# Muhammad Fahim Faisal

Robotics and autonomy • Perception, control and embedded systems

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Computer science undergraduate building perception, control and autonomy software across underwater vehicles, rovers and experimental rocketry. Evaluates edge systems with source-linked bench, replay and simulation evidence.

## Engineering experience

**BRACU Duburi**

*Former Engineering Team Lead; previously Sub-Team Lead, AI & Machine Vision* *(Sep 2023 – Aug 2026)*

https://bracuduburi.com/robosub/2026

- Led engineering for the 2026 RoboSub campaign: 8th of 58 teams, best round 6,234 points.
- Built the CNN perception stack and dataset pipeline; deployed edge inference and integrated perception into the shared ROS 2 vehicle stack.

**Amateur Experimental Rocketry (AERD)**

*Core Member; A&GNC, trajectory, parachute, procurement* *(Feb 2023 – Feb 2025)*

- ROS 2 (Humble) data acquisition; flight control with Pixhawk and Betaflight; led V1 of an in-house flight computer for a monocopter UAV.
- VSLAM for GPS-denied navigation; trajectory prediction with RocketPy against real flight-test data.

**Dubotech**

*Junior Autonomous Engineer* *(Oct 2025 – Feb 2026)*

- Worked on custom sonar firmware and navigation software for deep-water monitoring.

**BRACU Mongol-Tori**

*Contributor, Autonomous Subteam* *(Dec 2024 – May 2025)*

- Inverse kinematics for a 2-DOF arm that types on a keyboard; a separate lightweight vision unit for alignment; custom OCR to tell keys apart.

## Selected engineering projects

**Camera capture latency** https://fh1m.github.io/notes/the-frame-age-problem

Reduced kernel-stamped frame age from 396.1 ms to 16.9 ms in a controlled camera-stall benchmark; compared buffering policies against kernel timestamps, not throughput.

**Visual-navigation investigations: Dhrubotara / Matra / Dhara** https://fh1m.github.io/notes/dhrubotara

Reference matching/homography, depth-scale normalization and capture-time velocity units, evaluated with CPU-controlled experiments and recorded-input replay; not flight validation.

Related investigations: Matra: depth scale · Dhara: capture-time units

## Education

**United International University (UIU)**

B.Sc. Computer Science and Engineering (in progress) (Fall 2026 – present)

**BRAC University**

Coursework toward B.Sc. Computer Science; minor studies in Electrical and Electronic Engineering. Degree not completed. (Sep 2023 – Aug 2026)

**IU International University of Applied Sciences**

Coursework toward B.Sc. Autonomous Systems (one semester, on campus) — Bad Honnef, Germany. (2024)

## Technical skills

**Languages:** Python, C, C++, Rust, TypeScript

**Robotics:** ROS 2, MAVLink, Nav2, Gazebo/ArduSub SITL, Pixhawk, ESP32, Jetson, Hailo-8

**Computer vision & machine learning:** PyTorch, OpenCV, YOLO, TensorRT, scikit-learn

**Embedded & hardware:** Arduino/AVR, ESP32, K210, KiCad, PCB design

**Tools:** Linux (Arch), Git, Docker, Bash, Astro, Flask