MIROSLAV GASPAREK

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CURRENT POSITION

DPhil in Engineering Science, St Cross College, University of Oxford 2019 - present
Research focus: Design and engineering of the synthetic biomolecular feedback systems.
Supervisor: Professor Antonis Papachristodoulou

EDUCATION

MEng in Biomedical Engineering, Imperial College London 2015-2019
Overall grade: First Class Honours

Private Secondary Grammar School, Zilina, Slovakia 2010-2015
Bilingual education in English language (awarded scholarship covering the tuition fees)
Final Exam: 1.0 Overall (the highest possible grade)

St Edmund's College, Ware, United Kingdom 2012-2013
A term-long study visit, AS Levels: Mathematics, Further Mathematics, Physics, Chemistry

RESEARCH EXPERIENCE

Undergraduate Research Student in Tanaka Group, Imperial College London Oct 2018 - Jun 2019

- Advisor: Dr. Reiko Tanaka
- Research project: (MEng Final Year Project) Design of the individualized eczema treatment policies using reinforcement learning.
- Approach: Mathematical and computational applications of reinforcement learning to determine optimal eczema treatment using clinical data-based model.

Visiting Research Intern at Endy Lab, Stanford University Jul 2018 - Sep 2018

- Advisor: Professor Drew Endy
- Research project: Changing compatibility of the plasmid vectors for the realization of protein-protein interaction assay in the minimal genome (JCVI-syn3.0)
- Approach: (Experimental) Primers design, PCR, Gibson assembly, gel electropheoresis, electroporation, Golden Gate cloning, preparation of samples for the sequencing. (Computational) Fundamentals of the supervised machine learning, protein database search using BioPython.

Visiting Research Intern at Murray Lab, California Institute of Technology Jul 2017 - Oct 2017

- Advisor: Professor Richard Murray
- Research project: Development of the computational framework *BioSIMI* for the input/output modeling of interconnected genetic circuits in the context of bottom-up approach to construction of a simple artificial cell
- Approach: (Computational) Modeling of the interconnection of subsystems in MATLAB *SimBiology*, analysis of the nonlinear dynamical systems. (Experimental) Protein expression from the TX-TL cell-free extract, encapsulation of the cell-free extract into the manufactured liposomes.

Undergraduate Research Intern in Tanaka Group, Imperial College London Feb 2016 - Aug 2016

- Advisor: Dr. Reiko Tanaka
- Research Project: Mathematical and computational modeling of the optimal treatment of eczema.
- Approach: The non-linear hybrid model of eczema dynamics was analyzed using the methods of nonlinear dynamical systems analysis in MATLAB under the co-supervision of a doctoral candidate.

RESEARCH INTERESTS

Synthetic Biology: Biomolecular Feedback Systems, Artificial cells, Essential Genes, Resource Competition
Systems Biology: Interconnected Biomolecular Systems, Optimal Eczema Treatment.
Control Theory: Feedback Control, Model Predictive Control, Biological Systems Applications
Reinforcement Learning: Optimal Control and Policy Planning, Applications in Biology and Health Care

WORKSHOP PARTICIPATIONS

SynBioControl 2019 Workshop, Worcester College, University of Oxford Sep 2019
· Attended the workshop on the applications of Control Theory in Synthetic Biology to inform the specific selection of my doctoral research topic.

5th Build-A-Cell Meeting, Massachusetts Institute of Technology, Boston Aug 2019
· Participated in the workshop on the construction of the artificial cells, learned about the major challenges associated with building of the functioning cells.

SynBITECH 2019 Conference, Queen Elizabeth II Centre, London Jun 2019
· Participated and networked with the academic and business leaders in the conference on building a multibillion-dollar synthetic biology industry.

4th Build-A-Cell Meeting, University of Minnesota, Minneapolis Aug 2018
· Participated in the workshop on the construction of the artificial cells, learned about the role of the essential genes in this process.

TEACHING, OUTREACH AND MENTORING EXPERIENCE

Podcast Host at Pravidelna Davka podcast Jun 2019 - present
· One of three hosts of Slovak podcast focused on Philosophy, Science & Religion, and Bioengineering.
· Analysis, news, and discussions about current innovations in Bioengineering, Synthetic Biology, and Medicine.

Mentor at TalentGuide, Slovakia Feb 2018 - present
· Mentoring of the talented Slovak high school students through the established mentoring scheme.

Public Lecturing about Synthetic Biology and Bioengineering in Slovakia Sep 2017 - present
· Promotion of Bioengineering and Synthetic Biology through invited lectures at the various Slovak high schools and at the other occasions (approx. 15 lectures).

Team Member at Unimak Sep 2015 - present
· Member of the non-profit organization helping Slovak & Czech students with admissions to the foreign universities.
· Former Vice President and STEM Team Leader, advised to approx. 30 students.
· Co-founded the lecture tour about studying abroad in the Slovak high schools.

Undergraduate Teaching Assistant at Imperial College London Jan 2018 - Jun 2019
· Undergraduate Teaching Assistant for the Signals and Control (BE2-HSCL), Wet Labs (BE2-HWLS), and Modelling in Biology (BE3-HMIB). Mentored students during the computational/experimental task assignments, prepared introductory and final remarks, prepared and explained the example solutions.

Invited Speaker at Strategic Conference of Svet Zdravia, Slovakia Apr 2017
· Lectured about Synthetic Biology and Bioengineering to approx. 250 clinicians and executives at the strategic medical conference of Svet Zdravia, the largest Slovak private network of hospitals.

