Research field

Biomedical systems, control theory, pathophysiological modeling, system identification, cancer treatment

Place of birth

Budapest, Hungary

Date of birth

January 07, 1986

Address

H-1034 Budapest,
Bécsi street 96/b. BA.3.25

Phone number

0036305310911
0016665553

E-mail

sapi.johanna@nik.uni-obuda.hu

Johanna Sápi, PhD

Professional position

2016 – **Senior lecturer**
Obuda University
John von Neumann Faculty of Informatics
Institute of Biomatics
Physiological Controls Research Center

2015 – 2016 **Assistant lecturer**
Obuda University
John von Neumann Faculty of Informatics
Institute of Biomatics
Physiological Controls Group

2013 – 2015 **PhD student**
Obuda University
John von Neumann Faculty of Informatics
Institute of Applied Informatics
Physiological Controls Group

2012 – 2013 **PhD student**
Budapest University of Technology and Economics
Faculty of Electrical Engineering and Informatics
Department of Control Engineering and Information Technology
Laboratory of Biomedical Engineering

Education

2016 Semmelweis University's Institutional Animal Care and Use Committee
Experimental animals – animal experiments course level "B"
The course gives permission to carry out animal experiments and design projects

2013 – 2015 Obuda University
Doctoral School of Applied Informatics and Applied Mathematics (PhD)
PhD in Applied Informatics (Summa cum laude)
Research topic: *Model-based control of cancer diseases*
Thesis: *Controller-managed automated therapy and tumor growth model identification in the case of antiangiogenic therapy for most effective, individualized treatment*
Supervisor: Levente Kovács PhD, habil

2012 – 2013 Budapest University of Technology and Economics
Doctoral Schools at Faculty of Electrical Engineering and Informatics
PhD in Electrical Engineering
Research topic: *Model-based control of cancer diseases*
Supervisor: Levente Kovács PhD

2010 – 2012	Budapest University of Technology and Economics Faculty of Electrical Engineering and Informatics **MSc in Biomedical Engineering** (Summa cum laude) Thesis: *Optimal control algorithms for antiangiogenic therapy based tumor treatment* Supervisors: Levente Kovács PhD, István Harmati PhD, Dániel András Drexler, Prof. Zoltán Sápi MD PhD
2006 – 2010	Semmelweis University Faculty of Medicine **BSc in Health care management** Thesis: *Interactive, personalized health education and therapy support via Internet for patients with metabolic syndrome* Supervisor: Zoltán Sára
1998 – 2004	St. Stephens Secondary School, Budapest Class of Natural Sciences **High school diploma**

Languages

Hungarian:	native
English:	intermediate
Russian:	basic

Professional results

2009	III. place in Students' Scientific Association (TDK) conference Semmelweis University Paper: *Metabolic Syndrome – the endemic* Supervisor: Péter Csépe MD PhD Semmelweis University, Faculty of Medicine, Department of Public Health
2017	Dean's award Obuda University, John von Neumann Faculty of Informatics

Supervisor activities

- Budapest University of Technology and Economics, Faculty of Electrical Engineering and Informatics, Biomedical Engineering MSc thesis (1)
- Obuda University, John von Neumann Faculty of Informatics, Computer Science and Engineering BSc thesis (2)
- Obuda University, John von Neumann Faculty of Informatics, Computer Science and Engineering MSc thesis (2)
- Pázmány Péter Catholic University, Faculty of Information Technology and Bionics, Molecular Bionics Engineering BSc thesis (1)
- Pázmány Péter Catholic University, Faculty of Information Technology and Bionics, Info-Bionics Engineering MSc thesis (1)
- Obuda University, John von Neumann Faculty of Informatics, Scientific Students' Associations (TDK) (2)

Courses taught

- Biomedical computing practices (BMEVIMIM301), BME-VIK, Biomedical Engineering MSc, in Hungarian
- Control Theory (BMEVIMM158), BME-VIK, Biomedical Engineering MSc, in Hungarian
- Biomedical Engineering (BMEVIIIAV09), BME-VIK, Biomedical Engineering MSc, in Hungarian

