Yelchuri Venkata Sai Harsha

harshayelchuri2000@gmail.com | https://harshayelchuri.github.io/ | Google Scholar | Bonn, Germany

Education

University of Bonn, Bonn, Germany — **Current Grade: 1.2 (1.0 best)**
M.Sc. in Mobile Robotics — Oct 2025 – Sep 2027 (Expected)
Relevant Coursework: Robot Learning, ML for Robotics & Computer Vision, Computer Vision, Humanoid Robotics

RV College of Engineering, Bengaluru, India — **GPA: 9.01/10**
B.E. in Information Science and Engineering — Aug 2018 – Aug 2022
Visvesvaraya Technological University

Publications

For a complete and updated publication list, see Google Scholar.

1. **Robotwin: A Robotic Teleoperation Framework Using Digital Twins**.
Harsha Yelchuri, Nithish K. Gnani, Diwakar Kumar Singh, and T. V. Prabhakar. *arXiv preprint*, 2025. Video.
2. **SeMaScore: A New Evaluation Metric for Automatic Speech Recognition Tasks**.
Zitha Sasindran, **Harsha Yelchuri**, and T. V. Prabhakar. *Interspeech*, 2024.
3. **Towards a Resource-Efficient Semi-Asynchronous Federated Learning Framework for Heterogeneous Devices**.
Zitha Sasindran, **Harsha Yelchuri**, and T. V. Prabhakar. *National Conference on Communications (NCC)*, 2024.
4. **Ed-Fed: A Generic Federated Learning Framework with Resource-Aware Client Selection for Edge Devices**.
Zitha Sasindran, **Harsha Yelchuri**, and T. V. Prabhakar. *International Joint Conference on Neural Networks (IJCNN)*, 2023.
5. **H_eval: A New Hybrid Evaluation Metric for Automatic Speech Recognition Tasks**.
Zitha Sasindran, **Harsha Yelchuri**, Supreeth Rao, and T. V. Prabhakar. *IEEE Automatic Speech Recognition and Understanding Workshop (ASRU)*, 2023.
6. **MobileASR: A Resource-Aware On-Device Personalization Framework for Automatic Speech Recognition on Mobile Phones**.
Zitha Sasindran, **Harsha Yelchuri**, Pooja Rao, and T. V. Prabhakar. *International Conference on AI-ML Systems*, 2023.
7. **SmartSV: Real-Time Solenoid Valve Diagnosis at the Embedded Edge**.
Harsha Yelchuri, Shrutkirthi S. Godkhindi, Prajwal B. N., Vishwanath Shastry, and T. V. Prabhakar. *TinyML Asia Technical Forum, COMSNETS*, 2024.
8. **GASP: Gap Analysis for Spark Plugs**.
Harsha Yelchuri, Abhigna V. Kumar, Siddharth Sahu, Savinay Kumar, Shrutkirthi S. Godkhindi, and T. V. Prabhakar. *COMSNETS*, 2024.
9. **A Review of TinyML**.
Harsha Yelchuri and Rashmi R. *arXiv preprint*, 2023.

Research Experience

Student Research Assistant — Jul 2026 – Present
Fraunhofer Institute for Communication, Information Processing and Ergonomics (FKIE), Wachtberg, Germany

- Evaluated task execution strategies for field robots operating under asynchronous human feedback, comparing offline VLA models with hybrid architectures that leverage MoveIt/Nav2, modular neural policies, and LLM-generated code execution.
- Trained an Action Chunking with Transformers (ACT) policy for continuous skill execution, with ongoing work focused on fine-tuning compact VLAs and π_0-based architectures to improve generalizable control.

Post-Baccalaureate Fellow — Aug 2024 – Jun 2025
Indian Institute of Technology Madras, Chennai, India

- Investigated diffusion-based control policies for safe reinforcement learning, focusing on generating feasible actions under safety constraints.

Project Associate Sep 2022 – Aug 2024
Indian Institute of Science, Bengaluru, India

- **Robotics and Digital Twins**
  - Designed and implemented an intercity teleoperation system for controlling a UR3 manipulator over approximately 400 km.
  - Developed a real-time digital twin to synchronize operator commands with the physical robot.
  - Designed discrepancy-detection and state-correction methods to update the digital twin when simulated and physical robot states diverged.
- **LLM-Based Evaluation Metrics**
  - Developed two novel speech-to-text metrics (H_{eval} combining semantic distance with non-keyword error rates, and $SeMaScore$ using segment-wise mapping) to overcome traditional Word Error Rate limitations.
- **Federated Learning**
  - Developed an end-to-end federated-learning framework for heterogeneous edge devices and designed a bandit-based client-selection strategy to improve fairness.
- **Resource-Aware On-Device Training**
  - Developed a methodology for adapting model training to mobile-device constraints such as available memory and battery level.

