

Mayank Mittal

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EDUCATION

- 2018–present **Master of Science**, *Eidgenössische Technische Hochschule (ETH)*, Zürich
Major: Robotics, Systems, and Controls
- 2014–2018 **Bachelor of Technology**, *Indian Institute of Technology (IIT)*, Kanpur
Major: Electrical Engineering

PUBLICATIONS

- 📄 [arXiv](#) **Neural Lyapunov Model Predictive Control**,
Mayank Mittal[†], Marco Gallieri[†], Alessio Quaglino, Seyed S.M. Salehian, Jan Koutnik
(*Under Review*)
- ICRA 2020 **Learning Camera Miscalibration Detection**,
📄 [arXiv](#) Andrei Cramariuc[†], Aleksandar Petrov[†], Rohit Suri, Mayank Mittal, Roland Siegwart, Cesar Cadena
- ISRR 2019 **Autonomous Vision-Based UAV for Urban Search and Rescue**,
📄 [arXiv](#) Mayank Mittal, Rohit Mohan, Wolfram Burgard, Abhinav Valada
- IROS 2018 **Vision-based Autonomous Landing in Catastrophe-Struck Environments**,
📄 [arXiv](#) Mayank Mittal[†], Abhinav Valada[†], Wolfram Burgard
Workshop on Vision-based Drones: What's Next?

EXPERIENCE

Professional

- Sep '19–April '20 **Research Intern**, *NNAISENSE*, Lugano, Switzerland
- Designed an algorithm for safe-learning and verification of controllers by alternately training a Lyapunov neural network and a stabilizing unconstrained MPC
 - Integrated a deep-learning solution for grasping with an SQP-based motion planner to perform bin-picking with Franka Emika Panda arm

Academic

- May '20–present **Visiting Student Researcher**, *University of Toronto*, Canada
Advisor: Prof. Animesh Garg
- Working on task and motion planning for mobile manipulators
- Nov '18–Jul '19 **Graduate Student Researcher**, *ETH Zürich*, Switzerland
Advisor: Prof. Marco Hutter
- Investigated application of multi-agent reinforcement learning to learn whole-body control of a torque controlled quadrupedal robot (ANYmal) equipped with a 6-DOF Kinova Jaco arm
 - Worked on the development of a framework using Tensorflow C/C++ APIs to train and deploy RL algorithms (such as PPO, TRPO, and DDPG) on a real robot
- May '17–Aug '18 **Visiting Student Researcher**, *University of Freiburg*, Germany
🌐 [website](#)
📺 [video](#)
Advisor: Prof. Wolfram Burgard
- Designed a vision-based system for UAVs to perform on-board localization, mapping, trajectory planning and landing sites detection; tested it on simulations and real-world scenarios
 - Using Microsoft AirSim, created synthetic dataset comprising of RGB, depth, surface normals, and segmentation information from a city-scale disaster affected region
- Nov '14–Jun '18 **Undergraduate Student Researcher**, *IIT Kanpur*, India
🌐 [website](#)
📄 [github](#)
Advisor: Prof. Mangal Kothari
- Designed and developed Institute's first autonomous underwater vehicle (*Varun*) which used dead-reckoning and computer vision for navigating and performing tasks like shooting torpedoes
 - Worked on designing the vehicle on SolidWorks and Ansys along with its manufacturing
 - Built the circuitry for powering the robot and providing diagnostic information about its battery
 - Mentored the team for the next vehicle (*Anahita*) in various divisions such as acoustic pinger localization and sensor fusion using doppler velocity log (DVL) and IMU

SELECTED PROJECTS

- Dec '19–Jan '20 **Online Adaptation using Graph Networks in Model-based RL**
Course Project for *Deep Learning*, Prof. Thomas Hofmann
 - Developed an algorithm that leverages graph networks and reinforcement learning to learn a model that exploits an agent's morphology and adapts to environmental uncertainties
- Feb '19–Jun '19 **Detecting Sensor Miscalibration using Semantics**
Course Project for *Perception and Learning for Robotics*, Dr. Cesar Cadena
 - Proposed a deep learning architecture to utilize semantic information in the environment for detecting miscalibration in a camera's intrinsic parameters
- Feb '19–Jun '19 **Deep Learning for Multi-Camera Tracking and Mapping**
[report](#) Course Project for *3D Vision*, Prof. Marc Pollefeys
[github](#)
 - Extended the existing DeepTAM pipeline to leverage a multi-camera setup for visual odometry
- Feb–Apr '18 **Survey on Variational Autoencoders (VAEs) for Bayesian Inference**
[report](#) Course Project for *Probabilistic Modeling and Inferences*, Prof. Piyush Rai
 - Studied and implemented various recent developments in VAEs such as semi-amortized autoencoders, conditional VAEs, DRAW architecture
- Oct–Nov '16 **Failure Handling in a Swarm of Quadrotors**
[report](#) Course Project for *Embedded and Cyber-Physical Systems*, Prof. Indranil Saha
 - Proposed an extended state machine design for communication in a swarm, with ability to handle failures, while ensuring redundancy, decentralization and anonymity

TEACHING EXPERIENCE

- Jan–Apr '18 **Autonomous Navigation, AE640A**, Prof. Mangal Kothari, IIT Kanpur
[website](#)
 - Helped in developing the course syllabus and preparing the assignments
 - Guest lecturer on mathematical foundation for robotics, non-parametric filters for localization, system integration using ROS, and robot simulation

ACADEMIC ACHIEVEMENTS

- 2018 **Sri. Binay Kumar Sinha Award**, IIT Kanpur (Best undergraduate project that has industrial applicability and social relevance)
- 2018 **SIIC Student Innovation Award**, IIT Kanpur (Best socially-relevant project of global importance among graduating students)
- 2017 **Academic Excellence Award**, IIT Kanpur (Dean's List)
- 2017 **WISE Scholarship** by DAAD (Awarded to 192 students in the country)
- 2016 **2nd place** in **Student Underwater Vehicle (SAVe)** competition by NIOT, Chennai
- 2012 **Kishore Vaigyanik Protsahan Yogna (KVPY)** Fellowship by Govt. of India
- 2010 **National Talent Search (NTSE)** Scholarship by Govt. of India

TECHNICAL SKILLS

- Software:** Gazebo, UnrealEngine Editor (AirSim), SolidWorks, Ansys, KiCAD
- Languages:** C++, Python, Shell(bash), MATLAB, HTML, CSS
- Frameworks:** ROS, PyTorch, TensorFlow, OpenCV, PCL, Caffe
- Other:** Git, GNU Octave, L^AT_EX

POSITIONS OF RESPONSIBILITY

- Jan '16–Mar '18 **Team Lead**, *AUV Team*, IIT Kanpur
 - Led a team of 18 members to participate at the national underwater robotics competition
 - Interacted with various technical companies and research laboratories to acquire sponsorship
- Mar '16– Apr '17 **Coordinator**, *Robotics Club*, IIT Kanpur
 - Organized various events, workshops, and competitions for robotics enthusiasts in the campus
 - Mentored and ensured completion of summer projects on wheeled humanoid using speech and facial recognition, 3-DOF robot manipulator, and gesture based gaming console