Gourishankar Mahadeo Bansode

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Summary

Robotics and AI Software Engineer with 2+ years of experience building production-grade Python, C, and C++ systems for distributed, safety-critical platforms. Research Assistant at ASU working on NASA event-based star tracking with Alphacore Inc., with strengths in computer vision, event-based sensing, state estimation, robotics simulation/control, data pipelines, observability, and performance-driven engineering on Linux.

Experience

Research Assistant Jan. 2026 – Present

Arizona State University - Prof. Dr. Suren Jayasuriya; NASA project with Alphacore Inc. *Tempe, AZ*

- Lead research on the ASU–Alphacore NASA event-based star-tracking project for high-speed spacecraft attitude estimation under low-SWaP constraints.
- Led development of the centroid-correction algorithm, improving the measurement model from brightness-only correction to a speed-aware and brightness-aware formulation for fast-moving stars.
- Implemented and evaluated speed-aware centroid correction with adaptive measurement uncertainty, event batching, centroid extraction, astrometric initialization, and weighted Wahba attitude estimation.
- Supported the Phase I proposal submitted to NASA and currently contributing to Phase II technical progress, including experiments, evaluation design, and research/proposal writing.

Software Executive Dec. 2021 – June 2024

Tata Advanced Systems Limited *Mumbai, India*

- Led backend development for the Indian Army's Integrated Electronic Warfare Systems (IEWS), delivering distributed C/C++ and Python services, data pipelines, and control-plane components across heterogeneous hardware; managed a team of 6 engineers.
- Designed and documented a reusable Health Monitor SDK for Indian Navy programs (3D-ASR, CMS), standardizing telemetry, diagnostics, fault-detection interfaces, and observability across products.
- Automated Fire Controller Units for Dhanush, ATAGS, and Pinaka platforms, reducing manual intervention by 75% through deterministic control logic, Python scripting, and repeatable validation workflows.
- Implemented high-performance data cataloging and processing features in the Ballistic Logix library for ballistic range data, improving processing efficiency by 60% and enabling downstream analytics and model development.

Software Engineering Intern Jan. 2021 – June 2021

Softnautics LLP *Pune, India*

- Developed a gesture-driven car infotainment prototype using OpenCV and TensorFlow, integrating REST APIs for real-time data exchange and achieving 92% gesture-recognition accuracy.
- Combined machine learning, computer vision, and data visualization for a real-time automotive interface; profiled and debugged the perception pipeline to resolve latency and performance bottlenecks.

Technical Skills

Languages: Python, C, C++, MATLAB, SQL, Bash, Java

Robotics, State Estimation & Control: ROS, MATLAB/Simulink, NVIDIA Isaac Sim/Isaac Lab, NVIDIA Warp, PID/PI control, inverse kinematics, SLAM, visual odometry, Wahba attitude estimation, EKF-style estimation

AI/ML, NLP & Computer Vision: PyTorch, TensorFlow, Scikit-learn, OpenCV, YOLO, 3D Gaussian Splatting, 3D computer vision/reconstruction, graphics pipelines, Transformers, Temporal Fusion Transformer, LSTM, ARIMAX, BERT, GPT, GANs, reinforcement learning, deep imitation learning, neural network training/deployment, ML model deployment

Event-Based Vision & Space Autonomy: event-based cameras, asynchronous sensing, vision-based and tactile sensors, star tracking, centroid extraction/correction, astrometry, synthetic data generation, low-SWaP attitude estimation

Backend, Systems & DevOps: Linux/Unix, Qt, Django, FastAPI, REST APIs, Postman, SDK development, API integration, SDLC, Docker, Kubernetes, AWS, Firebase, Git, GitHub Actions, CI/CD, Infrastructure-as-Code, automation/scripting, MQTT, Raspberry Pi

Data, Reliability & Performance: data engineering, data pipelines, data cataloging/processing, MySQL, MongoDB, database design, Pandas, NumPy, Matplotlib, data visualization, metrics/KPI design, experiment analysis, data quality assurance, observability, profiling/debugging, concurrency, multithreaded and distributed systems

Education

Arizona State University Aug. 2024 – May 2026

M.S. in Robotics and Autonomous Systems (Artificial Intelligence), GPA: 3.79 *Tempe, AZ*

MIT School of Engineering, MIT-ADT University Aug. 2017 – July 2021

B.Tech. in Computer Science, Specialized in Intelligent Systems *Pune, India*

Projects

Vision-Guided Differentiable Physics for Robotic Manipulation | *3DGS, Isaac Lab, NVIDIA Warp* Nov. 2025

- Built a perception-to-control framework integrating 3D Gaussian Splatting with NVIDIA Warp for real-time differentiable physics-based manipulation and system identification.
- Engineered an Isaac Lab synthetic data pipeline for high-fidelity RGB-D datasets with automated labels for object dynamics and contact forces; inferred latent properties such as friction and mass from visual gradients.

S&P 500 Forecasting with Transformers | *PyTorch, TFT, LSTM, ARIMAX* Nov. 2025

- Developed a monthly market forecasting framework comparing Temporal Fusion Transformer, LSTM, and ARIMAX models with macroeconomic indicators and held-out test evaluation.
- Standardized metrics, visualizations, and experiments for fair model comparison; collaborated with a team of 5 on model design, hyperparameter experiments, and quantitative analysis.

Autonomous Drone Landing System | *MATLAB, Simulink, Computer Vision* May 2025

- Integrated a ground-based line follower with a Parrot Mambo Minidrone for autonomous landing, achieving 95% detection reliability, tracking error below 8 pixels, and 5 cm landing tolerance in 80% of runs.
- Implemented PI feedback control and simulation/hardware validation for landing on a moving platform at speeds up to 0.2 m/s.

Automated Goalkeeper Robot | *YOLOv8, OpenCV, Raspberry Pi 5, MQTT* June 2025

- Developed an edge vision-to-actuation pipeline for ping-pong ball detection, tracking, and trajectory prediction, achieving 92% mAP with a custom YOLOv8 model.
- Implemented quadratic regression with gravity adjustments and real-time servo control over MQTT; achieved 2.7 ms/frame inference on Raspberry Pi 5.

Achievements, Publications & Certifications

IEEE Publication - "A Transfer Learning Approach for Descriptive Question Answering System," IEEE Pune Section International Conference. Dec. 2021

Smart India Hackathon Winner - Winner of Smart India Hackathon organized by MHRD, Government of India. Mar. 2019

National Innovation Contest Finalist - Represented MIT-ADT University at National Innovation Contest by MHRD Innovation Cell. Aug. 2020

Certifications - Qt 6 Core with C++ (Beginner, Intermediate, Advanced); Machine Learning - Stanford University/Coursera.