
  end if
  catch (IOException — InterruptedException e)
    handle exception
  end try
end method
end class
```

Reduce - Algorithm

```
class Reducer <InputKey, InputValue, OutputKey, OutputValue >
method reduce(InputKey key, Iterable¡InputValue¿ values)
  try
    Avg ← image values
    T ← 0
    for value in values do
      add values to Avg
      T ← T + 1
    end for
    if T > 0 then
      Sum the values
      AvgD ← get the Sum values
      Result ← type of AvgD
      Display the output
    end if
  catch (IOException — InterruptedException e)
    handle exception
  end try
end method
end class
```

## IV. Experimental Results

The input Hemangioma images stored in HDFS are divided into uniformly sized blocks and then passed to the map function. Within the map phase, the data is handled as <key, value >pairs, which are forwarded to the reduce phase. During reduction, the output produced by the mapper is further processed, and the final output is generated. Table II presents the average pixel intensity values corresponding to various image modalities.

TABLE II
Various Image modality averaged pixel intensity values for Hemangioma

| Image Modality | Red | Green | Blue |
|---|---|---|---|
| Photographic Images | 0.367828 | 0.270305 | 0.295825 |
| CT-scan | 0.175929 | 0.175929 | 0.175929 |
| MRI | 0.404486 | 0.407392 | 0.410778 |

Figure 3 displaying the graph results of various Hemangioma imaging modes, including the average pixel intensity values across different bands.

MRI images exhibit the highest average pixel intensity values across all three RGB-equivalent channels when compared to photographic and CT images. This indicates that MRI provides richer grayscale contrast and superior tissue differentiation, which is critical in medical imaging tasks like hemangioma segmentation. High intensity values in MRI are a result of its ability to capture deep tissue characteristics and vascular structures more accurately than surface-level photographic images or density-based CT scans.



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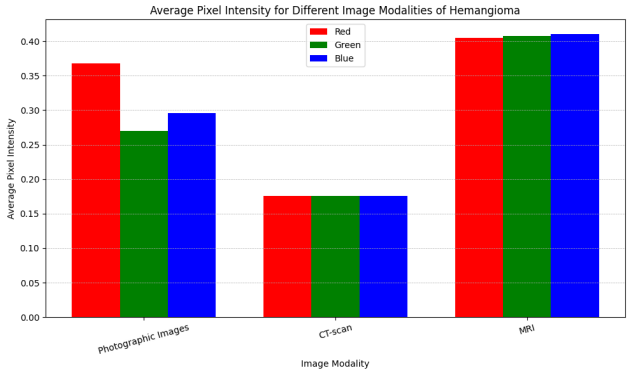



Fig. 3. Mean pixel intensity values across various imaging modalities

In the HIPI framework using MapReduce, MRI images contribute significantly during the mapper phase, where each pixel's intensity is extracted and averaged. Because MRI data carries more consistent and stronger intensity values, it ensures that vital tissue information is retained during the reducer phase when normalized averages are calculated. This leads to more reliable and precise segmentation of hemangiomas, especially in internal or deep tissue regions where color cues from photographic images are insufficient and CT lacks detailed contrast.

Therefore, MRI emerges as the most effective modality for hemangioma analysis in a distributed computing setup like HIPI, owing to its high pixel intensity distribution and medical-grade contrast resolution.

## V. Discussion

Infantile hemangioma is a benign vascular tumour that develops in children during birth or at the early stage of birth. Some tumours may be healed naturally, and some may not. There is also a need for an automated computer diagnosis to determine whether hemangioma can be healed naturally or whether any special treatment is needed for diagnosis. In the course of achieving this result, hemangioma lesion segmentation to be performed to identify the area of the tumour and to identify the stage of hemangioma, whether proliferative or involutional. The following is the Table III that details the most of the research work that is carried out on Infantile Hemangioma related to field of CAD systems and compared with the proposed work.

