

Emir Sokic

Curriculum Vitae

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Personal Data

Place and Date of Birth: Bosnia and Herzegovina, Visoko | 10 February 1985

Education

- 2012–2015 **Doctor of Philosophy (PhD) - 3 years programme, Electrical Engineering**, *University of Sarajevo*, Faculty of Electrical Engineering, Department of Automatic Control and Electronics, *GPA – 10.0 of 10.0*.
Research area: Signal/image processing and image retrieval
- 2008–2011 **Master of Science (Mr.sci.) - 2 years programme, Electrical Engineering**, *University of Sarajevo*, Faculty of Electrical Engineering, Department of Automatic Control and Electronics, *GPA – 10.0 of 10.0*.
Graduated first in class, Best student award; Thesis research area: Signal processing and modelling
- 2003–2008 **Diploma Engineer (dipl.el.ing.) - 5 years programme, Electrical Engineering**, *University of Sarajevo*, Faculty of Electrical Engineering, Department of Automatic Control and Electronics, *GPA – 9.86 of 10.0*.
Graduated first in class, Gold student award; Thesis research area: Image processing

Experience

Vocational

- 2021–present **Associate Professor**, FACULTY OF ELECTRICAL ENGINEERING, Department for Automatic Control and Electronics, Sarajevo.
Currently responsible the following courses: Signal Theory, Signals and Systems, Signals and Systems II, Introduction to digital image processing
- 2016–2021 **Assistant Professor**, FACULTY OF ELECTRICAL ENGINEERING, Department for Automatic Control and Electronics, Sarajevo.
Was responsible the following courses: Signal Theory, Signals and Systems, Logical Systems Design, Design of Microprocessor Based Systems, Electronics TK2
- 2011–2016 **Senior Teaching and Research Assistant**, FACULTY OF ELECTRICAL ENGINEERING, Department for Automatic Control and Electronics, Sarajevo.
Organized tutorials and laboratory exercises mostly in the following courses: Signal Theory, Signal and System Analysis, Digital Control Systems, Embedded Systems.

- 2008–2011 **Teaching and Research Assistant**, FACULTY OF ELECTRICAL ENGINEERING, Department for Automatic Control and Electronics, Sarajevo.
Organized tutorials and laboratory exercises mostly in the following courses: Signal Theory, Signal and System Analysis, Digital Control Systems, Electronic Elements and Circuits, Lab Work in Automatics and Informatics, Lab Work in Electrical Engineering and Electronics, Robotics 1, Introduction to Control Systems, Digital Signal Processing, Microelectronic Components and Structures.
- [Additional professional engagement](#)
- 2021–Present **Founder and CEO of PixelmatIQ - part time.**
Start-up for engineering solutions in area of machine vision and special measurements in industry.
- [Consulting and research](#)
- 2013–Present **Consultant and Researcher at EnergoBos ILJIN Sarajevo - part time.**
Working as part of the EnergoBos ILJIN's team and responsible for activities related to electronics, data acquisition and measurement systems, control, image and video processing.
- 2024–Present **Consultant and Researcher at Chili.Chips*ba - part time.**
I work as part of Chili.Chips*ba's team, focusing on image processing activities, application project preparation, and project leadership responsibilities.

Background

- Mathematical competitions Throughout the elementary and high school, participated at more than 25 local, region, republic and international mathematical competitions. Some of the best results achieved: Honorable mention on IMO 2003 and Silver medal on the MMO 2003.
- Best student awards "Best student award" awarded for elementary and high school. Moreover, a "Most Valuable Student Award" for each year of Undergraduate studies and a "Golden Ring Award" on graduation. Graduated first on almost every level of education.
- Memberships Multiple times elected as a Member of Ethical Committee, Faculty of Electrical Engineering Sarajevo. Was also a Representative member of teaching assistants of the Department for Automatic Control and Electronics at the same Faculty. Member of IEEE since 2004., when he joined as student member, and Cigre B&H since 2019.

Publications

- Papers Authored more than 40 papers in international journals and conferences. His research interests and publications generally fall within the following categories: Signal processing and data acquisition, Image processing and retrieval, Automatic control and electronics and medical image processing.
- Books Published one book "Embedded systems - hardware aspects", co-authored with dr. Samim Konjicija.

