Shreeram Murali

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Education

2023–2025 (exp.) **M.Sc. in Electrical Engineering**, *Aalto University*, Finland.
Major: Control, Robotics, and Autonomous Systems
Minor: Computer Science
GPA: 4.48/5.0, 91 credits
Advisors: Prof. Dominik Baumann, Prof. Simo Särkkä
Awards:
- Aalto University Scholarship (Category A, 100%)
- Dean's Incentive Scholarship

2017–2021 **B.Eng. in Mechanical Engineering**, *Ramaiah Institute of Technology*, India.
GPA: 9.37/10.0
Awards and Honours:
- Graduated First Class with Distinction
- Best Achiever Award, outgoing class of 2021

Experience

Research

6/2024– 11/2024 **Research Assistant**, *Aalto University*, Espoo, Finland.
CYBER-PHYSICAL SYSTEMS GROUP, PROF. DOMINIK BAUMANN
full-time from 6–8 2024 (3 months); part-time from 9–11/2024 (3 months)
The goal of my research here was to learn a reward transformation that mitigates the effect of low-probability, high-impact scenarios reinforcement learning agents might experience. One way would be to leverage the Koopman operator to learn a transformation that renders rewards ergodic.
Contributions
- Explored RL environments and other dynamical systems potentially exhibiting non-ergodic behaviour.
- Trained Koopman operators on such systems to learn utility functions that can act as reward transformations.

11/2023– 5/2024 SENSOR INFORMATICS AND MEDICAL TECHNOLOGY GROUP, PROF. SIMO SÄRKKÄ
part-time (7 months)
Worked on modelling, simulation, and control of a rotary-inverted pendulum. I wrote a package that simulated and implemented control algorithms (PID, LQR, swing-up control) and handled high-frequency real-time data acquisition and control at 1000Hz. Furthermore, these packages utilised JAX for optimized and accelerated numerical computations.

8/2021– 7/2023 **Junior Research Fellow**, *Indian Institute of Science*, India.
DATA, CONTROL, AND AUTONOMOUS SYSTEMS LAB, PROF. JISHNU KESHAVAN
My main focus at DACAS was to explore how visual information can enable mobile robots to perform autonomous behaviours. I learned about various control methods that depend on vision, such as nonlinear and data-driven approaches, with a focus on adaptability, guarantees, and reduced computational overload. Some of the projects I participated in were: (a) coordinating the movements of ground vehicles using vision-based nonlinear control, (b) guiding quadrotors to land safely using optical flow, (c) identifying the dynamics of complex systems using Koopman autoencoders.

Teaching

2/2025– present **Teaching Assistant**, *Aalto University*, Finland.
For the graduate-level course **ELEC-E8121 Networked Control of Multi-agent Systems** taught by Prof. Dominik Baumann.

9/2024- 12/2024 For the graduate-level course **ELEC-E8740 Basics of Sensor Fusion** taught by Prof. Simo Särkkä.

Industry

2/2021– 7/2021 **Software Engineer Intern – IoT**, *Tata Consumer Products*, Bangalore, India.
Produced code for IoT devices that operate in Starbucks stores. These devices would monitor store parameters (such as WiFi speed, temperature, etc.). Built a cloud-based database that stores time-series data and a data visualization tool for the end-users.

Publications

2023   **[J1]** J. Keshavan, S. Belgaonkar and **S. Murali**, "Adaptive Control of a Constrained First Order Sliding Mode for Visual Formation Convergence Applications," in IEEE Access, vol. 11, pp. 112263-112275, 2023.
doi: `10.1109/ACCESS.2023.3323896`

[C1] S. Singhal, J. Keshavan, and **S. Murali**, "Constant Optical Flow Divergence based Robust Adaptive Control Strategy for Autonomous Vertical Landing of Quadrotors," AIAA SCITECH 2023 Forum, Jan. 2023.
doi: `10.2514/6.2023-1150`

Projects

2024   **`Olympic Medals Predictor`**: *Python, sklearn* | code
Forecasted the number of medals a country would win based on socioeconomic indicators. Implemented a Random Forest regressor model that yielded R^2 of 0.9; this was benchmarked against baseline linear regression.

`Dual-clip PPO`: *Python (PyTorch)* | code
Implemented a baseline PPO and benchmarked it against an extension motivated by this paper, which adds a second clip to large policy deviations where the advantages are negative.

`Balancing a Pole with Spot`: *Python, ROS2, Docker* | demo video
Sensor integrations, PID controllers for balancing a pole, and data collection for reinforcement learning — with Boston Dynamics' Spot Robot. Diffusion autoencoders for generating synthetic RL data, motivated by this paper.

`Multi-Agent Reinforcement Learning`: *Python* | code
A proof-of-concept implementation of a fully decentralised multi-agent reinforcement learning algorithm with networked agents. Motivated by this paper.

`Extended Kalman Filter GNSS`: *Python* | code, report
Implemented Kalman Filter based algorithms to estimate a receiver's position based on pseudorange estimates.

2023   **`Shawshank Text Adventure`**: *Scala* | code
A text based adventure game that incorporates multiple aspects of object-oriented programming.

`Sensor Fusion for AGV`: *Python* | code, report
Calibrated the IMUs, cameras, and the motor controller of an autonomous ground vehicle to enable localisation and estimation.

2019–2021   **`Edhitha UAS`**: *Pixhawk, ArduPilot, px4* | technical paper
Led a competitive student group to develop an autonomous UAV capable of imagery, air delivery, and obstacle avoidance — complete with real-time data acquisition and transmission of GNSS data, imagery, and interoperability.

Skills

Code	Python, Scala, C, C++, MATLAB
Engineering	ROS, ROS2, Gazebo, SOCs (Pi, Arduino, Jetson, Pixhawk), OpenCV, JAX
Tools	Git, Scripting (shell, slurm), Linux, AWS, Docker
Languages	English (bilingual native, TOEFL score 112/120), Finnish (CEFR A1.1)
Others	Basic Life Support – certified first responder