

UNA PALE

“Electrical engineer and data scientist in the healthcare domain, passionate about open science, science policy, and impactful projects.”

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Date and place of birth: **1992, Croatia**

ACADEMIC EDUCATION

- 04/2024 - Present **Data scientist** at the Neurointensive care unit of University Hospital of Zurich and **postdoctoral researcher** at University of Zurich
- 07/2023 – 10/2023 **Postdoctoral researcher** at [Embedded Systems Lab](#) at EPFL, Lausanne, Switzerland
- 02/2018 – 07/2023 **PhD student in electrical engineering/neuroscience**
UP Hummel and Embedded Systems Lab at École Polytechnique Fédérale de Lausanne, Switzerland
- 09/2014 – 09/2016 **Master of Science in Electrical Engineering and Information Technology**
Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia (GPA: 4.8/ 5.0)
- 09/2015 – 03/2016 **Erasmus exchange**
at Master program Biomedical Engineering, Technical University of Vienna, Austria
- 09/2011 – 07/2014 **Bachelor of Science in Electrical Engineering and Information Technology**
Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia (GPA: 4.7/ 5.0)

WORK EXPERIENCE

- 12/2018 – Present **[NGO Penkala](#) – Croatian Association of Young Scientists**
Board member, project leader and manager
Leading the association, funding applications, and deciding on the main plans, activities, and future directions. Working on building a Croatian scientific network and providing additional soft skills education for Croatian scientists.
- 02/2017 – 06/2017 **Development engineer**
UMO neuroscience j.d.o.o, Zagreb, Croatia
Working on a patent for an algorithm for automatic detection of Cz electrode on a neurofeedback headset, which was developed within the company.
- 07/2015 – 09/2015 **Summer intern**
Robert Bosch GmbH, Robert Bosch Research Center Renningen, Stuttgart, Germany
Programming Fanuc robot and industrial cameras for automatic video inspection of products.

PROJECTS

Non-scientific projects:

- [“Science and Policy Summer School”](#), 2022 - 2023
- [Map of Croatian Scientists](#), 2023 - Present
- [“Istražilica”](#), 2022 - Present
- [Podcast “Slušalica”](#), 2018 - Present
- International competition IYNT, 2014-2018
- “Youth Research Center” NGO, 2012 - 2016
- Initiator and co-organizer of PhD summer school funded by EPFL/ETHZ, <https://scienceandpolicy2023.epfl.ch/>
- Initiator and coordinator of web platform aimed at mapping Croatian scientists world-wide, project in the scope of NGO Penkala
- Initiator and coordinator of web platform for scientific opportunities for young Croatian scientists, project in the scope of NFO Penkala
- Initiator of the first Croatian scientific podcast, host of many episodes, available on YouTube, Spotify and Google Podcasts
- Co-organizing Croatian selection for the International Young Naturalists’ Tournament, helping students in solving scientific problems and preparation for the competition
- Leading student organization, ensuring funding, organizing workshops and competitions

Scientific projects:

