

MOHIT SINGH

PHD CANDIDATE

+47 96924443 | mohit.singh@ntnu.no | [LinkedIn](#) | [Github](#) | [Google Scholar](#)

RESEARCH INTERESTS

Computer Vision | Underwater Robotics | Visual Inertial State Estimation | Camera Models | Space Robotics | Deep Learning

EDUCATION

Norwegian University of Science and Technology (NTNU)

August 2022 – October 2026 (tentative)

PhD, Department of Engineering Cybernetics

Thesis (working title): Resilient Underwater Vision based Perception and Autonomy

Indian Institute of Technology, Kharagpur

July 2017 – May 2022

B.Tech and M.Tech (Dual Degree) in Aerospace Engineering

CGPA: 8.21/10

RESEARCH EXPERIENCE

Resilient Underwater Vision Based Perception and Autonomy [Videos]

August 2022 – Present

PhD Candidate | Advisor: [Dr. Kostas Alexis](#) Co-Adv.: [Dr. Eleni Kelasidi](#), [Dr. Margarita Chli](#) Autonomous Robots Lab, NTNU

- Developed a novel, online refractive camera model to adapt computer vision methods in unknown refractive media.
- Developed DeepVL, a deep learning method for long-term proprioception in extended visual blackout.
- Developed robust state-estimation and perception enabling autonomous exploration underwater in challenging scenarios.
- Invented a sensor, and developed a method to estimate robot state in long-term visual blackout, accuracy beyond Tactical INS.
- Developed and deployed multiple robotic platforms: BlueROV2-based vision-driven AUV, fully custom vision-acoustic AUV, multi-sensor aerial robot (LiDAR, radar, camera, and IMU), advised development of an underwater quadruped.

Bird's-Eye-View-based Visual-Inertial Odometry for Lunar Navigation

June 2025 – September 2025

Visiting Researcher (JVSRP) | Advisor: [Dr. Michael Paton](#) Co-Adv.: [Dr. Issa Nesnas](#) NASA Jet Propulsion Laboratory, Caltech

- Analyzed empirical lower limit of the visual feature update rate of a fast, vision-based rover, over long-term Day-Night scenes.
- Developed Bird's-Eye-View feature matching formulation, adaptive to scene geometry, to enhance matched features at a much lower frame-rate of 0.25 Hz, compared to 0.4 Hz of baseline.

Autonomy and control for hybrid ground/aerial mobility robot

April 2020 – May 2022

Research Collaborator | Advisor: [Dr. Sahand Sabet](#), Co-Adv.: [Dr. Ali Agha](#) (JPL)

(Remote) University of Arizona

- Derived LiDAR-based terrain informed control law for a hexarotor based hybrid rolling/flying spherical robot on 3D terrains.
- Validated tracking error of ≈ 0.2 m for analytical terrain baseline and ≈ 0.3 m for proposed controller with terrain point cloud.

Multi-modal robotic system for mid-air docking and ground rolling [Video]

Dec. 2017 – May 2022

Research Group Member | Advisor: [Dr. Somesh Kumar](#)

Aerial Robotics Lab Kharagpur, IIT Kharagpur

- Fabricated a system of two decentralized MAVs that dock in mid-air using onboard vision, morph, and roll on the ground.
- Developed vision-based docking framework using AprilTag for relative pose estimation fused with IMU data via Kalman Filter.

SELECTED PUBLICATIONS

1. “Online Refractive Camera Model Calibration in Visual-Inertial Odometry” [Mohit Singh](#), Kostas Alexis 2024 *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* [PDF]
2. “DeepVL: Dynamics and Inertial Measurements-based Deep Velocity Learning for Underwater Odometry” [Mohit Singh](#), Kostas Alexis 2025 *IEEE International Conference on Robotics and Automation (ICRA)* [PDF]
3. “Ariel Explores: Vision-based underwater exploration and inspection via generalist drone-level autonomy” [Mohit Singh](#), Mihir Dharmadhikari, Kostas Alexis Presented at 2025 *IEEE ICRA Workshop on Field Robotics*, evolved version under review at Transactions of Field Robotics [PDF¹] [PDF²]
4. “BEVIO: Efficient Bird's-Eye-View-based Sparse-Update Visual-Inertial Odometry for Lunar Day-Night Navigation” [Mohit Singh](#), Shehryar Khattak, Ashish Goel, Michael Paton, Kostas Alexis, and Issa Nesnas, Accepted at *IEEE ICRA 2026* [PDF]
5. “RadVIO: Tightly-Coupled Radar-Visual-Inertial Odometry” Morten Nissov, [Mohit Singh](#), and Kostas Alexis, Accepted at *European Control Conference 2026 (ECC)* [PDF]

Full list available at [Google Scholar](#).