Invited Speaker at Medical Conference of Svet Zdravia, Slovakia Nov 2016
· Lectured about the Mathematics and Bioengineering applications in Health Care and Eczema treatment to approx. 200 clinicians at the working medical conference of Svet Zdravia, the largest Slovak private network of hospitals.

Private Tutor of Mathematics and Physics 2013-2014

· Tutored Mathematics (Calculus) and Physics (Mechanics) to the Slovak high school and university students.

AWARDS AND HONORS

Build-A-Cell: Travel Award Aug 2019

· Awarded travel grant to participate in the 5th workshop on engineering of the synthetic cells in Boston.

Tatra Banka: Students to the World Scholarship May 2018, 2019

· Scholarship helped to partially cover the living expenses associated with research at Stanford University (2018) and the University of Oxford (2019).

Central European Foundation (CEF): Talents of the New Generation Scholarship Mar 2018, 2019

· Tatra Banka and CEF Scholarship covered the expenses associated with research at Stanford University (2018) and the University of Oxford (2019).

Institution of Engineering & Technology: Undergraduate Award Aug 2018

· Awarded to 11 final year UK engineering students for the demonstration of engineering leadership & commitment.

Imperial College Faculty of Engineering Alumni Association: Student Activity Award Aug 2018

Royal Academy of Engineering: Engineering Leaders Scholarship Mar 2017

· Scholarship awarded to 22 potential UK engineering leaders in the second year of their undergraduate studies.

Penta Foundation Scholarship Mar 2017

· Scholarship from the Slovak foundation covered the costs of the research at Caltech in the summer of 2017.

Diploma of St Gorazd Nov 2015

· Top prize awarded by Education Secretary of the Slovak Republic for representation in 7 international Olympiads.

International Olympiad on Astronomy and Astrophysics 2011-2015 2011-2015

· Participation in 5 International Olympiads: Poland 2011 (Certificate of Participation), Brazil 2012 (Honorable Mention), Greece 2013 (Gold Medal), Romania 2014 (Bronze Medal), Indonesia 2015 (Silver Medal)

International Physics Olympiad 2015 Jul 2015

· India 2015 (Honorable Mention)

International Young Physicists Tournament 2015 Jul 2015

· Thailand 2015 (Honorable Mention)

SOCIETIES, COMMITTEES, AND AFFILIATIONS

Member of Scientific Advisory Board at DNA Era Sep 2019 - present

· Scientific Advisor to the Slovak startup *DNA Era* focused on the genetic testing and analysis of the saliva samples.

UG Engineering Representative at Imperial College Union Council Oct 2018 - Aug 2019

· One of four representatives of undergraduate engineers in the highest body of the Imperial College student union.

Bioengineering Departmental Representative at Imperial College London Oct 2017 - Aug 2019

· Representative of all undergraduate and taught postgraduate bioengineering students (approx. 700) on the Departmental level, participated in the curriculum review, managed the Bioengineering student representation team.

· Management of the student representation team, engineering representative to the Imperial College Union Council.

Bioengineering Year Representative at Imperial College London Oct 2015 - Aug 2017

· Representative of Class of 2019 undergraduate bioengineering students (approx. 100).

Co-Chair of Imperial College Synthetic Biology Society Aug 2017 - Aug 2018

Industrial Liaison Officer at Imperial College Bioengineering Society Aug 2016 - Aug 2018

· Responsible for the corporate relations, sponsorship acquisition, and organization of the entrepreneurial events.

· Co-organized & secured funding for the first two Imperial Hackatons focused on the healthcare applications.

INDUSTRIAL EXPERIENCE

Team Member at DNA Era Dec 2018 - Apr 2019

· Assisted with the marketing and promotion of this Slovak genetic testing startup.

· Conducted the literature search and co-authored the health reports related to the particular genetic variants.

Value Delivery Consultant Intern at Exponea Aug 2016 - Oct 2016

· Internship in a Slovak start-up offering e-commerce data analysis and customized marketing solutions.

· Customer analytics consulting, implementation of the automated marketing solutions using HTML and JavaScript.

SELECTED PROJECTS

Development of the interactive educational games about eczema Oct 2017 - Jun 2018

· MEng group project (8 students) developed four educational games explaining the important aspects of eczema mechanisms and treatment to the wide public and showcased in the Imperial Festival 2018.

Synthetic Biology course, mini iGEM project: NOxIOUS Feb 2018 - Mar 2018

· Group project (6 students) designed a denitrifying genetic circuit in *E. Coli* converting NO_x species into N_2.

· Designed and modelled the denitrifying pathway, final design also included biological kill switch and biosensor.

Engineering Design Project: ThinkControl Group Universal Controller Oct 2016 - Jun 2017

· Group (9 students) developed a headset providing users (especially those with cognitive and/or motor impairments) with inputs for the wireless control of the systems such as Scalextric racing car and computer mouse cursor.

Co-Founder & Head of R&D: Smart Water Intake Management System Oct 2015 - Oct 2016

· Co-founded a start-up project of a smart PET bottle cap (WellsCap) and smartphone app (WellsApp) measuring and tracking user's water intake, developed algorithm for the optimal water intake calculation.

· Project won the UK National round of "CISCO Switch-Up Challenge" focused on IoT applications.

· WellsCap's flow measurement system legally protected as an utility model by Slovak Industrial Property Office.

TECHNICAL SKILLS & OTHER INTERESTS

Technical Skills: MATLAB, Python, Wet Lab Skills, Data Analytics & ML in Python (Keras)
Other Interests: Accordion, Weightlifting, Medicine & Healthcare, Entrepreneurship, Economics, Politics