

Alwyn Mathew

POSTDOCTORAL RESEARCH ASSISTANT, UNIVERSITY OF DUNDEE

WORK EXPERIENCE	University of Dundee , Scotland, United Kingdom <i>Postdoctoral Research Assistant</i> <i>Division of Imaging Science and Technology</i>	<i>Dec 2021–present</i>
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EDUCATION	Indian Institute of Technology (IIT) Patna , Bihar, India <i>Ph.D. in Computer Vision</i> CGPA: 8.63/10	<i>Aug 2021</i>
	College of Engineering Karunagappally , Kerala, India <i>Masters in Technology, Image Processing</i> CGPA: 8.8/10	<i>May 2016</i>
	Tamilnadu College Of Engineering , Coimbatore, India <i>Bachelors in Technology, Information Technology</i>	<i>April 2012</i>

RESEARCH INTERESTS	<i>Computer Vision, 3D Computer Vision</i> <i>Medical Robotics, Autonomous Robots</i> <i>Adversarial Machine Learning, Adversarial Attacks</i> <i>Reinforcement Learning, Demand Side Management</i>
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PUBLICATIONS **Journal Articles**

Mathew, A. and Mathew J., Monocular depth estimation with SPN loss, Image and Vision Computing, 2020.

Mathew, A., Roy, A., and Mathew, J., Intelligent Residential Energy Management System Using Deep Reinforcement Learning, IEEE Systems Journal, 2020.

Mathew, A., Jolly, MJ., and Mathew, J., Improved Residential Energy Management System Using Priority Double Deep Q-learning, Sustainable Cities and Society, 2021.

Mathew, A., and Mathew, J., MDDNet: Learn Depth and Ego-motion from Videos with Camera Distortion, Computer Vision and Image Understanding, 2020. (Under-revision)

Mathew, A., Patra, A., and Mathew, J., Monocular Depth Estimators: Vulnerabilities and Attacks, IEEE Intelligent Systems, 2020. (Under-review)

Mathew, A., and Mathew, J., Monocular Depth Estimation with Unknown Cameras, Knowledge Based System, 2021. (Under-review)

Mathew, A., and Mathew, J., Cheaper Depth Sensor Enhances Monocular Depth Estimation, Information Fusion, 2021. (Under-review)

Mathew, A., and Mathew, J., Efficient Demand Response in Residential Grid using Q-learning, IEEE Systems Journal, 2021. (Under-review)

Mathew, A., Gopugari, B., and Mathew, J., Improving Unsupervised Monocular Depth Estimation with Stereo Assistance, *IEEE Transactions on Intelligent Vehicles*, 2021. (Under-review)

Conference Proceedings

Bander, B., Mathew, A., Magerand, L., Trucco, E., and Manfredi, L., Real-Time Lumen Detection for Autonomous Colonoscopy, *MICCAI 2022 ISGIE Workshop*, 2022.

Mathew, A., Neeraj., and Mathew, J., UnkDisp: Monocular Depth Estimation with Unknown Baseline and Focal Length, *International Conference on Neural Information Processing*, 2022. (Under-review)

Mathew, A., Patra, AP., and Mathew, J., Self-Attention Dense Depth Estimation Network for Unrectified Video Sequences, *IEEE International Conference on Image Processing*, 2020.

Sanodiya RK, Mathew, A., Mathew, J., and Khushi, M., Statistical and Geometrical Alignment using Metric Learning in Domain Adaptation, *IEEE International Joint Conference on Neural Networks*, 2020.

Srivastava, H., Mathew, A., and Mathew, J., A Novel Frame Similarity Based Pedestrian Counting Approach in Surveillance Videos, *IEEE India Council International Conference*, 2018.

Mathew, A., Mathew, J., Govind, M., and Mooppan, A., An Improved Transfer learning Approach for Intrusion Detection, *International Conference on Advances in Computing Communication*, 2017.

Patents

Easa Z., Gupta D., Mathew J., and Mathew A., Automated two wheeler parking system by detecting the location of the vehicle using sensor under the platform Appl.no. 201731036379. (2019 Indian Patent)

RESEARCH EXPERIENCE

Post-Doctoral Research Experience

Supervisor: Dr. Luigi Manfredi (University of Dundee)

Scotland, UK

Since Dec 2021

- Developed real-time **lumen detection** model for autonomous colonoscopy.
 - Developed **supervised depth estimation** models for endoscopy monocular camera.
 - Developed self-supervised depth estimation models for **high FOV** endoscopy monocular camera.
 - Developed expertise in **integrating** deep learning models with soft robot.
 - Developed expertise in **real time** deep learning models.
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Doctoral Research Experience

Supervisor: Dr. Jimson Mathew (IIT Patna)

