Pranav Kedia

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EDUCATION

- **University of Konstanz** — Konstanz, Germany
  Ph.D. in Computer Science — *Sep 2023 - Till Date*
  - **Focus topics**: Swarm Robotics in Field, Task, and Motion Planning, Energy-aware systems and Bio-inspired decision making

- **International Institute of Information Technology Bangalore (IIIT Bangalore)** — Bangalore, India
  Integrated Masters in Electronics and Communication — *Aug 2015 - Sep 2020*
  - **Courses**: Multi-Agent Systems, Intro to Robotics, Control Theory, Signals and Systems, Signal Processing, Machine Learning, Real-Time OS, Device Driver Development and Microprocessors and Microcontrollers.

RESEARCH EXPERIENCE

- **Cyber Physical Group @ University of Konstanz** — Konstanz, Germany
  Research Assistant - Advisor: Prof. Dr-Ing. Heiko Hamann — *Sep 2023 - Till Date*
  - **SailSwarm**: Swarming behaviors in a collective of autonomous robotics sailboats.

- **Biorobotics Lab @ Freie Universität Berlin** — Berlin, Germany
  Research Assistant - Advisor: Prof. Dr. Tim Landgraf — *Feb 2021 - Jul 2023*
  - **RoboBee**: Design and Development of a Robot bee platform and associated software stack for mimicking bee wangle dance in a real beehive as a part of the EU H2020 funded project 'Hiveopolis'.
  - **Beehive Experiments**: Involved in performing and analysing the interaction and acceptance experiments of the RoboBee with real bees.
  - **Hardware systems**: Also involved in support for hardware systems development(Robotics systems and medical automation systems) in the lab.

- **Artificial Life Lab @ Karl-Franzens University Graz** — Graz, Austria
  Visiting Researcher — *Jul 2022 - May 2023*
  - **Hiveopolis Intergration experiments**: Multiple visits over a year performing multiple integration workshops and experiments for the robotics subsystems built at FU Berlin with collaborators from Uni Graz, EPFL, and Pollenity(commercial enterprise) as a part of the EU H2020 funded project 'Hiveopolis'.

- **Surgical and Assistive Robotics Lab @ IIIT Bangalore** — Bangalore, India
  Graduate Researcher - Advisor: Prof. Dr. Madhav Rao — *Jan 2019 - Sep 2020*
  - **Bio-Inspired Swarm Robotics**: Investigation in foraging techniques of ants (pheromone-based) and other insects; Designing and developing bio-inspired Swarm robotics platform artificially imitating these natural processes of communication and coordination among a group of robots.
  - **Passenger safety in public vehicles**: Researching contact and contactless passenger emotion and state identification and classification techniques using Galvanic skin response, pressure response, EQ-Radio, etc.

- **A.R.M.S. Lab @ Indian Institute of Technology, Bombay** — Mumbai, India
  Research Intern - Advisor: Prof. Dr. Arpita Sinha — *May 2019 - Jul 2019*
  - **Shape Formation with Kilobots**: Investigations in additive and subtractive shape formation algorithms for a swarm of 40 Kilobots. Experiments were carried out in the V-REP simulator as well.
  - **Simulation of Kilobots using V-REP and NetLogo**: Tested additive and subtractive shape formation algorithms for Kilobots in a V-REP scene and Netlogo simulation.

- **Machine Intelligence and Robotics Center @ IIIT Bangalore** — Bangalore, India
  Undergraduate Researcher - Advisor: Prof. Dr. Sachit Rao — *Jan 2019 - May 2019*
  - **LEGO-based planar manipulators**: Designed an easily replicable 4 DOF and 2 DOF planar manipulator for testing various trajectory planning algorithms using LEGO® MINDSTORMS® EV3 with EV3Dev distro for better actuator and sensor data access.

- **Haryana Police Department** — Haryana, India
  Research Intern - Guide: Dr. Hanif Qureshi, PhD (Commissioner of Police) — *Jun 2016 - Jul 2016*
  - **Geographic Information System (GIS) for crime analysis**: My work at the Commissioner's Office was looking over the available infrastructure and developing low-cost crime mapping and analysis software solutions for the Law enforcement agency.

Publications

Papers:

- **Pranav Kedia**, Madhav Rao,"**GenGrid: A Generalised Distributed Experimental Environmental Grid for Swarm Robotics**", 2021 International Conference on Robotics and Automation (**ICRA**), 2021, pp. 1910-1917, DOI: 10.1109/ICRA48506.2021.9561654.

