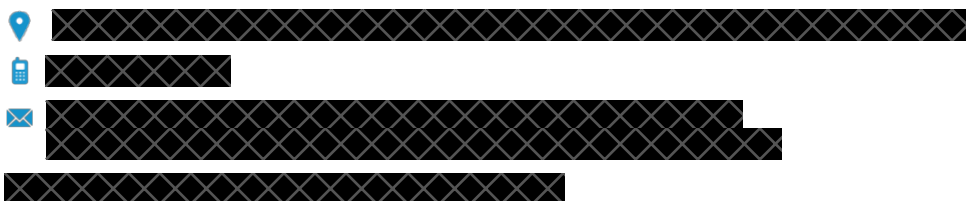


PERSONAL INFORMATION



Roberta Bruschetta



I am a Biomedical Engineer, with specialization in the fields of ICT- based medical devices design and development of medical software and algorithms for supporting clinical decisions. During my education, I have gained experience in processing and classifying bioimages using machine learning and deep learning techniques for diagnostic, therapeutic and monitoring purposes. Currently, I am a PhD Student in the National PhD in Artificial Intelligence (Health and Life Sciences) program of Campus Bio-Medico of Rome in collaboration with the Institute for Biomedical Research and Innovation (IRIB) of National Research Council of Italy, Messina unit. I started my research activities at Polytechnic University of Turin in 2019. My research focuses on the development of automatic systems for early diagnosis and new biomarkers identification of neuro disorders using Artificial Intelligence methods and processing heterogeneous biomedical data. My primary goal is the development of a multimodal framework based on AI models to gain new insights into sensory, behavioral and cognitive aspects of autism, investigating different areas of children's development including motor abilities, communicative and social skills, language and emotions. Specifically, I am currently investigating infants' general movements and children's gestural behavior by tracking body landmarks and extracting cinematic parameters. Additionally, I am exploring language area developing systems for speech impairments identification and assessment of dysarthria. Furthermore, I am studying social attention through eye-tracking experiments and analyzing physiological signals to understand children's engagement levels during therapies.

PROFESSIONAL EXPERIENCE

01/11/2021 – up to present	PhD Student – National PhD in Artificial Intelligence (Health and life sciences) Biomedical Campus University – Rome – ITALY - with research activities affiliated with IRIB CNR
01/09/2020 – 31/10/2021	Research Fellow CNR Institute for Biomedical Research and Innovation (IRIB) of National Research Council – Messina (ME) – ITALY
01/10/2023 – 31/12/2023	Teaching in Data Mining & Analytics University of Messina – Messina – ITALY
10/05/2023 – 09/08/2023	Occasional self-employment work - “Monitoring and analysis of aspects related to the autistic spectrum through the use of wearable sensors and advanced artificial intelligence technologies” Institute for Biomedical Research and Innovation (IRIB) of National Research Council – Messina (ME) – ITALY
01/10/2022 – 31/12/2022	Teaching in Data Mining & Analytics University of Messina – Messina – ITALY
17/05/2022 –07/06/2022	Teaching in Artificial Intelligence Liceo “Leonardo Da Vinci” – Floridia (Siracusa) - ITALY

01/09/2020 – up to present

Research activities affiliated with IRIB CNR of Messina (Certified on SIGLA)

- *Identification and evaluation of dysarthria in children with Ataxia by applying audio processing techniques and developing an innovative hierarchical machine learning model (HMLM) designed to automatically analyze speech impairments from audio recordings of structured speech disturbance tests.*
- *Analysis of cinematic data recorded during various motor tasks performed by patients with ataxia (Gait, Sitting, Stance, Finger Chase, Fast Hand) employing signal processing techniques to develop AI models for the assessment of ataxia severity.*
- *Automatic tracking of limbs movement in infants with ASD in free-moving conditions from video recordings using AI and extraction of kinematic parameters and features to characterize their general movements to facilitate early detection of neurodevelopmental disorders.*
- *Analysis of physiological parameters (such as heart-rate variability and GSR) collected using wearable sensors during robot-assisted therapies in order to assess the feasibility and efficacy of using a socially assistive robot in group-based cognitive behavioral therapy and to evaluate socio-emotional engagement during treatment.*
- *Exploration of social skills in children with autism by utilizing an eye-tracker to analyze their visual scanning patterns modeled using AI techniques and Markov chains .*
- *Development of an automatic digital coding approach based on a transformer architecture for the identification of specific deictic gestures from naturalistic videos of parent-child interactions.*
- *Assessment of motor skills to evaluate the ability of ASD children to express different "Vitality Forms" with their actions in different social contexts. AI is employed for video processing and to automatically extract kinematic features of the child's hand during task execution*

02/12/2019 – 31/07/2020

Computer System Validation Research & Support

Abbvie - Campoverde di Aprilia (LT) – ITALY

Research and Support at the CSV group in order to ensure that computer-based systems used in the manufacturing department, produce data that meet a set of defined requirements and to assume that they are consistently performing in the way they were intended.

