CV | Domokos Meszéna, M.Sc.

Date and Place of birth: 1st June 1989, Pécs, Hungary
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Lab Website: http://www.ulbertlab.com/
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Marital status: Married

PROFESSIONAL SKILLS, KEYWORDS

Electrophysiology, Two-photon Laser Scanning Microscopy, Patch-Clamp, Multi-channel Probe Development and Testing, In vivo and In vitro Recordings, Optogenetics, Model-based Simulations, Current Source Density Analysis (CSD)

EDUCATION

2014 - 2020 (theses submitted) **PhD degree in Engineering (specialised in Neuroscience),**
Roska Tamás Multidisciplinary Doctoral School of Sciences and Technology, Pázmány Péter Catholic University, Faculty of Information Technology and Bionics, Budapest, Hungary
Supervisor: Prof. István Ulbert, MD, DSc *(Group leader, full professor)*

2013 - 2014 **MSc degree in Info-bionics Engineering,** PPCU, Budapest
Qualification: Excellent, First class honours degree
Thesis title: Model-based analysis and parameter estimation of a Human blood glucose control system model
Supervisor: Prof. Gábor Szederkényi, DSc *(Full professor)*

2008 - 2012 **BSc degree in Molecular Bionics Engineering**, PPCU, Budapest, Hungary
Diploma: Good, First class honours degree
Thesis title: The dynamics of the communication in cortical neurons
Supervisor: László Négyessy, PhD, Wigner Research Center for Physics

2002 - 2008 **Lajos Nagy High School of the Cistercian Order**, Pécs, Hungary
Final Exams: **A+ Grade** *(with Lajos Nagy medal for excellence)*

PROFESSIONAL EXPERIENCE

2014 - *(5.5 years)* **Institute of Cognitive Neuroscience and Psychology**,
Research Centre for Natural Sciences, Budapest, Hungary
Status: Young Researcher Fellowship *(full time: 2017 Sept -)*
PhD Student *(2014-2017)*
Fields: Cortical modelling, Electrophysiology, Multi-photon imaging
Probe development and design, Data analysis
Supervisor: Prof. István Ulbert, MD, DSc *(Group leader, full professor)*

2012 - 2014 *(2 years)* **Process Control Research Group (PCRG)**
Status: Graduate Research Student
Research area: Mathematical modelling of physiological control systems
Supervisor: Prof. Gábor Szederkényi, DSc *(Full professor)*

2011 - 2013 *(1.5 years)* **Complex Systems and Computational Neuroscience Group (CSCNS)**
Wigner Research Centre for Physics
Status: Undergraduate Research Student
Research area: Statistical analysis of neocortical spike trains in primates
Supervisor: László Négyessy, PhD *(Senior research fellow)*

PUBLICATIONS

Preprints and works in progress

D. Meszéna*, D Cserpán, L. Wittner, K. Tóth, I. Ulbert and Z. Somogyvári. Spatio-temporal membrane potential and resistive current reconstruction from parallel multi-electrode array and intracellular measurements. *(In preparation)*

R. Fiáth, **D. Meszéna**, M. Boda, P. Barthó, P. Ruther and I. Ulbert. Recording site placement on planar silicon-based probes affects neural signal quality: edge sites enhance acute recording performance. *(Under review) (Preprint on **BioRxiv,** DOI: 10.1101/2020.06.01.127308)*

T. Marek, G. Orbán, **D. Meszéna**, G. Márton, I. Ulbert, G. Mészáros and Zs. Keresztes. Optimization Aspects of Electrodeposition of Photoluminescent Conductive Polymer Layer onto Neural Microelectrode Arrays. *(Under submission)*

G. Dimitriadis, J. P. Neto, A. Aarts, […] G. Marton, **D. Meszéna**, S. Mitra, […] B. Raducanu, P. Ruther, T. Schroeder, W. Singer, P. Tiesinga, I. Ulbert, S. Wang, M. Welkenhuysen, and A. R Kampff. Why not record from every channel with a CMOS scanning probe? *(Under review) (Preprint on **BioRxiv,** DOI: 10.1101/275818)*

Peer-Reviewed Journal Publications

2020

G. Márton, E. Z. Tóth, L. Wittner, R. Fiáth, D. Pinke, G. Orbán, **D. Meszéna**, I. Pál, E. L. Győri, Z. Bereczki, Á. Kandrács, K. T. Hofer, A. Pongrácz, I. Ulbert and K. Tóth. The neural tissue around SU-8 implants: a quantitative *in vivo* biocompatibility study. ***MATERIALS SCIENCE AND ENGINEERING C**, 112C, 110870, 2020. (IF: 4.96, Q1/D1)*
DOI: 10.1016/j.msec.2020.110870