Editors Editor of the Special issue of the Journal "B&H Electrical Engineering" entitled "Research trends in interrupting and switching in HV and MV switchgear", published by the Committee for Bosnia and Herzegovina International Council on Large Electric Systems - CIGRE in 2021.

Technical/Engineering skills and technologies

Basic FPGA
Intermediate 3D modeling, Robotics
Advanced Data acquisition, PCB design and layout, MCU, Industrial automation, Signal/Image processing, Research
Expert Electronic components and structures, Sensors, Machine Vision, Teaching

Computer skills

Basic Mathcad, HTML
Intermediate Python, QT, SoMachine, Fusion 360, OnShape, LPCXpresso, Altium, EPlan, NI LABView, Microchip/ATMEL Assembler, \LaTeX , OpenOffice and MS Office, Ubuntu Linux, Microsoft Windows
Advanced OpenCV, mBed, C, C++, Eagle PCB, SoMachine, MATLAB

Communication Skills

2008-Present Numerous oral presentations at international scientific conferences
2004-Present Experience in teaching, tutoring, writing instruction materials - always graded excellent in student polls

Languages

Bosnian Mothertongue
English Advanced *Conversationally fluent*
Italian Basic *Good understanding and reading*

Interests

- Signal (image) processing
- Research
- Electronics/Design
- Industrial automation
- Data acquisition
- Mechatronic structures
- Embedded systems
- Teaching

Scientific projects

2023 Voditelj projekta - Project leader. "Automated visual inspection based on deep neural networks", Funded by: Federal Ministry of Science and Education/ "Automatizirana vizuelna inspekcija zasnovana na dubokim neuronskim mrežama", Finansijer: Federalno ministarstvo obrazovanja i nauke, (dec. 2023 - dec. 2024.))

- 2023 Konsultant/Istraživač - Consultant/Researcher. "Unapređenje LP (Linear Puffer) prekidača uključujući i razvoj pogonskog mehanizma sa povećanom energijom"/"Upgrade of LP (Linear Puffer) to a Fault Interrupter and Development of a Higher-Energy Operating Mechanism", Funded by/Finansijer: EnergoBos ILJIN doo Sarajevo/G&W Electric Co. Bolingbrook, USA, (jan. 2023 - dec. 2023.))
- 2022 Konsultant/Istraživač - Consultant/Researcher. "Priprema za ispitivanja RP (Rotacioni Puffer) i LP (Linearni Puffer) sklopki i prekidača sa SF6 i alternativnim gasovima u LVS (Laboratorijama Velike Snage)/Preparation for Power Testing of RP (Rotary Puffer) and LP (Linear Puffer) Switches and Fault Interrupters with SF6 and Alternative Gases", Funded by/Finansijer: EnergoBos ILJIN doo Sarajevo/G&W Electric Co. Bolingbrook, USA, (jan. 2022 - dec. 2022.))
- 2021 Konsultant/Istraživač - Consultant/Researcher. "Mjerenja i testiranja G&W 24kV sklopke tipa LBS sa ciljem poboljšanja performansi i smanjenja proizvodnih troškova/Measuring and Testing G&W 24kV LBS Switch for Performance Improvement and Cost Reduction", Funded by/Finansijer: EnergoBos ILJIN doo Sarajevo/G&W Electric Co. Bolingbrook, USA, (jan. 2021 - dec. 2021.))
- 2020 Researcher/Istraživač. "Projekat tipskih elektro-ispitivanja na sterilizacijskim lampama modela UV-DE15 i UV-DE30, svjetiljkom sa UVC zračenjem"/ Electrical testing of sterilization lamps UC-DE15 and UV-DE30, Funded by/Finansijer: Safety Quality Systems - SQS d.o.o. Sarajevo (jul. 2020 - okt- 2020)
- 2019 Researcher/Teacher - Istraživač/Nastavnik. Teaching Mobility - Projekat mobilnosti Erasmus + Mare Nostrum, University of Algarve, Faro, Portugal, apr. 2019.
- 2018-2019 Researcher/Spoljni saradnik. "EnviBreak - Alternative Concepts for Environmentally Compatible Gas Circuit Breakers - podrška pripremi projekta", Finansijer: Ministarstvo civilnih poslova BiH (aug. 2018 - jul. 2019)
- 2018 Researcher/Saradnik. "Projekat vještačenja mjerenja brzine prenosa i konfiguracije GAMA stanice" Finansijer: Općinski sud u Sarajevu (sept. 2018 - nov. 2018)
- 2017-2018 Researcher/Spoljni saradnik. "EnviBreak - Alternative Concepts for Environmentally Compatible Gas Circuit Breakers - podrška pripremi projekta", Finansijer: Ministarstvo civilnih poslova BiH (jul. 2017 - jun. 2018)
- 2014-2016 Researcher/Istraživač. "Formiranje hibridnog 2D prikaza okoline korištenjem ultrazvučnih akustičnih odziva". Finansijer: Federalno ministarstvo obrazovanja i nauke
- 2014.-2015. Researcher/Istraživač. "Cloud Orchestrion and Unified Deployment of Services - CLOUDS" Finansijer: Vijeće Ministara BiH, grant "Programi za pripremu projekata i potencijalnih kandidata za sredstva iz fonda EU-FP7"

