IULIAN IOAN IORDACHITA Ph.D.
Research Professor

Department of Mechanical Engineering
Whiting School of Engineering, Johns Hopkins University
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Updated: September 15, 2022

RESEARCH INTERESTS

Robotics / Medical Robotics / Surgical Robotics
Medical Instrumentation / Smart Surgical Tools
Image-Guided Surgery / Computer Assisted Surgery
Mechanisms and Mechanical Transmissions for Robots

EDUCATION

03/2000-08/2000: **Post-Doctoral Fellow** in Medical Robotics, Brady Urological Institute, School of Medicine, Johns Hopkins University, Baltimore, MD, USA;

01/1992-11/1996: **Doctor Engineer Diploma** (equivalent to **Ph.D.)** in Mechanical Engineering, University of Craiova, Romania

Dissertation: *Contributions to the study of biologically-inspired mechanisms for dragging locomotion.*

09/1988-06/1989: **Diploma of Advanced Studies** (equivalent to **MS**), in Industrial Robots, University of Craiova, Romania,

Thesis: *Mechanical Hands for Industrial Robots*

09/1979–06/1984: **Mechanical Engineer Diploma** (equivalent to **BS** & **MS**), Specialization - Technology of Mechanical Engineering, University of Craiova, Romania

Thesis: *Industrial Robot actuated with Pneumatic Motors*

09/1974-05/1978: **Diploma of Baccalaureate**, “Nicolae Titulescu” High School, Craiova, Romania

PROFESSIONAL EXPERIENCE

07/2019 – cont.: **Research Professor,** Department of Mechanical Engineering, Whiting School of Engineering, Johns Hopkins University, Baltimore, MD, USA - research activity

07/2014 – 06/2019: **Associate Research Professor,** Department of Mechanical Engineering, Whiting School of Engineering, Johns Hopkins University, Baltimore, MD, USA - research activity

11/2009 – 06/2014: **Assistant Research Professor,** Department of Mechanical Engineering, Whiting School of Engineering, Johns Hopkins University, Baltimore, MD, USA - research activity

07/2007 – 10/2009: **Assoc. Research Scientist,** Center for Computer-Integrated Surgical Systems and Technology, Johns Hopkins University, Baltimore, MD, USA - research activity

04/2004 – 06/2007: **Research Engineer**, Center for Computer-Integrated Surgical Systems and Technology, Johns Hopkins University, Baltimore, MD, USA - research activity

10/2003 – 03/2004: **Associate Professor**, School of Mechanical Engineering, University of Craiova, Romania – teaching and research activity

10/2002 – 09/2003: **Visiting Associate Professor**, Graduate School of Frontier Sciences, The University of Tokyo, JAPAN - research activity

10/1998 – 09/2002: **Associate Professor**, School of Mechanical Engineering, University of Craiova, Romania – teaching and research activity

10/1993 – 09/1998: **Senior Lecturer**, School of Mechanical Engineering, University of Craiova, Romania – teaching and research activity

09/1990 – 09/1993: **Assistant Professor**, School of Mechanical Engineering, University of Craiova, Romania – teaching and research activity

10/1986 – 08/1990: **Research-Design Engineer**, Research and Technology Institute for Electric Motors, Transformers and Electric Apparatus, Craiova, Romania – design and research activity

09/1984 – 09/1986: **Mechanical Engineer**, S.C. “Electroputere” SA, Craiova, Romania, Tools Factory – manufacturing process design activity

TEACHING EXPERIENCE

09.2015 – 12.2018: JHU, WSE, Mechanical Engineering Department:
- **EN.530.403, Engineering Design Project I** (part time)

02.2015 – 05.2019: JHU, WSE, Mechanical Engineering Department:
- **EN.530.404, Engineering Design Project II** (part time)

10.1998 – 03.2004: Associate Professor, School of Mechanical Engineering, University of Craiova, Romania:
- **Industrial Robots** – Course, Laboratory experiments;
- **Mechanical Structures for Robots and Manipulators** – Course, Laboratory experiments, Project, Seminar;
- **Machine Components Design** - Course, Laboratory experiments, Project;
- **Special Mechanisms and Mechanical Transmisions for Robots** - Course, Laboratory experiments, Project, Seminar;
- **Machine Design Optimization** - Course, Project, Seminar (2002-2004, new course).

10/1993 – 09/1998: Senior Lecturer, School of Mechanical Engineering, University of Craiova, Romania:
- **Industrial Robots** – Course, Laboratory experiments (new course);
- **Mechanical Structures for Robots and Manipulators** – Course, Laboratory experiments, Project, Seminar (new course);
- **Machine Components Design** - Course, Laboratory experiments, Project;
- **Mechanisms and Machines Theory** - Course, Laboratory experiments, Project, Seminar;

09/1990 – 09/1993: Assistant Professor, School of Mechanical Engineering, University of Craiova, Romania:
- **Machine Components Design** – Laboratory experiments, Project, Seminar;
- **Mechanisms and Machines Theory** – Laboratory experiments, Project, Seminar;

AWARDS

2022: Best Student Paper Award (for student Junxiang Wang), ISMR 2022
2022: Best Paper Award - 2nd Place (for students Kaiyu Shi, Yishun Zhou), ISMR 2022
2020: Best Paper Award - Finalist, IEEE IROS 2020
2019: Best Paper Award in Medical Robotics, ICRA 2019
2019: Best Symposium Poster Award, ISMR 2019
2019: Best Student Paper Award (for student Shahriar Sefati), ISMR 2019
2015: Best Paper Award, IEEE MFI 2015
2014: Best Medical Application Paper Award, IEEE Sensor 2014
2014: Best Student Paper Award (for student Berk Gonenc), IEEE Sensor 2014

2014: Best Student Paper Award - Finalist (for student Xingchi He), IEEE ICRA 2014
2014: Senior Member, IEEE
2012: Best Poster Award, 2nd Place, CARS 2012
2010: Best Poster Award, Hamlyn Symposium 2010

PUBLICATIONS

Books and Textbooks

[B1] Popescu, I., **Iordachita, I.,** Dumitru, N., Rinderu, P. *Biological Mechanisms,* SITECH Publishing House, Craiova, Romania, ISBN 973-97524-9-1, 1997, (in Romanian).
[B2] **Iordachita, I.** *Special Mechanisms and Mechanical Transmissions for Industrial Robots,* University of Craiova, Publishing House, 1997, (in Romanian).
[B3] **Iordachita, I**. *Industrial Robots,* University of Craiova, Publishing House, 1997, (in Romanian);
[B4] Catrina, G., Dumitru, N., Ilie, E., **Iordachita, I.,** Margine, A., Rosca, D. *Machine Parts. Practical Applications Guide,* University of Craiova, Publishing House, 1994, (in Romanian);

Books Chapters

[B5] Tosi, D., Poeggel, S., **Iordachita, I.,** and Schena, E., "Fiber Optic Sensors for Biomedical Applications." In *Opto-Mechanical Fiber Optic Sensors*, pp. 301-333. 2018, https://doi.org/10.1016/B978-0-12-803131-5.00011-8
[B6] Vander Poorten, E., Riviere, C.N., Abbott, J.J., Bergeles, C., Nasseri, M.A., Kang, J.U., Sznitman, R., Faridpooya, K. and **Iordachita, I**., Robotic Retinal Surgery. In *Handbook of Robotic and Image-Guided Surgery* (pp. 627-672). Oct.2019. Elsevier.
[B7] Deng, Z., Xu, X., Dehghani, H., Sforza, D.M., **Iordachita, I**., Lim, M., Wong, J.W. and Wang, K.K.H., "Quantitative Bioluminescence Tomography for In Vivo Volumetric-Guided Radiotherapy." In *Biomedical Engineering Technologies* (pp. 701-731). Dec. 2021 Humana, New York, NY., https://doi.org/10.1007/978-1-0716-1803-5_38,

