AFZAL AHMAD

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EDUCATIONAL BACKGROUND

Czech Technical University in Prague, Czech Republic 2020 - 2022
Master of Science (M.Sc) in Artificial Intelligence GPA: 1.7/5
Department of Computer Science

Indian Institute of Technology (IIT) Guwahati, India 2015 - 2019
Bachelor of Technology (B.Tech) in Electrical Engineering GPA: 7.38/10
Department of Electronics and Electrical Engineering

PUBLICATIONS

Tatana Prihodova, Giuseppe Silano, **Afzal Ahmad**, Vit Kratky, Tomas Baca, Pavel Petracek, Vera Saskova, Jan Bednar and Martin Saska.*"2022 IEEE Robotics and Automation Society Summer School on Multi-Robot Systems in Prague [Education]"*, IEEE Robotics & Automation Magazine (RAM), March 2023.

Afzal Ahmad, Daniel Bonilla Licea, Giuseppe Silano, Tomas Baca and Martin Saska. *"PACNav: A Collective Navigation Approach for UAV Swarms Deprived of Communication and External Localization"*, Bioinspiration & Biomimetics journal (BnB), Nov. 2022.

Afzal Ahmad, Viktor Walter, Pavel Petracek, Matej Petrlik, Tomas Baca, David Zaitlik and Martin Saska.*"Autonomous Aerial Swarming in GNSS-denied Environments with High Obstacle Density"*, IEEE International Conference on Robotics and Automation (ICRA) 2021.

Andriy Dmytruk, Tiago Nascimento, **Afzal Ahmad**, Tomas Baca, and Martin Saska. *"Safe Tightly-Constrained UAV Swarming in GNSS-denied Environments"*, International Conference on Unmanned Aircraft Systems (ICUAS) 2021.

Afzal Ahmad, Vojtech Vonasek and Martin Saska. *"Cooperative path planning for multiple MAVs operating in unknown environments"*, International Conference on Unmanned Aircraft Systems (ICUAS) 2020.

RESEARCH EXPERIENCE

Multi-Robot Systems Lab, Prague, Czech Republic Aug 2022 - Ongoing
Research Engineer

- Designing a simulator for learning high-speed, safe flight for a swarm of UAVs.
- Improving and maintaining existing open-source libraries and code-base for other projects.

Multi-Robot Systems Lab, Prague, Czech Republic Aug 2019 - Aug 2022
Research Assistant, Advisor: Dr. Martin Saska *paper, video*

- Designing decentralized control algorithms for collective navigation of a swarm of UAVs.
- Focus on self-organized flocking and path planning in an obstacle-rich environment (forests).

Collaborative transport using multiple UAVs, IIT Guwahati, India Aug 2018 - Apr 2019
Bachelor's Thesis, Advisor: Dr. Indrani Kar *paper*

- Designed a path planning method based on rapidly exploring random tree (RRT) algorithm for UAV navigation in an obstacle-rich urban environment.
- Designed an algorithm for cooperative navigation of UAVs using the path planning approach.

MIST Lab, Polytechnique Montreal, Canada May 2018 - July 2018
Research Intern, Advisor: Dr. Giovanni Beltrame

- Worked on a ROS-based architecture for path planning and control of multi-UAV systems.
- Developed a framework for long-term autonomy of a multi-robot system using adaptive locomotion.

Indian Institute of Technology (IIT) Guwahati, India June 2017 - Dec 2017
Research Intern, Advisor: Dr. Prithwijit Guha

- Developed a model-based learning technique for locomotion of a nonholonomic snake robot (ASROA).
- Used the learned model to implement obstacle avoidance in a simulated environment.

HONORS AND AWARDS

- Selected among the **top 6** Masters thesis dissertations for the **Cena Wernera von Siemense awards** under the **Industry 4.0** category (for potential impact on the new age of industrial revolution).
- Awarded a scholarship to cover tuition fees for the master's program at **Czech Technical University in Prague**.
- Awarded the **Shastri Research Student Fellowship** to pursue a research internship at **Polytechnique Montreal, Canada** (only awarded to 18 students all across India).
- Awarded **Best Secretary** among 11 technical societies (clubs) of IIT Guwahati. Also awarded the **Best Club** award for my tenure.
- Secured a rank of 4591 among 118,000 students in **IIT JEE**, Joint Entrance Exam - Advanced.

INDEPENDENT PROJECTS

ARLE: Autonomous Robot for Library Enhancement Aug 2017 - April 2019
4i Lab, IIT Guwahati

- Implemented autonomous navigation and collision avoidance and guided the team to integrate the control system with navigation to achieve smooth trajectories during locomotion.

HIVE: Distributed swarm system Dec 2016 - Feb 2017
Robotics Club, IIT Guwahati

- Implemented a modified version of Particle Swarm Optimisation (PSO) algorithm for self-organized flocking and collaborative search.

KBT: Autonomous football playing robot Sep 2016 - Oct 2016
Personal project, IIT Guwahati

- Designed an autonomous robot to play football using object tracking and path planning to accomplish maximum goals in the shortest possible time.

TECHNICAL SKILLS

Programming Languages	C++, Python, C
Softwares & Tools	OpenCV, Gazebo, Docker, Singularity, Git, V-rep, LaTeX, Solidworks, MATLAB
Operating Systems	Ubuntu, Robot Operating System (ROS1 and ROS2)
Hardware	Intel NUC, Raspberry Pi, Pixhawk Autopilot, Arduino

RELEVANT COURSES

Undergraduate	Advanced Control Systems, Patten Recognition and Machine Learning, Probability and Random Processes, Parallel Computing, Embedded Systems
Masters	Computational Game Theory, Statistical Machine Learning, Deep Learning, Combinatorial Optimization, AI in Robotics, Evolutionary Algorithms

VOLUNTEERING

Team leader, ARLE Project Aug 2017 - April 2019
4i Lab, IIT Guwahati, India

· Lead a team of 9 students to automate book retrieval and library management tasks at the Central Library of IIT Guwahati.
· Guided with software and overall design of the robot. The team implemented the first version capable of autonomous navigation in the library.

Secretary (Head of the student organisation) Aug 2017 - March 2018
Robotics Club, IIT Guwahati, India

· Lead a group of 40 students to organize workshops and hackathons in IIT Guwahati.
· Managed independent student projects and participated in regional and national competitions.

Coordinator and instructor May 2016 - July 2016
Avanti Learning Centers, New Delhi, India

· Conducted a workshop on introduction to robotics for underprivileged high school students.
· All the students were able to build their own Bluetooth-controlled robot after the workshop.