Industrial/Commercial projects /partial list/

**Industrial
Automation**

- 2022-2023 LEDLab - Design and development of an unsupervised automatic measurement and control system for performing "LED diode accelerated aging tests", *Client: "Provis Graphic", Visoko, BiH*
- 2023 Control box for manipulating MV/HV circuit breakers, *Client: "EnergoBos ILJIN", Sarajevo, BiH, "G&W Electric", Bolingbrook, USA*
- 2021 Conceptual solution of stone polishing machine upgrade for automatic contour detection and machine head trajectory planning - *Client: "Duno Lit & Marbo Stone", Lug Kiseljak, BiH*
- 2021 Conceptual solution of high resolution stone sheet scanning machine - *Client: "Duno Lit & Marbo Stone", Lug Kiseljak, BiH*
- 2014-... Lab measurement system for testing of MV/HV circuit breakers, *Client: "EnergoBos ILJIN", Sarajevo, BiH*
- 2012 System for testing the leakage of household radiators - *Client: "Metal AS", Visoko, BiH*
- 2012 Automatic control of the wire-feed for welding line - *Client: "Metal AS", Visoko, BiH*
- 2011 Automatization of the machine for structure testing of concrete samples - *Client: "Traffic Institute of Faculty of Civil Engineering", Sarajevo, BiH*

MCU/PCB design

- 2022 Custom PCBs for LED accelerated aging tests, *Client: "Provis Graphic", Visoko, BiH*
- 2020 Design and development of a distributed acquisition system and implantable pressure sensor", *Client: "EnergoBos ILJIN", Sarajevo, BiH*
- 2020 Development of a Wi-Fi based car gate remote control and supervision system - *Private client, BiH*
- 2015 Development of an implantable pressure sensor for HV CB applications, *Client: "EnergoBos ILJIN" Sarajevo, BiH*
- 2012 Custom function generator for potential experimental medical applications, *Client: private client, France*
- 2013 PCB development for smart ship instrument - *Client: "ELREG doo", Sarajevo, BiH*

Algorithms and software

- 2023-2024 "LED Data Processor" - Software solution for modeling LED diodes and predicting their lifetime based on LED accelerated aging tests, *Client: "Provis Graphic", Visoko, BiH*
- 2021 Algorithmic solution for automated positioning, connecting, orienting, and routing of embedded LED diodes for LED-based signs, *Client: "Provis Graphic", Visoko, BiH*

- 2021 Sensor selection and signal postprocessing for pressure measurement during no-load and on-load testing of MV CB - *Client: "G&W Electric", Bolingbrook, USA*
- 2017 Automatic testing of the system for speech recognition based on Pocketsphinx library - *Client: "Microwee", Sarajevo, BiH*
- 2015 Computer Based Assessment of Cervical Vertebral Maturation Stages Using Digital Lateral Cephalograms - *In collaboration with: "Department of Orthodontics, Faculty of Dentistry with Clinics University of Sarajevo", Sarajevo, BiH*