- *Innosuisse project: VentAI - Ventilatory decision support system for acute respiratory failure*
04/2024 - present Time series prediction for ARDS prediction and clinical decision support and ventilatory setup based on causal learning
- *Project - Open science practices and perception by young Croatian researchers*
09/2023 - present Investigating knowledge, perception, practices and needs of young researchers related to open science in Croatia.
- *Project - Benchmarks for epilepsy detection machine learning algorithms*
03/2023 - present Web platform, methodological setup and technical support for fair comparison of machine learning algorithms for epilepsy detection from EEG data. Funded by ETH Domain Open Research Data Program (Contribute projects), project name: Boost4Epilepsy.
- *PhD thesis - Hyperdimensional computing for epilepsy detection from EEG signals*
09/2019 – 06/2023 Designing new approaches for hyperdimensional computing for improving epileptic seizure detection from EEG signals, with the ultimate goal of implementation on wearable devices. Co-supervision of several students in the scope of this project.
- *Project - Impedance cardiography delineation tool and database*
09/2020 – 04/2021 Bio-signal processing and delineation of marker points for extraction of various features for hemodynamic monitoring from impedance cardiography signals. Co-supervision of student on this project.
- *Project - Multimodal wearable device for workload detection: MBioTracker*
11/2019 – 04/2021 Designing and implementing signal processing for multiple biosignals (ECG, RSP, SKT, PPG) as well as SVM prediction model on wearable device for stress and mental workload level detection.
- *Project - Development of visual tracking tool of EEG headcap*
11/2018 – 11/2019 In the scope of a project for home based tDSC treatment for epilepsy, I developed image analysis-based tracking and navigation for positioning correctly an EEG headcap with integrated tDCS electrodes.
- *Project- Muscle synergies for motor recovery quantization*
11/2018 – 11/2019 Using EMG data from wearable device for quantifying motor state based on several different movements. Quantifying inter- and intra-session variability of muscle synergies.
- *Project - Development of software tools for TMS data analysis*
02/2018 – 10/2019 Motor evoked potential analysis, signal processing and delineation of important features for classification of TMS response.
- *Project - Nadi shodana breathing technique's influence on autonomic nervous system*
09/2016 – 08/2017 Research on how the "Nadi shodana" yoga breathing technique effects autonomic nervous system, conducted at the University Hospital Centre in Zagreb, Croatia.
- *MSc thesis - Electromyographic biofeedback system*
03/2016 – 09/2016 Design, construction and testing of a compact-size, wireless (BLE) and surface EMG measurement system for physiotherapy, with developed Android application (Java) for user interface.
- *Graduate project - Contactless assessment of HR using Eulerian video magnification*
09/2015 – 02/2016 Eulerian video magnification applied to video recordings of palpation sites of human for contactless Heart Rate (HR) and Pulse Transit Time (PTT) assessment. Project conducted at Technical University of Vienna, Austria.
- *Project - Heart rate variability analysis using wavelet transform*
09/2015 – 11/2016 Assessment of three methods of wavelet transform for Heart Rate Variability (HRV) extraction from HR signal. Project conducted at Technical University of Vienna, Austria.

SCIENTIFIC PAPERS AND CONFERENCES

10 most recent publications are below, while all publications can be found on [Google scholar](#) or on my [ORCID](#) account.

- R. Erlebach, U. Pale, M. Seric, S. Markovic, T. Beck E. Keller: *“Limitations of the SpO2/FiO2-Ratio to classify and monitor Acute Respiratory Distress Syndrome”*, DIVI congress, 2024
- J. Dan, U. Pale, A. Amirshahi, W. Cappelletti, T.M. Ingolfsson, X. Wang, A. Cossettini, A. Bernini, L. Benini, S. Beniczky, D. Atienza, P. Ryvlin: *“SzCORE: Seizure Community Open-Source Research Evaluation framework for the validation of electroencephalography-based automated seizure detection algorithms”*, Epilepsia, 2024, DOI: 10.1111/epi.18113
- U. Pale, L. Savić, F. Novkoski: *“Strengthening Croatian-UK Research Ties through Network, Collaborations and Initiatives for Scientific Diaspora”*, OSF preprint, submitted to JSPG, 2023, DOI: 10.31219/osf.io/y592t
- U. Pale, PhD Thesis: *“Hyperdimensional computing for biosignal monitoring: Applications for epilepsy detection”*, 2023, Infoscience EPFL
- VP. Kumaravel, U. Pale, T. Teijeiro, E. Farella, D. Atienza, *“Knowledge Distillation-based Channel Reduction for Wearable EEG Applications”*, arXiv, submitted to JBHI Journal, 2023, DOI: 10.36227/techrxiv.22651156.v1
- U. Pale, T. Teijeiro, S. Rheims, P. Ryvlin, and D. Atienza, *“Combining General and Personalized Models for Epilepsy Detection with Hyperdimensional Computing”*, Artificial Intelligence in Medicine, Journal, 2023, DOI: 10.1016/j.artmed.2023.102754
- U. Pale, T. Teijeiro, and D. Atienza, *“Importance of methodological choices in data manipulation for validating epileptic seizure detection models”*, EMBC Conference, 2023, DOI: 10.1109/embc40787.2023.10340493
- U. Pale, T. Teijeiro, and D. Atienza, *“ExG Signal Feature Selection Using Hyperdimensional Computing Encoding”*, BIBM Conference, 2022, DOI: 10.1109/BIBM55620.2022.9995107
- R. Zanetti, U. Pale, T. Teijeiro, and D. Atienza, *“Approximate zero-crossing: a new interpretable, highly discriminative and low-complexity feature for EEG and iEEG seizure detection”*, Journal of Neural Engineering, 2022, DOI: 10.1088/1741-2552/aca1e4
- W. Simon, U. Pale, T. Teijeiro, and D. Atienza, *“HDTorch: Accelerating Hyperdimensional Computing with GP-GPUs for Design Space Exploration”*, ICCAD Conference, 2022, DOI: 10.1145/3508352.354947

