VISHNU B

G-mail | Linkedin | Github | Google Scholar

EDUCATION

Indian Institute of Technology Madras, India July 2020
Bachelor of Technology in Electrical Engineering (EE) **CGPA: 8.44/10**

Relevant Coursework: ***EE6180****: Advanced Topics in AI (Python),* ***EE1103****: Numerical Methods in Computation (Python, C++),* ***CS4410****: Topics in Algorithmic Combinatorics and Graph Theory,* ***EE5121****: Convex Optimization,* ***EE4371****: Data Structures and Algorithms (C++) ,* ***CH5350*** *: Applied Time Series Analysis (R)*

Saraswathi Vidyaniketan Public School, Kochi, India May 2016
12th grade- AISSCE, CBSE board **Score- 96.8%**

Rajashree S. M. Memorial School, Aluva, India May 2014
10th grade- AISSE, CBSE board **CGPA- 10/10**

PUBLICATIONS

Vishnu B, A. Sinha, Fast and Secure Routing Algorithms for Quantum Key Distribution Networks, International Conference on Communication Systems and Networks **COMSNETS 2022**. Jan 2022

- Presented the work at COMSNETS conference 2022, Bangalore, India.
- Extended journal version (v2) with added node vulnerability is submitted to **IEEE/ACM** Transactions on Networking.

Separate Talks: The work on Tandem Queue Decomposition(TQD) method used in QKD paper was presented at **University of Massachusetts Amherst**, Centre for Quantum Network Science (CQN) Seminar - [slides] Nov 2021

RESEARCH PROJECTS

Routing Algorithms for Generalised QKD networks [code] Jan 2020 - Sept 2021
Undergraduate Thesis, Learning and Networks Group under Prof. Abhishek Sinha

- Developed a novel network flow algorithm to optimize data traffic and ensure strong stability in a QKD encrypted generalized network (handling unicast, multicast and broadcast) based on the concept of Universal Max-Weight.
- Formulated **TQD** method and its comprehensive proof of queue stability using Lyapunov Drift minimisation.
- Produced better delay performance as compared to the celebrated Back Pressure algorithm backed QKD network and eliminated suboptimality arising from cycle hopping.
- Developed **Assured Path method**, a faster routing algorithm with ongoing research for a statistical proof of stability.

Multi-class classification of Diabetic Retinopathy Grades [code] Nov - Dec 2018
Digital Innovations Lab, IIM Bangalore – Research Intern, under Prof. Krishna Sundar

- Developed **Reti-Net**, a CNN based Diabetic Retinopathy grade classifier inspired by **VGG-net** architecture.
- Further worked on **U-Net** architecture based image segmentation to detect lesions and haemorrhages in the retina.
- Enhanced features using Contrast Limited Adaptive Histogram equalization**(CLAHE)** to increase the accuracy by 6%.

Information Bottleneck in Deep Learning - [code] [video] Oct - Nov 2019
Under Prof. Abhishek Sinha, IIT Madras

- Analysed the Information Theoretic bounds to learnability in the case of a **Deep Neural Network(DNN)** architecture by using the concepts of Statistical Learning Theory.
- Ran simulations to infer that SGD optimization comprises information compression and diffusion phases.

Structure Learning on Bayesian Networks Oct - Nov 2019
Under Prof. Abhishek Sinha, IIT Madras

- Used Jiao–Venkat–Han–Weissman**(JVHW)** estimator with **Chow Liu algorithm** to learn a Bayesian Network model for patient monitoring system from ALARM dataset. [code]
- Used Quantum Annealing to implement structure learning on Bayesian Networks by encoding it into a Quadratic Unconstrained Binary Optimisation(QUBO) problem. [code]

PEER REVIEW ROLES

- **Reviewer** and **Technical Programme Committee** member - Information Technologies and Intelligent Decision Making Systems **(ITIDMS 23)**, International Scientific and Practical Conference, Qingdao, China Oct 2022 - present

- **Reviewer**- International Conference on Intelligent Computing and Machine Learning, **(2ICML-22)** Oct 2022 - present

PROFESSIONAL EXPERIENCE

Oracle **Bangalore,** Nov 2020 - Present

Member of Technical Staff *Areas:* ***Distributed Systems, Data Structures, OS, Databases***

Part of the Data, Space and Transactions group, one of the most lucrative and coveted global tech teams at Oracle.