- Control Theory I. (NIRIT1SAEC), OE-NIK, Computer Science Engineering BSc, in Hungarian
- Control Theory II. (NIRIT2SAEC), OE-NIK, Computer Science Engineering BSc, in Hungarian
- Biomedical Engineering (NIRBE1SVNC) OE-NIK, Computer Science Engineering BSc, in Hungarian
- Basics of Information Systems (NIRIA1SEND), OE-NIK, Computer Science Engineering BSc, in English
- Control Engineering (NIRCE1SERD), OE, Science Without Borders program (for Brazilian students), angol nyelven
- Intelligent Systems (NIRIS1SERD), OE, Science Without Borders program (for Brazilian students), in English
- Control Theory (NIRIT0SAED), OE-NIK, Computer Science Engineering BSc, in Hungarian
- Biomedical Engineering (NAIBE1SEND), OE-NIK, Computer Science Engineering BSc, in English
- Systems and control theory (NAIRI1CANM), OE-NIK, Computer Science Engineering MSc, in Hungarian
- Systems and control theory (NAIRI1CENM), OE, Stipendium Hungaricum program, MSc, in English

Reviewer activities

- *Conference:*
  - IFAC (International Federation of Automatic Control)
  - INES (IEEE International Conference on Intelligent Engineering Systems)
  - CINTI (IEEE I nternational Symposium on Computational Intelligence and Informatics)
  - SAMI (IEEE International Symposium on Applied Machine Intelligence and Informatics)
  - SACI (IEEE International Symposium on Applied Computational Intelligence and Informatics)
  - SMC (IEEE International Conference on Systems, Man, and Cybernetics)
  - ICIEA (IEEE Conference on Industrial Electronics and Applications)
- *Journal:* Acta Polytechnica Hungarica
  - reviewer
  - Informatics Track Chair (2017 –)
- *Thesis:* Budapest University of Technology and Economics, Faculty of Electrical Engineering and Informatics (MSc); Obuda University, John von Neumann Faculty of Informatics (MSc)
- *Students' Scientific Association Conference (OU), National Students' Scientific Association Conference*
- *New National Excellence Program (ÚNKP)* Scholarship for MSc students – reviewer

Conference organization

- Organizing Committee Chair: 30th Jubilee Neumann Colloquium, 2017, Budapest
- Local Organizing Committee member / Track Chair:
  - SMC 2016 Junior Systems Science & Engineering track chair – IEEE International Conference on Systems, Man, and Cybernetics, Budapest, Hungary
  - SMC 2016 Local Organizing Committee member – IEEE International Conference on Systems, Man, and Cybernetics, Budapest, Hungary
- Technical Program Committee member:
  - SMC 2016 – IEEE International Conference on Systems, Man, and

Cybernetics, Budapest, Hungary
– SAMI 2016 – IEEE International Symposium on Applied Machine Intelligence and Informatics, Herl'any, Slovakia

Research projects involvements

- ERC StG Grant "*Tamed Cancer*" 679681 (2016-2021), professional coordinator, researcher (Principal Investigator: Prof. Dr. Levente Kovács)
- TÁMOP 4.2.2.D-15/1/KONV-2015-0002 project "*Development of smart technologies for supporting high-tech industrial areas*" (2015), researcher
- National Development Agency, GOP-2011-1.1.1 program, GOP-1.1.1-11-2012-0055 project, "*DIALOGIC – Mathematical model-based decision support system to improve diabetes health management*" (2012-2013), researcher

Professional affiliations and contributions

- John von Neumann Computer Society Biomedical Section board member (2016 –)
- IEEE (Institute of Electrical and Electronics Engineers) member (Membership number: 92621920)
- IEEE Student member (2013 – 2015)
- IEEE member (2015 –)
- IEEE Systems, Man, and Cybernetics (SMC) Society member (2015 –)
- IEEE SMC Hungary Section Chapter secretary (2016 –)
- IEEE Young Professionals member (2015 –)
- IEEE Women in Engineering member (2015 –)
- IEEE Engineering in Medicine and Biology Society member (2015 –)

Publications

Johanna Sápi's publications in MTMT:
https://vm.mtmt.hu//search/slist.php?lang=0&AuthorID=10036432

2017 Bence Czakó, Johanna Sápi, Levente Kovács, "Model-based Optimal Control Method for Cancer Treatment Using Model Predictive Control and Robust Fixed Point Method", In: IEEE (ed.), *Proc. of the IEEE 21st International Conference on Intelligent Engineering Systems (INES 2017)*. Larnaca, Cyprus, 2017.10.20-2017.10.23. Larnaca: IEEE, 2017. pp. 271-276.