2019

D. Meszéna*, B. P Kerekes, I. Pál, G. Orbán, R. Fiáth, T. Holzhammer, P. Ruther, I. Ulbert and G. Márton. A silicon-based spiky probe providing improved cell accessibility for in vitro brain slice recordings. ***SENSORS & ACTUATORS B – CHEMICAL**, 297C*, 126649, 2019. *(IF: 6.39, Q1/D1)*
DOI: 10.1016/j.snb.2019.126649

A. Zátonyi, G. Orbán, R. Modi, G. Márton, **D. Meszéna**, I. Ulbert, A. Pongrácz, M. Ecker, W. E. Voit, A. Joshi-Imre, and Z. Fekete. A softening laminar electrode for recording single unit activity from the rat hippocampus. ***SCIENTIFIC REPORTS***, 9(1), 1-13, 2019. *(IF: 4.12, Q1/D1)*
DOI: 10.1038/s41598-019-39835-6

G. Orbán, **D. Meszéna**, K. R. Tasnády, B. Rózsa, I. Ulbert and G. Márton. Method for spike detection from microelectrode array recordings contaminated by artifacts of simultaneous two-photon imaging. ***PLOS ONE***, 14(8): e0221510, 2019. *(IF: 2.78, Q1)*
DOI: 10.1371/journal.pone.0221510

2017

D. Cserpán, **D. Meszéna**, L. Wittner, K. Tóth, I. Ulbert, Z. Somogyvári and D. Wójcik. Revealing the Distribution of Transmembrane Currents along the Dendritic Tree of a Neuron with Known Morphology from Extracellular Recordings. ***eLIFE***; 6: e29384, 2017. *(IF: 7.73, Q1/D1)*
DOI: 10.7554/eLife.29384

Patent

2017

I. Ulbert, G. Márton, **D. Meszéna**, B. P. Kerekes, G. Orbán, K. R. Tasnády, D. Pinke. A design of an ionic conductance-based multi-electrode system for mitigating photoelectric artefacts. Hungarian Patent Application, *Registration number: 45B01FEF1C, File number: P1700527, Date: 15th December 2017.*

** First author*

Conference talks

2020

D. Meszéna*, G. Orbán, K. R. Tasnády, I. Ulbert and G. Márton. Towards co-localised microelectrode array recordings and two-photon microscopy. *HunDoc 2020*, Szeged, Hungary, 2020.

2014

D. Meszéna*, E. Lakatos and G. Szederkényi. Sensitivity analysis and parameter estimation of a human blood glucose regulatory system model. *11th International Workshop on Computational Systems Biology*, TISCP 64, pp. 28, Lisbon, Portugal, 2014.

2013

E. Lakatos, **D. Meszéna** and G. Szederkényi. Identifiability analysis and improved parameter estimation of a human blood glucose control system model. ***LECTURE NOTES IN COMPUTER SCIENCE***, A. Gupta and T.A. Henzinger (Eds.): LNBI 8130 Springer, pp. 248-249, 2013. *(IF: 1.12, Q2) DOI: 10.1007/978-3-642-40708-6*

2012

L. Négyessy, J. Minich, **D. Meszéna**, A. Buzás, B. Jákli, M. Bányai, E. Procyk, P. Barone and F. Bazsó. From Neuronal Communication to the Flow of Information in the Cerebral Cortex. *10th Digital Speech and Image Processing*, Kovacica, Serbia, 2012.

Conference poster presentations

2020

D. Meszéna*, G. Orbán, K. R. Tasnády, I. Ulbert and G. Márton. Towards co-localised microelectrode array recordings and two-photon microscopy. *IBRO Workshop*, Szeged, Hungary, 2020.

R. Fiáth, **D. Meszéna**, M. Boda, P. Barthó and I. Ulbert. Do edge recording sites on high-density silicon probes provide better recording quality than center sites? *IBRO Workshop*, Szeged, Hungary, 2020.

Cs. Horváth, **D. Meszéna**, L. Balázsi, R. Fiáth and I. Ulbert. Two-photon guided neurovascular reconstruction to reduce vascular damage caused by neural probe insertion. *IBRO Workshop*, Szeged, Hungary, 2020.

