

UTKARSH AASHU MISHRA

PERSONAL INFORMATION

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EDUCATION

2017 - PRESENT Bachelors of Technology in MECHANICAL ENGINEERING
Indian Institute of Technology(IIT), Roorkee, India
CGPA: 9.031/10.0 | [Transcripts](#)

INTERESTS

Robotics, Autonomous Vehicles, Optimal Control, Reinforcement Learning

BACHELOR THESIS

ONGOING SEP 2020	Learning Control Policies for Imitating Human Gaits Collaboration: EPFL Biorobotics Laboratory Primary Supervisor: Prof. Dr. Pushparaj M. Pathak , MIED, IITR Co - Supervisor: Prof. Dr. Auke J. Ijspeert , Biorobotics Laboratory, EPFL Simulating Healthy Movements using Predictive Simulation and developing Robust Control Policies using Deep Reinforcement Learning to effectively control a full body skeletal model and achieve the desired gait. Intro Video
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INTERNSHIPS

ONGOING JUL 2019	Structural Stability based Motion Planning for Cable Driven Parallel Robots Guide: Dr. Stephane Caro , Team Lead: ROMAS,LS2N, France Motion Planning of Suspended cable Robots in Cluttered Environments Implemented RRT* with GJK collision detection
JUL 2020 APR 2020	Behavioral Planning for Autonomous Vehicles using Reinforcement Learning Reinforcement Learning Intern at Swaayatt Robots , India Worked on constructing observation, states and action space for Behavioral Planning DRL framework coupled with a probabilistic local planner and PD controller Conducted experiments with DQN, DDPG, TRPO and PPO algorithms on Carla Self-Driving Simulator with ROS Bridge. More Information
MAY 2019 JUL 2019	Quasi Photon-Monte Carlo: An Importance Sampling Approach SPARK Research Fellowship 2019 at IIT Roorkee, India Accepted: ASME Summer Heat Transfer Conference (SHTC 2020) Worked on Quasi Photon Monte Carlo Method along with Importance Sampling technique and its application to radiative heat transfer.

RESEARCH EXPERIENCE

ONGOING JAN 2020	<p>Trajectory Planning and Tracking for Toe-Foot Bipedal Robot Model Computer Science and Engineering Department, IIT Roorkee, India</p> <p>Accepted: ROBOTICS AND ARTIFICIAL INTELLIGENCE (ROAI) 2020</p> <p>Working on a 9-DOF Toe-Foot Robot Model, developed Unsupervised Inverse Kinematics and Dynamic Equations for modelling.</p> <p>Novel Trajectory planning strategies are explored and Optimal Tracking controller is developed</p>
NOV 2019 AUG 2019	<p>Path Planning and Optimization of Cable-Driven Parallel Robots Mechanical and Industrial Department, IIT Roorkee, India</p> <p>Accepted: 28th Mediterranean Conference on Control and Automation (MED'2020)</p> <p>Worked on path planning through genetic algorithm and workspace analysis of Cable Driven Parallel Robots</p> <p>Dynamic optimization considering cable tensions and non-negligible cable mass. Cable sagging and Collision constraints are also considered</p>
FEB 2019 OCT 2018	<p>Optimal Flow Planning in Water Distribution Networks Mathematics Department, IIT Roorkee, India</p> <p>Accepted: ASME Fluids Engineering Division Summer Meeting (FEDSM 2020)</p> <p>Worked on optimal flow planning based on Electrical analogy using least impedance path and maintaining flow pressure</p> <p>Developed Dynamic Series-Parallel Cost function based Least Cost Algorithm</p>

PUBLICATIONS

SEPT 2020	<p>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.</p>
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TEAM PROJECTS

OCT 2020 SEP 2020	<p>Analyse the mental health of India during COVID Group Project for Spotle Aithon 2020</p> <p>Classified Mood based on grayscale facial expression images by using VGG-like architecture</p> <p>Performed Exploratory Data Analysis on Twitter data from Sep 18-22</p> <p>Multinomial NB model was used along with Tfidf Vectorizer to train the model with a stratified Cross-validation Strategy</p>
AUG 2020 JUL 2020	<p>Design, Simulation and Motion Planning for Quadrotor Group Project for Flipkart GRID 4.0</p> <p>Designing and Structural Analysis, followed by proper URDF modelling</p> <p>Integrated sensors and stereo-camera based localization and mapping using RTabMap</p> <p>Dynamic Modelling is done and appropriate probabilistic conformal lattice based planner is formulated More Information</p>

PRESENT JAN 2018	IIT Roorkee Motorsports Electric 2019 (RMSE'19) FS Prototype IIT Roorkee Motorsports , Formula Student Team of IIT Roorkee Experience of Designing and Fabricating an Electric Vehicle from scratch. Manufactured RMSE'19 Formula Electric Prototype As a member of the Autonomous Algorithms Subsystem, dedicated to vision-based Localization, Mapping and motion planning for our upcoming proposed vehicle
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KEY COURSES

2020	Robotics and Control (Cur.)	Vibration and Noise (9/10)
	Dynamics of Mechanical Systems (Cur.)	Machine Drawing (10/10)
	Automatic Control (8/10)	2018 Engineering Analysis and Design (8/10)
	Machine Design (9/10)	Kinematics of Machines (9/10)
2019	Dynamics of Machines (10/10)	Numerical Methods (10/10)
		2017 Programming and Data Structures (10/10)

SKILLS

Programming:	C++, PYTHON, TENSORFLOW,
Softwares:	ROS, Gazebo, MATLAB, SIMULINK, OPENSIM, VISUAL STUDIO, SOLIDWORKS, ANSYS (Design, Meshing, Structural, Fluent)
Others:	Linux(UBUNTU), L ^A T _E X

AWARDS AND ACHIEVEMENTS

JAN 2020	Secured Second Runners Up position in Formula Green 2020 with IIT Roorkee Motorsports
MAY 2019	Selected for the SPARK Research Internship Program by IIT Roorkee (Certificate)
MAY 2017	Joint Entrance Examination, Advanced (Indian Institute of Technology) All India Rank 2223, 98.99 percentile
MAY 2017	Awarded the prestigious KVPY Scholarship (Kishore Vaigyanik Protsahan Yojana) in-stream SX (2016) (Certificate)
MAY 2017	Achieved Merit Certificate in Physical Education in the CBSE AISSCE 2017 (Standard 12) (top 0.1%of examinees)(Certificate)

POSITION OF RESPONSIBILITIES

CURRENT	Aerodynamic SubSystem head at IIT Roorkee Motorsports
JAN 2019	Undergraduate Teaching Assistant, Academic Reinforcement Program, Teaching Assistant for the course MAN-004 Numerical Methods.
DEC 2018	Developer and WoC Mentor at Mobile Development Group, IIT Roorkee
AUG 2017	National Cadet Corps, 3UK NCC IIT Roorkee, India Successfully gave the Guard of Honour to our Institute's Director on the occasion of Independence Day

REFERENCES

Dr. N. Sukavanam Professor, Head of Department Mathematics Department Indian Institute of Technology Roorkee India ✉ n.sukavanam@ma.iitr.ac.in	Dr. Pushparaj Mani Pathak Professor Mechanical Engineering Department Indian Institute of Technology Roorkee India ✉ pushparaj.pathak@me.iitr.ac.in
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