Mohana Murugan

Artificial Intelligence Researcher

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A diligent researcher in the field of Artificial Intelligence, developing new approaches to solving complex problems across various disciplines with the aim of actively contributing to high-quality scientific research and development.

SKILLS SUMMARY

- **Technical Skills:** Python | C | C++ | R | JAVA | MySQL | MongoDB | AWS Cloud
- **Frameworks:** TensorFlow | PyTorch | OpenCV | Scikit-Learn | NLTK | spaCy | Hugging Face | AWS
- **Research Areas:** Computer Vision | Machine Learning | Deep Learning | MLOps | Data Analytics| Affective Computing | TinyML | Data Science | Mulsemedia | Medical Image Processing | Physiological Signal Processing | Natural Language Processing | LLMs | Brain Computer Interface
- **Platforms:** Jupyter Notebook | Google Colab | Visual Studio
- **Soft Skills:** Willing to learn new skills | Excellent Communication | Collaboration and Teamwork

EDUCATION

2021-2024 **Avinashilingam University – Ph.D. in Computer Science** India
- Supervised by Prof.P.Subashini and Co- Supervised by Prof. George Ghinea
- Thesis topic: *Emotion Recognition in E-Learning and Mulsemedia*

2018-2020 **Bharathiar University – Master of Philosophy (M.Phil.) in Computer Science** India
- Supervised by Prof.S.M.Jagatheesh
- Thesis topic: *Active Permission Identification for Android Malware Application Detection*
- Passed with Distinction

2015-2018 **Bharathiar University – Master of Computer Application (MCA)** India
- GPA: 8.61 (10.0 scale)
- First Class with Distinction
- 1st out of 30 students

2012-2015 **Bharathiar University – Bachelor of Science in Computer Science** India
- GPA: 7.53 (10.0 scale)
- First Class with Distinction

PROFESSIONAL EXPERIENCES

Senior Research Fellow (SRF) (2023 -2024), India, UK
- Supervised by Prof.P.Subashini and Co- Supervised by Prof. George Ghinea, Brunel University, UK
- Co-mentor by Prof. Celso Alberto Saibel Santos, Federal University of Espírito Santo (UFES), Brazil.
- Conducted research on analyzing learners' Quality of Experience (QoE) using Mulsemedia in E-learning to enhance the learning experience.
- Developed a Facial Emotion Recognition model using Autoencoder and Explainable AI (XAI) techniques to recognize emotions from facial expressions, achieving a prediction accuracy of 2.5%, a significant improvement over the existing approach.

Junior Research Fellow (JRF) (2021-2023), India, USA
- Supervised by Prof.P.Subashini at Avinashilingam University.
- Co-Supervised by Prof.Diksha Shukla at the University of Wyoming, USA
- Developing a Facial Emotion Recognition kit based on IoT and a proposed hybrid CNN-LSTM model for emotion recognition from facial expressions in an e-learning system, achieving significant accuracy compared to state-of-the-art techniques.

- Conducted research on adaptive learning to develop Kidbot 1.0, aimed at teaching primary school children AI concepts.

Programming Trainer at CSC Computer Education (2019-2020), India

- Providing training in a programming language (C, C++, Python, JAVA, PHP) to students who aim to secure industry placements.
- Constructing syllabus, course, and assessment preparation materials for placement training students.

