

# Saarang Srinivasan

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## EDUCATION

### Purdue University

Bachelor of Science in Computer Science (Honors)

GPA: 3.99

West Lafayette, Indiana

**Concentrations:** Machine Intelligence, Algorithms, Systems Software

**Relevant Coursework:** Data Structures & Algorithms, Data Mining & Machine Learning, Operating Systems, ML Systems (G), Motion Planning (G), Introduction to AI, Randomized Algorithms (G), Advanced Theory of Algorithms, Systems Programming, Reasoning About Programs (G), Computer Architecture, Object Oriented Programming, Theory of Computation

## EXPERIENCE

### Software Engineering Intern

Collins Aerospace / Raytheon Technologies

May 2024 – Aug 2024

Cedar Rapids, IA

- Built and certified flight control software for military Boeing KC-46 Pegasus.
- Designed and implemented new hardware configuration format for KC-46 Pegasus handling reducing file size by 72%.
- Built C/C++ tests to verify correctness of flight software based on composition analysis and MC/DC coverage.
- Automated data parsing and tracking with Python using ML, enhancing speed and accuracy of data handling by 30%.

### Algorithmic Game Theory Researcher

Dr. Simina Branzei, Purdue Computer Science Department

May 2024 – Dec 2024

West Lafayette, IN

- Researching reinforcement learning strategies applied to repeated fair division and Stackelberg games.
- Investigated strategy convergence and equitable outcomes in the repeated ‘cake-cutting’ problem for two learning agents.
- Designed and implemented simulations to validate algorithms, achieving observations on strategy outcomes.

### Software Engineering Intern

Hacklab Solutions Pvt Ltd

May 2023 – June 2023

Bangalore, India

- Built containerized AI product with server/client modules using Docker and Kubernetes for rapid deployment.
- Designed master server integrated with front-end dashboard, supporting Postgres/Redis for persistent storage.
- Implemented self-healing nodes, CI/CD, and load balancing with scalability in mind (MLOps/DevOps).
- Boosted deployment speed by 80% and reduced latency by 30% by optimizing memory accesses.

## PROJECTS

### TinyVerify: Translation Validation for Tinygrad | Z3 SMT Library, Formal Verification, ML Compilation

Nov 2024

- Built translation validation framework for the Tinygrad ML Compiler using SMT solvers (Z3).
- Verified correctness of GPU kernel optimizations in Tinygrad Intermediate Representation
- Extended support for ALU ops, memory ops, and vector types, enabling rigorous formal validation.
- Added support for GPU-specific variables and CPU control flow and range operations.
- Slides: <https://tinyurl.com/tinyverify>, trying to publish

### GNN Cost Model for Tensor Program Optimization | PyTorch Geometric, TVM, NLP, Multithreading

Nov 2024

- Designed a Graph Neural Network (GNN)-based cost model to predict runtime of tensor programs.
- Integrated the model into TVM’s search framework, replacing XGBoost for runtime prediction on NVIDIA V100 GPUs.
- Engineered features from TensorIR Abstract Syntax Trees (ASTs) using FastText embeddings trained on random walks.
- Surpassed XGBoost accuracy in runtime prediction and validated model performance on the TenSet dataset.
- Slides: <https://tinyurl.com/TPGNN>, trying to publish

### Pulse - Convert Lectures to TikToks | Next.js, Flask, PyTorch, OpenCV, Firebase, MongoDB

Jan 2024

- Developed a React.js web app to convert lecture videos/slides into TikTok-style clips, summarizing key topics.
- Built a robust two-layer MongoDB/Firebase DB architecture to increase video generation speed by 80%.
- Integrated with React Native iOS app for viewing generated videos, including deepfake videos and tweet summaries.
- Utilized OpenAI’s Whisper API and Modal/PyTorch for video processing and Firebase/MongoDB for data storage.

### Efficient Motion Planning with Mesh Simplification | Python, Blender, PyVista, A\*, RRT

Dec 2024

- Analyzed the impact of mesh simplification techniques (e.g., Quadratic Error Metrics) on 3D pathfinding algorithms.
- Implemented motion planning algorithms, including A\* and RRT, on high-resolution and simplified 3D meshes.
- Achieved a 30% reduction in computation time with negligible degradation in path accuracy.
- Preprocessed 3D meshes using Blender and PyVista, optimizing for robotic pathfinding efficiency.
- Presented findings on the trade-offs between computational efficiency and path quality for real-time robotics.

## Real-Time Anomaly Detection for Industrial IoT | *Pandas, TensorFlow, Scikit-learn, Python* Aug 2022 – May 2023

- Engineered IoT and ML solutions to diagnose machine failures through real-time sensor insights with Webee.io
- Built an anomaly detection system that alerted customers to equipment issues.
- Cleaned noisy sensor data with a 93% success rate, using linear regression and GMM clustering.
- Developed an anomaly detection pipeline with One-Class SVM and LSTM, achieving 83% accuracy in outlier detection.

## Personalized Bash Shell | *C, Lex, Yacc, GNU Bash* Mar 2024

- Developed a custom GNU Bash shell using Lex/Yacc for parsing, supporting loops, conditionals, and subshells.
- Added features like piping, file redirection, and system calls for child process management.
- Enabled signal handling, command history, and line editing with tab completion and arrow key navigation.
- Implemented process controls, including zombie process cleanup and ctrl-C interruption.

## HONORS & AWARDS

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**Gold Medalist:** Indian National Olympiad in Informatics 2022 (Top 10 in India).

**ICPC Regionals:** Rank 18 representing Purdue in the ACM International Collegiate Programming Contest Regionals 2022/23.

**International Olympiad in Informatics Training Camp:** Top 30 in India to be selected in 2021 and 2022.

## TECHNICAL SKILLS

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**Languages:** Python, C/C++, Java, JavaScript, Bash, R, MATLAB, ARM/x86, HTML/CSS, Rust

**Frameworks/Tools:** Pandas, Open-CV, Torch, Docker, Kubernetes, SQL, Flask, Firebase, Git, React.js, Node.js, Linux

**Certifications:** MITx: 6.431x Probability and Uncertainty of Data, Data Structures & Algorithms Certification by CodeChef

**Fields:** Systems for ML, NLP, Machine Learning, Computer Vision, Full Stack Development, Algorithms

## ACTIVITIES

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**Course Development:** CS381 Analysis of Algorithms (Fall '24, 400+ students), CS182 Discrete Math (Spring '24, 800+ students)

**Teaching Assistant:** CS381 (Fall '24), CS182 (Spring '24), CS311 Competitive Programming 2 (Spring '23)

**USACO Tutor:** Instruct Bay Area students in advanced algorithms for the USA Computing Olympiad with X-Camp Academy

**Club Treasurer/Officer:** Competitive Programming Union Club 2023-2024

## PAPER PRESENTATIONS

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**Efficient Algorithms for Device Placement of DNN Graph Operators:** Slides, Sept 2024

**MemGPT: Towards LLMs as Operating Systems:** Slides, Nov 2024

**Probabilistic Roadmaps for Path Planning in High-Dimensional Configuration Spaces:** Slides, Dec 2024