Cristina Nuzzi

Date of birth: 01/05/1993 | **Nationality:** Italian | **Gender** Female | cristina.nuzzi@unibs.it | http://vis4mechs.unibs.it/

WORK EXPERIENCE

01/11/2020 – CURRENT – Brescia, Italy
POST-DOC – UNIVERSITY OF BRESCIA

Research activity:
- Smart Automation and Robotics independent research activities involving AI applications for robotics and validation campaigns of developed systems.
- Software development for external industries involving computer vision techniques.

Educational activity:
- **Course practical exercises, lectures, and group projects support (20h total).** *Course:* Laboratorio di Misure Meccaniche e Termiche; *Professor:* Prof. Matteo Lancini; *Year*: 2020/2021
- **Course practical exercises, lectures, and group projects support (20h total).** *Course:* Sistemi Meccatronici Interagenti con l'Uomo; *Professor:* Prof. Alberto Borboni; *Year*: 2020/2021

01/11/2017 – 31/10/2020 – Brescia, Italy
PH. D. STUDENT – UNIVERSITY OF BRESCIA

Research activity:
- Development of a smart command system prototype for both Industrial and Collaborative robots based on hand-gesture recognition named *MEGURU*, resulting in a publication on the international journal "*Robotics and Computer Integrated Manufacturing*" and in a Ph. D. Thesis named "*Towards true Human-Machine Collaboration: the concept of Meta-Collaborative Workstations and a first software prototype*".
- Development of a teleoperation system based on vision and skeletonization algorithms.
- Research in the topic of safety for collaborative workstations.

Educational activity:
- **Laboratory and practical exercises support (10h total).** *Course:* Sistemi di Visione 3D; *Professor:* Prof. Giovanna Sansoni; *Year*: 2018/2019
- **Course practical exercises, lectures and group projects support (20h total).** *Course:* Sistemi Meccatronici Interagenti con l'Uomo; *Professor:* Prof. Alberto Borboni; *Year*: 2019/2020

Master Thesis referee for the following works:
- Rossano Rivadossi, "*Realizzazione e caratterizzazione metrologica di un sistema di comando per robot basato su riconoscimento di gesti real-time*", Academic year: 2017/2018
- Claudio Mor, "*Utilizzo di Convolutional Neural Networks su piattaforme embedded FPGA e GPU e benchmarking prestazionale*", Academic year: 2018/2019
- Piervincenzo Tavormina, "*Studio e sviluppo di un sistema di teleoperazione per robot basato su sistemi di visione e riconoscimento gesti*", Academic year: 2019/2020
- Luca Foletti, "*Teleoperazione di manipolatori robotici con posizionamento preciso su tre assi basato su sistemi di visione*", Academic year: 2019/2020

EDUCATION AND TRAINING

11/2017 – 12/2020 – Brescia, Italy
PH. D. IN APPLIED MECHANICS – Università degli Studi di Brescia

The Ph. D. project focuses on **collaboration** between industrial robots and human operators. The key points of the research are:
- to define a natural and easy-to-use **gesture language** as the communication method between human operators and robots;
- to set up a **real-time monitoring system** that can understand the gestures of the operator and, at the same time, can take care of the safety strategies (intensely using **Deep Learning** models and **AI**);
- to port the whole system intelligence on an **embedded platform** to remove or at least to reduce the usage of a PC.

EQF level 8

2015 – 2017 – Brescia
MASTER DEGREE IN INDUSTRIAL AUTOMATION ENGINEERING (110/110L) – Università degli Studi di Brescia

General skills:
- Economics and Industrial plants design

Technical skills:
- Mechanical systems and applications
- Mechatronics and advanced Control Systems
- Models theory and control
- Robotics and Microrobotics
- Microcontrollers and Industrial Sensors
- Industrial Electronics
- Measurments fundamentals (Electrical, Mechanical, Thermal)
- Python programming language
- LabVIEW fundamentals
- Computer Graphics fundamentals
- 3D Vision Systems

EQF level 7

2012 – 2015 – Brescia
BACHELOR DEGREE IN INDUSTRIAL AUTOMATION ENGINEERING (94/110L) – Università degli Studi di Brescia

