Animesh Singh

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Personal Profile

Results-driven robotics and software engineer with expertise in motion planning, controls, and autonomous systems. Adept at designing and deploying robotic algorithms, simulation platforms, and scalable architectures. Proficient in Python, C++, ROS, LLMs, AI/ML frameworks, with experience leading end-to-end robotics software development across various domains. Graduating in **May 2025** and willing to relocate.

Skills

Programming Languages Python(PyTorch, OpenCV, Transformers, Matplotlib), SystemC, C/C++, Matlab, Simulink

Frameworks/Tools ROS/ROS2, Isaac Sim, Mujoco, Gazebo, AWS, Docker, QEMU, Kuka, Doosan, Pixhawk

Project Management GIT, Jira, IBM RTC, Confluence, Lucidchart, Sharepoint, Professional Scrum Master 1

Robotics Experience

Planning & Control of full-sized vehicle — *Illinois, USA*

Prof. Kris Hauser, University of Illinois, Urbana-Champaign — *Aug 2024 - present*

- Implemented **probabilistic & graph based planning** algorithms with trajectory optimization and obstacle avoidance for Dubins Car.
- **Deployed** motion planning algorithms for obstacle avoidance, enabling **autonomous navigation** on GEM e4 utilizing ROS framework.
- Responsible for **software integration** of controls, perception, estimation, and planning sub-systems for successful operation of GEM e4 vehicle.

Driver Modeling for Autonomous System — *Bangalore, India*

Jaguar Land Rover — *September 2020 - January 2023*

- Developed a **Neural Network** to model human driving behavior by extracting driver's characteristics from vehicle handling data.
- Architected a control system performance analysis platform for evaluating various control strategies against the Key Performance Index (KPI).

Vision Based Automated Inspection System - *Foxconn Interconnect(Thesis Project)* — *Illinois, USA*

Prof. William Paul King, University of Illinois, Urbana-Champaign — *Aug 2023 - Present*

- Developed vision based automated inspection utilizing **feature matching** algorithm, reducing chip manufacturing setup cost by **60%**.
- Led **digital twin** development, optimizing camera & light placement in **NVIDIA Isaac Sim** for enhanced automation for chip inspection.
- Filed a **patent** for novel vision-based automation framework, enabling seamless integration of design, manufacturing, and metrology.

Robotics - Controls and Simulation — *Illinois, USA*

Prof. Justin Yim, University of Illinois, Urbana-Champaign — *Jan 2023 - Apr 2023*

- Derived & implemented optimized trajectory planning algorithms and control techniques on **CRS Robotic Manipulator** with TMS320F28335 DSP controller using C to perform precise tasks in limited time (Task demostration).
- Developed forward & inverse kinematics, equation of motion, various controllers including joint-space controller, **inverse dynamics controller**, task-space controller, **impedance controller**, and **hybrid-contact dynamics** for CRS Robot.
- Project Link - Dynamics and Control of CRS Robot

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Obstacle Avoidance with Segway - Controls — *Illinois, USA*

Dan Block, University of Illinois, Urbana-Champaign — *Aug 2023 - Dec 2023*

- Developed control system for a self-balancing segway robot with sensor fusion of infrared sensors deployed on **Texas Instrument C2000 micro-controller** using **C** to detect and avoid obstacles using position PI controller
- Statemachine approach was developed for having different functionalities like navigation mode & wall following mode for smart maneuvering.
- Project Link - Obstacle Avoidance of Segway

Professional Experience

CompassionAI — *Chicago, Illinois*

Senior Software Architect — *August 2023 - present*

- Designed **AI-driven system architecture**, building NLP-based therapist assistant applications leveraging **LLMs** and advanced ML algorithms.
- Developed secure & robust **microservice-based infrastructure**, ensuring HIPAA-compliant handling of sensitive medical data.

Jaguar Land Rover — *Bangalore, India*

Software Engineer — *September 2020 - July 2023*

- Architected **software-in-loop** design, ensuring seamless integration with existing platforms and optimizing performance.
- Developed automated SIL (Software-in-the-Loop) rigs using **Docker** and **QEMU**, saving 1700+ engineering hours per rig.
- Designed an LSTM-based **predictive maintenance** model, reducing failure rates in balancer shaft whine (patent filed).

Purdue University — *Indian, USA*

Robotics Engineering Intern — *May 2019 - July 2019*

- Developed a **digital twin** framework, simulating robotic operations using ROS and Unity for real-time monitoring.
- Integrated Kuka, Doosan, and CNC robots, automating synchronized robotic workflows and inter-robot communication.
- Implemented **haptic-based robotic control**, leveraging Phantom Omni for high-precision teleoperation.

Education

University of Illinois, Urbana-Champaign — *Illinois, USA*

MS in Mechanical Engineering — 4.0/4.0 GPA — *August 2023 - Present*

Indian Institute of Technology, Bombay — *Mumbai, India*

B.Tech in Mechanical Engineering — 9.57/10 CPI — *July 2016 - June 2020*