Patna, India

July 2016 – May 2021

- Developed expertise in **camera models**.
 - Developed expertise in self-supervised **depth estimation** from a single camera.
 - Introduced direct depth estimation with a **distorted** camera lens.
 - Studied the impact of **self-attention** in depth estimation network.
 - Developed expertise in **adversarial samples** and their effect on deep neural networks.
 - Studied the **vulnerabilities** of monocular depth estimators against Adversarial attacks.
 - Introduced an intelligent agent for **shifting load** from no-peak to off-peak hours in residential grids.
 - Studied the complexity of the RL-DSM environment and improved the learning curve of the agent.
 - Presented results at departmental seminars to more than 30 attendees.
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Experience in Research Guidance

Indian Institute of Technology Patna

Patna, India

Since July 2017

Mentored B.Tech. students in Computer Science Department

- An advanced reinforcement learning-based system for load shifting in a residential grid.
- We developed a reinforcement learning-based system for load shifting in a residential grid.
- We developed deep learning-based light-weight object detection for embedded systems.
- We have developed a system that estimates depth from a single uncalibrated camera.

Master's Project Research Experience

Supervisor: Dr. Binu VP

Kerala, India

May 2015–May 2016

- Investigated super-resolution with Convolutional Neural Networks.
- Super-resolution in gray scale and color.
- Presented the final report to five member evaluation committee.

**TEACHING
EXPERIENCE**

Teaching Assistance

IIT Patna, India
July 2016–Dec 2020

CS 225 Switching Theory	Jan–May, 2017
CS 229 Innovation Laboratory	Jan, 2017
CS 421 Computer Peripherals and Interfacing	July–Dec, 2017
CS 225 Switching Theory	Jan–May, 2018
CS 421 Computer Peripherals and Interfacing	July–Dec, 2018
CS 225 Switching Theory	Jan–May, 2019
EE 541 High Performance Computing	Jan, 2019
CS 421 Computer Peripherals and Interfacing	July–Dec, 2019
CS 225 Switching Theory	Jan–May, 2020
CS 421 Computer Peripherals and Interfacing	July–Dec, 2020
Mid and End-Semester Examination duties	2016–2020

**AWARDS &
ACHIEVEMENTS**

Scholarships & Sponsorship

Sponsorship from **Scheme for Promotion of Academic and Research Collaboration**, Ministry of Human Resource development, Government of India. Grant #P582. April 2020

Three year **Senior Research Fellowship (SRF)** at IIT Patna, Ministry of Human Resource Development, Government of India. April 2018

Two year **Junior Research Fellowship (JRF)** at IIT Patna, Ministry of Human Resource Development, Government of India. July 2016

Two year **Post Graduate Fellowship** at College of Engineering Karunagappally Institute of Human Resources Development, Government of Kerala. July 2014

Competitive Awards

Second Place, IoT Grand Challenge, Indian Institute of Technology (IIT) Patna. 2016

Finalist, Bosch DNA Challenge, Bosch India. 2017

Top 35, Patna Ideathon, Government of Bihar. 2018

Competitive Examinations

Graduate Aptitude Test in Engineering (**GATE**) 2016
All India Rank: 5493 out of 108495 candidates.

TALKS

Generative Adversarial Networks and Adversarial Attacks Dec, 2020
sponsored by All India Council for Technical Education, Government of India.

Adversarial Machine Learning Dec, 2019
sponsored by APJ Abdul Kalam Technological University, Government of Kerala.

Machine Learning makes Smart Grids smarter Sept, 2019
sponsored by Scheme for Promotion of Academic and Research Collaboration (SPARC), Ministry of Human Resource development, Government of India.

Generative Adversarial Networks July, 2019
sponsored by Third phase of Technical Education Quality Improvement Programme, Government of India and IEEE.

Generative Adversarial Networks and Adversarial examples July, 2019
sponsored by Third phase of Technical Education Quality Improvement Programme, Government of India.

Introduction to Convolutional Neural Networks Dec, 2018
sponsored by Third phase of Technical Education Quality Improvement Programme, Government of India.

PROFESSIONAL ACTIVITIES

Reviewer of MICCAI. 2022
IEEE Student Member, IEEE Membership Number: 96850267. 2019–2021
Reviewer of IEEE International Conference on Data Science and Engineering. 2019
Reviewer of IET Computer Vision. 2019
Subreviewer of IEEE International Symposium on Electronic System Design. 2018
Subreviewer of IEEE ICSCC. 2017

Organizer, MICCAI Imaging Systems for GI Endoscopy Workshop. Sept 2022
Organizer, GIAN course on Reliable and Fault Tolerent Computing. Jan 2017
Organizer, GIAN course on Internet of Things Security: Issues, Innovations, and Interplays. Dec 2016

SKILLS

Coding Python, C++, Java, ASP.NET, C# .NET
ML Packages Pytorch, TensorFlow, Keras
Teaching Conducted B.Tech and M.Tech classes at IIT Patna

REFERENCES

Dr. Jimson Mathew
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Department of Computer Science and Engineering
Indian Institute of Technology Patna
Bihar, India
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