Journal Papers

[J1] Patel, N., Urias, M., Ebrahimi, A., Taylor, R.H., Gehlbach, P. and **Iordachita, I**., "Force-Based Control for Safe Robot-Assisted Retinal Interventions: In Vivo Evaluation in Animal Studies." *IEEE Transactions on Medical Robotics and Bionics*, vol.4, no. 3, pp.578-587, Aug. 2022, DOI: 10.1109/TMRB.2022.3191441,
[J2] Deng, Z., Xu, X., **Iordachita, I.,** Dehghani, H., Zhang, B., Wong, J.W. and Wang, K.K.H., "Mobile bioluminescence tomography-guided system for pre-clinical radiotherapy research." *Biomedical Optics Express*, vol.13, no. 9, pp.4970-4989. Sep. 2022, DOI: 10.1364/BOE.460737
[J3] Ebrahimi, A., Sefati, S., Gehlbach, P., Taylor, R.H. and **Iordachita, I.I**., "Simultaneous Online Registration-Independent Stiffness Identification and Tip Localization of Surgical Instruments in Robot-Assisted Eye Surgery." *IEEE Transactions on Robotics*. Vol. xx, no. x, On-line Sep 9, 2022
[J4] **Iordachita, I.I**., de Smet, M.D., Naus, G., Mitsuishi, M., and Riviere, C.N., "Robotic Assistance for Intraocular Microsurgery: Challenges and Perspectives," in *Proceedings of the IEEE*, vol. 110, no. 7, pp. 893-908, Jul. 2022, DOI: 10.1109/JPROC.2022.3169466.
[J5] Sommersperger, M., Martin-Gomez, A., Mach, K., Gehlbach, P.L., Nasseri, M.A., **Iordachita, I**. and Navab, N., "Surgical scene generation and adversarial networks for

physics-based iOCT synthesis." *Biomedical Optics Express*, vol. 13, no. 4, pp. 2414-2430, Apr. 2022, https://doi.org/10.1364/BOE.454286

[J6] Su, H., Kwok, K.W., Cleary, K., **Iordachita, I**., Cavusoglu, M.C., Desai, J.P., and Fischer, G.S., "State of the Art and Future Opportunities in MRI-Guided Robot-Assisted Surgery and Interventions." *Proceedings of the IEEE*. vol. 110, no. 7, pp. 968-992, Jul. 2022, DOI: 10.1109/JPROC.2022.3169146.

[J7] Saeedi-Hosseiny, M.S., Alruwaili, F., McMillan, S., **Iordachita, I**. and Abedin-Nasab, M.H., "A Surgical Robotic System for Long-Bone Fracture Alignment: Prototyping and Cadaver Study." *IEEE Transactions on Medical Robotics and Bionics*. vol. 4, no. 1, pp.172-182, Feb. 2022, DOI: 10.1109/TMRB.2021.3129277

[J8] Alamdar, A., Patel, N., Urias, M.G., Ebrahimi, A., Gehlbach, P.L. and **Iordachita, I.,** "Force and Velocity Based Puncture Detection in Robot Assisted Retinal Vein Cannulation: in-vivo Study". *IEEE Transactions on Biomedical Engineering*. vol. 69, no. 3, pp.1123-1132, Mar. 2022, DOI: 10.1109/TBME.2021.3114638

[J9] Xu, X., Deng, Z., Dehghani, H., **Iordachita, I.**, Lim, M., Wong, J.W. and Wang, K.K.H., "Quantitative Bioluminescence Tomography-guided Conformal Irradiation for Pre-clinical Radiation Research". *International Journal of Radiation Oncology* Biology* Physics*., vol. 111, no. 5, pp 1310-1321, Dec. 2021, https://doi.org/10.1016/j.ijrobp.2021.08.010

[J10] Zhou, M., Wu, J., Ebrahimi, A., Patel, N., Liu, Y., Navab, N., Gehlbach, P., Knoll, A., Nasseri, M.A. and **Iordachita, I.I**., "Spotlight-based 3D Instrument Guidance for Autonomous Task in Robot-assisted Retinal Surgery". In *IEEE Robotics and Automation Letters*, vol. 6, no. 4, pp. 7750-7757, Jul. 2021 doi:10.1109/LRA.2021.3100937

[J11] Sefati, S., Hegeman, R., **Iordachita, I.**, Taylor, R.H. and Armand, M., "A Dexterous Robotic System for Autonomous Debridement of Osteolytic Bone Lesions in Confined Spaces: Human Cadaver Studies." *IEEE Transactions on Robotics*. vol. 38, no. 2, pp. 1213- 1229, Apr. 2022, doi: 10.1109/TRO.2021.3091283.

[J12] Patel, N., Yan, J., Li, G., Monfaredi, R., Priba, L., Donald-Simpson, H., Joy, J., Dennison, A., Melzer, A., Sharma, K., **Iordachita, I.I.**, and Cleary, K., "Body-mounted Robotic System for MRI-guided Shoulder Arthrography: Cadaver and Clinical Workflow Studies MRI-guided Robot for Shoulder Arthrography." *Frontiers in Robotics and AI*, vol.8, 10 pages, art. # 667121, May 2021. https://doi.org/10.3389/frobt.2021.667121

[J13] Jinno, M. and **Iordachita, I**., "Improved Integrated Robotic Intraocular Snake: Analyses of the Kinematics and Drive Mechanism of the Dexterous Distal Unit." *Journal of Medical Robotics Research*. vol. 06, no.01n02, pp.1-13, p. 2140001, May 2021, https://doi.org/10.1142/S2424905X21400018.

[J14] Ebrahimi, A., Urias, M., Patel, N., Taylor, R.H., Gehlbach, P.L. and **Iordachita, I**., "Adaptive Control Improves Sclera Force Safety in Robot-Assisted Eye Surgery: A Clinical Study." *IEEE Transactions on Bio-Medical Engineering*. vol. 68, no.11, pp.3356-3365, Nov. 2021, DOI: 10.1109/TBME.2021.3071135

[J15] Rezaee, M., **Iordachita, I**. and Wong, J.W., "Ultrahigh dose-rate (FLASH) X-Ray irradiator for pre-clinical laboratory research." *Physics in Medicine & Biology*. vol. 66, no. 9, pp.1-10, p. 095006, Apr. 2021, https://doi.org/10.1088/1361-6560/abf2fa

[J16] Dai, J., He, Z., Fang, G., Wang, X., Li, Y., Cheung, C.L., Liang, L., **Iordachita, I.I**., Chang, H.C. and Kwok, K.W., "A Robotic Platform to Navigate MRI-guided Focused Ultrasound System." *IEEE Robotics and Automation Letters*. vol. 6, no. 3, pp.5137-5144, Jul. 2021, DOI: 10.1109/LRA.2021.3068953

[J17] Sommersperger, M., Weiss, J., Nasseri, M.A., Gehlbach, P., **Iordachita, I**. and Navab, N., "Real-time tool to layer distance estimation for robotic subretinal injection using intraoperative 4D OCT." *Biomedical Optics Express*, vol.12, no.2, pp.1085-1104. Feb. 12, 2021, https://doi.org/10.1364/BOE.415477