2019

Z. Somogyvári, **D. Meszéna**, D. Cserpán, L. Wittner and I. Ulbert. Spatio-temporal membrane potential and resistive current reconstruction from parallel multielectrode array and intracellular measurements in single neurons. *10th IBRO World Congress of Neuroscience*, Daegu, Korea, 2019.

G. Orbán, **D. Meszéna**, K. R. Tasnády, I. Ulbert and G. Márton. Towards simultaneous microelectrode array recordings and two-photon microscopy. *XVI Meeting of the Portuguese Society for Neuroscience*, Lisbon, Portugal, 2019.

R. Fiáth, **D. Meszéna**, M. Boda, P. Barthó and I. Ulbert. Impact of the recording site location on the recording performance of silicon probes in acute experiments. *FENS Regional Meeting*, Belgrade, Serbia, 2019.

E. Z. Tóth, **D. Meszéna**, A Dublecz, D.Pálfi, K. Tóth, B. Rózsa, L. Erőss, A. Bagó, D. Fabó, I. Ulbert and L. Wittner. Back-propagating action potentials in human neocortical pyramidal cells and interneurons: A preliminary study. *Gordon Research Conference: Dendrites*, Ventura, CA, US, 2019.

2018

D. Meszéna*, I. Pál, B. P. Kerekes, G. Marton, K. Tóth, L. Wittner, Z. Somogyvári and I Ulbert. Simultaneous intra- and linear extracellular recordings with corresponding morphology: towards a ground-truth data for multichannel electrodes. *SfN Neuroscience 2018*, San Diego, CA, US 2018.

K. Tóth, E. Z. Tóth, L. Wittner, R. Fiáth, **D. Meszéna**, I. Pál, E. L. Győri, D. Pinke, Z. Bereczki, G. Orbán, A. Pongrácz, I. Ulbert and G. Márton. Biocompatibility of the SU-8 in the central nervous system. *SfN Neuroscience 2018*, San Diego, CA, US 2018.

D. Meszéna*, I. Pál, B. P. Kerekes, G. Marton, K. Tóth, L. Wittner, Z. Somogyvári and I Ulbert. Targeted and simultaneous investigation of intra- and extracellular neural signals and their relationship. *11th FENS Forum of Neuroscience*, Berlin, Germany, 2018.

** First author*

G. Orbán, T. Marek, **D. Meszéna**, B.P. Kerekes, K.R. Tasnády, I. Ulbert, G. Mészáros, Zs. Keresztes and G. Márton. Fluorescent conductive polymer coating on implanted microelectrodes for visualization under two-photon microscopes. *11th FENS Forum of Neuroscience*, Berlin, Germany, 2018.

D. Meszéna*, B. P. Kerekes, I. Pál, T. Holzhammer, P. Ruther, I. Ulbert and G. Márton. A novel, silicon-based spiky probe providing improved cell accessibility for in vitro brain slice recordings. *Gordon Research Conference: Neuroelectronic Interfaces*, Galveston, Texas, US, 2018.

2017

D. Meszéna*, I. Pál, B. P. Kerekes, G. Márton, Z. Somogyvári and I. Ulbert. Towards a better understanding of intra- and extracellular neural signals and their relationships. *FENS Regional Meeting*, Pécs, Hungary, 2017.

B. P. Kerekes, I. Pál, KT. Hofer, K. Tóth, **D. Meszéna**, V. Matusz, D. Zsíros, D. Dávid, FA Kader and I. Ulbert. A microsurgical method to modulate the spontaneous population activity and interictal-like activity in rat brain hippocampus slices. *FENS Regional Meeting*, Pécs, Hungary, 2017. *(Poster)*

K. Tóth, L. Wittner, R. Fiáth, **D. Meszéna**, I. Pál, E. L. Győri, D. Pinke, Z. Bereczki, G. Orbán, A. Pongrácz, I. Ulbert and G. Márton. Biocompatibility of the SU-8 in the central nervous system. *FENS Regional Meeting*, Pécs, Hungary, 2017.

D. Cserpán, **D. Meszéna**, L. Wittner, K. Tóth, I. Ulbert, Z. Somogyvári and D. Wójcik. Revealing the Distribution of Transmembrane Currents along the Dendritic Tree of a Neuron with Known Morphology from Extracellular Recordings. *2nd Nencki Symposium*, Warsaw, Poland, 2017.

