



Tamás Haidegger, Ph.D.

PERSONAL INFORMATION

Date of birth: Dec. 08, 1982
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Current occupation: associate professor / start-up CEO / R&D manager

RESEARCH INTERESTS

Medical robotics, Hand hygiene education and control, Image-guided surgery, Surgical education and skill assessment, Teleoperation, Control and filtering theory

ACADEMIC EXPERIENCE

- **Associate professor** *May 2016–*
Antal Bejczy Center for Intelligent Robotics, Óbuda University (ÓU), Budapest, HU
deputy director
 - Key research areas:
 - * Surgical robotics, Da Vinci Research Kit (DVRK)
 - * Ultrasound-based medical devices
 - * Cloud robotics
 - * Human-centered robotics, including health care applications
 - * Long distance teleoperation control (collaborator: “Politehnica” University of Timișoara, RO)
- **Adjunct professor** *February 2013–April 2016*
Antal Bejczy Center for Intelligent Robotics, Óbuda University (ÓU), Budapest, HU
deputy director
- **Adjunct professor** *January 2012–January 2013*
Laboratory of Biomedical Engineering, Budapest University of Technology and Economics (BME)
Dept. of Control Engineering and Information Technology (IIT), Budapest, HU
 - Key research areas:
 - * Intra-operative electromagnetic tracking
 - * Image-guided patient motion tracking and compensation
 - * Control theory for long-distance telesurgical applications
 - * Minimally invasive surgical education and training
- **Research faculty** *September 2010–December 2011*
Laboratory of Biomedical Engineering (BME IIT)
Key research area: computer-integrated surgical systems and technologies
- **Post-doctoral fellow** *May–September 2011*
Austrian Center for Medical Innovation and Technology (ACMIT), Wiener Neustadt, AT
 - Robot-aided gynecological brachytherapy (collaborator: Queens University, Kingston, ON)

- **Visiting research fellow** *January–April 2011*
Center of Biomedical Engineering and Physics, Medizinische Universität Wien (MUW), Vienna, AT
 - Robot-aided gynecological brachytherapy
 - Advisor: Prof. Wolfgang Birkfellner
- **Visiting scholar** *October 2007–October 2008*
Johns Hopkins University (JHU), Center for Computer-Integrated Surgical Systems and Technology (CISST ERC)
 - Image-guided robotic skull base drilling project
 - Advisor: Prof. Peter Kazanzides
- **Research assistant** *January–July 2004*
KFKI RMKI, Biophysics Group
 - Involvement in the RoboCup project
 - Advisor: Prof. Péter Érdi
- **R&D manager** *August 2011–*
ACMIT, Wiener Neustadt, AT
 - Key research area for *Simulation, Work-Flow and Usability Analysis (RA3)*:
 - * Computer-assisted surgical simulation, education and training
 - * Objective hand hygiene control; (collaborators: BME, HU, Hôpitaux Universitaires de Genève, CH & AKH Vienna)
- **Chief Executive Officer** *December 2012–*
HandInScan Kft., Debrecen, HU
 - Principal investigator of the research on hand hygiene control (2009–)
- **Chief Executive and Chief Technology Officer** *2011–2016*
Clariton Kft., Budapest, HU
- **Innovation consultant** *2013–2016*
BME, Technology Transfer Office, Budapest, HU
 - Mentor for student innovation projects
- **Professional intern** *September 2010–January 2011*
ACMIT, Wiener Neustadt, AT
 - Developing image guidance for robotic gynecological brachytherapy
 - Advisors: Prof. Gábor Fichtinger & Dr. Gernot Kronreif

BUSINESS
EXPERIENCE

SUMMARY OF
PUBLISHING
ACTIVITY

Complete list of publications at MTMT database

Google Scholar page

- Total number of publications: 180
- Peer reviewed publications: 116
- Patent: 1
- Independent citations: 399 & 3 recensions
- Total Impact Factor: 30.265