[J18] Li, G., Patel, N.A., Sharma, K., Monfaredi, R., Dumoulin, C., Fritz, J., **Iordachita, I**. and Cleary, K., "Body-Mounted Robotics for Interventional MRI Procedures." *IEEE Transactions on Medical Robotics and Bionics*, vol. 2, no. 4, pp.557-560, On-line 13 Oct. 2020, DOI: 10.1109/TMRB.2020.3030532

[J19] Sefati, S., Gao, C., **Iordachita, I**., Taylor, R.H. and Armand, M., 2020. Data-Driven Shape Sensing of a Surgical Continuum Manipulator Using an Uncalibrated Fiber Bragg Grating Sensor. *IEEE Sensors Journal*. vol. xx, no. x, pp.1-12, On-line 01 Oct. 2020, DOI: 10.1109/JSEN.2020.3028208

[J20] Ebrahimi, A., Alambeigi, F., Sefati, S., Patel, N., He, C., Gehlbach, P.L. and **Iordachita, I**., "Stochastic Force-based Insertion Depth and Tip Position Estimations of Flexible FBG-Equipped Instruments in Robotic Retinal Surgery." *IEEE/ASME Transactions on Mechatronics*. vol. 26, no. 3, pp.1512-1523, Jun. 2021, DOI: 10.1109/TMECH.2020.3022830

[J21] Sefati, S., Hegeman, R., Alambeigi, F., **Iordachita, I.**, Kazanzides, P., Khanuja, H., Taylor, R. and Armand, M., "A Surgical Robotic System for Treatment of Pelvic Osteolysis Using an FBG-Equipped Continuum Manipulator and Flexible Instruments." *IEEE/ASME Transactions on Mechatronics*., vol. xx, no. x, pp.1-12, On-line 30 Aug. 2020, DOI: 10.1109/TMECH.2020.3020504

[J22] Urias, M.G., Patel, N., Ebrahimi, A., **Iordachita, I**. and Gehlbach, P.L., "Robotic Retinal Surgery Impacts on Scleral Forces: In Vivo Study." *Translational Vision Science & Technology*, vol. 9, no. 10, pp. 109, Sep. 2020, https://doi.org/10.1167/tvst.9.10.2

[J23] Lo Presti, D., Massaroni, C., Leitão, C.S.J., Domingues, M.F., Sypabekova, M., Barrera, D., Floris, I., Massari, L., Oddo, C.M., Salvador Sales, S., **Iordachita, I.I**., Daniele Tosi, D., Emiliano Schena, E., "Fiber Bragg Gratings for medical applications and future challenges: a review," in IEEE Access, vol. 8, pp. 156863-156888, Sep. 2020, DOI: 10.1109/ACCESS.2020.3019138

[J24] Tsumura, R., **Iordachita, I**. and Iwata, H., Fine-Needle Insertion Method for Minimizing Deflection in Lower-Abdomen: In Vivo Evaluation. *The International Journal of Medical Robotics and Computer Assisted Surgery*, p.e2139. vol. 16, no. 6, pp.1-12, Dec. 2020, https://doi.org/10.1002/rcs.2139

[J25] Li, G., Patel, N., Melzer, A., Sharma, K., **Iordachita, I.I,** and Cleary, K., "MRI-guided lumbar spinal injections with body-mounted robotic system: cadaver studies." Minimally Invasive Therapy & Allied Technologies, vol. 31, no. 2, pp.297-305, Feb. 2022, DOI: 10.1080/13645706.2020.1799017

[J26] Li, G., Patel, N., Wang, Y., Dumoulin, C., Loew, W., Loparo, O., Schneider, K., Sharma, K., Cleary, K., Fritz, J. and **Iordachita, I.I**., "Fully Actuated Body-Mounted Robotic System for MRI-Guided Lower Back Pain Injections: Initial Phantom and Cadaver Studies." *IEEE Robotics and Automation Letters*. vol. 5, no. 4, pp.5245-5251, Jul. 2020, 10.1109/LRA.2020.3007459

[J27] He, C., Yang, E., Patel, N., Ebrahimi, A., Shahbazi, M., Gehlbach, P.L., and **Iordachita, I**., "Automatic Light Pipe Actuating System for Bimanual Robot-Assisted Retinal Surgery" *IEEE/ASME Transactions on Mechatronics*. vol. xx, no. xx, pp.1-11, 2020, Online May 22 2020, DOI: 10.1109/TMECH.2020.2996683

[J28] Li, Z., Shahbazi, M., Patel, N., Sullivan, E.O., Zhang, H., Vyas, K., Chalasani, P., Deguet, A., Gehlbach, P.L., **Iordachita, I.,** Yang, G.Z., and Taylor, R.H., "Hybrid Robotic-assisted Frameworks for Endomicroscopy Scanning in Retinal Surgeries." *IEEE Transactions on Medical Robotics and Bionics*, vol. 2, no. 2, pp. 176-187, May 2020, https://doi.org/10.1109/TMRB.2020.2988312

[J29] Phalen, H., Vagdargi, P., Schrum, M.L., Chakravarty, S., Canezin, A., Pozin, M., Coemert, S., **Iordachita, I.**, Hoffman, S.L., Chirikjian, G.S. and Taylor, R.H., 2020. "A Mosquito Pick-and-Place System for PfSPZ-based Malaria Vaccine Production", *IEEE Transactions on*

Automation Science and Engineering, vol. x, no. xx, pp. 1-12, Early Access May 2020. https://doi.org/10.1109/TASE.2020.2992131

[J30] Urias, M.G., Patel, N., He, C., Ebrahimi, A., Kim, J.W., **Iordachita, I**. and Gehlbach, P.L., "Artificial intelligence, robotics and eye surgery: are we overfitted?" *International Journal of Retina and Vitreous*, vol.5, no.1, pp.1-4. Dec. 2019. https://doi.org/10.1186/s40942-019-0202-y

[J31] Deng, Z., Xu, X., Garzon-Muvdi, T., Xia, Y., Kim, E., Belcaid, Z., Luksik, A., Maxwell, R., Choi, J., Wang, H., Yu, J., **Iordachita, I.,** Lim, M., Wong. J., and Wang, K., "In vivo Bioluminescence Tomography Center of Mass-Guided Conformal Irradiation." *International Journal of Radiation Oncology* Biology* Physics*. vol. 106, no. 3, pp. 612-620, Mar. 2020, https://doi.org/10.1016/j.ijrobp.2019.11.003

[J32] He, C.Y., Patel, N., Kobilarov, M. and **Iordachita, I**., "Real Time Prediction of Sclera Force with LSTM Neural Networks in Robot-Assisted Retinal Surgery." In *Applied Mechanics and Materials* , vol. 896, pp. 183-194 Trans Tech Publications Ltd. Feb. 2020, https://www.scientific.net/AMM.896.183

[J33] Li, G., Patel, N.A., Hagemeister, J., Yan, J., Wu, D., Sharma, K., Cleary, K. and **Iordachita, I.,** "Body-mounted robotic assistant for MRI-guided low back pain injection." *International Journal of Computer Assisted Radiology and Surgery*, vol. 15, no. 2, pp. 321-331, Feb. 2020. https://doi.org/10.1007/s11548-019-02080-3

[J34] Alambeigi, F., Pedram, S.A., Speyer, J.L., Rosen, J., **Iordachita, I.**, Taylor, R.H. and Armand, M., 2019. SCADE: SimultaneoSensor Calibration and Deformation Estimation of FBG-Equipped Unmodeled Continuum Manipulators. *IEEE Transactions on Robotics*, vol.36, no. 1, pp. 222-239. Feb. 2020. 10.1109/TRO.2019.2946726