EDUCATION

22/07/2019

Master's Degree in Biomedical Engineering

Politecnico di Torino

Thesis: "A skeletonization approach for the evaluation of vascular complexity using in-vitro phantoms and 3D LED-based photoacoustic images"

Design and fabrication of three vascular phantoms using Solidworks and the 3D printer MultiProjetMJP Plus. Images acquisition with a photoacoustic system (Prexion Corporation). Creation of an Automatic Segmentation algorithm for acquired images and volumes reconstruction of the three models. Skeleton extraction and processing. Calculation of different morphological and tortuosity parameters for the evaluation of vascular complexity using MATLAB and Excel.

Final grade 110/110 cum laude

23/03/2017

Bachelor's Degree in Biomedical Engineering

Politecnico di Torino

Thesis: Final test based on training

Creation of a Matlab algorithm for the analysis of fluorescent images of mouse cerebellum, manual segmentation of cellular clones and analysis of their distribution and features.

Final grade 101/110

01/07/2013 **High school diploma Maturità Scientifica**

Liceo Scientifico G. Seguenza (ME)

Final grade 100/100

**CERTIFIED RESEARCH
ACTIVITIES**

25/07/2022 - 29/07/2022
(duration 24 hours)

Lipari School on Computational Life Sciences (Artificial Intelligence in Biomedicine)

Università degli Studi di Catania

03/10/2016 - 16/12/2016
(duration 200 hours)

Internship: "Biomedical images segmentation"

Politecnico di Torino

Certificates obtained: skills declaration

**OTHER COLLABORATIONS
AND RESEARCH PROJECTS**

01/09/2019 - 10/09/2021

Insight in classification (CNNs)

In the field of Digital Pathology, in order to classify histological images of colon for the identification of lesions: Comparison among three different CNNs training strategies: full training from scratch, fine tuning and features extraction for classification with Support Vector Machine. Two different Convolutional Neural Networks (VGG16 and ResNet50) have been tested using Python, with different depth levels for transfer learning and different percentages of training set and validation set.

Politecnico di Torino

Segmentation of prostatic glands

Creation of a MATLAB automatic algorithm for the segmentation of prostatic glands, using K-means method for the identification of different clusters in the images and morphological operators for the processing. Calculation of statistical indexes for the validation of the algorithm by means of comparison to the gold standard.

Politecnico di Torino

Respiratory frequency measurement device NTC-based

Design and realization in a perforated breadboard, of a respiratory frequency measurement device based on temperature variations of exhaled air compared to room temperature, using an NTC thermistor and programming a microcontroller (AVR ATmega8) in Assembly.

Politecnico di Torino

OTHER ACTIVITIES

09/09/2022 - 10/09/2022
(duration 16 hours)

Training Course on Occupational Safety – High Risk

INFORMA Institute

PERSONAL SKILLS

Mother tongue Italian

Other languages

UNDERSTANDING		SPEAKING		WRITING
Listening	Reading	Spoken interaction	Spoken production	
English C1	C1	C1	C1	C1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
Common European Framework of Reference for Languages

Language certificates

2014 IELTS 6.5 British Council
2012 Trinity Level 1 Certificate in ESOL International (Speaking and Listening): C1 with Merit
2011 CAMBRIDGE ESOL ENTRY LEVEL CERTIFICATE IN ESOL INTERNATIONAL: B1

Computer skills

SELF-ASSESSMENT				
Information Elaboration	Communication	Content creation	Security	Problem solving
Advanced user	Advanced user	Advanced user	Advanced user	Advanced user

Levels: Basic user – Intermediate user – Advanced user
Computer skills – self-assessment form

OPERATING SYSTEM MICROSOFT WINDOWS: Knowledge level advanced.
ANDROID: Knowledge level advanced.
MacOs: Knowledge level advanced.

PROGRAMMING LANGUAGE/CODE C: Knowledge level advanced.
Python: Knowledge level advanced.
Assembly: level intermediate.

PROGRAMS/SOFTWARE Matlab, Simulink, Code: Blocks, Windows Office, Solidworks, Atmel Studio, Anaconda Navigator, ImageJ, LabVIEW, R
advanced level

CAD Solidworks
good level

SPREADSHEET Matlab, Excel
advanced level

Professional qualification 2020: Qualification to practice as Industrial Engineer – Politecnico di Torino

Driving License B

OTHER INFORMATION

Advanced knowledge about GMP
Advanced knowledge about CFR 21 Part 11
Personal skills: teamwork, problem solving, respect of deadlines, autonomy.

