Vincenzo Polizzi

Born in Canicattì, AG, Italy, 13 May 1997.

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Education

University of Toronto — *Toronto, CA*

Ph.D. student in Aerospace Science and Engineering - Working on perception for robotics. — *09/2023 - Ongoing*

Swiss Federal Institute of Technology (ETH) Zurich — *Zurich, CH*

Master of Science in Robotics, Systems and Control. Final grade 5.43/6.0 — *2019-2022*

Politecnico di Milano — *Milan, IT*

Bachelor in Automation Engineering. Final grade 110/110 — *2016 - 2019*

Publications

Data-Efficient Collaborative Decentralized Thermal-Inertial Odometry — *Zurich, 2022*

V. Polizzi, R. Hewitt, J. Hidalgo-Carrió, J. Delaune, D. Scaramuzza, IEEE RA-L and IROS 2022. DOI: 10.1109/LRA.2022.3194675

This work was presented at IROS 2022 in the Aerial System session and got three workshop spotlight presentations. We enable drones to fly and collaborate at any time using thermal cameras. Our results show that the proposed method improves by up to 46% trajectory estimation concerning a single-agent approach while reducing up to 89% of the communication data exchange between the agents. Code and datasets are open source.

Academic experience

Teaching Assistant — *Toronto, CA*

University of Toronto - Computer Vision for Robotics — *09-2023 - Ongoing*

TA for the class ROB501, Computer Vision for Robotics with Prof. Steven Waslander. The course teaches the basics of computer vision for robotics applications, from camera models to localization.

Research Assistant — *Zurich, CH*

UZH - Robotics and Perception Group — *08-2022 - Ongoing*

I worked as a Research Assistant on robust Simultaneous Localization And Mapping (SLAM) in challenging scenarios supervised by Prof. Davide Scaramuzza. In particular, I focused on pedestrian odometry for AR/VR applications with learned inertia. Also, I explored the area of SLAM with Neural Radiance Fields and diffusion models.

Laboratory Technician — *Zurich, CH*

ETH - Institute of Dynamic Systems and Control — *03-2022 - Ongoing*

I am working on hardware integration and testing in the Duckietown lab by Prof. Emilio Frazzoli. I am helping with the new implementation of the next generation of Duckiedrones.

Visiting Research Student at NASA Jet Propulsion Laboratory (JPL) — *Pasadena, CA*

Robotic Aerial Mobility group (347T) NASA JPL — *05-2021 - 11-2021*

I worked on implementing a collaborative Thermal-Inertial Odometry system for UAVs. The resulting multi-UAV setup showed outstanding results concerning the baseline. The work is implemented in the open-source JPL xVIO framework. This work also represents my Master's thesis in the Robotics and Perception Group at the University of Zurich with Prof. Davide Scaramuzza.

Teaching Assistant — *Zurich, CH*

ETH - Duckietown — *02-2020 - 02-2022*

I worked as a Teaching Assistant in the Institute of Dynamic Systems and Control in Prof. Emilio Frazzoli's lab for the "Autonomous Mobility on Demand: From Car to Fleet" course. I gave three tutorials to a class of 30 students at ETH about Docker, Augmented Reality, and Reinforcement Learning. I helped develop the MOOC version of the course on edX, attended by more than 4000 people, by designing control systems exercises. I've been featured in the "People Of Duckietown" https://www.duckietown.org/archives/87069.

Instructor of Robotics — *Canicattì, IT*

Euroform, Professional Institute — *2020*

I talked about robotics and automation to 25 students in an Italian high school class. At the end of the course (20 hours), the students assembled a wheeled robot that used Arduino to move and avoid obstacles.

Instructor for "Ambizione Italia" — *Milan, IT*

Microsoft, Fondazione Mondo Digitale — *02-2019 - 04-2019*

Every week for three months, I talked to a class of 30 students from different Italian high schools about Artificial Intelligence and its applications for the "Ambizione Italia" project.