[J35] Huang, P., Su, L., Chen, S., Cao, K., Song, Q., Kazanzides, P., **Iordachita, I**., Bell, M.A.L., Wong, J.W., Li, D. and Ding, K., "2D ultrasound imaging based intra-fraction respiratory motion tracking for abdominal radiation therapy using machine learning." *Physics in Medicine & Biology*, vol. 64, no. 18, p. 185006, Sep. 2019. https://iopscience.iop.org/article/10.1088/1361-6560/ab33db/meta

[J36] Beisenova, A., Issatayeva, A., **Iordachita, I**., Blanc, W., Molardi, C. and Tosi, D., "Distributed fiber optics 3D shape sensing by means of high scattering NP-doped fibers simultaneous spatial multiplexing". *Optics Express*, vol. 27, no. 16, pp.22074-22087. Aug. 2019, https://doi.org/10.1364/OE.27.022074

[J37] He, C., N. Patel, M. Shahbazi, Y. Yang, P. L. Gehlbach, M. Kobilarov, and **I. Iordachita**. "Toward Safe Retinal Microsurgery: Development and Evaluation of an RNN-based Active Interventional Control Framework." *IEEE transactions on bio-medical engineering*, vol. 67, no. 4, pp. 966-977, Apr. 2020, 10.1109/TBME.2019.2926060

[J38] He, C., Patel, N., Ebrahimi, A., Kobilarov, M. and **Iordachita, I**., "Preliminary study of an RNN-based active interventional robotic system (AIRS) in retinal microsurgery." *International journal of computer assisted radiology and surgery*, vol. 14, no. 6, pp. 945-954, Jun 2019. https://doi.org/10.1007/s11548-019-01947-9

[J39] Patel, N., Yan, J., Monfaredi, R., Sharma, K., Cleary, K. and **Iordachita, I.**, "Preclinical evaluation of an integrated robotic system for magnetic resonance imaging guided shoulder arthrography." *Journal of Medical Imaging*, vol. *6, no.* 2, p.025006. May 2019, https://doi.org/10.1117.1.JMI.6.2.025006

[J40] Alambeigi, F., Bakhtiarinejad, M., Sefati, S., Hegeman, R., **Iordachita, I**., Khanuja, H. and Armand, M., "On the Use of a Continuum Manipulator and a Bendable Medical Screw for Minimally-Invasive Interventions in Orthopedic Surgery." *IEEE Transactions on Medical Robotics and Bionics*. Vol. 1, no. 1, pp. 14-21, Feb. 2019, https://ieeexplore.ieee.org/document/8627979

[J41] Moreira, P., Patel, N., Wartenberg, M., Li, G., Tuncali, K., Heffter, T., Burdette, E.C., **Iordachita, I.**, Fischer, G.S., Hata, N. and Tempany, C.M., "Evaluation of robot-assisted

MRI-guided prostate biopsy: needle path analysis during clinical trials." *Physics in medicine and biology*. vol. 63, no. 20, p.20NT02 (9p), Oct. 2018. http://iopscience.iop.org/article/10.1088/1361-6560/aae214

[J42] Monfaredi, R., **Iordachita, I.**, Wilson, E., Sze, R., Sharma, K., Krieger, A., Fricke, S. and Cleary, K., "Development of a shoulder-mounted robot for MRI-guided needle placement: phantom study." *International Journal of Computer Assisted Radiology and Surgery*, vol. 13, no.11, pp.1829-1841. Nov. 2018. https://doi.org/10.1007/s11548-018-1839-y

[J43] Wartenberg, M., Schornak, J., Gandomi, K., Carvalho, P., Nycz, C., Patel, N., **Iordachita, I.**, Tempany, C., Hata, N., Tokuda, J. and Fischer, G.S., "Closed-Loop Active Compensation for Needle Deflection and Target Shift During Cooperatively Controlled Robotic Needle Insertion." *Annals of biomedical engineering*, pp.1-13. Jun. 2018 https://doi.org/10.1007/s10439-018-2070-2

[J44] Patel, N.A., Li, G., Shang, W., Wartenberg, M., Heffter, T., Burdette, E.C., **Iordachita, I.,** Tokuda, J., Hata, N., Tempany, C.M. and Fischer, G.S., "System Integration and Preliminary Clinical Evaluation of a Robotic System for MRI-Guided Transperineal Prostate Biopsy," *Journal of Medical Robotics Research*. vol. 4, no. 02, pp. 1950001, Jun. 2019, https://doi.org/10.1142/S2424905X19500016

[J45] Tsumura, R., Kim, J.S., Iwata, H., **Iordachita, I.I**., "Preoperative Needle Insertion Path Planning for Minimizing Deflection in Multi-layered Tissues." *IEEE Robotics and Automation Letters.* vol. 3, no. 3, pp.2129-2136, Jul. 2018, https://doi.org/10.1109/LRA.2018.2809540

[J46] Gonenc, B., Chae, J., Gehlbach, P., Taylor, R.H., and **Iordachita, I.,** "Towards Robot-Assisted Retinal Vein Cannulation: A Motorized Force-Sensing Microneedle Integrated with a Handheld Micromanipulator." *Sensors.* vol. 17, no.10. p. 2195 (25 pg.) Sep. 2017. https://doi.org/10.3390/s17102195

[J47] Su, L., **Iordachita, I.,** Zhang, Y., Lee, J., Ng, S.K., Jackson, J., Hooker, T., Wong, J., Herman, J.M., Sen, H.T. and Kazanzides, P., "Feasibility study of ultrasound imaging for stereotactic body radiation therapy with active breathing coordinator in pancreatic cancer." *Journal of Applied Clinical Medical Physics*. vol. 18, no. 4, pp.84-96, Jul. 2017. https://doi.org/10.1002/acm2.12100

[J48] Alambeigi, F., Wang, Y., Sefati, S., Gao, C., Murphy, R.J., **Iordachita, I.,** Taylor, R.H., Khanuja, H. and Armand, M., "A curved-drilling approach in core decompression of the femoral head osteonecrosis using a continuum manipulator." *IEEE Robotics and Automation Letters*, vol. 2, no. 3, pp.1480-1487, Jul. 2017, https://doi.org/10.1109/LRA.2017.2668469

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Tempany, C.M., "Development of Pneumatic Robot for MRI-guided Transperineal Prostate Intervention," *Proc. Int. Soc. Mag. Reson. Med. (ISMRM),* Stockholm, May 2010.

[A41] U-Thainual, P., **Iordachita, I.**, Vikal, S., Fichtinger, G., "Teaching Aid for Computer-Assisted Surgery," *Eastern Ontario Symposium for Educational Technology,* Oshawa, Ontario, May 2009.

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[A43] U-Thainual, P., Vikal, S., **Iordachita, I.**, Fichtinger, G., "The Perk Station: Portable training station for percutaneous interventions," *Orthopaedic Care Conference,* Kingston Canada, 2008.

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[A45] Krieger, A., Guion, P., Csoma, C., **Iordachita, I**., Singh, A.K., Kaushal, A., Whitcomb, L., Ménard, C., and Fichtinger, G., "MRI-Guided Robotic Prostate Intervention," *Proceedings of the 7th ImNO Imaging Symposium,* Toronto, Sep. 2008.

[A46] Krieger, A., **Iordachita, I**., Csoma, C., Fichtinger, G., Whitcomb, L.L., "Design and Preliminary Clinical Studies of an MRI-Guided Transrectal Prostate Intervention System," *7th International Symposium on Interventional MRI*, Baltimore, Section IV, pp. 6-10, Sep. 2008.

