Sidharth S. Nair

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Education

Birla Institute of Technology and Science Pilani — Rajasthan, India
B.E. in Electrical and Electronics Engineering; ***GPA: 8.35/10.00*** — *Aug 2019 – May 2023 (Expected)*

Vishwaprakash Central School — Trivandrum, India
Central Board of Secondary Education (CBSE); ***GPA: 96.6/100*** — *Jun 2017– May 2019*

Research Experience

Department of ECE, Indian Institute of Science (IISc) — Bangalore, India
Undergraduate Research Assistant — *Jun 2022 – Dec 2022*

- Currently Working in the Signal and Information Processing Lab under the supervision of Prof. Sundeep Chepuri and Mr. Prasobh Sankar R.S.
- Developing Graph Neural Network based architectures towards efficient User scheduling and Beamformer design in 5G/B5G MIMO Wireless communication systems

BITS Internet of Things Lab (BITS-IoT Lab) — Rajasthan, India
Undergraduate Research Assistant — *Jan 2021 – Jan 2022*

- Worked on Multi-Base station Resource Allocation problem using Graph Neural Network (GNN) based architectures
- Designed an urban 5G environment, with features such as Network slicing and user mobility for empirical dataset synthesis. Implemented the same in Python
- Proposed a spatio-temporal GCLSTM architecture for this probelm and implemented the same using libraries such as PyTorch Geometric
- Supervised by Prof. Vinay Chamola and Mr. Praveen Gorla

Agency for Science, Technology and Research (A*STAR), Singapore | Remote
Research Intern — *Feb 2022– May 2022*

- Worked on the Zero-shot Visual Search problem supervised by Dr. Mengmi Zhang at Centre For AI Research (CFAR), A*STAR
- Implemented the IVSN model from the paper "Finding any Waldo: zero-shot invariant and efficient visual search" by Zhang et. al, 2018 using Pytorch and computed evaluation metrics and evaluated robustness of the algorithm on the new COCO-Search18 dataset

Central Electronics Engineering Research Institute (CEERI), Chennai | Remote
Research Intern — *May 2021– July 2021*

- Worked on the topic of creating a Computer Vision pipeline for the task of Video Plethysmography, used for remote detection of Cardiac Arrythmias in patients
- Designed said pipeline incorporating Facial recognition using a pretrained MTCNN and skin pixel segmentation using Color space thresholding combined with a region-growing algorithm
- Achieved real-time skin pixel extraction on 24 fps video data

Research Projects

Relational Graph Learning for Drug Repurposing | Pilani, India
Study Project — *Jan 2022 – May 2022*

- Ran experiments to finetune an RGCN model to repurpose combinations of existing drugs for COVID-19 on a new Knowledge graph (COVID-19 KG)
- Proposed a bipartite learning architecture for this task and analysed it from a theoretical standpoint [report]
- Supervised by Prof. Vinti Agarwal

Awards & Achievements

Joint Entrace Exam (JEE) Main 2019: Ranked in the top 0.8 percentile among more than one million applicants

National Standard Exam in Astronomy 2018: Scored 115/200 marks and was selected to participate in the second national stage exam, Indian National Astronomy Olympiad (INAO) 2018

Organizations

Computer Vision Research Society(CVRS) | 🌐 *June 2021 – Present*

Undergraduate Researcher

- CVRS is an independent student-led research group working on Deep learning for Computer vision
- Worked on two challenging vision projects, **Video Super Resolution** and **3D Reconstruction**
  - Video SR: Worked on improving Video Super Resolution using current SoTA architectures like Recurrent Back-Projection Networks (RBPN) and Temporally Deformable Alignment Networks (TDAN) as a basis.
  - 3D Reconstruction: Worked on 3D Animal reconstructions. We worked using the architecture of Coarse-to-fine Animal Pose and Shape Estimation by Chen et.al., NIPS, 2021 as basis, with the goal of creating 3D reconstruction even for occluded images.

The Radio Astronomy Club (TRAC) | 🌐 *Jan 2020 – May 2021*

Team Lead, LIGO Special Interest group

- Team lead of **LIGO** (Gravitational Observatory) Special Interest Group of the club and worked on enhancing aspects of Gravitational Wave (GW) signal processing using DL such as classifying glitches/anomalies in LIGO timeseries data, improving GW signal detection from raw strain data
- Worked on the **SWAN Project** to setup and install a VLBI Radio Telescope Tile on our campus; supervised by Prof. Avinash Deshpande, RRI, Bangalore

Inspired Karters Electric *Sep 2019 – May 2021*

Subsystem Head, Accumulator

- Primarily worked on **Battery Modelling** aspects of Formula Student car, built Battery Modelling systems using MATLAB and Simulink, also worked on SOC Estimation using Kalman Filters
- Head of the High Voltage and Accumulator Subsystem of the Formula Student team. Won Multiple awards at the FSEV (Formula Student EV) Concept Challenge during 2020-21 including **overall first position** in the 2020 edition.

Workshops Attended

LOGML Summer School 2022 July 2022

- Selected as a student attendee (One of 100 selected from 1000+ applications)
- Worked on a short mentored research project on computation reductions for graph attention variants, taking inspiration from counterparts like Linformer, Performer etc.
- Supervised by Mr. Kaustubh Dhole, Emory University

LIGO Open Data Workshop 2020 May 2020

- Student attendee at the LIGO Open Data workshop, 2020, organised by the LIGO-VIRGO collaboration
- Participated in the Open data Challenge and had hands on experience with LIGO signal processing libraries such as GWPy, PyCBC etc.

Skills

Programming Languages: Python, MATLAB, C++, Verilog

Technologies: Git, Linux, Bash, LaTeX

Deep Learning Frameworks/Libraries: PyTorch, PyTorch Geometric, OpenCV, Tensorflow

Relevant Coursework

Major coursework: Deep Learning, Computational Learning Theory, Calculus I-II, Linear Algebra, Differential Equations, Digital Design, Probability and Statistics, Signals and Systems, Communication Systems, Digital Signal Processing

MOOCs: Stanford CS 224W: Machine Learning with Graphs, Deep Learning.ai Specialization–Coursera