Digital Ambassador for "Make Learn Share Europe" — *Sheffield, UK*

Mondo Digitale — *2016 and 2018*

Make Learn Share Europe is a European project to create a network of students keen on technology. I participated in 2016 as a student, presenting my guided tour app Monumenta (article). In 2018 as a mentor, I accompanied five students in Sheffield for four days (article).

Reviewing

2022 - Ongoing

Journals: IEEE Sensors - Conferences: ICRA, IROS

Industry experience

Software Engineer Intern

Zurich, CH

IniVation AG

01-2022 - 07-2022

I worked on the dynamic vision processing (DV-processing) library, developing new features such as the integration of an event-based Visual Inertial Odometry (VIO) frontend with a third-party backend, extension of a camera-IMU calibration framework with additional camera models, and research and training of feature extraction neural network on event images.

Robotics Engineer Intern

Zurich, CH

Rheinmetall Air Defence

09-2020 - 04-2021

I developed the software infrastructure for an autonomous drone for inspection, airport security, and surveillance. I also worked on a simulation for tracking systems for aerial vehicle detection.

Projects

Visual Odometry with semantic cues

Zurich, CH

"Vision Algorithms for Mobile Robotics", ETH Zurich course by Prof. Davide Scaramuzza

2020

I implemented a Visual Odometry Algorithm that uses semantic segmentation to avoid tracking feature points on moving objects and improve feature matching. For simulation, I used an ad-hoc version of the Duckietown Gym that includes the semantic ground truth.

Memory Card

Zurich, CH

"Visualization, Simulation and Interaction - Virtual Reality I", ETH Zurich course by Prof. Andreas Kunz

2020

I developed an app for iOS and Android to play the Memory card game using Mixed Reality.

Semantic Place Recognition for Multi-Robot Applications

Zurich, CH

Semester Project in the Vision for Robotics Lab at ETH, supervised by Prof. Chli

2020

I proved how different semantic descriptors could improve features matching in loop closure with wide view changes for UAV systems, enabling multi-robot collaboration.

Duckietown Parking Area

Zurich, CH

"Autonomous Mobility on demand: from car to fleet" ETH Zurich course by Prof. Frazzoli

2019 - 2020

"Autonomous Mobility on Demand from car to fleet" is a limited-seat course (30 students) at ETH. I worked in the parking area team. The goal was to make a Duckiebot (3 wheels car prototype) park without colliding with other vehicles.

Monumenta

Sicily, IT

iOS and Android application, monumenta.iobii.com

2016 - Ongoing

The app provides tourists with a city guide using augmented reality, offering suggestions to organize a good journey in the city. Six municipalities have already been involved in the project, thanks to the interest of cultural associations that want to enlighten Sicily's beautiful archaeological and natural sites.

PoliAssembly

Milan, IT

Computer Science class, Politecnico di Milano

2016 - 2017

I made the pseudo-assembly interpreter used during the computer science class in Politecnico di Milano. It shows how registers and memory work when a program is executed. Prof. Daniele Maria Braga shared the program with his class of more than 150 students.

RomeCup

Rome, IT

Fondazione Mondo Digitale

2016

Italian Robotics Competition Explorer category, the goal was to build a robot that can find sound, light, and gas sources moving in an unknown environment. I was the third-best and one of the few participants finding light sources.

Awards and Competitions

Essay Competition Award

Sicily, IT

International Computer Vision Summer School (ICVSS)

07-2022

I won the best essay award in the summer school ICVSS 2022. The essay title is: "The societal impact of AI, its dual-use and peacebuilding capabilities. Discuss the topic from a research and innovation perspective, from the standpoint of one worldwide research community". https://iplab.dmi.unict.it/icvss2022/EssayCompetition.