SUMMARY OF AD-
VISORY/TEACHING
ACTIVITY

Involvement in numerous courses

2006–

- Modern medical robots (*M.Sc.*)
- Computer-Integrated Surgery (*M.Sc.*)
- Advanced robot programming (*M.Sc.*)
- Robot control (*M.Sc.*)
- Introduction to biomedical engineering (*M.Sc.*)
- Electrical and biomedical engineering laboratories (*B.Sc. & M.Sc.*)
- Process control (*M.Sc.*)

- Fundamentals of biological and engineering systems (*M.Sc.*)
- Modern surgical techniques and technologies (*M.D. program*)

Total number of students supervised: 47

- Successful B.Sc. defenses: 2
- Successful M.Sc. defenses: 18 & 5 in progress
- Ph.D. students: 6 (co-supervising)
- Students' Scientific Circle (TDK) papers: 6

EDUCATION

Budapest University of Technology and Economics

2001–2011

Ph.D. in Electrical Engineering (2011, *summa cum laude*)

- Thesis: *Theory and Method to Enhance Computer-Integrated Surgical Systems*
- Supervisor: Prof. Zoltán Benyó
- Advisors: Prof. Imre Rudas & Prof. József Sándor

M.Sc. in Biomedical Engineering (2008, *summa cum laude*)

- BME/Semmelweis University (SE) joint program
- Thesis: *Improving the Accuracy and Safety of a Robotic System for Neurosurgery*
- Supervisors: Prof. Zoltán Benyó & Prof. Peter Kazanzides

M.Sc. in Electrical Engineering (2006, *summa cum laude*)

- Thesis: *Control of Redundant Multi-Manipulator Systems*
- Supervisors: Prof. István Harmati & Dr. Zsolt Kemény

LANGUAGE SKILLS

- *English*—fluent (*advanced level state exam*, 2000)
- *French*—intermediate (*intermediate level state exam*, 2000)
- *German*—basic

COMPUTER SKILLS

Advanced hardware and software knowledge and experience

- *Programming languages*—MATLAB, C, C++, ARPS
- *Software*—Microsoft Windows and Office products
- *Open source*—Linux, Latex, Slicer 3D

PROFESSIONAL TRAINING AND EXPERIENCE

In biomedical engineering

- Surgery for Engineers course; *Johns Hopkins Medical Institute* (2008, Baltimore, MD)
- Graduate Student Project@Singapore scholarship; *Contact Singapore* (2010, Singapore)
- Participation in the NSF/IEEE Winter School on Medical Robotics and Computer-Integrated Interventional Systems (MRCIIS); *JHU* (2009, Baltimore, MD)
- Experience@Singapore—Engineering and Technology program; *Contact Singapore* (2009, Singapore)
- Participation in the 2nd & the 3rd “Summer European University on Surgical Robotics”; *LIRMM*, (2005, 2007, Montpellier)

In innovation management

- Spin-off Management course; *Innostart Center* (2009)
- Biotech Manager course; *Hungarian Biotech Association—MBSZ* (2006–08)
- Biotechnology Leader Academy course; *Semmelweis Innovations—SI & MBSZ* (2010–11)

- Semmelweis International BioEntrepreneurship program—SIBE; *SI* (2011)
- EEF Venture Accelerator course; *European Entrepreneur Foundation & CEU Business School* (2011)
- Mentor at EIB Social Innovation Tournament Bootcamp (2013–)
- Mentor at European Institute of Technology ICT Labs Innovation Management Program (2014–)

In project & event management

- Project Management course; *Dr. Prónay & Dr. Pap* (2005)
- Involvement in numerous national and international conferences

