Madhav Tummala

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Education

The University of Texas at Austin *Austin, TX, USA*

MS in Computer Science | CGPA: 3.88 *August 2022 - May 2024*

Advanced OS, Robotics, ML for Systems, , Data Center Networks | Teaching: Computer Networks (undergrad)

Indian Institute of Technology (IIT) Bhubaneswar *Bhubaneswar, India*

B.Tech in Computer Science | CGPA: 9.72 *July 2016 - May 2020*

Compilers, Distributed Systems, Network stack for mobile IoT | Awards: Best Bachelors Thesis

Experience

UT Networked Systems, Research Assistant *Aug 2022 - Present, Austin, TX*

- **Automatic OS Configuration**: Developing an **AI** based solution for searching through the configuration space of various linux subsystems to guarantee SLAs while considering environment and application interference. Our optimal configurations resulted in a **4x** improvement in the 99th percentile latency for path planning in high speed **navigation robots**. Presented at **IROS 2023**.
- **Better service mesh (like Istio)**: Accelerated data plane using eBPF that achieves **20%** improvement in mean gRPC request latency and a control plane that optimizes placement of network functions. Presented at **NSDI 2023**. Working on **SmartNIC** offloads for service mesh.
- **Tech Stack:** Linux kernel, perf, C++17, ROS, eBPF, DPDK, cgroups, gRPC, python, pandas, keras

Goldman Sachs, Software Engineer *July 2020 - July 2022, Bangalore*

- Built and maintained a Rule-Engine that was used for **compliance over global market** regulations; on terabytes of daily feeds, by processing the rule as a sequence of optimal MapReduce steps. Maintained several components of corresponding **ETL pipelines**.
- Developed an acceptance testing library for MapReduce-Protobuf applications; increased code coverage of the Rule-Engine from 20% to 65% using it. Lack of such tests caused a **$1M** fine from regulators for a previously buggy rule.
- With an improved understanding of finra rules and equities data, took part in **planning and hiring** for migrating 90+ rules to our tool, making them ∼**20x** faster. Led a team of 5 to push 4 rules to production.
- **Tech Stack:** Java, Protobuf, Hadoop, HBase, Parquet, Avro, Spark, SQL, Snowflake, Antlr

Max Planck Institute for Software Systems, Summer Research Intern *May 2019 - Jun 2019, Saarbrücken, Germany*

- Analyzed instruction traces of specialized VMs to improve **cold-start** performance in **serverless** technologies like AWS Lambda. Mapped traces to time spent in individual OS components and analysed effects of picking a different VM configuration.
- **Tech Stack:** Linux tracing, Qemu-KVM, Docker, Rust, firecracker-microvm

Indian Institute of Technology (IIT) Hyderabad, Summer Research Intern *May 2018 - June 2018, Hyderabad*

- Developed a synthetic benchmark for compilers of P4 and analyzed performance of the compiled code on a p4 software switch.
- **Tech Stack:** p4, SDN, GDB, LLVM, python, tshark, wireshark

Positions & Awards

Google Developer Student Clubs, Core Head *July 2017 - July 2020*

- Winner of Smart India Hackathon (SIH) 2019 for a problem statement by **Cisco DevNet**. Won INR 1 lakh ($1400). Developed a customer service chat bot for hospitals. **Tech Stack:** VueJS, DialogFlow, PHP, SQL, Flask, Webhooks
- Silver medal at Schlumberger's Coding Hackathon, Inter-IIT Tech Meet 2019. Developed an android app to crowd-source road construction updates and damage data. **Tech Stack:** iOS, Firebase, Maps API, PHP
- Selected for **ACM-ICPC**(International Collegiate Programming Contest) - India Regionals 2017 & 2019.

Robotics and Intelligent Systems Club, Core Head *July 2017 - July 2020*

- Developed a prototype of portable AR Glasses for Tech Expo, Inter-IIT Tech Meet 2018.
- Took workshop sessions on Arduino programming and Raspberry Pi for ∼50 students.

e-summit-iitbbs.com, Web & Design Head *July 2016 - July 2019*

- Led the website development and registration system for the event and made several promotional videos.

Publications

IROS 2023 Configuring the OS for tomorrow's Robots, M Tummala, D Kim, J Biswas, A Akella

ApPLIED 2023 Towards Efficient Microservice Communication, D Saxena, W Zhang, M Tummala, S Goel, A Akella

IEEE SJ TimeCast: Real-Time Many-to-Many Data-Sharing in Low-Power Wireless Distributed Systems, J Debadarshini, M Tummala et al

CNSM 2022 FlexiCast: A Structure-Adaptive Protocol for Efficient Data-Sharing in IoT, M Tummala, M Kaushik, S. Saha

LCN 2020 FlexiCast: Fast Data Sharing in Skewed Wireless Sensor Networks, M Tummala, S. Saha