MICHAŁ BATSCH

BEng, MSc, PhD

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Portfolio

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ABOUT ME

I have over ten years of experience in scientific programming and computations including image and signal processing. Recently my scientific interests expanded to machine learning and neural networks. As a problem-solving-oriented person with the ability to understand complicated mathematical models and a strong mechanical engineering background, I am ready to dive into a data-driven world as a data scientist/ML engineer.

Matlab
Python
C/C++
SQL
HTML/CSS
LaTeX
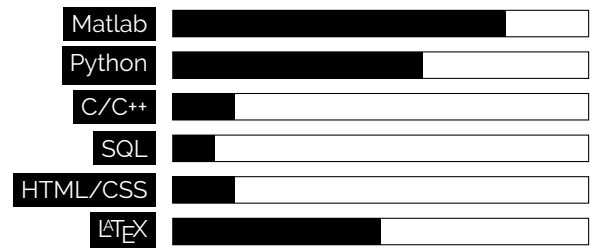
TOOLS

- NumPy
- Pandas
- Matplotlib
- OpenCV
- Scipy
- Scikit-learn
- Tensorflow
- Keras
- sqlite3

SKILLS

- scientific computations
- signal and image processing
- machine learning
- neural networks
- research planning and carrying
- interdisciplinary team leading
- mechanical engineering
- mathematical modelling
- differential geometry

PROFESSIONAL EXPERIENCE

2013 – now   **Assistant Professor**   **Rzeszow University of Technology**
Scientific computations and programming, signal and image processing, machine learning, research in mechanical engineering, teaching machine design, geometry, kinematics, and computer-aided design.

2015 – 2020
part time   **Lead design engineer**   **EL–Automatyka**
Design for production automation, 3D CAD modelling, developing the constructional solutions, drafting.

SELECTED R&D PROJECTS

2022–2023   **Mechatronic engineer**   **FortiFruits**
Project no. POPW.01.01.02-18-0116/21 entitled *Introduction of product innovation to the market - soft fruit extracts with increased antioxidant content for the production of dietary supplements, food, and pharmaceutical industries*

2022   **Image processing specialist**   **University of Rzeszów**
Grant no. N3_063, PCI-1GRA.5133.40.2021.ADZ entitled *Development of an innovative method for examining the visual field and mobility of the cervical spine, using virtual reality technology*

2022   **Scientific internship**   **SZEL–TECH**
Project no. RPPK.01.02.00-18-0002/20 entitled *Development and implementation of technology for producing aircraft assemblies with an integral thin-walled structure*

2020 – 2022   **R&D team leader – Mechatronic engineer**   **LIMET**
Project no. POIR.01.01.01-00-0630/19 entitled *Research on the development of a predictive system for diagnostics and processing of seals in brake, fuel, and gas installations*

2020–2021   **Project manager**   **Rzeszow University of Technology**
Project no. POIR.02.03.02-18-0114/19 entitled *Development of an optimal technical and functional design of an innovative type of mobile elevating work platform for modernization and construction of bridge structures as a result of research and development work*

2016 – 2017   **Gear analysis expert**   **Inżynieria Rzeszów**
Project no. POIR.01.01.01-00-0286/15-00 entitled *Designing an innovative type of a scraper with an integrated planetary drive for new or modernized sedimentation tanks*

2014 – 2015	**Researcher**	**Rzeszow University of Technology**

Project no. POIG.01.01.02-00-015/08-00 entitled *Modern Material Technologies in Aerospace Industry*

2013	**Design engineer**	**Rzeszow University of Technology**

Project no. INNOTECH-K2/IN2/39/182334/NCBR/13 entitled *Development and implementation of plastic forming technology with resistance heating of aircraft engine components made of difficult-to-deform nickel-iron superalloys*

2010 – 2012	**Design engineer**	**Rzeszow University of Technology**

Project no. OR00011611 entitled *UAV for terrain surveillance*

EDUCATION

2015	**Doctor of Engineering**	**Rzeszow University of Technology**

Construction and Exploitation of Machines

2013	**Master of Science**	**Rzeszow University of Technology**

Mechanics and Machine Building (specialty: mechanical drives)

2012	**Bachelor of Engineering**	**Rzeszow University of Technology**

Automation and Robotics (specialty: computer science in robotics)

SELECTED PROJECTS

Gear fault detection by unsupervised deep learning of autoencoder
</> Python, TensorFlow, Scikit-learn, NumPy, Scipy, Pandas 🔗 Read more

Vibration excitation in gearboxes due to surface deviations
</> Python, NumPy, Scipy, Matlab, Differential geometry, Optimization Toolbox 🔗 Read more

The method of prediction of tooth profile deviations in gear honing
</> Matlab, Differential geometry, Optimization Toolbox 🔗 Read more

Vision-based control of small educational double SCARA robot
</> Python, OpenCV, TensorFlow, Scikit-learn, NumPy, Scipy, C, RaspberryPI, Matlab, Automatic code gen. 🔗 Read more

Image processing algorithm for evaluation of the roundness of small objects
</> Matlab, Image processing toolbox, Optimization Toolbox 🔗 Read more

What is the optimal shape of sofa?
</> Matlab, Differential geometry, Optimization Toolbox 🔗 Read more

SELECTED SCIENTIFIC PUBLICATIONS

Helical Bevel Novikov Gears
👤 Michał Batsch 📅 2022 📖 Novikov/Conformal Gearing ed. by S.P. Radzevich, Springer 🔗 10.1007/978-3-031-10019-2

A Numerical Approach for Analysing the Moving Sofa Problem
👤 Michał Batsch 📅 2022 📖 Symmetry, 14(7) 🔗 10.3390/sym14071409

Image processing algorithm to assess the roundness of blanks for the production of copper seals for brake, fuel and gas installations
👤 Michał Batsch, Waldemar Witkowski, Dawid Wydrzyński 📅 2021 📖 Mechanik, 7 🔗 10.17814/mechanik.2021.7.10

Mathematical model and tooth contact analysis of convexo-concave helical bevel Novikov gear mesh
👤 Michał Batsch 📅 2020 📖 Mechanism and Machine Theory, 149 🔗 10.1016/j.mechmachtheory.2020.103842

A novel method of obtaining honing tool profile for machining gears with profile modifications
👤 Michał Batsch 📅 2020 📖 ASME Journal of Manufacturing Science and Engineering, 142(9) 🔗 10.1115/1.4047351

Measurement and mathematical model of convexo-concave Novikov gear mesh
👤 Michał Batsch, Tadeusz Markowski, Stanisław Legutko, Grzegorz Królczyk 📅 2018 📖 Measurement, 125
🔗 10.1016/j.measurement.2018.04.095

LANGUAGES

- Polish - native
- **English** - C1 level

AWARDS

- third degree award of the Committee on Mechanics of the Polish Academy of Sciences
- six awards from the Head of the RUT

INTERESTS

- motorcycles
- music
- skiing
- microcontrollers