

Oleksandr Bilokon

PhD Computer Science

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Scientific interests

Mathematical methods of artificial intelligence, research into artificial neural networks and their architectures. Computer vision algorithms for robotic applications. Robotic automation of machine tools and equipment, wheeled robotics, medical and surgical robotics, automation of CAD systems, and intelligent mechatronic systems.

My research focuses on the study of mathematical computational models based on artificial intelligence and artificial neural networks, applied geometry and engineering graphics, theory of machines and mechanisms, machine parts. I also research algorithms for motion planning, control and navigation, SLAM, artificial intelligence and machine learning methods, as well as theoretical foundations of computer science, in particular formal models and the theory of automata, for autonomous robotic systems and their computational modeling.

The engineering aspect of research and development includes the design of neural network architectures, testing and deployment on various computing capacities, mainly microprocessor systems. Also engineering developments and computer design of hardware developments for robotic systems, development of CAD models and technical documentation, in particular 2D drawings and 3D models for prototyping and integration of complex systems.

The goal is to create reliable, scalable and reproducible solutions for both software and computing implementation and hardware devices for robotic solutions in applied robotics developments.

Education

Doctor of Philosophy in Computer Science (PhD), 2018–2024

V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine

Kyiv, Ukraine

Dissertation: «Neural network models and methods for amplification finite state machine for tasks of traversing mazes»

Master of Business Administration (Marketing Management) MBA, 2006–2008

Kyiv National University of Trade and Economics

Kyiv, Ukraine

Mechanical engineer (specialist), 2004–2005

Kyiv National University of Building and Architecture

Kyiv, Ukraine

Bachelor of Engineering Mechanics, 2000–2004

Kyiv National University of Building and Architecture

Kyiv, Ukraine

Publications

Articles in scientific journals:

- Bilokon Oleksandr Features of Mobile Robot Trajectory Detection and Assessment Science and technology today, Issue №12(26) 2023 P.672-688.
[https://doi.org/10.52058/2786-6025-2023-12\(26\)-672-688](https://doi.org/10.52058/2786-6025-2023-12(26)-672-688)
- Bilokon Oleksandr Review and Analysis of the Development of Artificial Neural Networks Cybernetics and Computer Technologies. 2023. 3 P.68-80.
<https://doi.org/10.34229/2707-451X.23.3.6>
- Bilokon Oleksandr Software Architecture of Navigation Systems for Control Modules of Robotics Electronic Modeling. 2023. V. 45. № 5, P. 103—112.
<https://doi.org/10.15407/emodel.45.05.103>
- Bilokon Oleksandr Review and Analysis of Small Mobile Robots With Intelligent Behavior Science and technology today, Issue №11(25) 2023 P.631-647.
[https://doi.org/10.52058/2786-6025-2023-11\(25\)-630-646](https://doi.org/10.52058/2786-6025-2023-11(25)-630-646)
- Bilokon Oleksandr Application of deep learning technology for creating intellectual autonomous machines Problems of Programming №2-3 2020 p. 407-418.
DOI:10.15407/pp2020.02-03.407

Conferences:

- O. Bilokon, O. Dudnik, D. Chechotkin, I. Denkov. An iterative algorithm for determining the temporal characteristics of solar X-ray flares for the automated formation of a data set in machine learning systems. The European Geophysical Union General Assembly 2024.
<https://doi.org/10.5194/egusphere-egu24-6670>
- D. Chechotkin, O. Yakovlev, O. Bilokon. Detection of a corotating interaction region in solar wind using RPW and SWA instruments of the Solar Orbiter mission. The European Geophysical Union General Assembly 2024.
<https://doi.org/10.5194/egusphere-egu24-3926>
- O. Bilokon, O. Dudnik, O. Yakovlev, D. Chechotkin. Determination of the characteristics of solar X-ray flares as sources of CME and interplanetary shock waves. IAU Symposium 388 “Solar & Stellar Coronal Mass Ejections”. P. 25.
DOI:10.13140/RG.2.2.10569.35683
- O. Bilokon, O. Dudnik. An iterative algorithm for machine analysis of temporal structures and clustering of X-ray flare variations. The third STIX meeting, Paris, 3-6 June 2024. Abstracts, P. 7.
Abstract booklet
- O. Bilokon Comparative analysis of pulsations at various phases of flare by thermal and non-thermal radiation of plasma. Gamow International Astronomical Conference “Astronomy and Beyond: Astrophysics, Cosmology and Gravitation, Astroparticle Physics, Radioastronomy, Astrobiology and Genetics”, 19-23 August 2024, Odesa, Ukraine. Book of Abstracts, P. 53.
Abstract booklet
- O. Bilokon, I. Denkov. Neural network models for processing intensity profile from STIX data for approximation and forecasting problems. American Geophysical Union