Engine Database (EDBMS) – Beta

- Handled the designing of slice management layer (**SLM**), which incorporates a new horizontal partitioning technique (called slicing) for fast queries and absolute availability.
- Refactored the hierarchical structure of SLM Catalogs (a set of metadata tables) residing at the Level 2 of table abstraction to establish astute separation of logical and physical entities.
- Integrated SLM refactoring to Active Messaging, Topology Cache, Bootstrapping and Control Cluster modules.
- Created functional and unit test frameworks for each component of SLM catalog restructuring in SQL and Python.

RDBMS – 23c

- Enabled In-memory Transaction Private Journal to handle variable length bitmaps.
- Fixed several mission critical bugs in the areas of **In-Memory Compression units** and **Transaction management**.

Mentoring

- Mentored and guided new hires on Database and systems architecture concepts, development tools, RDBMS bug triage/fixing and Engine Database projects.

Samsung Research Institute **Bangalore,** Jun – Aug 2019

Research Intern *Areas:* ***NLP, Machine Learning, Data Structures***

Part of the On-device Intelligence Team that develops AI based optimizations on Samsung Galaxy smartphones.

- Augmented Bixby Search Engine by developing **Intelligent Grouped Keywords** feature using **SMS data**.
- Worked on Latent Dirichlet Allocation **(LDA)** model optimised with a self-developed algorithm for topic modelling.
- Worked with Google's state-of-the-art transformer model **BERT** to develop topic-keyword clusters.
- Received a **full time offer** based on project performance and advanced level competitive coding.

AWARDS AND ACHIEVEMENTS

- Best Poster Award - **JTG 2022, IIT Mandi** for poster on Tandem Queue Decomposition: A Throughput-Optimal Routing Policy for Quantum Key Distribution Networks [poster] (2022)
- Secured **All India Rank** of **331** in JEE Advanced 2016 and an **All India Rank** of **434** in JEE Mains 2016 from about 1.5 million applicants, being in **the top 0.02%.** (2016)
- Qualified and placed among the **top 0.1%** of students in **Regional Maths Olympiad** (RMO) and **National Standard Examination in Chemistry** (NSEC); thereby selected for **Indian National Maths** and **Chemistry Olympiads** (2015)
- Awarded **National Talent Search Examination** (NTSE) Scholarship by NCERT (New Delhi). (2012)
- Two time awardee of **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship (Young Scientist Fellowship) by the Department of Science & Technology, Govt. of India and administered by IISc, Bangalore. (2015, 2016)
- Awarded **Prime Minister's Scholarship** (PMSS) by the Ministry of Defense for academic excellence. (2019)

LEADERSHIP AND EXTRACURRICULARS

Event Head, Tech N Innovation Fair, Shaastra 2019, IIT Madras

- Spearheaded a team of 6, in organizing the one and only entrepreneurship event of the annual tech fest.
- Garnered partners including startup incubators and venture capitalists for mentorship as well as financing.
- Founded Shaastra Launchpad, a business planning event for early stage startups to receive mentorship.

Project Representative, National Service Scheme, IIT Madras chapter

- Organized in-person Science Teaching Camps for underprivileged children in Chennai.
- Led a volunteer group of 10 students, mentored them and managed the finances and logistics of the project.

Trekking Enthusiast

- Completed **3 high altitude Himalayan treks**: Kedarkantha Summit – winter expedition (12,500 ft), Chandrashila summit (12,110 ft) and Kashmir Great Lakes (13,750 ft).

Fine Arts

- Member of the Fine Arts Club: Represented IIT Madras at inter-IIT cultural meet 2019 and placed as 3rd runner up.