MANUSCRIPTS UNDER REVIEW AND PREPRINTS

1. **“Bionic Neuromast Inertial Odometry”** [Mohit Singh](#), Kostas Alexis, *under review at Springer, Nature Portfolio Journal, Robotics*
2. **“pip install tartanair: A Dataset to Push the General Robot Perception”** Wenshan Wang, Y. Hu, Y. Shaoul, [Mohit Singh](#), Y. Qiu, Y. Zhang, S. Zhao, and Sebastian Scherer, *under review at Springer, Nature, Scientific Data*

TALKS AND PRESENTATIONS

Resilient vision-driven underwater autonomy (Invited Talk)

Venue: Robotics: Science and Systems 2026, Workshop: Mapping the Reef, Sydney

Advancing underwater autonomy with resilient perception

Venue: Vision AI Seminar 2025, NASA Jet Propulsion Lab, Caltech

Visual Inertial Navigation for Amphibious Systems

Venue: Amphibious Robotics Workshop, ICRA 2025, Atlanta

Resilient, Exclusively Vision-Driven Underwater Autonomy (Invited talk) [\[Presentation\]](#)

Venue: IROS 2024 (Abu Dhabi, UAE) Workshop on Autonomous Robotic Systems in Aquaculture

PATENTS

BNIO: Bionic Neuromast Inertial Odometry

A passive, Bio-inspired, long-term underwater state estimation sensing and framework, enabling blind underwater navigation over 300 meters, with errors below 1%. (*Patent Pending: European Patent Application No. 26387035.4*)

AWARDS AND ACHIEVEMENTS

Qualification Grant, Research Council of Norway

Awarded \$50,000 for the commercialization of research on Bionic Neuromast Inertial Odometry (Patent Pending, European Patent Application No. 26387035.4). [\[Results\]](#)

Best Contributed Talk, IEEE/RSJ ICRA 2025 Amphibious Robotics Workshop

Presented research on Resilient, Refraction-aware Vision-Based Perception and Autonomy across Air and Water. [\[Certificate\]](#)

Finalist, IEEE/RSJ IROS 2021 Best Paper Award for Mechanism and Design

Co-Authored and contributed to multi-body simulation and flywheel stability mechanism for spherical robot. [\[IROS 2021 Awards\]](#)

Silver, DRDO DRGE's Vision Based Obstacle Avoidance Drone Event, 9th Inter IIT Technology Meet 2021, IIT Guwahati

Implemented Graph-Based Exploration Planner for an aerial robot to navigate high-clutter narrow passages. [\[Certificate\]](#)

First Place, 11th International Micro Aerial Vehicle Competition and Conference 2019, Madrid, Spain

Developed Aerial Robot framework for Autonomous Warehouse Inventory Management and competed against 14 International teams. [\[Certificate\]](#)

Finalist, Boeing Laws of Motion-2018, IIT Kharagpur

Fabricated a Stall Resistant UAV with enhanced glide ratio, vortex generators, and streamlined fuselage for high glide endurance.

Finalist, Milset-Expo Science International 2013, Abu Dhabi

Developed a robot with face detection for rescue operations equipped with wheeled base and 5-D.O.F Manipulators as hands.

MENTORSHIP EXPERIENCE

Masters student supervision at NTNU

August 2024 – Present

- Supervising 4 Masters students in the following research areas: Trans-refractive media visual odometry, Uncertainty aware vision based underwater mapping, Locomotion of underwater quadruped, Learned inertial proprioception in high-speed aerial robots.

IEEE Robotix Winter Workshop at IIT Kharagpur | *Student Mentor and Manager*

December 2018

- Designed courses on feature detection and lane detection for 7 days Computer Vision workshop for 250+ newcomers.
- Mentored 30 newcomers and sophomores for implementations of Computer Vision methods in OpenCV.

Technology Robotix Society Computer Vision Workshop [\[Certificate\]](#) | *Student Mentor*

March 2018

- Mentored 30+ newcomers and sophomores through and after the workshop on stereo cameras and disparity calculation.
- Developed and demonstrated a blob-following ground robot using a color segmentation and proportional controller.