[A47] U-Thainual, P., Fischer, G.S., Carrino, J.A., Fichtinger, G., **Iordachita, I.**, "MR/CT Percutaneous Intervention Training Suite," *7th International Symposium on Interventional MRI,* Baltimore, Section III, pp. 81-85, Sep. 2008.

[A48] Kazanzides, P., Song, D., Fiene, J.P., Burdette, E.C., Kronreif, G., Ptacek, W, **Iordachita, I.,** Fichtinger, G., "Clinical Trials of a Robot Assistant for Ultrasound-Guided Prostate Brachytherapy," *20th International Conference of the Society for Medical Innovation and Technology (SMIT),* Vienna, Austria, ISBN 3-902087-25-0, abstract in Minimally Invasive Therapy, vol. 14, No. 4, p. 213, 2008.

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[A54] Krieger, A., Csoma, C., Guion, P., **Iordachita, I**., Metzger, G., Qian, D., Singh, A., Whitcomb, L., and Fichtinger, G., "Phantom Experiments with a Novel MR-Guided Transrectal Prostate Interventional System," *Joint Annual Meeting ISMRM-ESMRMB - 2007,* Berlin, Germany, May 2007.

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[A58] Kennedy, C.W., **Iordachita, I.**, Burdette, E.C., Kronreif, G., Ptacek, W., Kazanzides, P., Song, D.Y., Fichtinger, G., "Robotically Assisted Needle Placement for Prostate Brachytherapy," *AAPM 48th Annual Meeting, Conference of American Association of Physicists in Medicine,* Orlando, FL, Journal of Medical Physics, Jul. – Aug. 2006.

[A59] Wong, J.W., Armour, E.A., Tryggestad, E., Deng, H., Kennedy, C., Ford, E., McNutt, T., **Iordachita, I.**, Kazanzides, P., DeWeese, T.L., "A Bench-Top "Micro" Image Guided Radiation Therapy (μIGRT) System for Laboratory Animals," *AAPM 48th Annual Meeting, Conference of American Association of Physicists in Medicine,* Orlando, FL, Journal of Medical Physics, Jul. – Aug. 2006.

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[A63] Li, J.C., **Iordachita, I.**, Balogh, E., Fichtinger, G., Kazanzides, P., "Validation of an Image-Guided Robot System for Measurement, Biopsy and Injection in Rodents," *Proc. IEEE 31st Annual Northeast Bioengineering Conf.,* Hoboken, NJ, pp. 131-133, Apr. 2005.

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[A65] **Iordachita I**., "Considerations over the Kinematics of Mechanisms that Provide Snake-like Locomotion," *XXII-th Yugoslav Congress of Theoretical and Applied Mechanics, YUCTAM'97,* Vrnjacka Banja, Yugoslavia, 1997.

Other Papers

[O1] Bohren, J., **Iordachita, I.**, Whitcomb, L.L., "Toward a Fully-Actuated MRI-Compatible Robotic Device for MRI-Guided Transrectal Prostate Intervention," *Fourth NCIGT and NIH Image Guided Therapy Workshop,* 2011.

[O2] Song, S., Cho, N., Tokuda, J., Hata, N., Tempany, C., Fichtinger, G., **Iordachita, I**., "MRI compatibility study of a pneumatically actuated robotic system for transperineal prostate needle placement," *3rd Annual Image-Guided Therapy Workshop*, Arlington, VA, Mar. 2010.

[O3] Fischer, G.S., **Iordachita, I**., U-Thainual, P., Carrino, J.A., Fichtinger, G., "A Training Suite for Image Overlay and other Needle Insertion Techniques," *2008 MICCAI Workshop - Augmented Environments for Medical Imaging and Computer-Aided Surgery (AMI-ARCS),* Sep. 2008.

[O4] Krieger, A., Guion, P., Csoma, C., **Iordachita, I**., Singh, A.K., Kaushal, A., Whitcomb, L.L., Fichtinger, G., "MRI Guided Prostate Biopsy and Marker Placements," *Workshop on Clinical Image-Guided Therapy: Opportunities and Needs,* Rockville, Maryland, Mar. 2008.

[O5] Song, D., Deguet, A., Jain, A., Armour, E., Le, Y., Blevins, J., **Iordachita, I**., Burdette, E.C., Fichtinger, G., "Registered Ultrasound and Fluoroscopy for Intraoperative Dynamic Dosimetry in Prostate Brachytherapy," *Workshop on Clinical Image-Guided Therapy: Opportunities and Needs,* Rockville, Maryland, Mar. 2008.

[O6] Fichtinger, G, Fiene, J., Kennedy, C., **Iordachita, I.**, Kronreif, G., Song, D.Y., Burdette, E.C., Kazanzides, P., "Robotic Assistance for Ultrasound Guided Prostate Brachytherapy," *Workshop on Clinical Image-Guided Therapy: Opportunities and Needs,* Rockville, Maryland, Mar. 2008.

[O7] Fichtinger, G, Fiene, J., Kennedy, C., **Iordachita, I**., Kronreif, G., Song, D.Y., Burdette, E.C., Kazanzides, P., "Robotic Assistance for Ultrasound Guided Prostate Brachytherapy," *The Fourth AdMeTech Foundation Conference: Ending the Era of Blind Cancer Care & Creating a Future of Image-Guided, Minimally Invasive Diagnosis & Treatment.* Washington, DC, Sep. 2007.

[O8] Catrina, G., **Iordachita, I**., Margine, A., "The Linear Trajectory Precision for Industrial Robots," *Third International Conference on Electro-mechanic and Energetic Systems (SIELMEN-2001),* ISBN 9975-9638-8-9, Chisinau, Moldova, Vol. III, pp. 207-210, 2001.

[O9] **Iordachita, I**., Stoianovici, D., Catrina, G., "A Mechanism for Rotation and Insertion of the Needles Used in Medical Procedures," *Third International Conference on Electro-mechanic and Energetic Systems (SIELMEN-2001),* ISBN 9975-9638-8-9, Chisinau, Moldova, Vol. III, pp. 203-206, 2001.

[O10] Catrina, G., **Iordachita, I**., Popa, D., "Consideration over the Optimal Design of Elements of Machines," *1st Conference with International Participation of the Millennium: The Auto vehicle – Safety, Comfort and Durability (SMAT 2001),* Craiova, Romania, ISBN 973-8043-23-4, vol. I, pp. 331-336, 2001. (in Romanian)

[O11] **Iordachita, I**., "Considerations over the Mechanisms that Provide Snake-like Locomotion," *The 2nd National Workshop on Mobile Robots (WMRC-2001),* Craiova, Romania, ISBN 973-8043-39-5, 2001. (in Romanian)

[O12] Tudor, M., **Iordachita, I**., "Studies on the Bio-mechanisms for Walking with Creeping Locomotion with Applicability of Mobile Robots," *The 2nd National Workshop on Mobile Robots (WMRC-2001),* Craiova, Romania, ISBN 973-8043-39-5, 2001. (in Romanian)

[O13] **Iordachita I**., "Realizations regarding the robot-mechanisms for dragging locomotion," *The 4th Conference New Technologies and Designing Methods in Mechanical Engineering (INGMEC'98),* Craiova, Romania, ISSN 1223-5296, Vol. I, pp. 405-410, 1998. (in Romanian)

[O14] **Iordachita, I**., "Aspects Regarding the Inverse-Kinematics of the Dragging Locomotion Mechanisms," *Proceedings of the Scientific Communications Meeting of "Aurel Vlaicu" University, Third Edition,* Arad, Romania, vol. III, pp. 49-54, 1996. (in Romanian)