AWARDS AND RECOGNITIONS

Awards and scholarships for scientific merit

- IEEE SA Emerging Technology Award (as member of the IEEE RAS ORA group, 2015)
- Dennis Gábor award (2014)
- Young Research Fellow of the Year—Óbuda University (2013)
- Hungarian Academy of Sciences—János Bolyai Research Scholarship (2013–16)
- 19th MMVR Medicine Meets Virtual Reality—Poster Award (2012)
- BME Doctoral Candidate Scholarship (2009/10, 2010/11)
- Werner von Siemens Excellence Award (2009)
- ATA08—Best student paper contest; finalist (2008)
- Hungarian Chamber of Engineers' Diploma Award (2008)
- Pro Progressio Foundation Diploma Scholarship (2008)
- 16th IAA Humans in Space Symposium—Poster Award; 2nd Prize (2007)
- HTE Diploma Award; 2nd Prize (2006); merit (2008)
- Infopark Foundation Diploma Award (2006)
- MATE Diploma Award; 1st Prize (2006, 2008)
- Hungarian Republic Scholarship (2005/06, 2006/07, 2007/08)
- BME University Scholarship (2004/05/I–II., 2005/06/I.)

Innovation awards

For developing Hand-in-Scan, a device enabling the objective training and control of hand hygiene

- *Swedish Chamber of Commerce Innovation Grand Prize*; in team (2016, Budapest)
- *IEEE Robotics and Automation Award for Product Innovation*; in team (2015, Seattle)
- *Újbuda Startup Grant*; in team (2015, Budapest)
- *Life Science: Science2Business*; 2nd Prize for technology transfer (2015, Vienna)
- *Innovact Campus Awards 2014*, finalist in team (2014, Reims)
- *V4 Startup Contest—Best Hungarian Startup*; award in team (2014, Rotterdam)
- *ERF2014 Entrepreneurship Workshop—Business Pitch competition*; semi-finalist (2014, Rovereto)
- *Society of Photographic Instrumentation Engineers—SPIE Startup Challenge*; semi-finalist in team (2014, San Francisco)
- *European Investment Bank Institute—EIB Social Innovation Tournament*; 1st Prize in team (2012, Luxembourg)
- *Best of Biotech—LISA MedTech* award in team; AWS, LISA (2012, Vienna)
- *European Young Innovator of the Year* award; EYIF (2012, Brussels)
- Singularity University, Global Impact Competition CEE&SEE; finalist (2012, Budapest)
- Innovact Campus Awards 2011, European Innovation Forum; 1st Prize in team (2011, Reims)
- ICPIC—*Innovation Academy award*; 1st Prize in team (2011, Geneva)

- IEEE Presidents' Challenge: Change the World; *Outstanding Student Humanitarian Prize* in team (2011)

Leadership and entrepreneurship awards

- *EIT Health InnoStars GoEurope Award*; in team (2016, Budapest)
- *Award for Successful Entrepreneurship—Start-up of the month*; Hungarian Ministry of Economics (2013)
- *European Venture Contest—Health Care* semi-finalist in team (2012, Aarhus)
- *ACES Academic Enterprise Awards—The Young Entrepreneur Award*; Science—Business (2012, Brussels)
- *Kairos 50 (K50)* recognition (2012, New York)
- JEREMIE Venture Contest; finalist in team (2011, Budapest)
- *IEEE Student Enterprise Award*; in team (2011)
- Intel Challenge—Europe, Business plan competition, semi-finalist in team (2011, Sopot)
- Spin-off Planéta, Hungarian Business Plan competition, 1st Prize in team (2011, Budapest)
- *Student Leader of the Year* award; FDE, MOSZ, HVG (2005)