TECHNICAL PROJECTS

- **Patient Medical Text Summarization** Using NLP Transformers and Attention Mechanisms. Dec 2023
  - Developed a model for summarizing patient medical records using NLP transformers and attention mechanisms.
  - Utilized Python, TensorFlow, PyTorch, and Hugging Face Transformers for model implementation and fine-tuning.
  - Achieved high-quality summarizations, reducing information extraction time for healthcare professionals by 40%
- **Skin Cancer Classification Using Vision Transformers** June 2023
  - Applied transfer learning with vision transformers (ViTs) alongside pre-trained convolutional neural networks (CNNs) like VGG16 and ResNet50 to classify skin cancer images.
  - Utilized Python and frameworks such as TensorFlow and Keras for model development, leveraging vision transformers for enhanced feature extraction and classification.
  - Demonstrated improved classification accuracy and robustness in skin cancer diagnosis, showcasing the effectiveness of vision transformers in medical image analysis tasks.
- **Technology Enhanced Mulsemedia Learning** web portal using HTML, CSS, and PHP. Jan 2023
  - Developed a responsive web portal using HTML, CSS, and PHP to enhance learning with multimodal sensory media.
  - Implemented user authentication, content management, and multimedia integration for an immersive educational experience.
  - Increased user engagement and learning retention by 30% through interactive and multisensory content.

RESEARCH PUBLICATIONS

*denotes equal contribution and joint lead authorship

BOOK

Python for Chemistry, Notion Press, India 2024
P. Subashini, P.Lalitha, R.Janani, M.B. Janifer, M.Mohana

BOOK CHAPTERS

Springer **Technology Enhanced Mulsemedia Learning (TEML) Through Design for Learners with Dyslexia for Enhancing the Quality of Experience (QoE)** 2024
M.Mohana*, Aleph Campos da Silveira*, P.Subashini, Gheorghita Ghinea,Celso Alberto Saibel Santos. *Envisioning the Futures of Education Through Design, Springer*

IGI Global **Review on Artificial Intelligence and Robots in STEAM Education for Early Childhood Development: The State-of-the-Art Tools and Applications** 2022

Handbook of Research on Innovative Approaches to Early Childhood Development and School Readiness, edited by Anastasia Lynn Betts and Khanh-Phuong Thai, IGI Global, 2022.
Mohana M, Nandhini, K., Subashini, P.

JOURNALS

Springer **XAI: Explainable-based Deep Semi-Supervised Convolutional Sparse Autoencoder for Enhancing Facial Expression Recognition** 2024
Signal, Image, and Video Processing *(Under Review)*
Mohana Murugan, Parthasarathy Subashini, Gheorghita Ghinea

Springer **Towards Enhancing STEM Learner Experience by Leveraging Mulsemedia Technology**
Multimedia Tools and Application, Springer *(Under Review)* 2024
Mohana Murugan, Aleph Campos da Silveira, Parthasarathy Subashini, Celso Alberto Saibel Santos, Gheorghita Ghinea

Springer **Performance Comparison of Autoencoders in Facial Emotion Recognition from Facial Expression** (*Under Review)* 2024
Neural Processing Letter, Springer
M.Mohana, P. Subashini

Inderscience **Empowering Young Learners: M-Learning Application with Adaptive Learning and CCI Standards** *(Accepted)* 2024
International Journal of Technology Enhanced Learning, Inderscience.
S.Divyasri, M.Mohana*, T.T.Dhivyaprabha; P, Subashini

Springer **Facial Expression Recognition Using Machine Learning and Deep Learning Techniques: A Systematic Review** 2024
SN Computer Science, Springer
M.Mohana, P. Subashini,

IOS Press **Revisiting Face Detection: Supercharging Viola-Jones with Particle Swarm Optimization for Enhanced Performance** 2024
Journal of Intelligent & Fuzzy Systems, IOS Press
M.Mohana, P. Subashini, Diksha Shukla

Inderscience **Analysing the Performance of Viola-Jones and Multi-Task Convolution Neural Network (MTCNN) Face Detection algorithms using video sequences.** 2024
International Journal of Computational Vision and Robotics. Inderscience Publishers
M.Mohana, P. Subashini

World Sci **Emotion Recognition from Facial Expression using Hybrid CNN-LSTM Network** 2023
International Journal of Pattern Recognition and Artificial Intelligence. World Scientific
M.Mohana, P. Subashini, M. Krishanveni

CONFERENCES

Springer **Technology Enhanced Mulsemedia Learning: Insights of an Evaluation** 2023
International Conference on Computer-Human Interaction Research and Applications
M.Mohana, Aleph Campos, P. Subashini, Celso Alberto Saibel Santos, Gheorghita Ghinea

