

curriculum vitae

PERSONAL INFORMATION

Surname	Usuelli
Name	Mirko
Telephone	
Fax	
E-mail	
Skype	

Nationality	
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Date of birth	
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Education and training	PhD student in Information Technology (Computer Science and Engineering)
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	PhD in Information Technology (Computer Science and Engineering)
• Date (from – to)	
• Name and type of organisation providing education and training	Politecnico di Milano
Duration of the program of study	3 years (started 01/06/2023)
• Principal subjects/occupational skills covered	Autonomous multimodal perception for sustainable management of agricultural systemsPhD in Information Technology
• Title of qualification awarded	PhD in Information Technology
Final mark obtained	---

	MSc in Computer Science and Engineering
• Date (from – to)	2nd year: - September 2022 – December 2022: Data Analysis for Smart Agriculture, mark: 30L/30 - February 2022 – September 2022: Advanced Deep Learning Models and Methods (PhD course), mark: 30L/30 - September 2021 – July 2022: Computer Vision and Image Analysis, mark: 29/30 - February 2022 -- June 2022: Robotics, mark: 30L/30 - September 2021 – July 2022: Data Mining, mark: 24/30 - February 2022 – June 2022: Model Identification and Data Analysis 2, mark: 27/30 - September 2021 – February 2022: Control of Mobile Robots, mark: 28/30 - September 2021 – January 2022: Artificial Neural Networks and Deep Learning, mark: 30/30 - September 2021 – November 2021: Game Theory, mark: 27/30

	1st year: - February 2021 – September 2021: Machine Learning, mark: 30/30 - February 2021 – June 2021: Model Identification and Data Analysis 1, mark: 30/30 - February 2021 – June 2021: Computer Security, mark: 26/30 - February 2021 – July 2021: Advanced Computer Architectures, mark: 30L/30 - February 2021 – June 2021: Computing Infrastructures, mark: 30/30 - September 2020 – February 2021: Formal Languages and Compilers, mark: 25/30 - September 2020 – June 2021: Foundations of Operation Research, mark: 29/30 - September 2020 – February 2021: Data Bases 2, mark: 30/30 - September 2020 – June 2021: Software Engineering 2, mark: 27/30 - September 2020 – January 2021: Soft Computing, mark: 29/30 - September 2020 – January 2021: Artificial Intelligence, mark: 27/30
• Name and type of organisation providing education and training	Politecnico di Milano
Duration of the program of study	2 years
• Principal subjects/occupational skills covered	Computer Science and Engineering, Artificial Intelligence and Machine Learning, Multi-Modal Perception, Robotics and Computer Vision, Deep Learning, Smart Agriculture
• Title of qualification awarded	Master of Science degree in Computer Science and Engineering
Final mark obtained	110 with honors / 110 – GPA: 28.40/30.00

	BSc in Engineering of Computing Systems
• Date (from – to)	3rd year: - February 2017 – June 2018: Thermodynamics and Heat Transfers - February 2017 – June 2018: Mechanics - February 2017 – June 2018: Knowledge Engineering - February 2017 – June 2018: Economy and Management - September 2017 – January 2018: Fundamentals of Electronics - September 2017 – January 2018: Digital Logic Design - September 2017 – January 2018: Information Systems - September 2017 – January 2018: Software Engineering 1 - September 2017 – January 2018: Data Bases 1 2nd year: - February 2019 – June 2019: Probability and Statistics - February 2019 – June 2019: Fundamentals of Automation - February 2019 – June 2019: Algorithms and Principles of Computer Science - September 2018 – January 2019: Calculus 2 - September 2018 – January 2019: Logic and Algebra 1 - September 2018 – January 2019: General Chemistry - September 2019 – January 2019: Computer Architectures and Operating Systems 1 st year: - February 2018 – June 2018: Physics - February 2018 – June 2018: Fundamentals of Internet and Networking - February 2018 – June 2018: Circuit Design and Electromagnetism - September 2017 – January 2018: Geometry and Linear Algebra - September 2017 – January 2018: Calculus 1 - September 2017 – January 2018: Fundamentals of Computer Science
• Name and type of organisation providing education and training	Politecnico di Milano
Duration of the program of study	3 years
• Principal subjects/occupational skills covered	Computer Science, Software Engineering, Digital Logic Design, Algorithms and Data Structures, Data Bases
• Title of qualification awarded	Bachelor of Science degree in Engineering of Computing Systems
Final mark obtained	93/110 – GPA: 23.82/30.00

