Kousheek Chakraborty

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Education

École Polytechnique Universitaire de Lille Lille, France

MSc in Robotics and Autonomous Systems (M2), Grade: 17.6/20, Rank 1 Sep. 2023 – Sep. 2024

- **Subjects covered** - Machine Learning and Computer Vision, IOT, Industrial Robotics, Mobile and Aerial Robots, Real-Time Systems, Applied Mechanics
- Attended the AERO-TRAIN Summer School hosted by ETH Zurich
- **Thesis** - Intelligent Task Scheduling for Swarm AGVs through Vision-Language-Action Models in Multi-Stage Manufacturing Systems

École Centrale de Lille Lille, France

MSc in Robotics and Autonomous Systems (M1), Grade: 17.4/20, Rank 1 Sep. 2022 – Sep. 2023

- **Subjects covered** - Kinematics and Dynamics, Advanced Programming, ROS1 / ROS2, Control Theory, Sensor Fusion, Project Management, Marketing, Intellectual Property
- Volunteered for the Technical Committee of the RoboCup Logistics League
- Project lead of our team for the CoHoMa contest hosted by the French Ministry of Defence

Sri Aurobindo International Centre of Education Pondicherry, India

BSc in Mathematics and Computer Science, Prize for Academic Excellence Dec. 2018 – Oct. 2021

- **Subjects Covered** - Data Structures and Algorithms, Calculus, Linear Algebra, Numerical Analysis, Abstract Algebra, Analog Electronics, English, French
- Organised the annual science fair by managing funds, mentoring juniors and driving promotional activities
- **Thesis** - Morphology-Agnostic Reinforcement Learning for Quadrupedal Locomotion

Research and Technical Contributions

- Pal, S., **Chakraborty, Kousheek**, Aditya, D., Datta, A., Peters, J. "**Controlling Industrial Machines by Tracking Movements of their Operators**". Patent application (Link)
- **Chakraborty, Kousheek**, Fürbaß, L., Kohout, P., Rohr, A., Ruelas, D., Savage, J., Swoboda, D., Viehmann, T., "**Robocup Logistics League Rulebook 2024**" (Link)
- Boutignon, A., **Chakraborty, Kousheek**, Deptula, M., Merzouki, R., "**Integrated Design of an Aerial Ground Collaboration Platform for Autonomous Navigation through Rough Terrain**". Technical report for the French Ministry of Defence.
- **Chakraborty, Kousheek**, Lalaux, M., Rousseau, M., Saleh, A., Sanz-Lopez, M., **Implementation of Intelligent Task Scheduling for Swarm AGVs for the Robocup Logistics League**. Robocup Symposium 2024.

Experience

Saxion University of Applied Science, (SMART Mechatronics and Robotics Lab) Enschede, Netherlands

Robotics Research Engineer Sep. 2024 – Present

- Designing a Physics-Informed RL-based control systems architecture for aerial robots to preemptively stabilize against impulse disturbances using a feedforward signal
- Developing a differentiable simulation environment for contact-rich aerial physical interaction

Lynxdrone Canejan, France

Embedded System Engineer Sep. 2023 – Sep. 2024

- Developed a high-frequency multi-sensor state estimation pipeline for PX4-based drones
- Optimised 3D lidar-based SLAM algorithms for embedded processors in a drone to contain GPS-based factors
- Created a GUI for aerial and mobile robot operators working in GPS-denied conditions

CNRS UMR 9189, (Laboratoire CRIStAL) Lille, France
Student Researcher Mar. 2023 – Jul. 2023

- Built an autonomous drone using a Pixhawk flight computer and an NVIDIA Jetson Orin offboard computer
- Integrated advanced functionalities like GPS denied waypoint navigation and obstacle avoidance through a custom state estimation pipeline
- Developed a Qt C++ Desktop application for simultaneous control of a drone and mobile robot

Technical University Darmstadt, (Intelligent Autonomous Systems Lab) Darmstadt, Germany
Robotics and Machine Learning Engineer Aug. 2020 – Aug. 2022

- Developed a PyTorch Reinforcement Learning Toolkit for robotic applications with 8 algorithms
- Developed a real-time, single object 6D object pose estimation pipeline
- Developed a C++ API for real-time motion control of industrial manipulator arms
- Conducted testing and evaluation of state of the art visual-inertial odometry algorithms
- Led the design and prototyping of an embedded system to track the orientation of a robot operator's hand

Projects

Banter - Interactive GUI for Vision Language Action Models Mar. 2023 – Jul. 2023
Designed an interactive web-based GUI for interfacing with Vision-Language-Action models to control mobile manipulators powered by a Llama 3.1 8B-based LLM.

DriftWood - Autonomous Port Monitoring Sep. 2022 – Dec. 2022
Developed a 4G-connected autonomous boat for port monitoring using a custom Pure Pursuit path tracking controller and an NVIDIA Jetson Nano running CNN-based debris detection and collecting water level/quality data.

Open Source Kinematics Library for Arduino-based Microcontrollers Jan. 2022 – Mar. 2022
Developed an open source kinematics library for N-dof serial manipulator arms capable of running on Arduino-based microcontrollers with the help of a scratch built linear algebra and numerical optimisation library

Garbage Monitoring System for Urban Environments Nov. 2016 – Jun. 2017
Developed an IOT based platform for monitoring garbage levels in garbage bins across the city and determining the most efficient path for the garbage collection truck. Deployed to a portion of the town of Pondicherry, India

Honours and Awards

- **Topper in Introduction to Robotics Course – Rank 5/8844 – NPTEL** (Link) Dec. 2020
- **Prize for Academic Excellence – Sri Aurobindo International Centre of Education** Oct. 2019
- **Winner of 23 contests hosted on instructables.com** (Link)

Skills

Programming Languages – C++, Python, C, Matlab / Simulink, LabVIEW
Computer and Digital Skills – Fusion 360, Docker, Unreal Engine, Git, LaTeX
Libraries and Frameworks – Keras, Pytorch, JAX, Transformers, ROS, OpenCV, Eigen, PCL, CUDA, CasADi
Languages – English, French, Bengali, Sanskrit

Hobbies

Co-Author of Technovation (1.9M views) (Link)
FPV Drone Pilot
Physical Education (gymnastics, aquatic sports and team sports - basketball, volleyball, hockey)