

# SIDHARTH PADMANABHAN

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## EDUCATION

### Università della Svizzera Italiana (USI)

MSC IN INFORMATICS

Lugano, Switzerland

2025 – Present

- Relevant Courses: Distributed Systems, Graph Deep Learning

### Amrita Vishwa Vidyapeetham

B.TECH. ELECTRONICS AND COMPUTER ENGINEERING

Amritapuri, Kerala, India

2021 – 2025

- Relevant Courses: Data structures & algorithms, Calculus, Data Science, Deep Learning, Computer Networks

## PROFESSIONAL EXPERIENCE

### Singapore University of Technology and Design (SUTD)

Singapore

RESEARCH INTERN - ROBOTICS

Feb 2024– Apr 2024 | Onsite

- Tested and helped re-implement Smorphi educational robot curriculum designed by the SUTD research team
- Assisted in inventory management and quality control at Wefaa Robotics (15 robots), a startup spin-off from SUTD
- Led the development of a Smorphi-based cleaning robot, focusing on LiDAR mapping, navigation, and coverage optimization
- Worked on navigation backbone that allowed seamless integration of sensor controls, resulting in ~30% faster performance

### HuT Labs

Kerala, India

RESEARCH INTERN - MACHINE LEARNING

Aug 2023 – Feb 2024 | Onsite

- Re-implemented ML components from multiple research papers including using SVM to fuse MobileNet SSD and MobileNetv2 outputs for staircase detection in "sTetro" robot project
- Collected, processed, and labelled data (9500+ samples) to train and evaluate models for staircase detection
- Developed a custom deep CNN model with 23% improvement in staircase detection over other benchmarked models

### Team bi0s

Kerala, India

FULLSTACK DEVELOPER

Oct 2022 – Jan 2023 | Hybrid

- Collaborated with cross-functional teams to design and develop a CMS (Content Management System) website
- Implemented responsive web pages and multi-tier user login using Vite-React.js, Redux, and Tailwind CSS
- Gained agile development experience through sprint planning and stand-up meetings

## PUBLICATIONS

(Google Scholar) ↗

- **Sidharth P**, Sukrith Sunil, Poorna S S, Anuraj K. (2025) "Cepstral Graph GCN: An Efficient Approach to Parkinson's Disease Detection Using Graph Neural Networks". In: **Final Editing**.
- Manikandan Arunachalam, **Sidharth P**, Sooraj Nair, Nikhil Rajiv, Rakesh Suresh Babu. (2025) "Blockchain Approach for Real-Time Authentication in 6G Machine-to-Machine Communication". In: **IGI Global**. Book: **6G Networks and AI-Driven Cybersecurity**, Shaikh, Riaz Ahmed. ([Link](#)) ↗
- **Sidharth P**, Dr. Rajesh Kannan Megalingam. (2024) "Custom Deep CNN-Based Staircase Classification for Smart Environments". In: **ICONAT 2024**. ([Link](#)) ↗
- Sreedutt Ram J, **Sidharth P**, Sukrith Sunil, Poorna S S, Anuraj K. (2024) "Comparative Analysis of DL Models Using Cough Audio Data for Early Detection of COVID-19". In: **ICCIDIA 2024**. ([Link](#)) ↗
- Manikandan Arunachalam, **Sidharth P**, Sooraj Nair, Nikhil Rajiv, Rakesh Suresh Babu, Sanjay T. (2024) "Blockchain-based IoT Computing Services in Medical Healthcare Solutions - a thorough review". In: **IGI Global**. Book: **Blockchain-Based Solutions for Accessibility in Smart Cities**, Kumar Abhishek, Chinmay Chakraborty. ([Link](#)) ↗

## PROJECTS

(GitHub) ↗

### Spatiotemporal GNN for Probabilistic Postprocessing of Wind Speed Forecasts ↗ | PyTorch

Nov 2025 – Dec 2025

- Re-designed a Temporal Graph MLP-Mixer for weather forecasting to predict 97hr lead times at each stations in parallel.
- Attained 0.9017 MAE further reduced to 0.88 MAE on optimization, 0.6243 CRPS with <0.6% variance across 5 seeds.
- Trained under 35 min on RTX3070, outperforming heavy graph/attention models requiring more than 1hr on A100 GPU.

### Datacenter Simulator ↗ | Python

Nov 2025 – Dec 2025

- Built a discrete event datacenter simulation (priority queues) with deterministic, reproducible testing.