	Technical High School in Computer Science
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• Date (from – to)	From 2012 to 2017
• Name and type of organisation providing education and training	ITIS Guglielmo Marconi – Gorgonzola, Milan
Duration of the program of study	5 years
• Principal subjects/occupational skills covered	Computer Science and Robotics
• Title of qualification awarded	Computer Expert Diploma (“Perito Informatico” in italian)
Final mark obtained	93/100

graduation thesis

Title	The Lord of the Sensors: A Multi-Sensor Framework for SLAM
Language	English
Supervisor	Prof. Matteo Matteucci
Thesis Summary	<p>Simultaneous Localization and Mapping (SLAM) are two of the most crucial problems in the Robotics research field. The main goal of this MSc Thesis was to develop a Multi-Sensor Framework for SLAM to allow further Multi-Modal developments upon any combination of sensors.</p> <p>The architecture has been tested in agricultural and urban environments to be independent from the scenario. The most original aspect of this framework is the ability to merge odometry trajectories by achieving sensor fusion through an optimization graph. The total independence of sensors and modules permits extreme scalability based on the user's need.</p> <p>The framework's validity has also been demonstrated by successfully integrating a poorly explored sensor in the SLAM literature, such as the Radar. Deep learning techniques have been employed to accomplish this novelty, including dealing with noisy measurements, extracting learnable descriptors, and achieving state-of-the-art in the Loop Detection task.</p>

publications and articles submitted

1 Academic publication in conference, 2 Academic competitions representing my university

Author(s) and title	<p>Paolo Cudrano, Simone Mentasti, Emanuele Locatelli, Matteo Nicolò, Samuele Portanti, Alessandro Romito, Sotirios Stavrakopoulos, Gülce Topal, Mirko Uselli, Matteo Zinzani, Matteo Matteucci</p> <p>"Detection and mapping of crop weeds and litter for agricultural robots"</p>
Language	English
Publication place	2022 AEIT International Annual Conference (AEIT), Rome (Italy)
Date of publication	5th October 2022

Author(s) and title	<p>Eugenio Lomurno, Mirko Uselli, Andrea Lampis, Cristian Sbrilli</p> <p>3rd place out of 64 teams in GenHack2 – Hackathon for Generative Modelling (representing Politecnico di Milano)</p> <p>"Spatially Conditioned Time Series Forecasting through Big Generative Adversarial Network for Ocean Temperature Climate Change "</p> <p>It consisted of a Generative Deep Learning competition involving Ph.D. and MS students of STEM universities worldwide.</p> <p>The case of the study was the generation of time series related to ocean temperature affected by climate change in the period of 2008-2016 by having the dataset from 1975 to 2007 of an</p>
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	<p>unknown location. We decided to train a custom Big GAN architecture spatially conditioned to account for multiple recording stations. To keep track of the distribution of the generated sample, we imposed the Absolute Kendall Error for distribution dependence distance and the Anderson-Darling for marginal errors as our criteria for early stopping and final evaluation.</p> <p>Link: "https://www.polytechnique.edu/en/education/academic-and-research-departments/applied-mathematics-department-depmap/student-event/genhack-2-hackathon-generative-modelling"</p>
Language	English
Publication place	École polytechnique (Paris, France)
Date of publication	2nd February 2022

