# Soham Shirish Phanse

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## Education

**University of Michigan** — **Aug 2023 – May 2025**
*Master of Science in Mechanical Engineering (Mechatronics) | GPA: 3.93/4.0* — *Ann Arbor, United States*
**Coursework:** *Feedback , Digital and Optimal Control, Kalman Filtering, Deep Learning*

**Indian Institute of Technology Bombay (IIT Bombay)** — **Aug 2019 – Jul 2023**
*Bachelor of Technology in Aerospace Engineering & Minor in Artificial Intelligence | GPA: 8.98/10* — *Mumbai, India*
**Coursework:** *Structural Design and Optimization, Dynamics and Control Theory, Data Science*

## Work Experience

**Systems Engineer II (Advanced Control)** — **Jun 2025 – Present**
*Applied Materials Inc.* — *Santa Clara, California*

- Developing a Python/C++ automation stack to accelerate control loop calibration and tuning across multiple tool and chamber families, emphasizing improvement in tracking performance, disturbance rejection and reducing manual commissioning effort
- Implemented software for new throttle valve and pressure control applications, collaborating with multiple internal customers to integrate updated hardware and ensure stable chamber operations across different tool families
- Drafted technical specifications and developed Embedded C firmware on STM32/Win-RT platforms, including closed-loop control, flow estimation algorithms, device state management and fault handling logic for pressure/flow control
- Authored over 20 technical workflow documents covering firmware procedures, flow/pressure calibration, field-bus communication, diagnostics, and error recovery, enabling structured AI-based parsing for internal technical support and improving on-boarding effectiveness for new team members

**Autonomous Driving Software Intern** — **Jun 2024 – Apr 2025**
*Magna International Inc.* — *Auburn Hills, Michigan*

- Implemented ADAS features like Rear Collision Warning, Autonomous Emergency Braking in Simulink using Model-Based development and conducted MiL, SiL, and in-vehicle HiL testing using CarMaker & Vector CANape
- Developed production-level feature logic in C/C++ for Radar detection-based Pre Crash Warning features like Side Crash Warning, Autonomous Emergency Steering, aligning with EURO NCAP 2026 and ISO 26262 safety standards
- Designed a feature arbiter for Safe Stop by integrating Driver Attention signals with Adaptive Cruise Control (ACC)
- Developed an automated Python framework to compute KPIs like stopping distance, and FPs for AEBs

**Graduate Student Research Assistant - Bandits and Reinforcement Learning** — **Sep 2023 – Sep 2024**
*Laboratory for Air Transportation (LATTICE), University of Michigan | Publication* — *Ann Arbor, Michigan*

- Developed a multi-armed bandit algorithm for adaptive environmental exploration using a Greedy Bayesian approach
- Designed a real-time decision policy to optimize UAV fleet management, targeting safety and efficient deliveries
- Implemented a Python framework, to evaluate performance, and fine-tuned hyperparameters with Factorial Design
- **Insights**: Bayesian sampling outperforms naive random policies, and online rerouting minimizes fleet cost

## Technical Projects - University of Michigan

**Battery State-of-Charge (SoC) Estimation with Kalman Filters** — **Aug 2024 – Dec 2024**

- Architected 2nd-order circuit models for Li-ion batteries and implemented high-accuracy SoC estimation using EKF, AEKF, UKF, GHKF, and Particle Filters.
- Optimized real-time estimation for dynamic EV loads, achieving a 0.01 RMSE through rigorous sensitivity analysis

**Machine Learning Projects** — **Sep 2023 – Dec 2023**

- **Computer Vision**: Implemented edge detection, K-means clustering, Regression denoising, Image Stitching in Python
- **Monocular Object Detection**: Optimized training for foggy weather and streamlined KITTI format inference
- **Recurrent Neural Networks**: Developed data augmentation models & source localization for convection-advection

**Controls & Robotics Independent Technical Writer** — **Jul 2023 – Present**

- Authored 15+ technical articles on Controls and state estimation (EKF, UKF, Particle Filters), growing a specialized audience to 60+ followers with over 10k+ total reads on Medium
- Developed and open-sourced Python implementations for complex control systems geared towards robotics applications.

## Technical Skills

**Programming**: C, C++, Python, MATLAB, Simulink, LINUX Bash, Batch, Git, Command Line, Github
**Robotics and Controls**: Vehicle Dynamics, LQR, Model Predictive Control, PID, Kalman Filtering
**Hardware**: 3D printing, UAV Electronics (BLDC motors, ESCs, GPS, Servo motors), Pixhawk PX4
**Data Processing**: Python-based sensor data pipelines, signal processing, feature extraction, KPI Computation