2016

D. Meszéna*, I. Pál, B. P. Kerekes, G. Márton, Z. Somogyvári and I. Ulbert. Integrative experimental design for simultaneous electrophysiology and two-photon calcium imaging in the rat hippocampus, in vitro, *10th FENS Forum of Neuroscience*, Copenhagen, Denmark, 2016.

I Pál, KT. Hofer, B. P. Kerekes, K. Tóth, B. Rózsa, **D. Meszéna** and I. Ulbert. Modulation of interictal-like and spontaneous population activity by microsurgical intervention in rat brain slices, *10th FENS Forum of Neuroscience*, Copenhagen, Denmark, 2016.

D. Meszéna* and I. Ulbert. Simultaneously recorded multimodal signals in the hippocampal CA1 region, in vitro. *EMBO Practical Course in Advanced Optical Microscopy*, Marine Biological Association, Plymouth, United Kingdom, 2016.

D. Meszéna*, I. Pál, B. P. Kerekes, G. Márton, Z. Somogyvári and I. Ulbert. Simultaneously recorded multimodal signals in the hippocampal CA1 region, in vitro, *IBRO Workshop*, Budapest, Hungary, 2016.

2015

D. Meszéna* and I. Ulbert. Parameter estimation and validation of the single-cell CSD method using simultaneous electrode recordings and two-photon microscopy, *3rd Baltic-Nordic Summer School on Neuroinformatics,* Tartu, Estonia, 2015.

SCHOLARSHIPS AND AWARDS

2020 **Travel Bursary** from OIST to Computational Neuroscience Course (OCNC2021), Okinawa, Japan *(postponed to 2021 due to COVID-19)*

2019 **Annual Institute Publication Award** (pre-doctoral category), RCNS, ICNP

2019 **FENS-SfN Stipend,** complete fee waiver at the Summer School on Neurotechnology, Bertinoro. Italy

2018 **UNKP Scholarship,** New National Excellence Program of the Ministry of Human Capacities *(10 months, doctoral candidate level)*

2017 **Young Researcher Scholarship, HAS** *(Hungarian Academy of Sciences)*

2016 **Travel Grant** from the **Human Brain Project**, Obergurgl, Austria

2016 **Best Presentation Award**, Annual PhD Conference of the Doctoral School, PPCU

2016	**EMBO Travel Grant** *(and complete fee waiver)* from the British Marine Biological Association, UK
2015-2016	**PhD Excellence Scholarship**, PPCU Multidisciplinary Doctoral Program
2015	**OTDK Special Award**, Scientific Students' Association Conference, National Competition Finals, *(Applied Informatics section)*
2014	**Scholarship** of the Honored Man Foundation - in memory of Charles Simonyi
2013-2014	**Scholarship for Scientific and Campus Activities**
2013	**TDK 1st place**, Scientific Students' Association Conference, Campus round, *(Systems Biology section)*
2010 - 2014	**Academic Scholarship**, *(for the excellent grade point averages)*
2008	**Lajos Nagy Medal** *(for excellence in secondary education)*

OTHER SCIENTIFIC ACTIVITIES

2020 (3 weeks)	**OCNC: OIST Computational Neuroscience Course**, Okinawa, Japan *(postponed to 2021 due to COVID-19)*
2019 (1 w)	**FENS-SfN Summer School** – Brain reading and writing: new perspectives of neurotechnology, **Bertinoro, Italy**
2018 (1 w)	**Gordon Research Conference** participant, **Galveston, Texas, United States** *Topic:* Beyond Feasibility - Bridging the Gap in Neuroelectronic Interfaces
2018 (2 w)	**Invited Research Student**, University of Oxford, Department of Pharmacology, Medical Science Division, **Oxford, United Kingdom** *Host:* Prof. Peter Somogyi, FRS, FMedSci *(First 'Brain Prize' Laureate, 2011)*
2016 (1 w)	**3rd Human Brain Project School**, Obergurgl University Centre, **Obergurgl, Austria**
2016 (2 w)	**EMBO Practical Course** in Advanced Optical Microscopy, British Marine Biological Association, **Plymouth, United Kingdom**
2015 (1 w)	**3rd Baltic-Nordic Summer School** on Neuroinformatics, **Tartu, Estonia**
2015 (2 w)	**Short trip**, University of Notre Dame**, South Bend, Indiana, United States** *Host:* Prof. Gregory Timp, PhD *(Director of the Systems Biology Lab)*
2014 (1 w)	**NWG Course** "Analysis and Models in Neurophysiology", Bernstein Center for Computational Neuroscience, **Freiburg, Germany**
2014 (1 w)	**Advanced Course** on Neural Data Analysis, 6th Winter Course of the German Neuroinformatics Node (G-Node) **Munich, Germany**
2013 (2 w)	**International Summer School** on Principles-Oriented Systems Biology, BIOCANT Innovation Center, **Cantanhede**, **Portugal**
2012 (2 w)	**International Summer School AACIMP**: 'Achievements and Applications of Contemporary Informatics, Mathematics and Physics', Kyiv Polytechnic Institute (KPI), **Kiev, Ukraine**

