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## Alwyn Mathew

Kochumalil (H), Wallardie Jn, Vandiperiyar PO, Idukki Dist, Kerala-685533, India

<https://alwynm.github.io>

alwyn.pcs16@iitp.ac.in, alwynmathew.90@gmail.com

+91 96452 39304

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Ph.D. fellow trained in Computer Vision with areas of expertise in 3D Computer Vision. Passionate about teaching machines to see like we do. I have extensive research experience and the ability to work independently or as part of a team.

### EDUCATION

<b>Indian Institute of Technology (IIT) Patna</b> <i>Ph.D. in Computer Vision (Thesis submitted)</i>	Patna, India Aug 2021
<b>College of Engineering Karunagappally</b> <i>Masters in Technology, Image Processing</i>	Kerala, India May 2016
<b>Tamilnadu College Of Engineering</b> <i>Bachelor's in Technology, Information Technology</i>	Coimbatore, India April 2012

### SCHOLARSHIPS AWARDED

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  
Awarded by Ministry of Human Resource Development, Government of India. April 2018

Two year **Junior Research Fellowship** (JRF) at IIT Patna  
Awarded by 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

<b>Second Place</b> , IoT Grand Challenge, Indian Institute of Technology (IIT) Patna.	2016
<b>Finalist</b> , Bosch DNA Challenge, Bosch India.	2017
<b>Top 35</b> , Patna Ideathon, Government of Bihar.	2018

## PROFESSIONAL MEMBERSHIP

**IEEE Student Member**, IEEE Membership Number: 96850267.

## COMPETITIVE EXAMINATIONS QUALIFIED

Department of Higher Education, Ministry of Human Resources Development, India

- Graduate Aptitude Test in Engineering (**GATE**) 2016, All India Rank: 5493 out of 108495 candidates (95 percentile).

## RESEARCH EXPERIENCE

### Doctoral Research Experience

*Indian Institute of Technology 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.

### Ongoing Research works

*Collaboration with my Thesis supervisor (Dr. Jimson Mathew)*

Patna, India

Since May 2021

- Dynamic moving object masking for monocular depth estimation with video sequence.
- Handle textureless surface in photometric loss
- Light-weight monocular depth network

### Experience in Research Guidance

*Indian Institute of Technology Patna*

Patna, India

Since July 2017

Mentored Junior Research Fellows in the group.

- Fisheye cameras are commonly used in applications like autonomous driving and surveillance to provide a large field of view ( $> 180^\circ$ ). We developed per-pixel dense distance estimation on fisheye cameras for automotive scenes.
- Deep learning-based load prediction model on time series data. These models will be used for applications like Demand Side Management in Smart Grid.

- Designed algorithm to adapt classification task on unlabelled data with fewer know labelled data.

Mentored M.Tech. students in Computer Science Department.

- Designed a system that distinguishes familiar/unfamiliar images from EEG (Electroencephalogram) captured using an eight electrode helmet. Extended future to deception detection using deep learning.
- We designed a fast multi-object hybrid tracking system using particle filter and neural network.
- We designed a light-weight deep learning-based facial recognition system.

Mentored B.Tech. students in Engineering Physics.

- 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**

*College of Engineering Karunagappally*

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 ASSISTANCE EXPERIENCE**

### **Indian Institute of Technology Patna**

*Research Fellow*

Patna, India

July 2016–July 2021

I have performed the following teaching assistance during my Ph.D. program at Indian Institute of Technology Patna.

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|---|----------------|
| • 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

## SKILLS

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

## PUBLICATIONS

### Journal Articles

- **Mathew, A.** and Mathew J., Monocular depth estimation with SPN loss, *Elsevier 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, *Elsevier Sustainable Cities and Society*, (2021).
- **Mathew, A.**, and Mathew, J., MDDNet: Learn Depth and Ego-motion from Videos with Camera Distortion, *Elsevier 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 Camera, *Elsevier Image and Vision Computing*, (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., Monocular Depth Estimation with Stereo Assistance Depth Consistency, *IEEE Intelligent Systems*, (2021). (*Under-review*)

### Conference Proceedings

- **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).

## PATENT

- 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. (Indian Patent Pending) 2017

## TALKS

- **Generative Adversarial Networks and Adversarial Attacks** sponsored by All India Council for Technical Education (AICTE), Government of India. Dec, 2020
- **Adversarial Machine Learning** sponsored by APJ Abdul Kalam Technological University, Government of Kerala. Dec, 2019
- **Machine Learning makes Smart Grids smarter** sponsored by Scheme for Promotion of Academic and Research Collaboration (SPARC), Ministry of Human Resource development, Government of India. Sept, 2019
- **Generative Adversarial Networks** sponsored by Third phase of Technical Education Quality Improvement Programme, Government of India and Institute of Electrical and Electronics Engineers. July, 2019
- **Generative Adversarial Networks and Adversarial examples** sponsored by Third phase of Technical Education Quality Improvement Programme (TEQIP-III), Government of India. July, 2019
- **Introduction to Convolutional Neural Networks** sponsored by Third phase of Technical Education Quality Improvement Programme (TEQIP-III), Government of India. Dec, 2018

## PROFESSIONAL ACTIVITIES

- **Subreviewer** of IEEE International Conference on Smart Computing and Communications (ICSCC). 2017
- **Subreviewer** of IEEE International Symposium on Electronic System Design. 2018
- **Reviewer** of IET Computer Vision. 2019
- **Reviewer** of IEEE International Conference on Data Science and Engineering. 2019

## OTHER ACTIVITIES

- **Technical committee** of Research Scholars Day, Indian Institute of Technology (IIT) Patna 2017-2019

## REFERENCE

- **Dr. Jimson Mathew**  
Head, Associate Professor  
Department of Computer Science and Engineering,  
Indian Institute of Technology Patna  
Bihar, India  
Email: jimson@iitp.ac.in  
Phone: +91-612-3028347  
Mobile: +91-91109-56262
- **Dr. Samrat Mondal**  
Assistant Professor  
Department of Computer Science and Engineering,  
Indian Institute of Technology Patna  
Bihar, India  
Email: samrat@iitp.ac.in  
Phone: +91-612-3028163  
Mobile: +91-82925-83635
- **Dr. Binu VP**  
Associate Professor  
Department of Computer Science and Engineering  
College of Engineering Karunagappally  
Kerala, India  
Email: binuvp@gmail.com  
Mobile: +91-98473-90760