OpenCV AI Competition 2021 Phase 1 Finalists

Zurich, CH

OpenCV.org

2021

For this competition, my team used the depth camera with on-edge computing, made by OpenCV and LUXONIS (OAK-D). Our project brings the OAK technology to the Duckietown platform, enabling Depth-AI research in the Autonomous Driving Cars educational products. Certificate number: 29536451

Scholarship Aurelio Beltrami

Milan, IT

Fondazione Beltrami *2018*

Scholarship for Milan Universities in engineering. FAB annually selects outstanding students in fields of study related to electronics and computer science and awards the available scholarships after a rigorous selection of applicants. The amount won was € 2'800,00, and only six students got the prize.

Scholarship Cassa Forense

Italy

Cassa Forsense *2018-2019-2020*

Scholarship for excellent students with parents working in forensics. The amount won was € 3'500,00 for all the years.

The Best Freshmen Students

Milan, IT

Politecnico di Milano *2016*

Prize for "The best freshmen students", conferred based on academic achievements in the first year of the bachelor degree.

Chess championships

Agrigento, IT

A.C.S.D. Leonardo *2009 - 2010 - 2011 - 2012 - 2013*

I participated in the Italian and Sicilian chess championships. I ranked 1st for five consecutive years in my province (Agrigento, Sicily, IT)

Skills

Languages English: Full Proficiency, Italian: Native, Chinese Mandarin: Starting Level

Technical skills C++, Python, Docker, ROS, ROS2, UNIX, LAMP Server

Hardware platforms Visual/thermal/event cameras, NVIDIA embedded platforms, Arduino UNO, Raspberry Pi

Extracurricular courses and activities

International Computer Vision Summer School (ICVSS)

Sicily, IT

Summer School by Prof. Roberto Cipolla, Prof. Sebastiano Battiato, Prof. Giovanni Maria Farinella *2022*

Computer Vision: a Renaissance. The School provided a clear and in-depth summary of the state-of-the-art research in Computer Vision, Machine Learning, and Artificial Intelligence. The lectures covered theoretical and practical aspects of real problems and examples of their successful commercialization. World-renowned experts from academia and industry delivered the courses (30 hours).

Google Developers Student Club (GDSC) Zurich

Zurich, CH

Student organization *2022 - ongoing*

In GDSC, students grow their knowledge in a peer-to-peer learning environment and build solutions for local businesses and communities. I organized the event "Look back in time with NASA James Webb Space Telescope," attended by more than 116 students with Dr. Giuseppe Cataldo from the NASA Goddard Space Flight Center.

Getting Started with DeepStream for Video Analytics on Jetson Nano

Zurich, CH

NVIDIA Deep Learning Institute *2020*

It is a certificate of completion for the course "Getting Started with DeepStream for Video Analytics on Jetson Nano" held by NVIDIA DLI. During the course, I learned about the DeepStream plugins and structure to develop Intelligent Video Analytics applications. Certificate number: 9cf3cc1926b24f90be64f2c522d09482

Getting Started with AI on Jetson Nano

Zurich, CH

NVIDIA Deep Learning Institute *2020*

It is a certificate of completion for the course "Getting started with AI on Jetson Nano" held by NVIDIA DLI. The course showed how to use the NVIDIA Jetson AI tools. Certificate number: b708b0aee20646ad81506c9791497f5d

Summer School "The human being behind the man: the cyborg"

Vienna, AT

Torrescalla, RUI *2018*

The central theme of the school was the ethical aspect of how technology can change and improve the human body, enhancing its possibilities but increasing disparities among people.

PEoPLe@DEIB - Machine Learning for geophysical data interpretation

Milano, IT

Politecnico di Milano *2018*

The course gave an overview of analyzing geophysical data using machine learning algorithms.

IT Consultant of the Mayor

Burgio, IT

Municipality of Burgio *2017 - 2018*

I developed an app to put the city council in contact with the citizens (article). With no expenses for the municipality.

JUMP (Job-University Matching Project)

Milan, IT

Torrescalla, RUI *2016 - 2019*

The curse aims to teach the students different teaching concerning the technical one. Indeed some of the taught topics are ethics, global mindset, and public speaking.