[O15] **Iordachita, I.**, Margine A., "Dragging Locomotion Mechanisms – An Experimental Model,"

Proceedings of the Scientific Communications Meeting of ″Aurel Vlaicu″ University, Third Edition, Arad, Romania, vol. III, pp. 55-60, 1996. (in Romanian)

[O16] **Iordachita, I.**, "Contributions about Kinematics of Dragging Locomotion Mechanisms," *Proceedings of the Scientific Communications "The Scientific Research Implication in Development and Modernization of Processing Methods",* Sibiu, Romania, pp. 209-214, 1995. (in Romanian)

[O17] **Iordachita, I.**, "Kinematics of the Dragging Locomotion Mechanisms," *3rd International Scientific Conference "Modern Machines and Technologies", MTeM'95,* Cugir, Romania, 1995. (in Romanian)

[O18] Georgescu, S., **Iordachita, I**., "Software Package for the Masses Calculus of Tubes Presenting Ribs," *National Symposium PRASIC'94,* Brasov, Romania, pp. ,61-68, 1994 (in Romanian)

[O19] **Iordachita, I.**, "About the Structure of Locomotion Dragging Mechanisms," *3rd National Conference of Technologies and Numerical Drawing Methods in Engineering,* Craiova, Romania, vol. II, pp. 258-265, 1994. (in Romanian)

[O20] **Iordachita, I.**, Dumitru, N., "Locomotion Systems for Digging Tunnel Machine based on Bionics Principles," *VI-th National Symposium on MTM.* Timisoara, Romania, vol. 1, MTM paper #41, 1992. (in Romanian)

[O21] Dumitru, N., **Iordachita, I.**, "Algorithm for Gearing Mechanisms Study," *VI-th National Symposium on MTM,* Timisoara, Romania, vol. 2 MTM, paper #32, 1992. (in Romanian)

[O22] Catrina, G., Radulescu, M., **Iordachita, I**., Margine, A., Bogdan, R., "Stand for testing of Differential Transmissions Screw-nut," *VI-th National Symposium on MTM,* Timisoara, Romania, vol. 2 MTM, paper #47, 1992. (in Romanian)

[O23] **Iordachita, I.**, Sabau, A., "Working Space Volume Calculus for the RD5NT Robot using the Monte Carlo Method," *Proceedings of the Scientific Communications "Conception, Technology and Management in Engineering,"* Iasi, Romania, pp.123-128, 1992. (in Romanian)

PRESENTATIONS

Conferences and Workshops (excluding paper presentations)

[T1] "Optimized Manipulator for in-bore MRI-guided Trasperineal Prosate Biopsy," invited talk to *Workshop on Robotics Microsurgery and Image-Guided Surgical Interventions*, IEEE BioRob 2014, SaoPaulo, Brazil, August 12th, 2014.

[T2] "Robot-assisted retinal microsurgery: current challenges and future perspectives," 16th EURETINA Congress, Bella Center, Copenhagen, Denmark, September 11th, 2016

[T3] "Optical Fiber-based Sensorized Instrauments for Robot-Assisted Surgery," invited talk to *Workshop on Current and Future Chalanges in Robotics Research for Biomedical Applications*, IEEE EMBC 2017, Jeju Island, South Korea, July 11th, 2017.

[T4] "Fundamentals of Engineering to Understand Robotic Surgery," 17th EURETINA Congress, CCIB, Barcelona, Spain, September 9th, 2017

[T5] "Dexterous Continuum Manipulators for Robot-Assisted Surgery," invited talk to *Workshop on Continuum Robots in Medicine – Design, Integration, and Applications*, IEEE IROS 2017, Vancouver, Canada, Septemeber 24th, 2017

[T6] "Safe Tissue Manipulation in Retinal Microsurgery via Motorized Instruments with Force Sensing," invited talk to *Focused Session – Sensor for Medical Robotics*, IEEE SENSORS 2017, Glasgow, Scotland, UK, October 31st, 2017

[T7] "Safe Tissue Manipulation in Retinal Microsurgery via Force Sensing Instruments," invited semi-plenary talk to *International Symposium on Medical Robotics*, ISMR 2018, Atlanta, GA,

March 1st, 2018

[T8] "Enabling Technology for Safe Robot-Assisted Vitreoretinal Surgery," invited talk to *2nd workshop on Advances in Image-Guided Ophthalmic Interventions,* Hamlyn Symposium 2018, London, UK, June 24th, 2018.

[T9] "Robot-Assisted Retinal Surgery," invited keynote speech to *25th Edition of World Congress of Ophthalmologist,* London, UK, November 8th, 2018.

[T10] "Safe Robot-Assisted Retinal Surgery," invited talk to Workshop Robot-Assisted Eye Surgery: Steps Toward Operating Room, *International Symposium on Medical Robotics*, ISMR 2019, Atlanta, GA, April 3rd, 2019

[T11] "Shape Sensing Based Navigation of Flexible Medical Devices," invited talk to Symposium "Advanced in Device Navigation", *Society for Image-Guided Neurointerventions 2019 Conference* (SIGN 2019), Baltimore, MD, June 10th, 2019

[T12] "Toward Intelligent Robotic Assistance for Safe Manipulation in Retinal Surgery" invited talk to Cutting Edge Forum "Surgical Robotics with AI", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), November 6th, 2019, Macau, CHINA

[T13] "Safe Robot-Assisted Retinal Surgery," invited talk to Workshop "Autonomous System in Medicine: Current Challenges in Design, Modeling, Perception, Control and Applications" IROS 2020, October 25th, 2020, (virtual)

[T14] "Enabling Technology for Safe Robot-Assisted Retinal Surgery," invited keynote speech to *1st International Conference on Advanced Research in Engineering*, CARE 2020, Craiova, Romania, October 30th, 2020. (virtual)

[T15] "Shape-Sensing for Dexterous Continuum Manipulators," invited talk to Workshop "Holistic Integration of Design, Sensing, and Intelligence in Dexterous Medical Robotics Systems" ICRA 2021, June 4th, 2021 (virtual)

[T16] "Shape-Sensing for Dexterous Continuum Manipulators," invited talk to Workshop "Holistic Integration of Design, Sensing, and Intelligence in Dexterous Medical Robotics Systems" ICRA 2021, June 4th, 2021 (virtual)

[T17] "Shape Sensing Based Navigation of Flexible Medical Devices," invited talk to ISMR 2021 Workshop on "Sensing and Feedback in Dexterous Medical/Surgical Robotics", November 17th, 2021, Georgia Tech, Atlanta, GA, USA

[T18] "Needle Shape Detection for Interventional MRI," invited talk to ISMR 2021 Workshop on "Improving clinical outcomes of image-guided needle-based interventions: development and clinical translation of new approaches", November 17th, 2021, Georgia Tech, Atlanta, GA, USA

[T19] "Shape-Sensing and Prediction using FBG-Sensorized Needles" invited talk to the 12th National Image Guided Therapy Workshop, May 19, 2022 (virtual)

Invited University Colloquia and Seminars

[T20] "Robot-assisted retinal microsurgery: current challenges and future perspectives," Worcester Polytechnic Institute, Worcester, MA, USA, December 5th, 2014.

