

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*
- **Teaching Assistant - VL853 Advanced ARM Architectures** Bangalore, India
IIT Bangalore *Fall 2019*

ACADEMIC SERVICE

- Reviewer Conferences: 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
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Prof. Dr. Tim Landgraf, Junior Professor
Freie Universität Berlin
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Prof. Dr. Sachit Rao, Assistant Professor
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