2017 Dániel A Drexler, Johanna Sápi, Levente Kovács, "Positive control of a minimal model of tumor growth with bevacizumab treatment", In: W Xie, C Hu, L Jiang (ed.), *Proc. of the 12th IEEE Conference on Industrial Electronics and Applications (ICIEA 2017)*. Siem Reap, Cambodia, 2017.06.18-2017.06.20. (IEEE), Singapore: IEEE Industrial Electronics Society, 2017. pp. 2081-2084.

2017 Daniel A Drexler, Johanna Sapi, Levente Kovacs, "Positive nonlinear control of tumor growth using angiogenic inhibition", In: IFAC (ed.), *Proc. of the 20th World Congress The International Federation of Automatic Control (20th IFAC World Congress)*. Toulouse, France, 2017.07.09-2017.07.14. Toulouse: IFAC, 2017. pp. 15633-15638.

2017 Daniel A Drexler, Johanna Sapi, Levente Kovacs, "Optimal discrete time control of antiangiogenic tumor therapy", In: IFAC (ed.), *Proc. of the 20th World Congress The International*

Federation of Automatic Control (20th IFAC World Congress). Toulouse, France, 2017.07.09-2017.07.14. Toulouse: IFAC, 2017. pp. 14046-14051.

2017 Dávid Csercsik, Johanna Sápi, Levente Kovács, "A bicompartmental dynamic tumor growth model", In: IFAC (ed.), *Proc. of the 20th World Congress The International Federation of Automatic Control (20th IFAC World Congress)*. Toulouse, France, 2017.07.09-2017.07.14. Toulouse: IFAC, 2017. pp. 12727-12732.

2017 Johanna Sápi, "Animal Experiments in Cancer Research: Wasteful or Unavoidable?", In: Anikó Szakál (ed.), *Proc. of the IEEE 30th Jubilee Neumann Colloquium (Neumann Colloquium 2017)*. Budapest, Hungary, 2017.11.24-2017.11.25. Budapest: Óbuda University, 2017. pp. 157-162.

2017 Dániel András Drexler, Johanna Sápi, and Levente Kovács, Modeling of Tumor Growth Incorporating the Effects of Necrosis and the Effect of Bevacizumab, *HINDAWI COMPLEXITY*, IF: 4.621, Volume 2017, Article ID 5985031, 10 pages, doi: 10.1155/2017/5985031 (2017)

2017 D A Drexler, J Sápi, L Kovács: "A minimal model of tumor growth with angiogenic inhibition using bevacizumab, In: Anikó Szakál (ed.), *Proceedings of the IEEE 15th International Symposium on Applied Machine Intelligence and Informatics (SAMI 2017)*. Herlany, Slovakia, 2017.01.26-2017.01.28. Budapest: IEEE, 2017. pp. 185-190. (2017)

2017 Tamás Ferenci, Johanna Sápi, Levente Kovács: "Modelling Tumor Growth Under Angiogenesis Inhibition with Mixed-effects Models", *ACTA POLYTECHNICA HUNGARICA*, IF: 0.745, 14:(1) pp. 221-234. (2017)

2017 Johanna Sápi, Dániel András Drexler, Levente Kovács: "Potential Benefits of Discrete-Time Controllerbased Treatments over Protocol-based Cancer Therapies", *ACTA POLYTECHNICA HUNGARICA*, IF: 0.745, 14:(1) pp. 11-23. (2017)

2017 Levente Kovács, Zoltán Sápi, Dániel A. Drexler, Johanna Sápi: "Taming Cancer: Is it Possible?", invited presentation, *BIT's 10th Annual World Cancer Congress 2017*

2016 Tamás Ferenci, Johanna Sápi, Levente Kovács: "Modelling xenograft tumor growth under antiangiogenic inhibitation with mixed-effects models", *Proceedings of the 2016 IEEE International Conference on Systems, Man, and Cybernetics*. Budapest, Hungary, 2016.10.09-2016.10.12. pp. 3912-3917.