Outgoing fellowships and travel awards

- Erasmus for Young Entrepreneurs fellowship; ACMIT, AT (2012–13, 4 months)
- Hungarian Eötvös post-doctoral fellowship; ACMIT, AT (2012, 6 months)
- Hungarian Eötvös post-doctoral fellowship; ACMIT, AT (2011, 5 months)
- OMAA/ÖeAD visiting researcher fellowship; MUW, AT (2011, 4 months)
- ERASMUS professional internship grant; ACMIT, AT (2010–11, 12 months)
- Hungarian–American Enterprise Scholarship Fund's (HAESF) Undergraduate Fellowship; JHU, Baltimore, MD (2007–08, 12 months)
- The Hungary Initiatives Foundation's Conference Participation Support Grant; IEEE IROS'14, Chicago, IL (2014)
- Foundation for Education PhD scholarship, NTP-OKA-VIII.-B; SPIE'12, San Diego, CA (2011)
- MICCAI Student Travel Award; MICCAI'11, Toronto, ON (2011)
- OKA Foundation Post-doctoral Travel Award, SPIE'11, Orlando, FL (2011)
- GSP@Singapore scholarship; in team, Singapore (2010)
- MMAA–RNA post-graduate grant; IROS'10, Taipei (2010)
- NIBIB/NIH Student Travel Fellowship; EMBC'09, Minneapolis, MN (2009)
- MMAA–RNA travel grant; NSF/IEEE Winter School on Medical Robotics—MRCIIS; JHU, Baltimore, MD (2009)
- Hungarian NKTH Mecenatúra travel grant (2005, '07, '08, '09)
- European Space Agency IAC Student Participation Program (2003, '04, '06)
- Hungarian Mobilitás—Youth in Action travel grant; European Youth Parliament, International session delegate, in team (2001, '02)

PROFESSIONAL
SERVICES AND
VOLUNTEERING

National expert, International Organization for Standardization (ISO/TC 184/SC 2/JWG 9, 2011–)

TC 184: Technical Committee on Automation Systems and Integration,
SC 2: Sub-Committee on Robots and Robotic Devices,
JWG 9: Joint Work Group on Standard for Medical Robots (WG 7 & IEC/SC 62A)

PD IEC/TR 60601-4-1 Ed.1 Medical electrical equipment Part 4-1: Guidance and interpretation—Medical electrical equipment and medical electrical systems employing a degree of autonomy

Delegate of the Hungarian Standards Institution (MSZT)

IEC TC62/ SC 62D & ISO TC 299 JWG 35: Medical Robots for Surgery

Member of the IEEE RAS Joint Workgroup for Ontologies for Robotics and Automation (2011–)

Co-author of the P1872/D2 Draft Standard for Ontologies for Robotics and Automation (2014)

External Reviewer and Expert on medical device software validation (2012–)

For CE Certiso Medical and Hospital Technology Clearance and Validation LLC. (Budaörs)

Advisor, International Center of Excellence in Medical Robotics—ICEMR (2011–)

IRCAD–AITS, Show Chwan Health Care System (Changhua, Taiwan)

Engineering consultant, Semmelweis University (2009–)

Surgical Skill Development Unit (Dept. of Surgical Research and Technique)

Mentor, A Journey Through Entrepreneurship program (2012)

US Embassy–Semmelweis Innovations Entrepreneurship Course

Memberships in professional organizations

- **Institute of Electrical and Electronics Engineers—IEEE (2007–)**
 - * Robotics and Automation Society (RAS)
 - Industrial Activities Board; RAM column rep. (2016–)
 - Member Services Committee chair (2012–2015)
 - Young Professional Representative (2014–2015)
 - Student Activities Committee chair (2010–11, 2 years)
 - Improved the undergraduate membership by 79%, +537 members*
 - Founder of the Student Reviewing Program* Hungary Chapter vice chair; IES/RAS Section chair (2015–)
 - * Engineering in Medicine and Biology Society (EMBS)
 - * Industrial Electronics Society (IES)
 - * Systems, Man, and Cybernetics Society (SMC)
 - Technical Committee on Computational Cybernetics*
- **EURobotics aisbl (2013–)**
 - * Topical Group on Standards (2013–)
- **Scientific Society of Measurement, Automation and Informatics—MATE (2006–)**
 - * Secretary of the Control Engineering Chapter (2007–2015)
- **Electrical Engineering Students' Hungarian Association—MAVE (2002–2006)**
 - * Alumni (2006–)
 - * Member of the board (2003–05)
- MTA—Hungarian Academy of Sciences, Public Body, VI. Section on Engineering Sciences (2011–)
- Society for Medical Innovations and Technology—SMIT (2009–)
- Hungarian Astronautical Society—MANT (2008–)
- Scientific Society of Mechanical Engineering—GTE (2008–)
- John von Neumann Computer Society—NJSZT (2004–)
- Society of Photographic Instrumentation Engineers—SPIE (2010–2014)
- Medical Image Computing and Computer Assisted Intervention Society—MICCAI (2011–2014)
- Scientific Association for Infocommunications Hungary—HTE (2004–2015)

