

Devaganthan S S

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RESEARCH INTERESTS

Machine Learning Theory, Computer Vision

EDUCATION

Mohamed Bin Zayed University of Artificial Intelligence, Abu Dhabi <i>Master of Science in Machine Learning</i>	<i>Aug 2024 - Jun 2026</i>
Indian Institute of Technology Madras <i>Dual Degree (Bachelor's+Master's) in Electrical Engineering; CGPA: 8.03/10</i>	<i>Aug 2019 - Jun 2024</i>
Politecnico Di Milano, Italy <i>Master's in Computer Science and Engineering (Semester Exchange)</i>	<i>Jan 2022 - May 2022</i>

PROFESSIONAL EXPERIENCE

Computational Imaging Lab, IIT Madras <i>Dual Degree Thesis Guide: Dr. Kaushik Mitra</i> <u>Extreme Low Light Stereo Image Enhancement</u> <ul style="list-style-type: none">Collaborating with a team to publish extreme stereo-paired low light Images with ground truth in outdoor and indoor settings, along with analysis and results on depth estimation and enhancement and benchmarks with standard architecturesLeveraged SIRFormer, a transformer-based architecture, to enhance low-light images in sRGB space, and used Vanilla UNet for enhancement in both sRGB and RAW space across various exposure levelsPerforming model interpretability analysis, specifically Feature Ablation, using Captum Library	Chennai, India <i>Aug 2023 - Present</i>
OptimML Lab, MBZUAI <i>Undergraduate Research Internship Guide: Dr. Martin Takac</i> <u>Renewable-Powered Battery Optimisation</u> <ul style="list-style-type: none">Collaborated and developed an RL based approach for optimising energy storage and consumption from energy gridsUsed real-world data from Greece to validate the proposed methodology and provided open-source code implementationCreated an optimal benchmarking solution by outlining a problem framework, formulating equations, and specifying initial conditions and constraints for evaluation. The optimal action values saw a 27.39% money saved in contrast to 11% saving by our best-performing RL algorithm	Abu Dhabi, UAE <i>May 2023 - Aug 2023</i>
Electrical Engineering Department, IIT Madras <i>Mini Research Project Guide: Dr. Mansi Sharma</i> <u>Unsupervised Extreme Low Light Image Enhancement</u> <ul style="list-style-type: none">Studied existing literature and various approaches to Low Light Image Enhancement, with a focus on using GANImplemented and analyzed the impact of integrating an Amplification Module into the enhancement pipeline to assess its influence on performance	Chennai, India <i>Aug 2022 - Nov 2022</i>

KEY COURSEWORKS

Artificial Intelligence	Mathematics and Computing	Miscellaneous
Machine Learning	Probability and Statistics	Internet of Things
Modern Computer Vision	Linear Algebra	Communication Systems
Deep Learning for Imaging	Multi-variable Calculus	Data Structures and Algorithms
Natural Language Processing	Numerical Linear Algebra	Advanced Computer Architecture
Advanced Topics in Speech Signal Processing	Detection Theory	Principles of Neuroscience

SCHOLASTIC ACHIEVEMENTS

Selected for a Summer Research Internship Role at TATA Consultancy Service	2022
Ranked in the top 1% in the Joint Engineering Entrance Advanced exam out of 0.15 million shortlisted students	2019
Secured 7th rank in Mathematical Genius Award (A state level competition)	2014
Cleared District and School level, qualified for State-level in Wordsworth International Spell Bee	2013
Awarded with Meritorious Certificates in school for academic excellence	

SKILLS

- **Programming/Scripting Languages:** Python, MatLab, C, C++, HTML | **Technologies:** Git, Linux, \LaTeX
- **Libraries:** PyTorch, Matplotlib, NumPy, OpenCV, Gekko

COURSE WORKS

Information Retrieval System for Cranfield Dataset

IIT Madras

Natural Language Processing

May 2023

- Developed an Information Retrieval (IR) System using the Cranfield Dataset, employing the Vector Space Model
- Achieved a precision of 39%, recall of 29%, F-score of 30%, MAP of 69% and nDCG of 44%
- Improved the IR System by employing Latent Semantic Analysis (LSA) algorithm handling synonym and polysemy and also implemented a bottom-up approach for stop-word removal, explored and studied different similarity measures

Panoramic Stitching

IIT Madras

Modern Computer Vision

Nov 2021 - Dec 2021

- Developed an algorithm for stitching a panorama from overlapping photos by estimating a transformation by computing features using Speeded Up Robust Features algorithm (SURF) in both images and matching them to obtain correspondences
- A homography is estimated from these correspondences to stitch these in a common coordinate system
- Extended this algorithm to stitch multiple images

Hardware Accelerator for Image Compression

IIT Madras

Computer Organization

Nov 2021 - Dec 2021


- Implemented a Hardware Accelerator in Verilog for JPEG Decoding algorithm for Image Compression
- Reduced the number of clock cycles from 5100 to 18 Cycles for an iteration of row/column Inverse Discrete Cosine Transform

Miscellaneous

IIT Madras

Computer Vision, Python Programming, Microprocessor, Computer Organization | Course Assignments

Jan 2020 - July 2023

- **Hybrid Images **: Created a hybrid image by blending a low-pass filtered version of a first image and a high-pass filtered version of another image. The resultant hybrid image is perceived differently at different distances
- **Circuit Solver**: Developed a Python Script that accepts a liner circuit as a .netlist file and outputs the Nodal Voltages and Current
- **Bandpass FIR Filter**: Implemented 5-Tap and 32-Tap versions of bandpass FIR filter in AVR Atmega8 microcontroller, using Atmel AVR Studio 7 for design and debugging
- Implemented all instructions of the RV32I in Verilog set to make a *Synthesizable single-cycle CPU*

PROFESSIONAL INVOLVEMENTS AND EXTRA CURRICULARS

Academic Workshops

- Participated in the in-person workshop titled, "Reinforcement Learning: Recent Trends and Future Challenges" at IISc Bangalore
- Attended Learning Theory Alliance Fall 2023 Mentoring Workshop centering on communicating one's research verbally for students interested in Learning Theory and related fields

Teaching Assistantship and Mentorship

- Aiding Prof. Kaushik Mitra with conducting the course Modern Computer Vision
- Assisted the instructor in conducting a course to develop students' soft skills and general well-being
- Mentored and provided academic guidance to 2 first-year undergraduate students, as part of AcadBuddy Program, IIT Madras

Associate, Case Club - IIT Madras

Nov 2021 - Aug 2022

- Was part of the Student Club aimed at fostering a problem-solving culture within the Institute
- Aided fellow students in their preparations for Consultation and Product Management roles

Sports Endeavours

- **Beginner Runner**: Completed two Half Marathons under 2:20 hrs
- **Football**: Represented my district as forward in State Level Football Championship in 2012
One amongst 30 students selected for the National Sports Organization Football Program amongst first-year undergraduates
- **Amateur Chess Enthusiast**: Peak Rapid *Chess.com* rating of 1322, Puzzle Rating of 2182