2016 Johanna Sápi, Dániel András Drexler, Levente Kovács: "Comparison of protocol based cancer therapies and discrete controller based treatments in the case of endostatin administration", *Proceedings of the 2016 IEEE International Conference on Systems, Man, and Cybernetics*. Budapest, Hungary, 2016.10.09-2016.10.12. pp. 3830-3835.

2016 J Sápi, D A Drexler, L Kovács: “Discrete time state feedback with setpoint control, actual state observer and load estimation for a tumor growth model” In: Szakál Anikó (szerk.) *Proceedings of the 11th IEEE International Symposium on Applied Computational Intelligence and Informatics SACI 2016*. Timisoara, Romania, 2016.05.12-2016.05.14. Budapest: IEEE, 2016. pp. 111-118.

2016 Johanna Sápi, Dániel András Drexler, István Harmati, Zoltán Sápi, Levente Kovács: „Qualitative analysis of tumor growth model under antiangiogenic therapy – choosing the effective operating point and design parameters for controller design”, *OPTIMAL CONTROL APPLICATIONS AND METHODS*, IF: 0.90, 37:(5) pp. 848-866. (2016)

2015 Johanna Sápi, Levente Kovács, Dániel András Drexler, Pál Kocsis, Dávid Gajári, Zoltán Sápi: “Tumor Volume Estimation and Quasi- Continuous Administration for Most Effective Bevacizumab Therapy”, *PLOS ONE,* IF: 3.23, 10:(11) Paper e0142190. 20 p.

2015 Johanna Sápi, Tamás Ferenci, Dániel András Drexler, Levente Kovács: “Tumor model identification and statistical analysis”, In: Sam Kwong, Daniel Yeung (ed.) *Proceedings of the 2015 IEEE International Conference on Systems, Man, and Cybernetics*. Hong Kong, China, 2015.10.08-2015.10.12. pp. 2481-2486.

2015 Sápi Johanna, Drexler Dániel András, Kovács Levente: “Comparison of mathematical tumor growth models”, In: Anikó Szakál (ed.) *Proceedings of the 13th IEEE International Symposium on Intelligent Systems and Informatics*. Subotica, Serbia, 2015.09.17-2015.09.19. Subotica: IEEE Hungary Section, 2015. pp. 323-328.

2015 Johanna Sájevicsné Sápi: “Controller-managed automated antiangiogenic cancer therapy”, 160 p. Saarbrücken: LAP Lambert Academic Publishing, 2015. 160 p. (ISBN:978-3-659-74344-3)

2015 Johanna Sájevicsné Sápi: “Controller-managed automated therapy and tumor growth model identification in the case of antiangiogenictherapy for most effective, individualized treatment”, 127 p. Óbudai University, Doctoral School: Doctoral School of Applied Informatics and Applied Mathematics. Supervisor: Levente Kovács PhD, habil. PhD thesis, 2015

2015 L Kovács, T Ferenci, J Sápi, Gy Eigner, J Klepsitz, P Szalay, M Kozlovszky, I Rudas: “Physiological Modeling and Control at Obuda University”, In: Anikó Szakál (ed.), *SACI 2015 – 10th IEEE International Symposium on Applied Computational Intelligence and Informatics*. Timisoara, Romania, 2015.05.21-2015.05.23. Budapest: Óbudai University, 2015. pp. 21-25.

2014 J Sápi, D A Drexler, Z Sápi, L Kovács: “Identification of C38

colon adenocarcinoma growth under bevacizumab therapy and without therapy", In: Anikó Szakál (ed.), *CINTI 2014 – 15th IEEE International Symposium on Computational Intelligence and Informatics*. Budapest, Hungary, 2014.11.19-2014.11.21. (IEEE Computational Intelligence Society), Budapest: IEEE Hungary Section, 2014. pp. 443-448.