Conference organizing committees

- 2016 IEEE SMC Conf. Special Session on Knowledge-based and Intelligent Control Solutions for Medical Cyber-Physical Systems (co-organizer, 2016, Budapest)
- 6th Workshop on Computer/Robot Assisted Surgery—CRAS (program committee, 2016, Pisa)
- 7th IEEE CogInfoCom Conf. (intl. organizing committee, 2016, Wroclaw)
- 6th Workshop on Computer/Robot Assisted Surgery—CRAS (program committee, 2016, Pisa)
- 6th International workshop on safety standardization for medical robotics – ERF (co-chair, 2016, Ljubljana)
- 6th Ontologies for Robots Workshop – ERF (co-chair, 2016, Ljubljana)
- 11th IEEE International Symposium on Applied Computational Intelligence and Informatics (program committee, 2016, Timisoara)
- 5th Workshop on Computer/Robot Assisted Surgery—CRAS (program committee, 2015, Brussels)
- RoboBusiness, Robotics Business Review (awards committee, 2015, San Jose, CA)
- ROBOT’2015 – Second Iberian Robotics Conference (program committee, 2015, Lisbon)
- Shared Frameworks for Medical Robotics Research Workshop—IEEE ICRA (co-chair, 2015, Seattle)
- 27th IEEE Intl. Conf. on Intelligent Robot and Systems—IROS (exhibition co-chair, 2015, Hamburg)
- IEEE Intl. Colloquium: Robotics in the 21st Century: New Frontiers (program chair, 2015, Budapest)
- 5th Hardware and software modularity and inter-operability in Service Robotics: Toward standardisation—ERF (co-chair, 2015, Vienna)
- 13th International Symposium on Applied Machine Intelligence and Informatics (technical program committee, 2015, Herl’any)
- 26th IEEE Intl. Conf. on Intelligent Robot and Systems—IROS (exhibition co-chair, 2014, Chicago)
- Human–Robot Collaboration in Standardization and R&D Activities Workshop—IEEE IROS (co-chair, 2014, Chicago)
- Standardized Knowledge Representations and Ontologies for Robotics and Automation—IEEE IROS (co-chair, 2014, Chicago)
- 4th Workshop on Computer/Robot Assisted Surgery—CRAS (program committee, 2014, Genova)
- IEEE 18th Intl. Conf. on Intelligent Engineering Systems—INES (program committee, 2014, Tihany)
- IEEE International Symposium on Robotics, Manufacturing and Automation—RoMA (intl. advisory committee, 2014, Kuala Lumpur)
- Hungarian Surgical Society—Section of Surgical Endoscopy, XV. Congress (Herceghalom, 2013)
- 3rd Joint Workshop on New Technologies for Computer/Robot Assisted Surgery – CRAS (program committee, 2013, Verona)
- 9th IEEE International Conference on Computational Cybernetics—ICCC (program co-chair, 2013, Tihany)
- Co-organizer of the *EuroSurge—Technology Transfer and Innovation in Robotic Surgery Workshop, European Robotics Forum* (co-organizer, 2013, Lyon)
- International organizer of the *IRCAD/IEEE B.E.S.T. Innovation in Minimally Invasive Surgery* course (2012, Strasbourg)
- IFAC Symposium on Biological and Medical Systems—BMS (2012, Budapest)
- IEEE RAS/EMBS Intl. Conf. on Biomedical Robotics and Biomechatronics—BioRob (2012, Rome)
- MAVe–BME 1st Intl. Workshop on Computer-Integrated Surgery (chair, 2011, Budapest)
- IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems—IROS (2011, San Francisco)