Author(s) and title	<p>Paolo Cudrano, Simone Mentasti, Emanuele Locatelli, Matteo Nicolò, Samuele Portanti, Alessandro Romito, Sotirios Stavrakopoulos, Gülce Topal, Mirko Uselli, Matteo Zinzani, Matteo Matteucci</p> <p>"FRE 2022: Field Robotics Event" (Agricultural Robotics Competition representing Politecnico di Milano) – Autonomous Navigation and Weeds/Litters detection task</p> <p>It consisted of a challenge involving European universities of multidisciplinary engineering. The competition was split into two main tasks with a commercial agricultural robot:</p> <p>1) Autonomous navigation: during the round, a random navigation sequence was provided among crop field rows; we adopted a cluster analysis to establish row distances. While through the move-base ROS package, we have been able to perform the turning stage based on the pre-defined random route.</p> <p>2) Litter and weed detection: we decided to deal with YOLO as a deep learning model for object detection and RGB-D cameras to estimate detected object positions. To keep track of detections, we also implemented an Extended Kalman Filter from scratch to take into account localization and mapping (of detected objects as landmarks) simultaneously.</p> <p>Due to COVID-19 reasons, the competition was also held online with the help of Gazebo simulation.</p> <p>Link: "https://fieldrobot.nl/event/"</p>
Language	English
Publication place	Mannheim, Germany
Date of publication	16th June 2022

certifications

GRE	-
GMAT	-
Certifications of language knowledge	<p>IELTS Academic – 02/03/2019 – mark: 6.5</p> <p>FCE Cambridge certificate B2 – April 2016</p> <p>PET Cambridge certificate B1 – March 2015</p>

Work experience, stages, studies abroad

• Date (from – to)	March 2022 – Present: Research project
• Name and address of firm/university	Edison S.p.A. - Milano, Foro Buonaparte, 31
• Type of business or sector	Robotics autonomous navigation and SLAM

• Type of employment	Student Researcher
• Main activities and responsibilities	I have been involved into the application of my MSc Thesis in an underground scenario required by Edison S.p.a. . The goal is to achieve full autonomous navigation while localization and mapping over a GNSS-denied environment such as Edison's underground tunnels for hydroelectric plants, avoiding human manual inspection.

• Date (from – to)	October 2022 – December 2022: Project experience
• Name and address of firm/university	Agricola Moderna, Sunspring S.r.l. – Via Sandro Pertini 26, 20066 Melzo (Milan)
• Type of business or sector	Indoor Vertical Farming
• Type of employment	Project Manager and Data Scientist
• Main activities and responsibilities	Project manager of a group composed by other two students; Data Science project involving AI Explainability for indoor salad yields predictions and necrosis classification tasks, and the correlated sustainable business management.

• Date (from – to)	December 2021 – January 2022
• Name and address of firm/university	Business Integration Partners S.p.A. – Piazza San Babila 5 Milano, 20122
• Type of business or sector	Machine Learning and AI solutions for business consulting
• Type of employment	Project Manager and Data Scientist
• Main activities and responsibilities	Project manager of group composed by other four students; Data Science project involving anomaly prediction in KPI time series related to a real telecommunication infrastructure.

• Date (from – to)	June 2015 – July 2015: Summer School Working Stage
• Name and address of firm/university	ABE Elettronica S.r.l – Via Leonardo da Vinci, 224, 24043 Caravaggio BG
• Type of business or sector	B2G and B2B Business in End-to-end TV-Broadcasting, Electronics and IT sector
• Type of employment	C++ Software Developer
• Main activities and responsibilities	Embedded Systems, Transmission Protocols programming and Signal Processing.