General skills:
- Calculus, Physics, Chemistry, Analytical Mechanics

Technical skills:
- Technical and mechanical drawing and design with SolidWorks
- Machines construction theory
- Electronics and Electrotechnology
- PLC and Control Systems
- Automation fundamentals and Digital Control
- Computer science theory and C and C++ programming languages
- Programming Languages theory (ProLog, Haskell, Scheme)
- Networks and Telecommunication theory and design

EQF level 6

2007 – 2012 – Brescia
TECHNICAL HIGH SCHOOL DEGREE (82/100) – Istituto Tecnico Superiore per Geometri Niccolò Tartaglia

General skills:
- General studies of high school level

Technical skills:
- Topography
- Cadastral survey
- Buildings construction theory
- Technical drawing

EQF level 5

LANGUAGE SKILLS

Mother tongue(s): ITALIAN

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C2	C1	C1	C1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

Miscellaneous

Microsoft Office | Zoom | Microsoft Teams | LinkedIn | Google Drive | Skype | Social Media | Google Docs

Software and Programming

Python | MATLAB | LabVIEW | SolidWorks | ROS

PUBLICATIONS

Development and characterization of a safety system for robotic cells based on multiple Time of Flight (TOF) cameras and point cloud analysis

https://ieeexplore.ieee.org/abstract/document/8439037 – 2018
S. Pasinetti, C. Nuzzi, M. Lancini, G. Sansoni, F. Docchio, and A. Fornaser, "*Development and Characterization of a Safety System for Robotic Cells Based on Multiple Time of Flight (TOF) Cameras and Point Cloud Analysis*," 2018 Workshop on Metrology for Industry 4.0 and IoT, Brescia, 2018, pp. 1-6, doi: 10.1109/METROI4.2018.8439037

Deep Learning Based Machine Vision: First Steps Towards a Hand Gesture Recognition Set Up for Collaborative Robots

https://ieeexplore.ieee.org/abstract/document/8439044 – 2018
C. Nuzzi, S. Pasinetti, M. Lancini, F. Docchio and G. Sansoni, "*Deep Learning Based Machine Vision: First Steps Towards a Hand Gesture Recognition Set Up for Collaborative Robots*," 2018 Workshop on Metrology for Industry 4.0 and IoT, Brescia, 2018, pp. 28-33, doi: 10.1109/METROI4.2018.8439044

Deep learning-based hand gesture recognition for collaborative robots

https://ieeexplore.ieee.org/document/8674634 – 2019
C. Nuzzi, S. Pasinetti, M. Lancini, F. Docchio and G. Sansoni, "*Deep learning-based hand gesture recognition for collaborative robots*," in IEEE Instrumentation & Measurement Magazine, vol. 22, no. 2, pp. 44-51, April 2019, doi: 10.1109/MIM.2019.8674634

Hand Gesture Recognition for Collaborative Workstations: A Smart Command System Prototype

https://doi.org/10.1007/978-3-030-30754-7_33 – 2019
C. Nuzzi, S. Pasinetti,, R. Pagani, F. Docchio, and G. Sansoni, *"Hand Gesture Recognition for Collaborative Workstations: A Smart Command System Prototype*," New Trends in Image Analysis and Processing -- ICIAP 2019, Lecture Notes in Computer Science, vol 11808, Springer, Cham. 2019, pp. 332-342, doi: https://doi.org/10.1007/978-3-030-30754-7_33

RemindLy: A Personal Note-bot Assistant

https://doi.org/10.1145/3371382.3379456 – 2020
C. Nuzzi, S. Ghidini, R. Pagani, and F. Ragni, "*RemindLy: A Personal Note-bot Assistant*," 2020 ACM/IEEE International Conference on Human-Robot Interaction (HRI '20). Association for Computing Machinery, New York, NY, USA, 2020, pp. 631–632. doi: https://doi.org/10.1145/3371382.3379456

Hands-Free: a robot augmented reality teleoperation system

https://ieeexplore.ieee.org/document/9144841 – 2020
C. Nuzzi, S. Ghidini, R. Pagani, S. Pasinetti, G. Coffetti and G. Sansoni, "*Hands-Free: a robot augmented reality teleoperation system*," 2020 17th International Conference on Ubiquitous Robots (UR), Kyoto, Japan, 2020, pp. 617-624, doi: 10.1109/UR49135.2020.9144841