PUBLICATIONS

H-Index: 4. [49 citations] Ref. Scopus updated 07 mar 2024

1. Tartarisco G.; Cicceri G; Bruschetta R; Tonacci A; Campisi S; Cerasa A; Distefano; S; Pellegrino A; Modesti PA; Pioggia G. An Intelligent Medical Cyber-Physical System to support Heart Valve Disease Screening and Diagnosis. *Journal of Expert Systems with Application* 2023
2. Murdaca, G., Banchemo, S., Casciaro, M., Paladin, F., Tafuro, M., Monacelli, F., Nencioni, A., Bruschetta, R., Pioggia, G., Tartarisco, G., Gangemi, S., 2023. Multiparametric Evaluation of Geriatric Patients Admitted to Intermediate Care: Impact on Geriatric Rehabilitation. *Diagnostics* 13, 2906.
3. Longo, U.G., Di Naro, C., Campisi, S., Casciaro, C., Bandini, B., Pareek, A., Bruschetta, R., Pioggia, G., Cerasa, A., Tartarisco, G., 2023. Application of Machine Learning Algorithms for Prognostic Assessment in Rotator Cuff Pathologies: A Clinical Data-Based Approach. *Diagnostics* 13, 2915.
4. Marino, F., Failla, C., Bruschetta, R., Vetrano, N., Scarcella, I., Doria, G., Chilà, P., Minutoli, R., Vagni, D., Tartarisco, G., Cerasa, A., Pioggia, G., 2023. TeleRehabilitation of Social-Pragmatic Skills in Children with Autism Spectrum Disorder: A Principal Component Analysis. *IJERPH*, 20, 3486.
5. Cerasa, A., Tartarisco, G., Bruschetta, R., Ciancarelli, I., Morone, G., Calabrò, R. S., Pioggia, G., Tonin, P., Iosa, M., 2022. Predicting Outcome in Patients with Brain Injury: Differences between Machine Learning versus Conventional Statistics. *Biomedicine* 10, 2267.
6. Failla, C., Marino, F., Bernardelli, L., Gaggioli, A., Doria, G., Chilà, P., Minutoli, R., Mangano, R., Torrisi, R., Tartarisco, G., Bruschetta, R., Arcuri, F., Cerasa, A., Pioggia, G., 2022. Mediating Mindfulness-Based Interventions with Virtual Reality in Non-Clinical Populations: The State-of-the-Art. *Healthcare*. 10, 1220
7. Pugliese, M.E., Battaglia, R., Raso, M.G., Chiaravallotti, R., Coschignano, F., Pagliuso, A., Bruschetta, R., Pugliese, G., Scola, P., Tonin, P., Cerasa, A., 2022. Heterologous COVID-19 Booster Vaccination in the Chronic Disorder of Consciousness: A Pilot Study. *Clin Pract.* 12, 318-325
8. Bruschetta, R., Maggio, M.G., Naro, A., Ciancarelli, I., Morone, G., Arcuri, F., Tonin, P., Tartarisco, G., Pioggia, G., Cerasa, A., Calabrò, R.S., 2022. Gender Influences Virtual Reality-Based Recovery of Cognitive Functions in Patients with Traumatic Brain Injury: A Secondary Analysis of a Randomized Clinical Trial. *Brain Sci.* 12, 491
9. Bruschetta, R., Tartarisco, G., Lucca, L.F., Leto, E., Ursino, M., Tonin, P., Pioggia, G., Cerasa, A., 2022. Predicting Outcome of Traumatic Brain Injury: Is Machine Learning the Best Way? *Biomedicine* 10, 686.
10. Pugliese, M.E., Battaglia, R., Cerasa, A., Raso, M.G., Coschignano, F., Pagliuso, A., Bruschetta, R., Pugliese, G., Scola, P., Tonin, P., 2021. Anti-SARS-CoV-2 S-RBD IgG Antibody Responses after COVID-19 mRNA Vaccine in the Chronic Disorder of Consciousness: A Pilot Study. *J. Clin. Med.* 10, 5830.
11. Tartarisco, G., Bruschetta, R., Summa, S., Ruta, L., Favetta, M., Busà, M., Romano, A., Castelli, E., Marino, F., Cerasa, A., Schirinzi, T., Petrarca, M., Bertini, E., Vasco, G., Pioggia, G., 2021. Artificial intelligence for dysarthria assessment in children with ataxia: a hierarchical approach. *IEEE Access* 1–1.

CONFERENCE PROCEEDINGS

12. Bruschetta, R., Campisi, S., Mastrogiuseppe, M., Leonardi, E., Aiello, S., Salvatore, C., Venturi, A., Schiavon, E., Campisi, A., Famà, F. I., Carrozza, C., Blandino, C., Marino, F., Cerasa, A., Capirci, O., Pioggia, G., Ruta, L., Tartarisco, G., 2023. A deep learning approach for automatic video coding of deictic gestures in children with autism', in 2023 International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME).
13. Tartarisco, G., Bruschetta, R., Marino, F., Capri, T., Minutoli, R., Chilà, P., Failla, C., Puglisi, A., Arnao, A. A., Cerasa, A., Pioggia, G., 2022. Exploring behavioural and physiological interactions in a group-based emotional skill social robotic training for autism spectrum disorders', in 2022 International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME), 1–4.

**ORAL PRESENTATIONS
INTERNATIONAL
CONFERENCES**

- Speaker in ICECCME 2023: The International Conference on Electrical, Computer, Communications and Mechatronics Engineering – Maldives National University
- Speaker in ICECCME 2022: The International Conference on Electrical, Computer, Communications and Mechatronics Engineering – Maldives National University
- Speaker in AISC 2022: The Affective Turn in Cognitive Science – University of Parma
- INSAR (International Society for Autism Research) 2023 Annual Meeting: May 3-6, Stockholm, Sweden