Hemangioma can be analysed using a variety of image modes, such as MRI, CT scan and photographic images in the medical field. In this paper, we analysed the different Hemangioma Image Modalities and suggested which Image Modalities would provide better segmentation results that would be further useful in identifying the Hemangioma stage. This work is carried out using the HIPI architecture, which provides flexibility in storing and processing large amounts of medical data with less time of execution and high throughput. The best image modality among the many is determined by calculating the mean pixel intensity values across various imaging modalities under RGB color mode and the results generated were tabulated and the graphic results were generated.

When working with colored hemangioma images (CFP) for image segmentation tasks, it's important to recognize that CFP images, although rich in color details, may not always provide enough clarity for accurate segmentation of hemangiomas. These images are typically captured in 2D and may suffer from factors such as low contrast, varying illumination, and noise. These issues can make it difficult to distinguish hemangioma lesions from surrounding tissues or other structures within the image. Additionally, subtle features like small or irregularly shaped lesions may not be easily identified in CFP images due to their inherent limitations in capturing depth or internal tissue details.

This is why a comparative analysis among different image modalities is necessary. By incorporating multiple modalities, such as CT-Scan and MRI, which offer additional imaging information (e.g., better contrast for soft tissues, 3D structural data, and clearer delineation of deeper tissue features), the segmentation process can benefit from more robust and comprehensive data. For instance, CT-Scan provides cross-sectional images that highlight the internal structure, while MRI offers superior contrast between soft tissues and clearer delineation of vascular or tumor-like lesions. Combining CFP with these modalities allows for a more accurate and holistic approach to hemangioma segmentation.

The motivation behind this comparative analysis lies in the need to leverage the unique strengths of each imaging modality. By integrating data from CFP, CT-Scan, and MRI, the segmentation process can achieve better accuracy, improved lesion boundary delineation, and more effective separation of lesions from surrounding tissues. This multi-modal approach minimizes the limitations of any single imaging modality and provides a richer, more complete understanding of the hemangioma lesions.

The proposed method using the Hadoop Image Processing Interface (HIPI) is superior in this context. HIPI enables efficient distributed image processing, making it capable of handling large, multi-modal datasets in a scalable manner. This method is particularly beneficial when working with diverse image modalities like CFP, CT-Scan, and MRI, as it allows for seamless integration and processing of large-scale datasets, leading to improved segmentation results. The proposed HIPI-based method significantly outperforms previous approaches that rely solely on CFP or a single modality, making it a more robust and accurate solution for hemangioma lesion segmentation.

## VI. Conclusion

The research work that is completed in the field of Computer science related to Hemangioma is less and among the delivered work, and practically all the analysts has focused just on photographic pictures as data set and results were produced. None of them took a shot at any big data architectures, utilizing such architecture execution time will be definitely decreased as



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TABLE III
COMPARISON OF TECHNIQUES FOR HEMANGIOMA SEGMENTATION ACROSS DIFFERENT DATASETS

| Reference | Dataset (Size) | Technique/Methodology | Image Modality |
|---|---|---|---|
| [12] | 200 Images | Deep learning | CFP |
| [13] | 33 Images | Morphological operations, SOM clustering | CFP |
| [14] | 40 Images | MAP classification method | CFP |
| [15] | 25 Images | Preliminary color based segmentation | CFP |
| **Proposed HIPI** | **300 Images** | **Hadoop Image Processing Interface (HIPI)** | **CFP, CT-Scan, MRI** |

the design includes in distributed parallel processing. Authors worked on various Image modalities of Hemangioma, and exploratory investigation is done. Among the various Image modalities, obtained results has outlined that MRI modality of Hemangioma has more average pixel intensity values, contrasted with CT and typical photographic pictures. In Computer vision applications, point to be noted is that, if more prominent the average pixel intensity values esteems, better the segmentation results for the image. We make a suggestion dependent on the acquired outcomes expressing that MRI pictures of Hemangioma will be reasonable for better Hemangioma lesion segmentation contrasted with CT and photographic pictures.

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