

Résumé

Utkarsh Aashu Mishra

EDUCATION

INDIAN INSTITUTE OF TECHNOLOGY (IIT) ROORKEE

BTECH IN MECHANICAL ENGINEERING

Expected May 2021 | Roorkee, India

Cum. GPA: 9.031/10

[Transcripts](#)

LINKS

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COURSEWORK

UNDERGRADUATE

Robotics and Control (Cur.)

Dynamics of Mechanical Systems (Cur.)

Automatic Control (8/10)

Machine Design (9/10)

Numerical Methods (10/10)

Electromagnetic Theory (9/10)

C++ Data Structures (10/10)

INTERESTS

Robotics

Autonomous Vehicles

Optimal Control

Reinforcement Learning

SKILLS

PROGRAMMING

Languages:

C++ • Python • Matlab • \LaTeX

Softwares:

ROS • Gazebo • Matlab-Simulink •

OpenSim • SCONE • PyBullet •

Solidworks • Ansys

Frameworks:

Tensorflow • Pytorch

OS:

Linux(Ubuntu) • Windows

BACHELOR THESIS

EPFL BIOROBOTICS LABORATORY | **THESIS COLLABORATION**

Sept 2020 – Present | Switzerland, Remote (Covid'19)

Primary Supervisor: Prof. Dr. Pushparaj M. Pathak, MIED, IIT Roorkee

Co-Supervisor: Prof. Dr. Auke Ijspeert, Biorobotics Laboratory, EPFL

- Collaborating with Dr. Dimitar Stanev and simulating Healthy Movements using Predictive Simulation
- Developing Robust Control Policies using Deep Reinforcement Learning to effectively control a full body skeletal model and achieve the desired gait.
- [Intro Video](#)

EXPERIENCE

SWAAYATT ROBOTS | **REINFORCEMENT LEARNING INTERN**

April 2020 – July 2020 | India, Remote (Covid'19) | [More Information](#)

- Constructed Observation, States and Environment for Behavioral Planning DRL framework using the Perception Stack (Lidar, Camera)
- Conducted experiments with DDPG and PPO algorithms for velocity prediction agent on Carla Simulator with ROS Bridge

SPARK FELLOWSHIP | **UNDERGRADUATE RESEARCH INTERN**

May 2019 – July 2019 | IIT Roorkee, India

- Published: ASME Summer Heat Transfer Conference (SHTC 2020)
- DOI: <https://doi.org/10.1115/HT2020-8950>

RESEARCH | UNPUBLISHED

INDIAN INSTITUTE OF SCIENCE | **STOCH LAB COLLABORATOR**

Nov 2020 – Present | India

- Working on Quadrupedal Locomotion on Non-flat terrain with Linear Policy optimization based on Augmented Random Search (ARS).

NANTES LABORATORY OF DIGITAL SCIENCES | **COLLABORATOR**

July 2020 – Nov 2020 | France, Remote (Covid'19)

- Working with the RoMaS team under the guidance of Dr. Stéphane Caro.
- Worked with path planning of a Cable Driven Parallel Robot in complex obstacle-cluttered environments under objectives of Maximizing Stability and Manipulability.
- Publication submitted. [Pre-Print Video](#)

MATHEMATICS DEPARTMENT | **ROBOTICS PROJECT STUDENT**

Jan 2020 – Nov 2020 | IIT Roorkee

- Working on a 9-DOF Toe-Foot Bipedal Robot Model under guidance of Prof Dr. N. Sukavanam.
- Developed Unsupervised Inverse Kinematics, Novel Trajectory planning strategies and an Optimal Tracking controller.
- Publication Accepted: Robotics and Artificial Intelligence (ROAI) 2020, Proceedings: Journal of Physics [Pre-Print](#)
- Under Review: Elsevier Robotics and Autonomous Systems [Pre-Print](#)

REFERENCES

DR. STÉPHANE CARO

CNRS Research Director
Team Leader: ROMAS
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DR. N. SUKAVANAM