- Modeled realistic network physics with leaf-spine topology, congestion-aware routing, partitions, and latency calculation.
- Implemented hardware failure injection with resource fluctuation and Chaos Monkey-style node shutdowns
- Simulated distributed time challenges including clock drift and synchronous/async communication with timeout handling.
- Extended into a **protocol testing suite** used to validate consensus algorithms (Paxos, Raft) and replication protocols under controlled fault injection.

#### **Medical Image Anomaly Detection and Classification | PyTorch**

Mar 2025 – June 2025

- Curated a unified dataset combining Brain MRI, Chest X-ray, and Liver CT images for anomaly detection and classification.
- Used ResNet-50 (Blocks 2 & 3) for feature extraction in an autoencoder-based adversarial network setup.
- Achieved clear anomaly separation on brain and lung data; liver CT showed moderate separation.
- Reached 87% classification accuracy across brain, lung, and liver disease classes.

#### **Graph Convolutional Neural Network for Chest X-ray Classification | PyTorch**

Jan 2025 – Mar 2025

- Developed a GCN model for classifying pneumonia and COVID-19 from chest X-rays, achieving 92.38% accuracy.
- Outperformed ResNet-50 by 8% with 100x fewer parameters, though requiring 2x training time.
- Enhanced model interpretability by leveraging graph-based spatial relationships in medical imaging.
- Currently adapting the method for brain tumor detection.

#### **Biomarker Identification for Diabetic Nephropathy | sklearn, TensorFlow**

Oct 2024 – Nov 2024

- Trained autoencoders with 250 perceptrons in the intermediary layer and 21 in the bottleneck layer.
- Generated heatmaps for raw data, intermediate, and bottleneck layers to analyze encoding.
- Selected 30 unique genes using a 0.7 threshold on normalized cumulative counts.
- Applied RFE with SVM as the base classifier to reduce to 19 genes, achieving the best classification accuracy.

#### **Sound Generation and 3D Visualization with Neural Networks | Python, TensorFlow**

Mar 2024 – June 2024

- Developed models using RNN, Autoencoder, and LNN for generating music samples, with Autoencoder giving the best results.
- Used deep autoencoders to represent audio (music) as trajectories in a low-dimensional embedding space.
- Implemented an end-to-end architecture with a recurrent module to predict the next point in the trajectory.
- Visualized and compared trajectories of original and generated samples to identify the closely matched patterns.

#### **HFCC Feature Extraction Package | Python**

Dec 2023 – Jan 2024

- Developed a comprehensive HFCC (Human Factor Cepstral Coefficients) feature extraction package to support the research presented in the paper "*Comparative Analysis of DL Models Using Cough Audio Data for Early Detection of COVID-19*" at ICCIDA.
- Designed the package to be fully customizable, allowing users to adjust each parameter according to specific requirements.

## LANGUAGES

**Malayalam** Mother tongue; **English** Fluent; **Hindi** Basic; **Tamil** Basic

## TECHNICAL SKILLS

**Programming:** Python(proficient), R(proficient), C(intermediate), JavaScript(intermediate), Matlab(intermediate)

**Frameworks:** Tensorflow(proficient), PyTorch(proficient), React.js(advanced), Next.js(advanced), Node.js(intermediate)

## POSITIONS OF RESPONSIBILITY

#### **IEEE RAS Chair at Student Branch, Amrita Vishwa Vidyapeetham**

Apr 2024 – Jan 2025

- Sharing information about funded projects in collaboration with IEEE, and providing learning resources
- Organizing robotics-related talks and workshops, fostering student engagement in robotics and ML

#### **Lead Colorist, Media Amritapuri (now B Rollers)**

Oct 2023 – Mar 2025

- Responsible for color correction and enhancement of media content, ensuring high-quality visual output. Collaborated with creative teams to achieve visual excellence in images.

#### **Executive committee member, Vidyut (campus multi-fest)**

Dec 2023 – Apr 2025

- Responsible for photography, videography quality maintenance, managing junior colorist team and recruiting new members.

## EXTRA-CURRICULAR ACTIVITIES

**SSR Project** - Hosted a 3 day Technical workshop to impart knowledge and skill to college students on Cyber Security, Microcontrollers (Arduino), C programming, Version Control Systems (Git/Github) and Conducted a coding contest for them as part of Student's Social Responsibility (SSR) initiative.

**Community Services - AmritaSREE Kit Distribution Seva** - Engaged in community service by participating in the AmritaSREE Self Help Groups organised by Mata Amritanandamayi Math on 24th December 2022 at Cherthala