• Date (from – to)	September 2014 – June 2017: Studies Abroad, Poland
• Name and address of firm/university	Robotics Erasmus+ project "Automaton", in partnership with the Polish Institute ZST Bytom
• Type of business or sector	Education and Robotics
• Type of employment	Java Software Developer
• Main activities and responsibilities	- Italian RoboCupJr 2016 (Rescue challenge) - Vercelli. - Italian RoboCupJr 2015 (Rescue challenge) - Busto Arsizio. - 2 weeks exchange Krakow-Warsaw-Katowice (PL): Robotics, 3D Printing and Team Building courses. - Hosting of three Polish mechatronics students.

• Date (from – to)	April 2016: Studies Abroad, London, UK
• Name and address of firm/university	1 week English Stage by ITIS Guglielmo Marconi, Gorgonzola
• Type of business or sector	Education
• Type of employment	Student
• Main activities and responsibilities	High School Stage in preparation for the FCE exam, held in London (Ealing), UK

• Date (from – to)	July 2015 : Studies Abroad, New York, US
• Name and address of firm/university	2 weeks English Stage by Kaplan, Milan
• Type of business or sector	Education
• Type of employment	Student
• Main activities and responsibilities	High School Stage in preparation for the FCE exam

• Date (from – to)	July 2014 : Studies Abroad, Newcastle, UK
• Name and address of firm/university	2 weeks English Stage by ITIS Guglielmo Marconi & ITC Argentina, Gorgonzola
• Type of business or sector	Education
• Type of employment	Student
• Main activities and responsibilities	High School Stage in preparation for the PET exam

Personal skills and competences

Acquired in the course of life and career but not necessarily evidenced by formal certificates and diplomas.

Mother tongue

Italian

Other language(s)

English

• reading

excellent

• writing

excellent

• speaking

excellent

Social skills and competences

Living and working with other people, in multicultural environments, in positions where communication is important and situations where teamwork is essential (e.g. Culture and sports), etc.

I have been fortunate to live and work in different countries, including Poland, where I worked with robotics students, and in other English-speaking countries, immersing myself in a multicultural setting. These experiences have enhanced my appreciation for diversity and taught me to respect and empathize with different cultures. Moreover, I played in a football club for five years and volunteered as a tutor for the youth club in my town, emphasizing communication and setting an example for children.

Organisational skills and competences

E.g. coordination and management of people, projects and budgets; at work, in voluntary work (e.g. culture and sports) and at home, etc.

During my time in High School from 2014 to 2017, I held the position of "Chief Technology Officer" (CTO) in an Erasmus+ project that involved Robotics and cultural exchange with Poland. The teachers were responsible for the project and assigned roles in a simulated robotic startup organization chart to some participating students. As the CTO, I managed a small budget for fulfilling the technological requirements to compete in the Italian RoboCup Jr. Effective communication was crucial during this project, especially for hosting international students in my family and vice versa.

Technical skills and competences

With computers, specific kinds of equipment, machinery, etc.

- Robotics: C++ programming, including OpenCV, g2o, PCL, Eigen, PyTorch (Python and C++)
- Deep Learning: tensorflow (keras), PyTorch either in Python or C++
- Computer Vision: OpenCV either in Python or C++, Matlab, PyTorch either in Python or C++
- Data Science, Machine Learning: Python programming. sklearn, pandas, matplotlib
- AI Explainability: Shap library in python
- ROS operating system (for Robotics)
- Linux
- Docker
- Java (EJB)
- SQL

Artistic skills and competences

Music, writing, drawing etc.

I am skilled in cooking and DIY projects, where the creative process involves designing and modeling choices.
At 15 years old, I constructed a 3D printer on my own and utilized it for various projects, including my diploma thesis, which involved designing a domotic military base with four robots that I built myself. The project can be viewed on my YouTube channel (Mirko Usuelli).

Other skills and competences

Competences not mentioned above.

Brown belt (1 kyu) in Karate Shotokan.

Additional information

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annexes

- 1) P. Cudrano *et al.*, "Detection and mapping of crop weeds and litter for agricultural robots," 2022 AEIT International Annual Conference (AEIT), Rome, Italy, 2022, pp. 1-6
- 2) Agri-tech Portfolio