2014 L Kovács, J Sápi, Gy Eigner, T Ferenci, P Szalay, J Klespitz, B Kurtán, M Kozlovszky, D A Drexler, P Pausits, I Harmati, Z Sápi, I Rudas: "Model-based healthcare applications at Obuda University", In: Anikó Szakál (ed.), *SACI 2014 – 9th IEEE International Symposium on Applied Computational Intelligence and Informatics*. Timisoara, Romania, 2014.05.15-2014.05.17. (IEEE) Timisoara: IEEE Hungary Section, 2014. pp. 183-187. (ISBN:978-1-4799-4694-5)

2014 Annamária Szeles, Dániel András Drexler, Johanna Sápi, István Harmati, Levente Kovács, "Model-based Angiogenic Inhibition of Tumor Growth using Adaptive Fuzzy Techniques", *PERIOD POLYTECH ELECTR ENG COMP SCI* 58(1) pp. 29-36. (2014)

2014 Levente Kovács, Annamária Szeles, Johanna Sápi, Dániel A Drexler, Imre Rudas, István Harmati, Zoltán Sápi, "Model-based Angiogenic Inhibition of Tumor Growth using Modern Robust Control Method", *COMPUTER METHODS AND PROGRAMS IN BIOMEDICINE*, IF: 1.555, 114 pp. 98-110. (2014)

2014 A Szeles, D A Drexler, J Sápi, I Harmati, L Kovács, "Study of Modern Control Methodologies Applied to Tumor Growth under Angiogenic Inhibition", In: E Boje, X Xia, *IFAC WC 2014 – 19th World Congress of the International Federation of Automatic Control*. Cape Town, South Africa, 2014.08.24-2014.08.29., Cape Town: Elsevier - IFAC, 2014. pp. 9271-9276.

2013 A Szeles, D A Drexler, J Sápi, I Harmati, Z Sápi, L Kovács, "Model-based Angiogenic Inhibition of Tumor Growth using Feedback Linearization", In: Parisini T, Tempo R (ed.) *CDC 2013 – 52nd IEEE Conference on Decision and Control*, Florence, Italy, 2013.12.10-2013.12.13. (IEEE), Piscataway: IEEE, 2013. pp. 2054-2059. (ISBN:978-1-4673-5716-6)

2013 J Sápi, D A Drexler, L Kovács, "Parameter optimization of H∞ controller designed for tumor growth in the light of physiological aspects", In: Anikó Szakál (ed.) *CINTI 2013 – 14th IEEE International Symposium on Computational Intelligence and Informatics*, Budapest, Hungary, 2013.11.19-2013.11.21. Budapest: IEEE Hungary Section, 2013. pp. 19-24. (ISBN:978-1-4799-0194-4)

2013 L Kovács, J Sápi, T Ferenci, P Szalay, D Drexler, Gy Eigner, P I Sas, I Harmati, M Kozlovszky, Z Sápi, "Model-based optimal therapy for high-impact diseases", In: Anikó Szakál (ed.) *INES 2013 – 17th International Conference on Intelligent Engineering Systems*, Costa Rica, 2013.06.19-2013.06.21. (IEEE), Budapest: IEEE Hungary Section, 2013. pp. 209-214.

2013 J Sápi, D A Drexler, I Harmati, A Szeles, B Kiss, Z Sápi, L Kovács, “Tumor growth model identification and analysis in case of C38 colon adenocarcinoma and B16 melanoma”, In: Anikó Szakál (ed.) *SACI 2013 – 8th International Symposium on Applied Computational Intelligence and Informatics,* Timisoara, Romania, 2013.05.23-013.05.25. (IEEE), Budapest: IEEE Hungary Section, 2013. pp. 303-308. (ISBN:978-4673-6400-3)

2013 B Kiss, J Sápi, L Kovács, “Imaging method for model-based control of tumor diseases”, In: Anikó Szakál (ed.) *SISY 2013 – 11th International Symposium on Intelligent Systems and Informatics*, Subotica, Serbia, 2013.09.26-2013.09.28. Budapest: IEEE Hungary Section, 2013. pp. 271-275. (ISBN:978-1-4799-0303-0)

2012 Yi-Che Changchien, Péter Tátrai, Gergő Papp, Johanna Sápi, László Fónyad, Miklós Szendrői, Zsuzsanna Pápai, Zoltán Sápi, “Poorly differentiated synovial sarcoma is associated with high expression of enhancer of zeste homologue 2 (EZH2).”, *Journal of Translational Medicine* 10: Paper 216. (2012), IF: 3.474, DOI: 10.1186/1479-5876-10-216

