Gaurav **Shinde**

Multi-Robot Autonomy · Collaborative Perception · Embodied AI

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EDUCATION

Ph.D. in Information Systems (AI/ML Track), UNIVERSITY OF MARYLAND, BALTIMORE COUNTY — Aug 2024 – May 2028 (expected)
Advisor: Dr. Nirmalya Roy · GPA 4.00/4.00 · Sigma Xi Research Honor Society (Full Member)

- **Focus:** Multi-Robot Autonomy · Collaborative Perception · Multimodal Sensor Fusion · VLM-Based Reasoning & Planning

M.S. in Engineering (AI/ML Track), SAN JOSE STATE UNIVERSITY — May 2024

B.S. in Computer Science, MIT WORLD PEACE UNIVERSITY — Apr 2021

RESEARCH EXPERIENCE

Graduate Research Assistant — MOBILE, PERVASIVE & SENSOR COMPUTING LAB — Aug 2024 – Present
Multimodal LLMs, Agentic AI, Feed-Forward 3D Reconstruction, Virtual–Physical Co-Simulation

- Introduced **CAViAR**, quality-aware vision–radio fusion for GPS-free relative range estimation among collaborative autonomous agents (**IEEE WoWMoM 2026**).
- Proposed **TAVIC-DAS**, task- and channel-aware variable-rate image compression for bandwidth-efficient information sharing across robot teams (**IEEE PerCom Workshops 2025**).
- Developed **COVER**, a multi-robot framework that estimates object dimensions and their reliability from multi-view RGB images and assigns robots to cover objects using LLM-based compatibility scoring and constrained optimization *(under review, **HSCC+ICCPS 2027**)*.
- Introduced **SPERE-Nav**, a zero-shot multi-robot object-goal navigation framework where a VLM assigns frontiers using retrieved visual evidence and object-level spatial relations, then verifies each assignment via reflective reasoning *(under review, **IEEE ICRA 2027**)*.
- Led a survey on efficient vision-language models for resource-constrained devices (**WIREs DMKD 2026**).

Graduate Research Assistant — MACHINE INTELLIGENCE & COMPLEX SYSTEMS LAB — Feb 2023 – May 2024
Time-Series Modeling, Battery Health Prognostics

- Developed **De-SaTE**, a denoising self-attention transformer architecture that accurately predicts the remaining useful life of Li-ion batteries under heterogeneous noise in battery operational data. (**IEEE BigData 2023**).

Earlier: Graduate Research Assistant, INTERPARES TRUST AI (2023–2024; systematic review of AI in archival science, **ASIS&T 2025**).

FEATURED PUBLICATIONS (150+ citations)

● lead ○ co-author

PEER-REVIEWED

- ● CAViAR: Quality-Aware Vision-and-Radio Fusion for Relative Range Estimation among Collaborative Autonomous Agents, **WoWMoM 2026**
- ● A Survey on Efficient Vision-Language Models, **WIREs DMKD 2025**
- ● Tracing the Past, Predicting the Future: A Systematic Review of AI in Archival Science, **ASIS&T 2025**
- ● TAVIC-DAS: Task and Channel-Aware Variable-Rate Image Compression for Distributed Autonomous System, **PerCom Workshops 2025**
- ● De-SaTE: Denoising Self-attention Transformer Encoders for Li-ion Battery Health Prognostics, **BigData 2023**
- ○ Fed-CASQ: Enhancing Class-Wise Accuracy in Pervasive Federated Learning with Class-Aware Scaling and Quantization, **PerCom 2026**
- ○ COHORT: Hybrid RL for Collaborative Large DNN Inference on Multi-Robot Systems Under Real-Time Constraints, **WoWMoM 2026**
- ○ Decoupling Perception and Reasoning for Contactless Respiratory Rate with Vision Language and Small Language Models, **CHASE 2026**
- ○ CALIBRA: Calibration-Aware Multi-Agent Verification for Contactless Physiological Monitoring, **CVPR Workshops 2026**
- ○ RespFormer: A Motion-Guided Temporal-Frequency Multimodal Fusion Transformer for Contactless Respiratory Monitoring, **ICMLA 2025**
- ○ E2RespUNet: End-to-End Respiratory Signal Reconstruction and Rate Prediction Using a Unified Attention-Enhanced U-Net, **SmartComp 2025**
- ○ CoOpTex: Multimodal Cooperative Perception and Task Execution in Time-Critical Distributed Autonomous System, **DCOSS-IoT 2025**

UNDER REVIEW

- ● COVER: Collaborative Object Perception for Semantic-Geometry-Aware Robot Deployment, **HSCC+ICCPS 2027**
- ● SPERE-Nav: Spatial and Perceptual Evidence Guided Reflective Reasoning for Zero-Shot Multi-Robot Object-Goal Navigation, **ICRA 2027**
- ○ RippleGuard: Defending Cross-Layer Cascading Attacks in Cooperative Perception for Multi-Agent Systems, **HSCC+ICCPS 2027**

HONORS, SERVICE & TEACHING

- **NSF Student Travel Grant** (IEEE PerCom 2025) · **Sigma Xi** Research Honor Society, Full Member (2026)
- **Reviewer:** IEEE TMC, WIREs DMKD, Pattern Recognition Letters, IEEE BigData, COMSNETS · **TPC Member**, COMSNETS 2027
- **Organizing:** NSF TRACE Robotic Testbed Workshop (2026) · Local organizer, IEEE PerCom 2025
- **Leadership:** GEARS Chair, UMBC GSA · Council Member, Research & Creative Achievement Council
- **Teaching & Mentoring:** IS 420 Database Application Development, *UMBC* (90 students) · Mentored REU students & a Ph.D. student
- **Field demos:** NSF TRACE Testbed 2026 (gallery, workshop) · DVPG Remote Robotics Experiment (DEVCOM ARL, 2025)

TECHNICAL SKILLS

- **Robotics & Simulation:** ROS/ROS2, NVIDIA Isaac Sim, Habitat, Gymnasium, Gazebo, Webots
- **Programming:** Python, C, C++, Java, TypeScript, JavaScript
- **Machine Learning:** PyTorch, TensorFlow, scikit-learn, Pandas, NumPy
- **Agentic & Multimodal AI:** VLMs/MLLMs, multi-agent reasoning, RAG, world models