

S. Kranthi Kumar Chowdary

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Research Interests

My research focuses on statistically grounded reliability monitoring for visual perception systems under distribution shift, with emphasis on safety-critical autonomous systems and embedded real-time deployment.

Research Experience

Research Assistant — Computer Vision

Oct 2025 – Present

Indian Institute of Technology Roorkee

- Developed a self-supervised optical flow framework (RAFT, PWC-Net) for UAV-based river surface velocity estimation without ground-truth labels
- Implemented photometric consistency and spatial smoothness objectives for self-supervised training under low-light and monsoon conditions
- Conducted quantitative validation against ADCP ground truth (n=2221 velocity measurements)
- Observed 36.39% mean underestimation using sparse KLT tracking versus 1.81% relative error using dense Farneback flow (mean ADCP velocity: 0.5884 m/s)
- Analyzed distributional variance and error propagation under high-flow deployment scenarios

Undergraduate Researcher — Visual Perception Systems

Jan 2023 – Present

SRM Institute of Science and Technology

- Led end-to-end development of a real-time pothole and road-asset detection system achieving 93.7% precision and 91.2% recall on uncurated Indian road footage
- Curated and annotated 12,000+ road images across diverse terrains, lighting conditions, and infrastructure variability
- Fine-tuned YOLOv11 architecture for real-time inference (30 FPS) under deployment-like constraints
- Investigated performance degradation under distribution shift, motivating development of statistical reliability monitoring frameworks

Research Intern — Network Systems

May 2024 – Aug 2024

National Institute of Technology, Surathkal

- Developed a Virtual Network Embedding architecture using Horizontal Federated Learning for scalable multi-domain resource allocation
- Designed privacy-aware aggregation mechanisms across distributed network controllers
- Evaluated performance using P3Alib Master simulation under heterogeneous traffic workloads

Research Projects

SPiDeR-SRI: Statistical Reliability Monitoring for Multi-Camera ADAS Systems

- Formalized reliability monitoring as a sequential hypothesis testing problem over cross-view feature divergence under distribution shift
- Implemented CUSUM-based change-point detection on multi-camera feature embeddings beyond entropy and softmax confidence baselines
- Achieved 80% failure detection under synthetic degradation (blur, fog, sensor noise) with 18 ms monitoring overhead
- Evaluated detection-false alarm trade-offs under real-time embedded ADAS latency constraints
- Designed for scalability across infrastructure-diverse deployment settings and cross-domain transfer scenarios

Tejas Vision: Real-Time Road Asset Detection for Unstructured Traffic

- Built a deployment-ready road asset detection system tailored to infrastructure-diverse Indian traffic environments
- Fine-tuned YOLOv11-based detection pipeline across 20+ classes achieving 80.4% precision
- Demonstrated real-time inference on live road video streams under challenging environmental variability

Publications

Smart Pothole Detection and Traffic Sign Identification for Indian Roads Using YOLOv11 April 2025

Kranthi Kumar Sariputi, Harshith Y., Preethiya T.

International Conference on Data Science and Business Systems (ICDSBS) 2025 — **Best Paper Award**

CLIPQ-Count: A Query-Guided Vision-Language Framework for Few-Shot Object Counting Sept 2025

Kranthi Kumar Sariputi, Prabakeran S., M. Saravanan

Proceedings of IEEE INDICON 2025 (22nd Edition)

Education

SRM Institute of Science and Technology Sept 2022 – Jul 2026

Bachelor of Technology in Computer Science and Engineering

Relevant Coursework: Computer Vision, Pattern Recognition, Image Processing, Cloud Infrastructure, Big Data Analytics

Technical Skills

Core Expertise: Reliability Monitoring, Multi-View Perception, Optical Flow, Domain Shift Analysis, Embedded Vision Systems

Programming: Python, PyTorch, OpenCV, NumPy, SciPy

Statistical Methods: Sequential Change-Point Detection (CUSUM), Divergence Metrics, Hypothesis Testing

Systems: Real-Time Optimization, Latency-Constrained Inference, Multi-Camera Pipelines

Leadership

Vice Chairperson, IEEE SRM Student Branch May 2025 – Present

- Leading a 200+ member technical community; organizing research workshops, invited talks, and interdisciplinary AI initiatives across domains
- Coordinating collaborative programs promoting applied research in embedded systems, computer vision, and autonomous technologies
- Mentoring junior members in research project formulation, paper writing, and technical development

Class Representative (CR) 2022 – Present

- Elected Class Representative for four consecutive academic years, serving as liaison between faculty and 70+ students
- Facilitated academic coordination, curriculum feedback discussions, and resolution of student concerns
- Supported organization of technical events, peer mentoring initiatives, and collaborative learning activities

References

Dr. K. S. Kasiviswanathan

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Indian Institute of Technology Roorkee

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Prof. R. Balasubramanian

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Indian Institute of Technology Roorkee

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Dr. Saravanan M

Professor

SRM Institute of Science and Technology

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