Research Intern Feb 2022 – Sep 2022
Indian Institute of Science, Bengaluru, India

- Developed an end-to-end predictive-maintenance pipeline for solenoid-valve fault detection and remaining-useful-life estimation.
- Deployed trained models on an Arduino Nano 33 BLE Sense for real-time on-device inference.

Research Intern Feb 2022 – Sep 2022
Samsung Research Institute, Bengaluru, India

- Developed a BiLSTM-based model for multi-class emotion classification from textual input.
- Extended the model to capture longer contextual information across groups of sentences.

Industry Experience

Machine Learning Lead Jan 2023 – Jun 2024
EdgeSeanara, Bengaluru, India

- Led the machine-learning team developing predictive-maintenance methods for aquaculture systems.
- Directed a proof-of-concept project for fruit-variety classification and quality assessment using computer vision.

Software Engineer Intern Jun 2021 – Jul 2021
Boeing India Private Limited, Bengaluru, India

- Developed performance analytics from flight-operational data for pilot-assessment training.
- Analyzed 1,646 real-world flight-data files, each containing 4,196 parameters.
- Developed algorithms to identify two new Non-Flight Operations Quality Assurance events.

Selected Projects

Open-Vocabulary Mobile Manipulation with Toyota HSR

- Developed scene-graph representations of indoor environments using two pipelines: (i) reconstructing the environment from iPad RGB-D scans and extracting objects using Mask3D, and (ii) directly constructing the scene graph from the Toyota HSR's RGB-D observations using BOXER.
- Developing a language-guided task pipeline in which an LLM interprets user requests, queries the generated scene graph, and translates the requested task into executable pick-and-place actions for the Toyota HSR.

Active View Planning for Object Reconstruction

- Developing an active vision pipeline that selects informative camera viewpoints for RGB-based 3D object reconstruction using a robotic manipulator.

- Investigating diffusion-based geometric priors and improved next-best-view strategies to increase reconstruction quality while reducing the number of required observations.

Teaching, Talks, and Workshops

Teaching Assistant Aug–Dec 2022, Aug–Dec 2023
Indian Institute of Science, Bengaluru, India

- Supported laboratory sessions, boot camps, and student projects for the course "Design for Internet of Things," covering IoT protocols, embedded systems, and machine learning.
- Mentored students on machine vision, robotic inspection, and deep-learning projects.

Invited Talks & Conducted Boot Camps

- Delivered an invited talk on TinyML at George Washington University
- Conducted hands-on embedded machine-learning boot camps at IISc.

Student Mentoring

Soma Srija, Shreya Shahane Oct 2023 - Jan 2024
EdgeSeanara, Bengaluru, India
Fruit Quality Inspection: Developed deep learning models for fruit breed identification and quality inspection using texture analysis.

Siddharth Sahu, Savinay Kumar Aug 2023 - Dec 2023
Indian Institute of Science, Bengaluru, India
Real-time identification of defective spark plugs on a conveyor belt : Developed a system that uses a camera and a robotic arm to automatically inspect and sort spark plugs based on their gap length.

Kumar Raj Gummadi, Kaushik Raghunandan Hasabnis Aug 2022 - Dec 2022
Indian Institute of Science, Bengaluru, India
Machine Vision based Foreign Object Detection: Developed a Line scan camera-based machine vision solution to detect Foreign Objects on the surface.

Achievements and Service

Erasmus+ Scholarship: Selected for an Erasmus+ semester-exchange scholarship; declined the award due to other academic commitments.

SmartX Hackathon 2022: Placed 10th among 165 teams by developing a prototype for music and bright-light therapy.

National Service Scheme Volunteer: Completed more than 200 hours of volunteering in STEM education and environmental-conservation initiatives.

eVidyaloka Trust Volunteer: Developed mathematics and science educational content for local-school students.

Senior Member, Coding Club: Organized programming competitions and hackathons and mentored junior students.

Technical Content Writer: Published technical articles on emerging technologies and embedded machine learning on Medium and Hackster.

Skills

Programming: Python, C++, C, MATLAB.

ML and Robotics: PyTorch, TensorFlow, ROS/ROS 2, Isaac Sim, OpenCV.

Robotic and Embedded Platforms: UR3/UR10/UR12, Toyota HSR, Kobuki, Crazyflie, DOBOT Magician, Arduino, Raspberry Pi Pico, ESP32.

Sensors and Tools: Stereo cameras, line-scan cameras, 3D LiDAR, radar, spectroscopy sensors, Git, Linux, Docker.