Nimesh Khandelwal

Ph.D. Candidate
Department of Mechanical Engineering

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Academic Details

Year	Degree/Certificate	Institute	CPI/%
2020 - Present	Ph.D.	Indian Institute of Technology, Kanpur	9.1/10
2016 - 2020	B.Tech	Malaviya National Institute of Technology, Jaipur	8.07/10
2016	CBSE(XII)	Mahaveer Public School, Jaipur	92.20%
2014	CBSE(X)	Mahaveer Public School, Jaipur	9.8/10

Key Projects

- **Software architecture and PEC pipeline for Svan-M2 robot** (*Sept'21- Present*)
  Advisor(s): Prof. Shakti S. Gupta (ME), Prof. Mangal Kothari (AE), IIT Kanpur.
  Tools Used: ROS2, DDS, C++
  Asynchronous (v1.0, v2.0) and fully-synchronous (v4.0) versions of the Planning-Estimation-Control (PEC) pipeline for the quadruped robot Svan-M2 with a finite-state-machine to ensure fully defined state of operation at all times.
  - Development of a novel **Distributed Inverse Dynamics Controller (DIDC)** for feedback control of legged robots
  - MuJoCo based simulation with added **rate-limiting** and **timing latencies** in sensing and control
  - A general **library for kinodynamics** of quadrupeds using Pinocchio, with additional analytical inverse kinematics
  - Efficient implementation of PEC and FSM to ensure **low CPU utilization**
- **Fabrication and Simulation of VTOL based UAV swarms for Disaster Relief, Military, and Commercial Applications** (*Aug'19- Jan'20*)
  Advisor(s): Prof. Dinesh Kumar (ME), MNIT Jaipur.
  Tools Used: ROS, Gazebo, C++, MAVROS, SITL (PX4/Ardupilot)
  Dual-rotor VTOL designed and developed from scratch for multi-purpose applications
  - Gazebo simulation environment with actuator control plugins
  - **Aerodynamics effects modelling** on wings and the main body
  - Implemented **swarm navigation** algorithms using the ArduPilot SIL environment

Professional Experience

- **Co-founder and Software lead, xTerra Robotics** (*Mar'23-Present*)
- **Assistant Research Scientist (Intern), CRRL, NYU** (*Jan'24-Present*)
- **Attended the "Elite Summer School on Robotics" at SDU, Odense, Denmark** (*Aug'22*)
- **Project Intern at Department of Aerospace Engineering, IISc, Bangalore** (*May'19-Jul'19*)
- **Web-developer at Drawberg Digital, Mansarovar, Jaipur** (*Dec'18-Feb'19*)

Positions of Responsibility

- **Part of the team leading the quadruped project at MRL, IITK** (*Sept'20-Present*)
  - Mentoring the current batch of M.Tech and Dual-degree students working on the project
- **Organized a Robotics Workshop at MNIT, Jaipur** (*Sept'17*)
  - Delivered lectures on basics of robots over a span of two weeks
- **Core team member of ZINE** (*Sept'16-Aug'20*)
  - Mentored a team of $\tilde{4}0$ students for robotics competitions and research projects

Technical Skills

- **Mathematical Modelling & Simulation:** ROS, Gazebo, MuJoCo, IsaacGym, MatLab, Octave, Gnuplot, ROOT
- **Programming & scripting Languages:** C, C++, Python, JavaScript, PHP, bash
- **Design and Analysis Softwares:** Autodesk Fusion360, Autodesk Inventor, MATLAB
- **Platforms:** Linux, MacOS, Windows, Arduino, Raspberry Pi
- **Machine Learning:** Regression, Classification, Deep-learning, Reinforcement Learning

Achievements

- Recipient of the **PMRF fellowship** (Cycle 8: January 2022), IIT Kanpur.
- Secured **1st position** in the Robowar event at Sphinx-2018, MNIT Jaipur.
- Participated in **ROBOCON-2018**, held at MIT, Pune
- Won **1st prize** in the Grid-O-Grinder event at Blitzschlag-2017, MNIT Jaipur
- **Finalists** in the autonomous event CONQUEST at Kshitij-2017, IIT Kharagpur

Interests & Hobbies

- Programming(Mathematical Simulations)
- Sports(Cricket, Gymnastics, Basketball)
- Physics