IEEE **A Study on Technology-Enhanced Mulsemedia Learning for Enhancing Learner's Experience in E-Learning** 2023

International Conference on Network, Multimedia and Information Technology (NMITCON)
M.Mohana, N. Valliammal, V.Suvetha, M.Krishnaveni, P.Subashini, Gheorghita Ghinea

Springer **Convolutional Sparse Autoencoder for Emotion Recognition** 2023
International Conference on Artificial Intelligence and Computer Vision, (AICV2023)
M.Mohana, P. Subashini

IEEE **Emotion Recognition using Deep Stacked Autoencoder with Softmax Classifier** 2023
International Conference on Artificial Intelligence and Smart Systems and Smart Systems
M.Mohana, P. Subashini

IEEE **Emotion Recognition using Autoencoders: A Systematic Review** 2023
International Conference on Intelligent Systems for Communication, IoT, and Security.
M.Mohana, P. Subashini

WORKSHOP

ACM **Technology Enhanced Mulsemedia Learning (TEML) for Learners with Dyslexia** 2023
International Conference on Interactive Media Experiences Workshops (IMXw '23),
M. Mohana*, Aleph Campos Da Silveira*, V. Suvetha, P. Subashini, Gheorghita Ghinea, and Celso Alberto Saibel Santos.

CERTIFIED COURSES

- AI in Healthcare Specialization – Stanford Online – Coursera 2024
- Affective Computing – NPTEL (IITM), India 2024
- Google Data Analytics Professional 2022
- Google Certified Educator – Level 1 2022

HONORS AND AWARDS

FELLOWSHIP

- University Grants Commission (UGC)-NET | India (2021-Present)

ACHIEVEMENTS

- Qualified UGC NET with JRF and Assistant Professor in the June 2020 exam, India
- Secured First Rank in Master of Computer Science, Tamil Nadu, India 2018
- Secured First Rank in SSLC exam in Public School, Tamil Nadu, India 2010

AWARD

- Won first place in Innovative Ideas to Products at National Science Day Celebrations, Coimbatore. 2023

OUTREACH AND TALKS

- **Seminar:** Mulsemedia in Education in Short Term Capacity Building Programme on Artificial Intelligence in Education, Avinashilingam University. 2023
- **Seminar:** Chat-GPT and Education in Short-Term Capacity Building Programme on Artificial Intelligence in Education, Avinashilingam University. 2023
- **Demonstration:** Systematic Review and Meta-Analysis (SRMAs) using PRISMA, Avinashilingam University. 2023
- **Seminar:** Data Analytics through EXCEL. 2023
- **Seminar:** Artificial Intelligence and Career Opportunities. 2022

SERVICES AND RESPONSIBILITY

- **Reviewer**
  - International Journal of Computational Intelligence and Applications (IJCIA), World Scientific.
  - Journal of Intelligent & Fuzzy Systems, IOS Press.
- **Mentorships**
  - Mentor for the two-week Summer STEM Camp organized by the U.S. Consulate General Chennai and the Centre for Science in Society (C-SiS), Cochin University of Science and Technology (CUSAT), Kerala, India. (2023)
  - Mentor for Post Graduate students Project at CMLI lab, Coimbatore, India (2023).
- **Subject Expert**
  - Nominated as a member of the Board of Studies in Computer Science (Artificial Intelligence and Data Science) at Gobi Arts and Science College, India (2024).
  - Nominated as a member of the Board of Studies in Computer Science (Artificial Intelligence and Data Science) at Gobi Arts and Science College, India (2023).

REFERENCES

Dr. Diksha Shukla
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Dept. of Electrical Engineering and Computer Science, University of Wyoming, Laramie, USA
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Dr. Gheorghita Ghinea
Professor of Mulsemedia Computing
Department of Computer Science Uxbridge,
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E-mail: George.Ghinea@brunel.ac.uk