Validation of Marker-Less System for the Assessment of Upper Joints Reaction Forces in Exoskeleton

https://doi.org/10.3390/s20143899 – 2020
S. Pasinetti, C. Nuzzi, N. Covre, A. Luchetti, L. Maule, M. Serpelloni, and M. Lancini, "*Validation of Marker-Less System for the Assessment of Upper Joints Reaction Forces in Exoskeleton Users*," Sensors, vol. 20, no. 14, 2020, pp. 3899, doi: https://doi.org/10.3390/s20143899

HANDS: an RGB-D dataset of static hand-gestures for human-robot interaction

https://doi.org/10.1016/j.dib.2021.106791 – 2021
C. Nuzzi, S. Pasinetti, R. Pagani, G. Coffetti, and G. Sansoni, "*HANDS: an RGB-D dataset of static hand-gestures for human-robot interaction*", in Data in Brief, vol. 35, 106791, 2021. doi: https://doi.org/10.1016/j.dib.2021.106791

MEGURU: a gesture-based robot program builder for Meta-Collaborative workstations

https://doi.org/10.1016/j.rcim.2020.102085 – 2021
C. Nuzzi, S. Pasinetti, R. Pagani, S. Ghidini, M. Beschi, G. Coffetti, and G. Sansoni, "*MEGURU: a gesture-based robot program builder for Meta-Collaborative workstations*," in Robotics and Computer-Integrated Manufacturing, vol 68, pp. 102085, April 2021. doi: https://doi.org/10.1016/j.rcim.2020.102085

Cobot User Frame Calibration: Evaluation and Comparison between Positioning Repeatability Performances Achieved by Traditional and Vision-Based Methods

https://doi.org/10.3390/robotics10010045 – 2021
R. Pagani, C. Nuzzi, M. Ghidelli, A. Borboni, M. Lancini, and G. Legnani, "C*obot User Frame Calibration: Evaluation and Comparison between Positioning Repeatability Performances Achieved by Traditional and Vision-Based Methods*," in Robotics, vol. 10 (1), pp. 45, 2021. doi: https://doi.org/10.3390/robotics10010045

DRIVING LICENCE

Driving Licence: B

ORGANISATIONAL SKILLS

Organisational skills

I am a very organized and indipendent person, taking care of my own research by investigating my ideas with some experiments first and reaching intermediate steps that I further discuss with my co-workes and Supervisors. I indipendently manage my courses to further expand my knowledge and contaminate my own ideas and expertise with the ones of colleagues of other research areas.
I have experience in the management of the courses organized by the Ph. D. program as a Students Representative. I also supervise Master Thesis projects and work in the development of different spin-off projects of my Laboratory not directly related to my current one.

COMMUNICATION AND INTERPERSONAL SKILLS

Communication and interpersonal skills

I can easily get along with co-workers or superiors and discuss with them my point of view clearly. I can communicate and manage conflicts in an assertive way thanks to some communication courses I've followed during the Ph. D. I have been a Students Representative of Ph. D. students, further refining my communication and leadership skills. I also assist students during the courses organized by my Laboratory, and I have some experience in supervising Master Thesis.

JOB-RELATED SKILLS

Job-related skills

- Good programming skills acquired both indipendently and in University courses (C, C++, Python, HTML, CSS, MATLAB, LabVIEW)
- Proficient user of OSX and Windows operative systems, good user of Ubuntu systems
- Good knowledge of the most famous Machine Learning algorithms and theory
- Good knowledge and usage of Deep Learning algorithms and theory
- Good knowledge and usage of TensorFlow and Keras frameworks
- Good knowledge and usage of ROS

OTHER SKILLS

Other skills

- Passionate reader of fantasy, urban fantasy and sci-fi novels and books, I also like reading classics and poetry sometimes
- Life-long passion for role-playing videogames, table-top games, and manga and anime products. These hobbies still drive my passion for writing and participating in role-playing written games with online friends in the free time
- I practiced figure roller skating for 7 years also competitively, and even if I haven't been practicing for years I still love to skate and feel the need to do it sometimes
- Good orienteering and self-organizing skills, refined during the month-long Camino de Santiago. I can easily communicate with foreign people even if we don't speak the same language at all
- Love to travel in the wild, love the silence and scenery of nature. I'm afraid of climbing but I love hiking