Mayank Mittal

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EDUCATION

2018–present	**Master of Science**, *Eidgenössische Technische Hochschule (ETH)*, Zürich

Major: Robotics, Systems, and Controls
Relevant Coursework: Deep Reinforcement Learning (Seminar), Deep Learning*, Model Predictive Control, Robot Dynamics, Perception and Learning for Robotics, Bayesian Statistics*, 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

Learning Camera Miscalibration Detection,
Andrei Cramariuc[†], Aleksandar Petrov[†], Rohit Suri, Mayank Mittal, Roland Siegwart, Cesar Cadena
(Under Review)

ISRR 2019
website, arXiv
Autonomous Vision-Based UAV for Urban Search and Rescue,
Mayank Mittal, Rohit Mohan, Wolfram Burgard, Abhinav Valada

IROS 2018
video, arXiv
Vision-based Autonomous Landing in Catastrophe-Struck Environments,
Mayank Mittal[†], Abhinav Valada[†], Wolfram Burgard
Workshop on Vision-based Drones: What's Next?

RESEARCH EXPERIENCE

Sept '19–present
Safe Grasping for Robotic Hand with Fingers
NNAISENSE, Dr. Marco Gallieri, Dr. S.S.M. Salehain
- Developing safety-based algorithm for grasping of unknown objects using adaptive-force control

Apr–July '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 6-DOF robotic arm
- Implemented the environment in RaiSim along with different multi-agent designs to train and evaluate their performances on a set of proposed benchmark tasks for mobile manipulators

Nov '18–May '19
Learning to Navigate with Reinforcement Learning (RL)
ETH Zürich, Prof. Marco Hutter
- Worked on the development of a framework in C++ to train and deploy state-of-the-art RL algorithms (like PPO, TRPO, and DDPG) 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
website, github
Bomb Disposal using Multi-Robot System
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
website, github
	Autonomous Underwater Vehicle (AUV)
	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 report	**Survey on Variational Autoencoders (VAEs) for Bayesian Inference** 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 report	**Failure Handling in a Swarm of Quadrotors** 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 website	**Autonomous Navigation**, *AE640A*, Prof. Mangal Kothari, IIT Kanpur ○ 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	**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** (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, TensorFlow, OpenCV, PCL, Caffe
Other:	Git, GNU Octave, LaTeX

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
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