Publications

Journals

- [1] Ahmic-Beganovic N, Sokic E, Salihbegovic A, Osmic N. "Method for noninvasive HV/MV switchgear motion analysis using kernel-based algorithm with adaptive feature extraction". *Journal of Engineering Research*. 2024 Jul 10.
- [2] M. O Touhami, E. Sokic, A. Smajkić, A. Laso, N. Uzelac. "Data acquisition and simulation software as tools for medium voltage switchgear assessment and optimization". *B&H Electrical Engineering*, Vol. 15, Special Issue, pp. 89-97, 2021.
- [3] Emir Sokic, Almir Salihbegovic, Samim Konjicija. "A comprehensive study of shape orientation methods for extraction of phase preserving Fourier descriptors". *B&H Electrical Engineering*, Vol. 13, pp. 71-79, Dec. 2019.
- [4] Emir Sokic, Mahir Muratovic, Samim Konjicija, Amer Smajkic, Sead Delic. "Design development and implementation of a distributed measurement system for no-load pressure measurement in high voltage circuit breakers". *B&H Electrical Engineering*, Vol. 13, pp. 35-43, Dec. 2019.
- [5] Emir Sokic, Vedad Becirovic, Amer Smajkic, Dejan Beslija, Mahir Muratovic, Belma Bosovic, Mirsad Kapetanovic. "Design development and implementation of a pressure measurement sensory system for a high voltage circuit breaker model". *Bosanskohercegovačka Elektrotehnika*, Vol. 10, pp. 46-55, Dec. 2016.
- [6] Emir Sokic, Samim Konjicija. "Phase preserving Fourier descriptor for shape-based image retrieval". *Signal Processing: Image Communication*, Vol. 40, pp. 82-96, 2016.
- [7] Vildana Dzemic, Emir Sokic, Alisa Tiro, Enita Nakas. "Computer Based Assessment of Cervical Vertebral Maturation Stages Using Digital Lateral Cephalograms". *Acta Informatica Medica*, Vol. 23, No. 6, pp. 364-368, Dec. 2015.
- [8] Emir Sokic, Alisa Tiro, Elma Sokic-Begovic, Enita Nakas. "Semi-automatic Assessment of Cervical Vertebral Maturation Stages using Cephalograph Images and Centroid-based Clustering". *Acta Stomatologica Croatica*, Vol. 46, No. 4, pp. 280-290, Dec. 2012.

- [9] Gušić M, Sokić E. "Flexible and Transportable Illumination Control System for Machine Vision Applications". In: International Conference "New Technologies Development and Applications", pp. 58-65. Cham: Springer Nature Switzerland, 2024 Jun 20.

Conferences

- [10] Emir Sokic, Isam Vrce, Armin Zunic, Nedim Osmic, Almir Salihbegovic. "Automated Image Processing Approach for Solving Semi-apictorial 2D Puzzles". 66th International Symposium ELMAR, Zadar, Croatia, 2024 Sep 16-18.
- [11] Emir Sokic, Almir Salihbegovic, Nedim Osmic, Majda Curtic-Hodzic, Samim Konjicija. "ETFCam - a Multifunctional Didactic Model for Machine Vision and Automated Visual Inspection". 66th International Symposium ELMAR, Zadar, Croatia, 2024 Sep 16-18.
- [12] Faik Tahirovic, Almir Salihbegovic, Emir Sokic, Nedim Osmic. "Enhanced Robustness Properties and Tracking Performance of the Quadrotor Unmanned Aerial Vehicle under Disturbances via the Second Order Sliding Mode Control". 2024 10th International Conference on Control, Decision and Information Technologies (CoDIT), Valetta, Malta.
- [13] Armin Zunic, Emir Sokic, Nedim Osmic, Isam Vrce, Almir Salihbegovic. "Image Processing on the Edge using an Entry-Level FPGA". 66th International Symposium ELMAR, Zadar, Croatia, 2024 Sep 16-18.
- [14] Faik Tahirovic, Almir Salihbegovic, Emir Sokic, Nedim Osmic, Samim Konjicija. "Twisting sliding mode Control of a nonlinear quadrotor UAV under perturbations and disturbances". 66th International Symposium ELMAR, Zadar, Croatia, 2024 Sep 16-18.
- [15] Nedim Osmic, Tarik Cohadzic, Almir Salihbegovic, Emir Sokic. "Implementation of Discrete FPGA-Based PID Controller". 66th International Symposium ELMAR, Zadar, Croatia, 2024 Sep 16-18.
- [16] Almir Salihbegovic, Azra Talic, Nedim Osmic, Emir Sokic. "3D Trajectory Tracking of a Quad-Rotor Unmanned Aerial Vehicle via the First Order Sliding Mode Control". 2023 9th International Conference on Control, Decision and Information Technologies (CoDIT), Rome, Italy.
- [17] Almir Salihbegovic, Vedad Capin, Nedim Osmic, Emir Sokic. "Trajectory Tracking of the Octo-Rotor Unmanned Aerial Vehicle Exposed to Parametric Uncertainties and External Disturbances Using First Order Sliding Mode Control". In: 2023 XXXI International Conference on Information Communication and Automation Technologies (ICAT).
- [18] Ermin Omeragic, Emir Sokic. "Counting rectangular objects on conveyors using machine vision". 28th Telecommunications Forum (TELFOR), IEEE, Belgrade, 2020 Nov 24-25.
- [19] Emina Alihodzic, Emir Sokic. "Development of a Wi-Fi based car gate remote control and supervision system". 28th Telecommunications Forum (TELFOR), IEEE, Belgrade, 2020 Nov 24-25.