HONOURS AND AWARDS

- Gold medal in 9th *“International Exhibition of Inventions”* (Kunshan, China) 2016 and Silver medal in 14th *“International Innovation Exhibition”* (Zagreb, Croatia) 2016 with *“Personal electromyographic biofeedback system - MyMyo”*
- *Rector's Award, 2015* - for work on project titled *“Audio phonebook for the blind people”*
- BEST Engineering Competition (Team Design category), 2013 - European competition in designing and constructing a prototype which fulfills task's requirements within a limited amount of time and material. Won 6. place in finals.
- *Dean's Award “Josip Lončar”*, 2012 - for outstanding performance in the 2nd year of undergraduate, University of Zagreb
- Scholarships
 - The *“City of Zagreb”* University Scholarship (2013 – 2016)
 - *“Internship Programme of German Business for the Countries of the Western Balkans”* foundation scholarship (2015)
 - *“DAAD”* scholarship for German language summer course (2014)
 - The *“City of Zagreb”* High School Scholarship (2009 – 2013)
- International Young Physicists Tournament (IYPT), Teheran, Iran, 2011, bronze medal
- International Young Physicists Tournament (IYPT), Vienna, Austria, 2010, bronze medal

TEACHING EXPERIENCE

- 02/2018 – 07/2024 Mentoring bachelor and master students as well as teaching assistant at the EPFL, Lausanne
- 07/2013 Workshop leader at “Summer Science Factory”, 2013, Croatia
- 09/2012 – 09/2014 Student assistant for various courses at the Faculty of electrical engineering and computing, University of Zagreb, Croatia
- 07/2012 Workshop leader at “Summer School of Science S3 + +” 2012, Croatia

ADDITIONAL EDUCATION AND COURSES

- 09/2022 – 01/2023 **Innosuisse Startup Training**
Business Concept training at EPFL Innovation Park
- 2019 - 2023 **French language course, EPFL, B1-2**
- 08/2014 **German language course, B1-2**
German Courses Passau, Passau, Germany
- 09/2000 – 07/2012 **Music school**
Music High School “Vatroslav Lisinski” - instrument Harp and Clarinet
Music Primary School “Ivan Zajc” – instrument Piano (2000 – 2007)

PERSONAL SKILLS

- Job-related skills
- Strong advocate for open science and data and code sharing
 - Versatility, persistence, attention to details, reliability and curiosity for research
 - Ability to work in multicultural environments, challenging social situations etc.
 - Experience in project management and leadership through work in Croatian Young Scientists student association “Penkala” (2018 – present) and on organization of EPFL-ETHZ funded “Science and Policy Summer School”, 2023
 - Organizational skills through leading of “Youth research center” student organization (2012-2016), and Croatian selection for International Young Naturalists’ Tournament (2014 – 2018) as well as many events in scope of “Penkala”
 - Language knowledge: English C1, German B2, French B1-2
- Computer skills
- Extensive knowledge and experience with: Python, Matlab, C, Solidworks, Altium
 - Extensive experience with various machine learning algorithms especially hyperdimensional computing
 - Solid grasp of signal and image processing algorithms, especially biomedical signals
 - Intermediary knowledge of: Java and Android Studio, C++
 - Multitude of projects with microcontrollers programming and PCB design (Arduino, MSP430, Stellaris...)
 - Growing experience in website development, podcasts recording and video processing
- Hobbies
- Outdoor oriented person: climbing, hiking, ski touring
 - Musically oriented childhood playing piano, clarinet and harp
 - Photography, painting and DIY things