- Pratyush Nandi, Anubhav Mishra, **Pranav Kedia**, Madhav Rao,"**Design of a real-time autonomous in-cabin sensory system to detect passenger anomaly**", 2020 IEEE Intelligent Vehicles Symposium (**IV 2020**), Las Vegas, 2020, DOI: 10.1109/IV47402.2020.9304666

- **Pranav Kedia**, Pranav Aggarwal, Madhav Rao,"**Design and development of an autonomous in-seat passenger state identification in a modern vigilance enabled public transportation system**", 2019 IEEE International Conference on Vehicular Electronics and Safety (**ICVES 2019**), Cairo, 2019, DOI: 10.1109/ICVES.2019.8906349

- **Pranav Kedia "Crime Mapping and Analysis using GIS: An Indian Perspective**", Haryana Police Department, 2016, DOI: 10.13140/RG.2.2.11064.14081

Extended Abstract and Posters:

- **Pranav Kedia**, Charlie Apolinsky and Heiko Hamann,"**Developing SailSwarm: Small Uncrewed Sailing Vessels for Maritime Environments**", 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS 2024**), 2024

- **Pranav Kedia**, Charlie Apolinsky and Heiko Hamann,"**Building SailSwarm: A Swarm of Autonomous Sailing Vessels**", Fourteenth International Conference on Swarm Intelligence (**ANTS 2024**), Konstanz, 2024

- **Pranav Kedia**, Pranav Aggarwal, Anubhav Mishra, Pratyush Nandi,"**Design and development of an autonomous in-seat passenger state identification in a modern vigilance enabled public transportation system**", IEEE International Conference on Electronics, Computing and Communication Technologies (**CONECCT 2019**), Bangalore, 2019

Project and Travel Grants

- PANDOTA Doctoral Research Grant [**5000€, PIs: Pranav Kedia**]

- Project grant from a DFG-funded excellence cluster CASCB [**10000€, How to be different together: comparing recruitment behaviour in European and African bees , PIs: Morgane Nouvian, Daniela Ramirez-Moreno, James Foster, Frida Hildebrandt, Pranav Kedia, Jacob Davidson, Jake Graving**]

- Project grant from a DFG-funded excellence cluster CASCB [**8448€, Swarming sailboats: Collective of energy-aware wind-powered vessels, PIs: Pranav Kedia, Heiko Hamann, Hannah Williams, Liang Li and Andreagiovanni Reina**]

- Travel grant [**300€, Event: ROOT 2024 summer school, OTC Rostock, Germany**]

Teaching Experience

Supervisor - Seminar cyber-physical systems	Konstanz, Germany
Universität Konstanz	*Fall 2023, Fall 2024*
Teaching Assistant - Evolutionary Robotics	Konstanz, Germany
Universität Konstanz	*Spring 2024*
Teaching Assistant - Operating Systems	Konstanz, Germany
Universität Konstanz	*Fall 2023, Spring 2025*
Teaching Assistant - VL853 Advanced ARM Architectures	Bangalore, India
IIIT Bangalore	*Fall 2019*

Academic Service

- Reviewer Conferences: IROS 2025, GECCO 2024, IEEE RASSE 2024, IEEE CONECCT 2023, IEEE ICVES 2019

- Reviwer Journals: Robotics and Autonomous Systems(RAS), HardwareX

Skills Summary

- **Programming Languages**: C, C++, Python, Linux scripting, Assembly(ARM)
- **Software Tools**: Git, MATLAB, GNU Octave, ROS, OpenCV, freeRTOS, KEIL, GNU Make, Open MPI, Vim
- **Design Software Tools**: Fusion360, Inkscape, KICAD, Autodesk Eagle
- **Simulation Tools**: Gazebo, V-REP, Netlogo, LTspice, Multisim
- **Embedded Development Platforms**: ARM Cortex M4(STM32F4, MSP432), Raspberry Pi, BeagleBone Black, ATmega328,ESP32 and Arduino
- **Prototyping**: CAD, 3D Printing(Creality, Anycubic, Ultimaker, and Makerbot), Etched and Printed PCB fabrication(Bantam and Voltera)

Languages Spoken

- **English**: Native or bilingual proficiency (C1)
- **Hindi**: Native or bilingual proficiency(C1)
- **German**: Intermediate proficiency(B1)

Honors, Awards and Achievements

- Invited for **2024 Fulbright-Cottrell Workshop** on Science Communication at Saarbrücken, Germany

- Selected for **Maritime Informatics & Robotics** summer school by University of Aegean, Greece

- Selected for **Huawei Merit Scholarship** from Huawei twice for the year 2016 and 2017

- Selected for the prestigious **University of Bristol International Leadership Programme** 2019

- Top 1% in All India Secondary School Examination (A.I.S.S.E.)

- Honourable Mention at **Intel IOT hackathon** 2016

- Honourable Mention at **ACM ICPC** Regional at Amritapuri and Chennai 2015

- Top 10 teams in the country in **Zeiss Hackathon** 2018

- Selected for Haryana State Talent Search Scholarship from the Government of Haryana

- Top 0.01% in Science, Maths and Computer Olympiads in India

- **Co-founder**, Project Advisor and Deputy Head of Enigma (IIIT Bangalore Student Robotics Club)

References

Prof. Dr-Ing. Heiko Hamann, Professor
Universität Konstanz
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Prof. Dr. Madhav Rao, Associate Professor, Program Coordinator and Faculty in-charge-Labs
IIIT Bangalore
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Prof. Dr. Tim Landgraf, Junior Professor
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