Annual Meeting, 9-13 December 2024, Washington, USA. SH01-11.
Poster

- Bilokon Oleksandr Mobile Robot Navigation System Based on A*(Star) Algorithm
Conference materials Information technologies and computer modeling ITCM-2020
P. 10-13.
<https://journal.comp-sc.if.ua/test/index.php/ITCM/article/view/472>
- Bilokon Oleksandr Status and prospects for the development of disinfection robotic systems: Ideas of academician V.M. Glushkov and current problems of piece intelligence
Proceedings of the VIII All-Ukrainian scientific and practical conference “Glushkov’s readings” 2019 P. 16-19.
<https://ru.calameo.com/read/00316837275adb75eb95b>
- Bilokon Oleksandr Assessment of Machine Learning Algorithms: Performance and Design Features (Logistic Regression and Naive Bayes Classifier)
Conference materials Information technologies and computer modeling ITCM-2019 C. 4-9.
<https://journal.comp-sc.if.ua/test/index.php/ITCM/article/view/88>
- Bilokon Oleksandr An Overview of Methods for Foresight Problems Technological Innovation
Conference materials Information technologies and computer modeling ITCM-2018 P. 89-92.
<https://journal.comp-sc.if.ua/test/index.php/ITCM/article/view/398>

Preprints:

- Bilokon, Oleksandr; Denkov, Ivan (2023). Backpropagation artificial neural network learning algorithm process impact based on hyperparameters. TechRxiv. Preprint.
DOI: 10.36227/techrxiv.24282511.v1
- O. Bilokon, I. Denkov Neural network models for processing intensity profile from stix data for approximation and forecasting problems
10.22541/essoar.173627348.83561457/v1

Manuscripts:

- O. Bilokon. Comparative Analysis of Pulsations in Different Phases of the Flare by Thermal and Non-Thermal Plasma Emissions. Springer Nature Acta Geophysica (status: Reviewers Assigned)

Work experience

Deputy Head of the International Relations Department, 2024–present
National Academy of Sciences of Ukraine (Head Office)
Kyiv, Ukraine

- Coordination of international scientific cooperation and institutional partnerships.
- Support for international scientific projects and academic mobility.

Junior Research Fellow, International Relations Department, 2017–2024
National Academy of Sciences of Ukraine (Head Office)
Kyiv, Ukraine

- Carrying out work on the scientific, organizational and practical implementation of international agreements of the NAS of Ukraine on scientific and scientific and technical cooperation in terms of the exchange of scientists and specialists.
- Ensuring protocol events with the participation of foreign representatives of scientific institutions and organizations at the Presidium of the NAS of Ukraine.
- Preparation of travel materials for official trips abroad of the leadership of the NAS of Ukraine and employees of the Presidium of the NAS of Ukraine.
- Participation in the preparation of annual reports on international scientific relations of the NAS of Ukraine.
- Summary of information materials received from institutions of the NAS of Ukraine about their participation in international scientific projects and programs.

Chief Specialist, International Relations Department, 2011–2017

National Academy of Sciences of Ukraine (Head Office)

Kyiv, Ukraine

- Ensuring protocol events with the participation of foreign representatives of scientific institutions and organizations at the Presidium of the NAS of Ukraine.
- Participation in the preparation of annual reports on international scientific relations of the NAS of Ukraine.
- Generalization of information materials received from NAS institutions on their participation in international scientific projects and programs.

Research Fellow, 2022–present

V.M. Glushkov Institute of Cybernetics, NAS of Ukraine

Kyiv, Ukraine

Postgraduate, 2018–2022

V.M. Glushkov Institute of Cybernetics, NAS of Ukraine

Kyiv, Ukraine

Leadership, project management and grant experience

- Leadership in the coordination of international scientific collaborations and mobility projects.
- Experience in project management in multi-institutional, interdisciplinary research initiatives.
- Hands-on involvement in the preparation, implementation and reporting of international grants.
- Experience working with funding agencies and international research partners.
- Ability to support large collaborative research projects and grant activities.

Scientific, organizational and educational activities

- Organization of popular science lectures on robotics and artificial intelligence at the National Academy of Sciences of Ukraine.

- Participation in the organization of the All-Ukrainian Science Festival (2017–2021), which was held with the participation of the National Academy of Sciences of Ukraine and the Small Academy of Sciences of Ukraine.
- Involvement of students, young scientists and schoolchildren in scientific research activities.

Applied results and technical portfolio

- A monocular navigation system for a mobile robot based on artificial neural networks, which provides autonomous movement in a real environment using a single camera.
- Implementation of applied engineering and research projects in the field of robotics, artificial intelligence, CAD design and mathematical modeling within an international professional platform with proven high efficiency.

Participation in international grant projects

- Participant of the joint scientific project of mobility of the National Academy of Sciences of Ukraine and the Polish Academy of Sciences. Project topic: "Neural network models and methods of navigation system of a mobile robotic platform implemented by the V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine and the Institute of Fundamental Technological Research of the PAS.
- Participant of the international long-term funding program (Long-Term Project, LTP), implemented by the Polish Academy of Sciences (PAS) and the National Academy of Sciences of the United States (NAS) in cooperation with the National Academy of Sciences of Ukraine. Topic: "Study of solar flares and their manifestations during the 25th cycle of solar activity using data from the Solar Orbiter and ground-based radio astronomy databases." Institution: Center for Space Research of the PAS.
- Selected as a visiting researcher at the School of Computer Science and Cybernetics, Augusta University (USA). Official invitation received; visit did not take place. (2022–2023)

Honorary titles and professional memberships

- Member of the international scientific honorary society Sigma Xi ((Rice University / Texas Medical Center, USA))
- Member of IEEE (Robotics and Automation Society)
- Member, IEEE Engineering in Medicine and Biology Society (EMBS)
- Member of ACM (SIGACT - Special Interest Group on Algorithms and Computation Theory)

Skills

Python, C, C++, MathCAD, AutoCAD, Autodesk Inventor, Fusion 360, L^AT_EX.