- [20] Mia Muminovic, Emir Sokic. "Automatic Segmentation and Classification of Resistors in Digital Images". In: 2019 XXVII International Conference on Information Communication and Automation Technologies (ICAT), pp. 1-6. IEEE, 2019.
- [21] Adnan Kreho, Jasmin Hadzajlic, Emir Sokic. "Design of Active Visual Marker for High Speed Object Tracking by Frame Subsampling". In: 2019 XXVII International Conference on Information Communication and Automation Technologies (ICAT), pp. 1-6. IEEE, 2019.
- [22] Delila Halac, Emir Sokic, Emir Turajlic. "Almonds classification using supervised learning methods". In: 2017 XXVI International Conference on Information Communication and Automation Technologies (ICAT), pp. 1-6. IEEE, 2017.
- [23] Emir Sokic, Kenan Softic, Mina Ferizbegovic, Jasmina Zubaca, Melita Ahic-Djokic. "A Hybrid Visualization of the Environment using Smart Ultrasound-based Sensor Arrays". 13th International Conference on Informatics in Control Automation and Robotics, pp. 573-578, Lisbon, Portugal, 2016.
- [24] Nermina Ahmic, Emir Sokic, Melita Ahic-Djokic. "Weighted-function based algorithm for retrieving handwriting trajectory from off-line data". In: 2016 XI International Symposium on Telecommunications (BIHTEL), pp. 1-6. IEEE, 2016.
- [25] Jasmina Zubaca, Mina Ferizbegovic, Kenan Softic, Emir Sokic, Melita Ahic-Djokic. "Design of a distributed ultrasound-based sensory system". In: XXV International Conference on Information communication and automation technologies (ICAT), Sarajevo, Bosnia and Herzegovina, 2015 Oct.
- [26] Almir Salihbegovic, Emir Sokic, Aida Salihbegovic, Mujo Hebibovic. "Synthesis of the integral sliding mode control and the robust internal-loop compensator for a class of nonlinear systems with matched uncertainties". In: XXV International Conference on Information communication and automation technologies (ICAT), Sarajevo, Bosnia and Herzegovina, 2015 Oct.
- [27] Emir Sokic, Mina Ferizbegovic, Jasmina Zubaca, Kenan Softic, Melita Ahic-Djokic. "Design of an ultrasound-based sensory system for environment inspection robots". In: Proceedings of the 58th International Symposium "Electronics in Marine", ELMAR, Zadar, Croatia, 2015 Sep.
- [28] Emir Sokic, Samim Konjicija. "Shape description using phase-preserving Fourier descriptor". In: Proceedings of the IEEE International Conference on Multimedia and Expo (ICME), Torino, Italy, 2015 Jul.
- [29] Emir Sokic, Delila Halac, Samim Konjicija. "Human-inspired shape-based image retrieval using weighted City-block distance and Fourier descriptors". In: Proceedings of the Human Memory-Inspired Multimedia Organization and Preservation Workshop (HMMP), Torino, Italy, 2015 Jul.
- [30] Emir Sokic, Samim Konjicija. "Novel Fourier Descriptor Based on Complex Coordinates Shape Signature". In: Proceedings of the 12th IEEE International Workshop on Content-Based Multimedia Indexing (CBMI), Klagenfurt, Austria, 2014 Jun.