Professor, Head of Department
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DR. PUSHPARAJ M. PATHAK

Professor
Mechanical Engineering Department
Indian Institute of Technology Roorkee
India
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PUBLICATION | [C]- CONFERENCE [J]- JOURNAL

[C] U. A. Mishra, I. Chawla and P. M. Pathak, "On Determining Shortest Path in Joint Space of a Cable-Driven Parallel Robot for Point-to-Point Motion," 2020 28th Mediterranean Conference on Control and Automation (MED), Saint -Raphaël, France, 2020, pp. 984-989, [doi: 10.1109/MED48518.2020.9183198](https://doi.org/10.1109/MED48518.2020.9183198). [Article](#)

[C] Soni, B, Mishra, UA, & Nayak, AK. "Optimal Control Strategy to Distribute Water Through Loop-Like Planar Networks." Proceedings of the ASME 2020 Fluids Engineering Division Summer Meeting, Volume 2: Fluid Mechanics; Multiphase Flows. Virtual, Online. July 13–15, 2020. V002T03A025. ASME. [doi: https://doi.org/10.1115/FEDSM2020-20097](https://doi.org/10.1115/FEDSM2020-20097). [Article](#)

[C] Mishra, UA, & Bansal, A. "Quasi-Photon Monte Carlo on Radiative Heat Transfer: An Importance Sampling Approach." Proceedings of the ASME 2020 Heat Transfer Summer Conference. Virtual, Online. July 13–15, 2020. V001T02A012. ASME. [doi: https://doi.org/10.1115/HT2020-8950](https://doi.org/10.1115/HT2020-8950). [Article](#)

TEAM PROJECTS

IIT ROORKEE MOTORSPORTS | FORMULA STUDENT ELECTRIC

IITR Motorsports Electric 2019 (RMSE'19) FS Prototype | Jan. 2018 – Present

- Aerodynamics System Lead, Role: Aerodynamic Optimization, Sponsor Meetings, Training juniors
- Experience of Designing and Fabricating an Electric Vehicle from scratch. Manufactured RMSE'19 Formula Electric Prototype
- Member of Autonomous Algorithms Subsystem, formulating SLAM base for autonomous endeavors in future

SPOTLE AI-THON 2020 | SPOTLE.AI DATA SCIENCE PROJECT

Analyse the mental health of India during COVID | Sept. 2020 – Oct. 2020

- Ranked 5th among 7342 Participants. [Certificate](#)
- Classified Mood based on grayscale facial expression images by using VGG-like architecture
- Multinomial NB model was used along with TfIdf Vectorizer to train the model with a stratified Cross-validation Strategy

FLIPKART GRID 4.0 2020 | ROBOTICS PROJECT

Design, Simulation and Motion Planning for Quadrotor | Jul. 2020 – Sept. 2020

- Designing and Structural Analysis, followed by proper URDF modelling Integrated sensors and stereo-camera based localization and mapping using
- RTabMap
- Dynamic Modelling is done and appropriate probabilistic conformal lattice based planner is formulated [Presentation Video](#)

AWARDS

- | | |
|------|---|
| 2020 | Secured 3 rd position in 5 th Formula Green 2020 with
IIT Roorkee Motorsports |
| 2019 | Selected for the SPARK Research Fellowship Program by IIT Roorkee |
| 2017 | All India Rank 2223 , 99.72 %ile in Joint Entrance Examination
Advanced(IITJEE) |
| 2017 | Awarded the prestigious KVPY Scholarship (Kishore Vaigyanik
Protsahan Yojana) in-stream SX (2016) (All India Rank 780 , 99.48 %ile) |

POSITION OF RESPONSIBILITIES

- | | |
|---------|---|
| Present | Aerodynamics Head and Autonomous Team member at IITR Motorsports |
| 2018 | Undergraduate Teaching Assistant, Academic Reinforcement Program,
Teaching Assistant for MAN-004 Numerical Methods |
| 2018 | Developer and WoC Mentor at Mobile Development Group, IIT Roorkee |