

Mayank Mittal

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EDUCATION

- 2018–present **Master of Science**, *Eidgenössische Technische Hochschule (ETH)*, Zürich
Major: Robotics, Systems, and Controls
Relevant Coursework: Model Predictive Control, Robot Dynamics, Deep Reinforcement Learning, Perception and Learning for Robotics, Advanced Machine Learning, 3D Vision
- 2014–2018 **Bachelor of Technology**, *Indian Institute of Technology (IIT)*, Kanpur
Major: Electrical Engineering
Relevant Coursework: Probabilistic Modeling and Inferences, Probabilistic Mobile Robotics, Robot Motion Planning, Robust Control Systems, Control System Analysis

PUBLICATIONS

- ISRR 2019 **Autonomous Vision-Based UAV for Urban Search and Rescue**,
[website](#), [arXiv](#) Mayank Mittal, Rohit Mohan, Wolfram Burgard, Abhinav Valada
(Under Review)
- IROS 2018 **Vision-based Autonomous Landing in Catastrophe-Struck Environments**,
[arXiv](#), [video](#) Mayank Mittal[†], Abhinav Valada[†], Wolfram Burgard
Workshop on Vision-based Drones: What's Next?

RESEARCH EXPERIENCE

- Apr–June '19 **Learning Hybrid Locomotion-Manipulation Control for Arm-on-ANYmal**
ETH Zürich, Prof. Marco Hutter
 - Investigated application of reinforcement learning to learn policies for the mobile manipulator ALMA, a torque controlled quadrupedal robot equipped with a robotic arm
 - Implemented the environment and different multi-agent system designs to train and evaluate performance on a set of proposed benchmark tasks
- Nov '18–present **Learning to Navigate with Reinforcement Learning (RL)**
ETH Zürich, Prof. Marco Hutter
 - Developing a framework in C++ to deploy state-of-the-art RL algorithms on a real robot
 - Developed the python package for performance comparison between various RL frameworks
- May '17–Aug '18 **Detecting Landing Sites from Aerial Images of Disaster Scenes**
University of Freiburg, Prof. Wolfram Burgard
 - Using Microsoft AirSim, created synthetic dataset comprising of RGB, depth, surface normals, and segmentation information from a city-scale disaster affected region
 - 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
- July '16–Mar '17 **Bomb Disposal using Multi-Robot System**
[website](#), [github](#) *Boeing-IIT Kanpur Joint Venture*, Prof. Shantanu Bhattacharya & Prof. S. Kamle
 - Integrated various hardware into a custom two-wheeled differential drive robot
 - Trained the object detection model 'YOLOv2' by J. Redmon *et al.* to classify objects as potential explosives and implemented it on NVidia Jetson TX1 board
- Nov '14–June '18 **Autonomous Underwater Vehicle (AUV)**
[website](#), [github](#) *IIT Kanpur*, Prof. Mangal Kothari & Prof. K.S. Venkatesh
 - Designed and developed Institute's first AUV (*Varun*) which used dead-reckoning for navigation and computer vision to navigate and shoot torpedoes underwater
 - Mentored the electrical and software subsystem teams for the next vehicle (*Anahita*)
 - Designing of a hydrophones board to perform underwater acoustic pinger localization
 - Implementing a decoupled PID-based control system for an underwater vehicle

SELECTED PROJECTS

- Feb –June '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 –June '19 **Deep Learning for Multi-Camera Tracking and Mapping**
Course Project for *3D Vision*, Prof. Marc Pollefeys
 - 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
- Feb–Apr '17 **Visual Odometry using careful Feature Selection and Tracking**
[github](#), [report](#) Course Project for *Probabilistic Mobile Robotics*, Prof. Gaurav Pandey
 - Implemented the algorithm for stereo odometry, adapted from the works of I. Cvišić and I. Petrović in 'Stereo odometry based on careful feature selection and tracking'
- 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](#)
 - Developed the course syllabus and prepared assignments
 - Guest lecturer on system integration using ROS, robot simulation, mathematical foundation for robotics, and non-parametric filters for localization

ACADEMIC ACHIEVEMENTS

- 2018 **SIIC Student Innovation Award**, IIT Kanpur (Convocation Award)
- 2018 **Sri. Binay Kumar Sinha Award**, IIT Kanpur (Convocation Award)
- 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 Scholarship (NTSE)** by Govt. of India

TECHNICAL SKILLS

- Software:** Gazebo, UnrealEngine Editor (AirSim), SolidWorks, Ansys, KiCAD
- Languages:** C++, Python, Shell(bash), MATLAB, HTML, CSS
- Frameworks:** ROS, 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 sponsorships
 - Managed a seed funding by the institute for the development of the first vehicle *Varun*
- Mar '16– Apr'17 **Coordinator, Robotics Club**, IIT Kanpur
 - Managed a team of 18 secretaries to organize various events, workshops, and competitions for robotics enthusiasts in the campus community
 - Mentored and ensured completion of summer projects on wheeled humanoid using speech and facial recognition, 3-DOF robot manipulator, and gesture based gaming console