[T21] "Optical Fiber-based Sensorized Instruments for Robot-Assisted Surgery," SPL, Brigham and Women's Hospital, Boston, MA, USA, March 23rd, 2016

[T22] "Safe Robot-Assisted Retinal Surgery," LCSR Seminar, JHU, Baltimore, MD. USA, April 17th , 2019

[T23] "Enabling Technology for Safe Robot-assisted Retinal Surgery," Rowan University, Henry M. Rowan College of Engineering, Glassboro, NJ, USA, October 22nd, 2020. (virtual)

[T24] "Sensor-based Technology for Safe Robot-assisted Retinal Surgery," Seminar, Dept. of Computer and Software Engineering, Institute of Biomedical Engineering, Polytechnique Montréal, Quebec, Canada, March 22nd, 2021, (virtual)

[T25] "Sensor-based Technology for Safe Robot-assisted Retinal Surgery," Seminar, 2021 Fall School on Medical Robotics, Georgia Institute of Technology, Atlanta, GA, USA, November 16th, 2021 (virtual)

RESEARCH FUNDING AND SUPPORT

Current:

1. Title: Multi-Scale Medical Robotics Center.
Dates: 6/01/2020-5/31/2025
Grantor: Chinese University of Hong Kong
Grant #: Multi-Scale Medical Robotics Center (Russell Taylor, PI)
Institution: Johns Hopkins University
Amount: $2,500,000 (JHU total)
Summary: JHU's role focuses on image-guided robotic interventions with the development of image-based automation in robotic surgery, high performance robotic systems for intra-operative MRI-guided interventions, image-guided robotic platform for minimally invasive orthopedic surgery, and a low-cost surgical robotic arm system for universal surgeries
Role: Co-Investigator

2. Title: MRI Compatible Robot for Improved Pain Injections in Adults and Children.
Dates: 6/01/2018-2/28/2023
Grantor: National Institutes of Health
Grant #: 1 R01 EB025179-01 (Kevin Cleary, PI)
Institution: Children's National Medical Center, subcontract Johns Hopkins University
Amount: $1,169,857 (JHU total)
Summary: Develop and evaluate a patient-mounted MRI-compatible robot for needle guidance for pain treatment injections in adult and pediatric interventional procedures.
Role: Principal Investigator (of Johns Hopkins University sub-contract)

3. Title: Enabling technology for image-guided robot-assisted sub-retinal injections.
Dates: 9/20/2019-6/30/2023
Grantor: National Institutes of Health
Grant #: 1R01 EB025883-01A1 (Iulian Iordachita, PI)
Institution: Johns Hopkins University
Amount: $480,791 (Y1)
Summary: Develop and test a cooperatively controlled robotic system that in conjunction with force-sensing microsurgical instruments guided by 4D intraoperative Optical Coherence Tomography could enable safe and reliable access to the subretinal space.
Role: Principal Investigator

4. Title: Automating mosquito microdissection for a malaria PfSPZ vaccine
Dates: 9/01/2017-5/31/2024
Grantor: NIH SBIR (Subcontract from Sanaria)
Grant #: R44 AI134500-01(Russell Taylor, PI)
Institution: Johns Hopkins University
Amount: $ 898,928
Summary: This project builds upon our earlier and ongoing collaboration with Sanaria in developing production processes for a malaria vaccine. JHU's roles include assisting in translation of our previously developed prototypes into GMP production and in developing a fully automated robotic system to increase production.

Role: Co-Investigator

5. Title: Adaptive Percutaneous Prostate Interventions using Sensorized Needle.
Dates: 8/01/2019-7/31/2023
Grantor: National Institutes of Health
Grant #: 1R01 CA235134-01(Junichi Tokuda, PI)
Institution: BWH, subcontract Johns Hopkins University
Amount: $171,160 (JHU/Y1)
Summary: Develop and validate optical fiber-based shape-sensing needle that can detect the deviation of needle in vivo and feed it back to the physician in real-time.
Role: Principal Investigator (of Johns Hopkins University sub-contract)

6. Title: X-ray/optical tomographic guidance and assessment for pre-clinical radiation research
Dates: 6/01/2019-3/31/2024
Grantor: National Institutes of Health
Grant #: 1R37 CA230341-01 (Ken Wang, PI)
Institution: UTSW
Amount: $314,480 (Total)
Summary: Advance the in vivo cancer imaging capability of SARRP to include quantitative bioluminescence and fluorescence tomography.
Role: Co-Investigator

7. Title: An ultra-high (FLASH) dose rate x-ray cabinet system for pre-clinical laboratory radiation research
Dates: 8/01/2021-7/31/2025
Grantor: National Institutes of Health
Grant #: 1R01CA262097-01 (Rezaee, Mohammad, PI)
Institution: JHU
Amount: $2,640,721 (Total)
Summary: The goal of this project is to develop a self-shield kilovoltage x-ray cabinet system with the capabilities of delivering both FLASH and conventional dose-rate irradiations for pre-clinical laboratory research.
Role: Co-Investigator

8. Title: Enabling Technology for Safe Robot-assisted Surgical Micromanipulation
Dates: 4/01/2022-03/31/2025
Grantor: National Institutes of Health
Grant #: 2R01EB023943-04A1 (Iulian Iordachita, MPI)
Institution: Johns Hopkins University
Amount: $1,182, 464/Total
Summary: The goal of this project is to develop and evaluate enabling technology for safe and reliable bilateral, semi-autonomous robotic assistance integrated with force sensing instruments to assist the surgeon with sensorimotor guidance for safe retinal vein cannulation.
Role: Principal Investigator

Completed:

9. Title: Patient-specific narrow beam breast CT
Dates: 5/01/2021-11/30/2022
Grantor: National Institutes of Health
Grant #: 1R43CA261381 (Ghazi, Peymon, PI)
Institution: Sub-award from Malcova LLC

Amount: $400,000 (Total)
Summary: The goal is to develop dedicated breast CT technology to improve the sensitivity and specificity of breast cancer detection in women with dense breasts.
Role: Co-Investigator

10. Title: MRI Compatible body-mounted robot to streamline pediatric shoulder arthrography.
Dates: 9/15/2016-6/30/2022
Grantor: National Institutes of Health
Grant #: 1R01 EB020003-01 (Kevin Cleary, PI)
Institution: Children's national Medical Center, subcontract Johns Hopkins University
Amount: $593,726 (JHU Total)
Summary: Develop and test a new patient-mounted MRI-compatible shoulder arthrography robot for needle guidance in pediatric interventional procedures.
Role: Principal Investigator (of Johns Hopkins University sub-contract)

11. Title: Enabling Technology for Safe Robot-assisted Surgical Micromanipulation
Dates: 3/15/2017-01/31/2021
Grantor: National Institutes of Health
Grant #: 1R01EB023943-01 (Iulian Iordachita, PI)
Institution: Johns Hopkins University
Amount: $1,017,478/Total
Summary: The goal is to develop a cooperatively controlled robotic system with enhanced sensorimotor capabilities that in conjunction with multifunction force-sensing microsurgical instruments could enable safe robot-assisted retinal surgery.
Role: Principal Investigator

12. Title: Quantitative bioluminescence tomography for pre-clinical radiotherapy research
Dates: 7/01/2019-6/30/2023
Grantor: National Institutes of Health
Grant #: 1R01 CA240811-01 (Ken Wang, PI)
Institution: Johns Hopkins University
Amount: $276,046 (JHU/Y1)
Summary: Develop and evaluate a tabletop quantitative bioluminescence tomography system readily adopted by small animal commercial irradiators.
Role: Co-Investigator

13. Title: Research and Development on a Novel Robotic System for Microsurgery
Dates: 2/01/2017-3/31/2020
Grantor: Galen Robotics, Inc
Grant #: Galen Robotics (Russell Taylor, PI)
Institution: Johns Hopkins University
Amount: $1,363,808
Summary: This is an industry-sponsored project to develop novel sensor-based tools, image-guidance methods, and applications for a new cooperatively-controlled surgical robot for head-and-neck microsurgery.
Role: Co-Investigator

14. Title: An Active Handheld Micromanipulator.
Dates: 8/01/2015-7/31/2019
Grantor: National Institutes of Health
Grant #: 2R01 EB000526-07 (Cameron Riviere,. PI)
Institution: Carnegie Mellon University, subcontract Johns Hopkins University
Amount: $354,825
Summary: Develop and test a new handheld micromanipulator that performs active tremor compensation in microsurgery.