- [31] Almir Salihbegovic, Emir Sokic, Nedim Osmic, Mujo Hebibovic. "High Performance Disturbance Observer based Control of the Nonlinear 2DOF Helicopter System". In: Proceedings of the XXIV IEEE International Conference on Information Communication and Automation Technologies (ICAT), Sarajevo, Bosnia and Herzegovina, 2013 Nov.
- [32] Senka Krivic, Admir Kaknjo, Muhidin Hujdur, Nadir Zubovic, Emir Sokic. "Haptic Paddle and Fuzzy Based Virtual Environment Model Control System as a Didactic Tool". In: Proceedings of the 9th France-Japan and 7th Europe-Asia Congress on Mechatronics (REM) and 13th Int'l Workshop on Research and Education in Mechatronics (MECATRONICS), Paris, France, 2012 Nov.
- [33] Almir Salihbegovic, Emir Sokic, Aida Salihbegovic, Mujo Hebibovic. "Reducing Off-road Vehicle Seat Vibrations Using Hydraulic Piston and Fuzzy Logic Controller". In: Proceedings of the IEEE International Symposium "Electronics in Marine", ELMAR, Zadar, Croatia, 2012 Sep.
- [34] Emir Sokic, Melita Ahic-Djokic, Almir Salihbegovic. "Analysis of Off-line Handwritten Text Samples of Different Gender using Shape Descriptors". In: Proceedings of the 11th IEEE International Symposium BIHTEL, Sarajevo, Bosnia and Herzegovina, 2012 Oct.
- [35] Emir Sokic, Melita Ahic-Djokic, Almir Salihbegovic. "Understanding Signal Theory through Play". In: Proceedings of the 34th IEEE International Convention MIPRO, Opatija, Croatia, 2011 May.
- [36] Emir Sokic, Samim Konjicija, Melita Ahic-Djokic, Almir Salihbegovic. "Stability Issues in Discretization of Wave Equation". In: Proceedings of the 18th IEEE International Conference on Systems, Signals and Image Processing (IWSSIP), Sarajevo, Bosnia and Herzegovina, 2011 Jun.
- [37] Emir Sokic, Melita Ahic-Djokic, Samim Konjicija. "Sound Field simulation and analysis using wave equation and finite differences method". In: Proceedings of the IEEE International Symposium "Electronics in Marine", ELMAR, Zadar, Croatia, 2010 Sep.
- [38] Emir Sokic, Melita Ahic-Djokic. "Simple Computer Vision System for Chess Playing Robot Manipulator as a Project-Based Learning Example". In: Proceedings of the IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), Sarajevo, Bosnia and Herzegovina, 2008 Dec.
- [39] Alisa Tiro, Emir Sokic, Vildana Dzemic, Lejla Redzepagic-Vrazalica, Enita Nakas. "Can Computer predict Cervical Vertebral Maturation Stages?". 88th EOS Congress, Santiago de Compostela, Spain, 2012 Jun.
- [40] Vedad Becirovic, Dejan Beslija, Amer Smajkic, Emir Sokic, Mirsad Kapetanovic. "System for simultaneous measurement of multiple travel records in a high voltage circuit breaker kinematic chain". 12. Savjetovanje Bosanskohercegovačkog komiteta CIGRE, Neum, Bosnia and Herzegovina, 2015 Oct.
- [41] Emir Sokic, Melita Ahic-Djokic. "Jednostavan sistem računarske vizije za implementaciju na robotskom manipulatoru kao primjer za projektno bazirano učenje". VII International Symposium BIHTEL, Sarajevo, Bosnia and Herzegovina, 2008 Nov.

Books

- [42] Samim Konjicija i Emir Sokić, "Ugradbeni sistemi: Hardverski aspekti", Elektrotehnički fakultet Univerziteta u Sarajevu, 2019, ISBN 978-9958-629-77-8

A handwritten signature in dark ink, appearing to read "Sokić", is located in the upper right quadrant of the page. The signature is fluid and cursive, with a prominent flourish at the end.