2012 D A Drexler, J Sápi, A Szeles, I Harmati, L Kovács, “Comparison of Path Tracking Flat Control and Working Point Linearization Based Set Point Control of Tumor Growth with Angiogenic Inhibition”, *BULETINUL STIINTIFIC AL UNIVERSITATI POLITEHNICA DIN TIMISOARA ROMANIA SERIA AUTOMATICA SI CALCULATORAE = SCIENTIFIC BULLETIN OF POLITECHNICA UNIVERSITY OF TIMISOARA TRANSACTIONS ON AUTOMATIC CONTROL AND COMPUTER SCIENCE* 57 (71):(2) pp. 113-120. (2012)

2012 Szeles Annamária, Sápi Johanna, Drexler Dániel, Harmati István, Sápi Zoltán, Kovács Levente, “Model-based Angiogenic Inhibition of Tumor Growth using Modern Robust Control Method.”, In: Balazs Benyo, Andreassen Steen, Feng David Dagan, Carson Ewart, Chase J Geoffrey, Levente Kovács (ed.), *IFAC BMS 2012 – 8th IFAC Symposium on Biological and Medical Systems*, Budapest: IFAC by Pergamon Press, 2012. pp. 113-118. (Biological and Medical Systems; 8.) ISBN: 978-3-902823-10-6

2012 Sápi Johanna, Drexler Dániel, Harmati István, Sápi Zoltán, Kovács Levente, “Linear state-feedback control synthesis of tumor growth control in antiangiogenic therapy.”, In: *SAMI 2012 – 10th International Symposium on Applied Machine Intelligence and Informatics*. Herlany, Slovakia, 2012.01.26-2012.01.28. (IEEE) Budapest: Óbuda University, pp. 143-148.(ISBN: 978-1-4577-0197-9)

2012 Kovács Levente, Ferenci Tamás, Sápi Johanna, Szalay Péter, “Népegészségügyi problémák számítógépes modellezése.”, *IME-INFORMATIKA ÉS MENEDZSMENT AZ EGÉSZSÉGÜGYBEN* XI:(8) pp. 49-55. Paper 15. (2012)

2012 Kovács Levente, Szalay Péter, Ferenci Tamás, Sápi Johanna, Sas Péter István, Drexler Dániel, Harmati István, Benyó Balázs, Kovács Adalbert, “Model-based control algorithms for optimal therapy of high-impact public health diseases.”, In: *INES 2012 – 16th International Conference on Intelligent Engineering Systems*. Lisbon, Portugal, 2012.06.13-2012.06.15. (IEEE)pp. 531-536. Paper 93. (ISBN: 978-1-4673-2695-7), DOI: 10.1109/INES.2012.6249892

2012 Drexler Dániel András, Sápi Johanna, Szeles Annamária, Harmati István, Kovács Adalbert, Kovács Levente, “Flat control of tumor growth with angiogenic inhibition.” In: *SACI 2012 – 6th International Symposium on Applied Computational Intelligence and Informatics*. Timisoara, Romania, 2012.05.24-2012.05.26. (IEEE) pp. 179-183.(ISBN: 978-1-4673-1014-7), DOI: 10.1109/SACI.2012.6249998

2011 Kovács Levente, Szalay Péter, Ferenci Tamás, Drexler Dániel András, Sápi Johanna, Harmati István, Benyó Zoltán, “Modeling and Optimal Control Strategies of Diseases with High Public Health Impact.”, In: *INES 2011 – 15th International Conference on Intelligent Engineering System*. Poprad, Slovakia, 2011.06.23-2011.06.25. (IEEE)pp. 23-28.(ISBN: 978-1-4244-8955-8), DOI: 10.1109/INES.2011.5954713

2011 Drexler Dániel András, Kovács Levente, Sápi Johanna, Harmati István, Benyó Zoltán, “Model-based analysis and synthesis of tumor growth under angiogenic inhibition: a case study.”, In: Bittanti, Sergio, Cenedese, Angelo, Zampieri, Sandro (szerk.), *IFAC WC 2011 – 18th World Congress of the International Federation of Automatic Control*. Milano, Italy, 2011.08.29-2011.09.02. (IFAC) Milano: IFAC by Pergamon Press, pp. 3753-3758. Paper 2107. (ISBN: 978-3-902661-93-7), DOI: 10.3182/20110828-6-IT-1002.02107