Aadesh Madnaik

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Education

Indian Institute of Technology (IIT) Bombay — Mumbai, India
B.Tech. in Electrical Engineering, *CPI: 9.31/10* — 2018 –Current

- **Thesis**: "Renting Edge Computing Resources for Service Hosting"
- with **Honors**: earned by crediting 4 extra graduate-level courses in Electrical Engineering
- with **Minor**: earned by crediting 5 additional courses in Computer Science and Engineering

Research Experience and Internships

Renting Edge Computing Resources for Service Hosting — Bachelor's Thesis
Mentor: Professor S. Moharir *(Dept. of Electrical Engg, IIT Bombay)* — June 2021 –Current

- Proposed **Better Late Than Never (BLTN)** to decide the state of **shared edge-computing** platforms with dependence on adversarial rent costs coupled with stochastic and negatively associated request arrivals
- Devised a formulation of **performance guarantees** in comparison with the optimal offline policy
- Reduced the computational complexity from O(expected switching time) to **O(1)** thereby reducing latency
- Critiqued some **heuristic policies**: 'Follow-The-Perturbed-Leader' and 'Time-To-Live' against BLTN

Oracle Cloud Infrastructure (OCI), Oracle India Pvt. Ltd. — Bangalore, India
Summer Intern with the Tenant Automation System team — May 2021 –Aug 2021

- **Storing Order Payloads: Investigation-based Project**
- Investigated pre-existing order booking pathways of rent requests (payloads): **APIs** and **Enterprise Manager**
- Integrated a methodology to **record order payloads**, alongside parsing and storing error responses
- **Root Cause Analysis (RCA) and Standard Operating Procedure (SOP)**: Extraction and analysis
- Scraped details from submissions to Jira using **Selenium**, **string parsers** and **argumentative logic**
- Developed an **i/o interface** to visualise and record data, reducing effort and **saving 15 hours** per request

Topological Methods for Data-Driven Analysis — R&D Project
Mentors: Professor D. Chatterjee *(Systems and Control Group, IIT Bombay)*; Professor N. Kanekar *(Dept. of Biosciences and Bioengineering, IIT Bombay)* — May 2020 –Feb 2021

- Applied **persistent homology**, a toolset to analyse high-dimensional data using topological data analysis, to **motor control**, which includes stride-to-stride fluctuations and gait dynamics, and neurodegenerative diseases
- Conducted a detailed literature survey to explore obstacle avoidance, negotiation, and ageing in healthy adults
- Studied group theory, algebraic topology (simplicial complexes) applied to **sensor networks**, **time-series** data
- Explored **Gudhi** (Python) for persistence diagrams and barcodes with **Bayesian classifiers** and **random forests**

SunEdison Infra (Solar PV company) — Chennai, India
Summer Intern — Jul 2020 –Aug 2020

- Coalesced academic articles, publications and technical guidebooks concerning clean-energy linked **smart-grid** and **micro-grid** architectures, **low-latency** control mechanisms, hardware structures and government policies
- Condensed information into **ten long-form pieces** to bridge technical and non-technical readers

Projects

Batch Job Scheduling using Markov Chain Monte Carlo — Fall 2021
EE 740: Advanced Data Network

- Modelled a cloud-computing system using a **two-stage process** with associated latencies and processing times
- Improved on a **O(batch-size)** Greedy Algorithm to implement MCMC-based job scheduling

Globally and Locally consistent Image Inpainting using GANs — Fall 2021
EE 610: Image Processing

- Built a **rectangular patch** filling model through an **image completion** network, **global** and **local** discriminators
- Re-purposed the model to denoise up to **95% random masked** images, and perform **super-resolution**

Cloud-based Temperature Monitor and IoT Server — Spring 2021
EE 344: Electronics Design Lab

- Developed a prototype **wireless temperature monitor** for cold storage with data backup to EEPROM
- Hosted a **web-server** to live-stream data to the cloud and display it on a locally hosted website

Scholarships and Awards

- Awarded **AP grade** for exceptional performance in EE224: Digital Systems **(top 3/200+ students)** 2020
- Achieved **All India Rank (AIR) 114** in JEE Main among 1.04 million aspirants all over India 2018
- Secured **99.2 percentile** ranking in JEE Advanced amongst two hundred thousand candidates 2018
- Selected for **INSPIRE scholarship** from the Government of India (top 1 percentile) in HSC 2018
- Secured **top 1 percentile** ranking in National Examination for Physics (NSEP) and Chemistry (NSEC) 2017
- Recognized in acclaimed newspapers as **highest scoring student** for IGCSE in the region 2016

Course Content Organization, Positions of Responsibility

- **Course Structure Organizer, Teaching Assistant** at IIT Bombay July 2020 - Feb 2021
  Design to Disrupt, Tinkerers' Laboratory in collaboration with Prof. Anurag Mairal, Adjunct Professor of Medicine and the Director, Global Outreach Programs at Stanford Byers Center for Biodesign
  - Organized a **two-phase design-thinking** course aimed towards identifying need statements for the under-served communities, with a focus on innovative solutions for **COVID-19** in developing economies
  - Facilitated **two teams** to work on innovations in **healthcare technologies** in low resource settings
- **Course Structure Organizer** at IIT Bombay Nov 2020 - Mar 2021
  Making and Prototyping at MakerSpace of IIT Bombay
  - Designed the course content, structure, delivery mechanisms and logistics involved with the introduction of an **elec-mech-prototyping** course for all undergraduates at IIT Bombay (**1200+** students)
- **Manager | Tinkerers' Laboratory** May 2020 –Apr 2021
  Nominated head of 'makerspace': led a team of 8 to approve funding and ensure optimum utilization of resources
  - Designed and implementing a **five-year plan** for **self-sustenance** of the lab through the encouragement of novel **in-house** product development, **entrepreneurship** and arranging corporate and alumni **sponsorship**
- **Institute Student Mentor | SMP IIT Bombay** Jul 2021 –Present
  Selected from 300+ applicants based on a 3-tier procedure including peer reviews and interviews
  - Responsible for mentoring **12 first-year students** to help cope with academics and socio-cultural activities
- **Teaching Assistant** at IIT Bombay May 2021 - July 2021
  Differential Equations (MA 108)
  - Mentored a batch of **50 students** by taking weekly tutorial sessions and periodic doubt-clearing sessions

Relevant Coursework and Technical Skills

- **Communications:** Advanced Data Networks | Communication Networks | Digital Communications | Communication Systems | Communications Lab | Digital Signal Processing | Signals and Systems
- **Probability and Mathematics:** Probability and Random Processes (Advanced and Basic) | Data Analysis and Interpretation | Calculus | Linear Algebra | Differential Equations I and II | Complex Analysis
- **Machine Learning and Computer Science:** Foundations of Learning and Intelligent Agents | Machine Learning for Remote Sensing | Data Structures and Algorithms | Design and Analysis of Algorithms | Operating Systems

Extracurricular Activities

- Completed a two-semester long swimming course, competed in inter-hostel Water Polo Championship
- Model United Nations (MUN): Awarded High Commendation, Co-Chaired a Model UN Conference
- Volunteer at Smart India Hackathon 2019, Hardware Edition
  Assisted the team members to operate machinery and catered to hardware requirements over a 5-day period where nine selected teams from specific categories had to build prototypes
- Oversaw the student council as Head Boy and was awarded 'Ace All Rounder' by school authorities