TEACHING EXPERIENCES

2020	Basics of Neurobiology *(online, in English)*	*(BSc, 5th semester and MSc, 2nd semester)*
2017	Discrete Mathematics	*(BSc, 1st semester)*
2015-2016	AFM and STM Microscopy - *Hands-on Lab*	*(BSc, 7th semester)*
2014-2015	MATLAB Programming - *Computer Lab*	*(BSc, 3rd semester)*
2013	Electrophysiology I-II.	*(BSc, 6th, 7th semester)*
2011-2013	Introduction to Functional Neurobiology	*(BSc, 6th semester)*
2011-2013	Basics of Neurobiology	*(BSc, 5th semester)*

STUDENT MENTORING

2020	Mihály Boda	(PPCU, Bionics Eng. BSc)	*(BSc thesis, first class honours)*
2019	Levente Balázsi	(PPCU, Bionics Eng. BSc)	*(BSc thesis, first class honours)*
2018	Mariam Majida Shokoya	(PPCU, Bionics Eng. BSc)	*(BSc thesis, first class honours)*

OTHER SKILLS and LANGUAGES

Matlab *(Advanced)*, LabVIEW *(Basic)*, C++ *(Basic)*, Python *(Basic)*, GitHub *(Basic)* **LaTeX** *(Solid)*, Mendeley, Microsoft Word, Excel, PowerPoint, Prezi, Corel Draw, Adobe Photoshop

2015	**Certificate for Animal Experiments** *(Advanced level)* Semmelweis Medical University of Budapest, Hungary
2007	**Driving license**, B category

Hungarian	Mother Tongue, native proficiency	
English	**Professional working proficiency**	*(ECL B2 Complex Language Exam, 2012)*
Italian	Limited working proficiency	*(TELC B2 Complex Language Exam, 2008)*
German	Limited working proficiency	*(ÖSD B2 Complex Language Exam, 2006)*

MEMBERSHIPS

2019 (IEEE brain)	IEEE Brain Community,
2018 (SfN)	Society for Neuroscience,
2017 (PS)	IEEE Photonics Society,
2016 (EMBS)	IEEE Engineering in Medicine and Biology Society,
2016 (IBE)	Hungarian Info-Bionics Association,
2016 (HBP)	The Human Brain Project visiting student,
2015 (FENS)	Federation of European Neuroscience Societies,
2015 (MITT)	Hungarian Neuroscience Society

HOBBIES AND EXTRACURRICULAR ACTIVITIES

Member of the Student Government, elected delegate for doctoral candidates *(PPCU FITB, 2018)*,
Playing on guitar *(for 23 years, both classical and jazz music)*,
'Beatles MB' – Founder member of a Hungarian Beatles Tribute Band *(acting as 'Dohm' Lennon ☺)*
Charity activities within the Focolare Movement (and yearly child every year),
Hiking and 'via ferrata' *(in the Dolomites and Tatra Mountains)*,
Sailing *(Lake Balaton and Adriatic Sea)*, DSLR Photography

SCIENTIFIC PROFILES, IDs (with LINKS)

Google Scholar ID **Researchgate Profile** **ORCID:** 0000-0003-4042-2542
Researcher ID: U-3696-2017 **Loop profile**: 499106 **Scopus Author ID**: 55894745900
RCNS *(Institutional Website)* **LinkedIn** **ODT** *(Hungarian Doctoral Council)*
MTMT (*Hungarian Publication Database)*

REFERENCES

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H-1117 Budapest, Magyar tudósok körútja 2.
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Zoltán Somogyvári, PhD
Group Leader, Senior Research Fellow
Complex Systems and Computational Neuroscience Group
Dept. Theory, Wigner Research Institute for Physics
Konkoly-Thege M. út 29-33, Budapest, H-1121, Hungary
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Gábor Szederkényi, DSc
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Faculty of Information Technology and Bionics
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