- IEEE/ASME Intl. Conf. on Advanced Intelligent Mechatronics—AIM11 (2011, Budapest)
- EU FP7 Future and Emerging Technologies—FET11; Budapest (2011)
- Main organizer of the *1st BME–MAVE International Workshop on Computer-Integrated Surgery* (2011, Budapest)
- 1st Intl. Conf. on Applied Bionics and Biomechanics—ICABB (2010, Venice)
- Main organizer of the *MATE CIS Symposia I–II* (2008–09, Budapest)
- Co-organizer of the *GE Healthcare–MAVE seminar series on medical software* (2008–09, Budapest)
- Head organizer of the *ACM–ICPC Central European Programming Competition’s regional finals* (2004–06, Budapest)
- Involvement in the organization of the *International 24-hour Programming Contest* for 5 years (head organizer 2004–05, Budapest)

Publishing/editorial service

- **Editor:**

- * Associate editor for the IEEE Robotics and Automation Magazine – special issue on *Enabling Autonomous Robots Through Knowledge Representation*, IF: 1.838 (2016)
- * Editor for the International Journal of Computer Assisted Radiology and Surgery (Springer), IF: 1.707 (2016–18)
- * Associate editor for IEEE Robotics and Automation Letters (2015–)
- * Editorial board member: International Journal of Advanced Robotic Systems (INTECH), IF: 0.526 (2015–)
- * Column editor for IEEE Robotics and Automation Magazine, IF: 2.413 (2014–)
- * Associate Editor: OA Robotic Surgery (EIJARS), (2014–)
- * Associate Editor/Track Chair for Acta Polytechnica Hungarica (Óbuda Univeristy), IF: 0.649 (2014–2015)
- * Associate Editor for Journal of Infectious Diseases Letters, Bioinfo Publications (2013–16)
- * Associate Editor for World Research Journal of Medical Science, Bioinfo Publications (2013–16)
- * Guest editor of a special issue of the J. of Artificial Intelligence in Medicine; on “AI Methods in Telesurgery” (2013)
- * “Proc. of the MAVE–BME 1st Intl. Workshop on Computer-Integrated Surgery,” ed., T. Haidegger. *BME*, Budapest, pp. 1–55, 2011, (*in press*).
- * “Proc. of the BME–MATE CIS Mini-Symposia I–II. (*in Hungarian*),” eds., Z. Benyó, J. Somló & T. Haidegger. *BME*, Budapest, ISBN: 978-963-421-589-9, pp. 1–52, 2009.
- * D. Marx & B. Bendek, “International 24-hour Programming Contest, 2000–2005: Problem Sets,” ed., T. Haidegger. *PANEM*, Budapest, ISBN: 963-54-5460-0, pp. 1–233, 2006.

- **Reviewing for conferences:** IEEE/RJS IROS, IEEE ICRA, IEEE EMBC, IEEE BioRob, IEEE ICAISC, RAAD, Automatica, ICABB, SPIE–MI, MICCAI, IFAC WC, ICAISC, RMC, SYROCO, UbiRobot, IEEE CINTI, IEEE SACI, IEEE RITA, IEEE ICC

- **Reviewing for journals:** IEEE Trans. on Biomedical Engineering, IEEE Trans. on Mechatronics, IEEE Trans. on Automation Science and Engineering, Intl. J. of Computer Assisted Radiology, J. of Healthcare Engineering, Surgery, J. of Women’s Health, J. of Artificial Intelligence in Medicine, J. of Artificial Intelligence in Medicine, Australian Journal of Mechanical Engineering, J. of Aeronautics & Aerospace Engineering, Acta Polytechnica, Medical Physics, Industrial Robot

OTHER SKILLS AND
EXPERIENCE

- Extensive experience in organizing international professional events
- Ability to work in team, either as a leader or a member
- Good communication skills; fluent in negotiating
- Experience as a translator (English–Hungarian)
- B category driving licence (2003–)

HOBBIES

- Rock climbing, mountaineering, photography
- Professional blog on surgical robotics: SurgRob.blogspot.com (2007–)

Budapest, 2016