

CV | Domokos Meszéna, Ph.D.

Date and Place of birth: 1st June 1989, Pécs, Hungary (31 years old)
Address: H-2330, Dunaharaszti, Petőfi Sándor utca 60.
Academic Emails: meszena.domokos at itk.ppke.hu ; meszena.domokos at ttk.hu
Lab Website: http://www.ulbertlab.com/
Marital status: Married (2017), father of one child (2019)

PROFESSIONAL SKILLS, KEYWORDS

Electrophysiology, Two-photon Laser Scanning Microscopy, Patch-Clamp, Multi-channel Probe Development and Testing, In vivo and In vitro Recordings, Post-Operative Human Slices, Novel Experimental Design, Optogenetics, Retina recording and stimulation, Model-based Simulations, Current Source Density

EDUCATION

- 2014 - 2020 **PhD degree, summa cum laude (Informatics, 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*)
Thesis title: Advanced recording techniques for
 studying cellular-level neurophysiology
- 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 **Nagy Lajos High School of the Cistercian Order, Pécs, Hungary**
Final Exams: **A+ Grade** (*with Lajos Nagy medal for excellence*)

PROFESSIONAL EXPERIENCE

- 2014 -
 (6 years) **Institute of Cognitive Neuroscience and Psychology,**
 Research Centre for Natural Sciences, Budapest, Hungary
Status: Research Associate (*full time, 2020 Oct -*)
 Young Researcher Fellowship (*full time, 2017 Sept -2020 Aug*)
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*)
- D. Szepesi Kovács, I. Hajdu, G. Mészáros, L. Wittner, **D. Meszéna**, E. Zs. Tóth., Z. Hegedűs, I. Ránczlovicz, J. Tóvári, T. Szabó, B. Szilágyi, M. Milen, Gy. M. Keserű and P. Ábrányi-Balogh. Synthesis and characterization of new fluorescent boro- β -carboline dyes. (*Under review*)
- 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 resubmission*) (*Preprint on [BioRxiv](#), DOI: 10.1101/275818*)

Peer-Reviewed Journal Publications

2020

- 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. *MATERIALS CHEMISTRY AND PHYSICS*, 260, 124163, 2020. (*IF: 3.41, Q2*) DOI: 10.1016/j.matchemphys.2020.124163
- G. Márton, E. Z. Tóth, L. Wittner, R. Fiáth, D. Pinke, G. Orbán, **D. Meszéna**, I. Pál, E. L. Györi, 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. Zátanyi, 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.

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 G. Orbán, **D. Meszéna**, P. Ruther, I. Ulbert and G. Márton. Noise filtering and data analyzing method for simultaneous in vivo electrophysiology and two-photon imaging, Bernstein Conference, 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. Eröss, 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.

- 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.
- 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***, 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 nCOVID-19 pandemic*)
- 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 nCOVID-19 pandemic*)
- 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

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|-----------|---|--|
| 2020 | Neuroscience Preparatory course (<i>online, in English</i>) | (MSc, 1 st semester) |
| 2020 | Basics of Neurobiology (<i>online, in English</i>) | (BSc, 5 th semester) |
| 2017 | Discrete Mathematics (<i>hu</i>) | (BSc, 1 st semester) |
| 2015-2016 | AFM and STM Microscopy - <i>Hands-on Lab</i> (<i>hu</i>) | (BSc, 7 th semester) |
| 2014-2015 | MATLAB Programming - <i>Computer Lab</i> , (<i>hu</i>) | (BSc, 3 rd semester) |
| 2013 | Electrophysiology I-II. (<i>hu</i>) | (BSc, 6 th , 7 th semesters) |
| 2011-2013 | Introduction to Functional Neurobiology (<i>hu</i>) | (BSc, 6 th semester) |
| 2011-2013 | Basics of Neurobiology (<i>hu</i>) | (BSc, 5 th semester) |

STUDENT MENTORING

2021	Levente Balázsi	(PPCU, Info-Bionics Eng. MSc)	(MSc thesis in progress)
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** (Advanced),
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		
<i>Hungarian</i>	Mother Tongue, native proficiency		
<i>English</i>	Professional working proficiency	(ECL B2 Complex Language Exam, 2012)	
<i>Italian</i>	Limited working proficiency	(TELC B2 Complex Language Exam, 2008)	
<i>German</i>	Limited working proficiency	(ÖSD B2 Complex Language Exam, 2006)	

MEMBERSHIPS

2020 (MTA KT)	Member of public body (“Köztestület”) of Hungarian Academy of Sciences
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

REVIEWER

2020- Journal of Neural Engineering (*JNE*)

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 (e.g. organizing summer child camps),
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	Researcher ID: U-3696-2017	RCNS (Institute)	Loop: 499106
MTMT	ResearchGate	ODT	Twitter
LinkedIn	Scopus ID: 55894745900	ORCID: 0000-0003-4042-2542	

REFERENCES



István Ulbert, MD, DSc

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Institute of Cognitive Neuroscience and Psychology
Research Centre for Natural Sciences,
H-1117 Budapest, Magyar tudósok körútja 2.
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Zoltán Somogyvári, PhD

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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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Pázmány Péter Catholic University
Faculty of Information Technology and Bionics
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