Role: Principal Investigator (of Johns Hopkins University sub-contract)

15. Title: Objective assessment of surgical competence in a septoplasty model.
Dates: 7/01/2015-6/30/2020
Grantor: National Institutes of Health
Grant #: R01DE025265 (Masaru Ishii, PI)
Institution: Johns Hopkins University
Amount: $582,025/2016
Summary: Our project aims to provide educators with an integrated objective skills assessment platform and tools for objective determination of competency, which can be readily deployed across graduate surgical training programs in the country.
Role: Co-Investigator

16. Title: Enabling technology for MRI-guided prostate interventions
Dates: 9/12/2011-7/31/2016
Grantor: National Institutes of Health
Grant #: 2R01CA111288-06 (Clare Tempany, PI)
Institution: Brigham and Women's Hospital, subcontract Johns Hopkins University
Amount: $ 4,090,575
Summary: Develop technology for transrectal needle based biopsy and local therapy of prostate cancer in conventional closed MRI scanner.
Role: Principal Investigator (of Johns Hopkins University sub-contract)

17. Title: An integrated x-ray/optical tomography system for preclinical radiation research.
Dates: 7/01/2011-6/30/2015
Grantor: National Institutes of Health
Grant #: R01 CA158100-01 (John Wong, PI)
Institution: Johns Hopkins Medical Institutions, subcontract Johns Hopkins University
Amount: $1,682,750
Summary: The goal is to develop an integrated x-ray/bioluminescence tomography system that can function as a standalone imaging research system and also dock to the SARRP to guide focal irradiation.
Role: Principal Investigator (of Johns Hopkins University sub-contract)

18. Title: Integrated 3D X-Ray/ultrasound guided radiation therapy of soft tissue targets
Dates: 10/15/2011-9/31/2015
Grantor: National Institutes of Health
Grant #: 1R01CA161613-01 (John Wong, PI)
Institution: Johns Hopkins Medical Institutions
Amount: $1,559,926
Summary: The goal is to develop an integrated x-ray/ultrasound tomography system on board a medical accelerator to ensure accurate irradiation of abdominal targets that have been difficult to localize with x-ray CT alone.
Role: Co-Investigator

19. Title: An Active Handheld Micromanipulator.
Dates: 2/1/2011 – 1/31/2015
Grantor: National Institutes of Health
Grant #: 1 R01 EB000526-04A1 (Cameron Riviere, PI)
Institution: Carnegie Mellon University, subcontract Johns Hopkins University
Amount: $988,130
Summary: Develop and test a new handheld micromanipulator that performs active tremor compensation in microsurgery.
Role: Principal Investigator (of Johns Hopkins University sub-contract)

20. Title: A Microsurgical Assistant System.

Dates: 8/1/2008 – 6/31/2014
Grantor: National Institutes of Health
Grant #: 1 R01 EB 007969-01 A1 (Russell Taylor, PI)
Institution: Johns Hopkins University
Amount: $5,885,314
Summary: Develop technology and systems addressing fundamental limitations in current microsurgical practice, using vitreoretinal surgery as the initial focus. This includes development of a "surgical workstation" that is interfaced to a stereo visualization subsystem and a family of novel sensors, instruments, and robotic devices.
Role: Co-Investigator

21. Title: OCT Imaging and Assistive Systems for Cochlear Implant Surgery
Dates: 2/01/2012 – 4/31/2014
Grantor: Cochlear Corporation
Grant #: 1 (Russell Taylor, PI)
Institution: Johns Hopkins University
Amount: $ 238,000
Summary: Develop the technology for imaging the cochlea canal and assisting cochlea implant insertion
Role: Co-Investigator

22 Title: Calibration and Commissioning of a Small Animal Radiation Research Platform (SARRP) for Pre-clinical Research
Dates: 09/01/09 – 08/31/12
Grantor: Gulmay Medical Ltd
Grant #: 1 (John Wong, PI)
Institution: Johns Hopkins Medical Institutions
Amount: $100,000
Summary: The goals are to provide continue technical support and to transfer the know-how from Hopkins to Gulmay in their commercialization of the first generation Small Animal Radiation Research Platform
Role: co-Investigator

23. Title: Engineering Research Center for Computer-Integrated Surgical Systems and Technology.
Dates: 9/1/1997-5/31/2010
Grantor: National Science Foundation
Grant #: EEC 9731748 (Russell Taylor, PI)
Institution: Johns Hopkins University
Amount: $30,000,000 (for 10 years)
Summary: The CISST ERC is a multi-institutional, multidisciplinary center whose focus is of basic science, computer-based technology, and engineered systems working cooperatively with surgeons to significantly change the way surgical procedures are carried out in the 21st century. Significant research focuses include modeling and analysis for treatment planning and control, robotics and human interfaces and systems for minimally-invasive, image-guided percutaneous therapy and microsurgery.
Role: Senior Research Staff

24. Title: R01: Transrectal Prostate Therapy Robot in Closed MRI Scanner
Dates: 9/2003 – 7/31/2009
Grantor: National Institutes of Health,
Grant #: 1 R01 EB002963-01 (Louis Whitcomb, PI)
Institution: Johns Hopkins University
Amount: $2,030,342
Summary: The major goal of this project is to design and develop a robot assisted system for transrectal needle placement inside closed MRI magnets for prostate interventions.
Role: Senior Research Staff

25. Title: Enabling technology for MRI-guided prostate interventions
Dates: 6/1/2006 – 5/31/2011
Grantor: National Institutes of Health,
Grant #: R01CA111288-01 (Clare Tempany, PI)
Institution: Brigham and Women's Hospital, Subcontract Johns Hopkins University
Amount: $220,000 (Johns Hopkins University)
Summary: Develop technology for transrectal needle based biopsy and local therapy of prostate cancer in conventional closed MRI scanner.
Role: Senior Research Staff

26. Title: Image Overlay for MRI-Guided Needle Insertion
Dates: 7/01/2007 – 6/30/2009
Grantor: National Institutes of Health
Grant #: R01 CA118371 (John Carrino, PI)
Institution: Johns Hopkins University
Amount: $300,000
Summary: The goal of this project is to make diagnostic closed high-field MRI scanners available for guiding needle placement with 2D Image Overlay technique.
Role: Senior Research Staff

27. Title: An Image Guided Small Animal Radiation Research Platform
Dates: 4/1/2005 – 3/31/2008
Grantor: National Institutes of Health
Grant #: 1 RO1 CA108449-01 (John Wong, PI)
Institution: Johns Hopkins University
Amount: $253,553 (3 year total)
Summary: The goal of this project is to develop and test an image guided small animal radiation research platform (SARRP) that will accurately deliver complex ionizing radiation dose distributions in small animal tumor model systems (mice, rats and rabbits).
Role: Senior Research Staff

28. Title: C-arm Fluoroscopy in Prostate Brachyterapy
Dates: 4/1/2005 – 3/31/2008
Grantor: National Institutes of Health
Grant #: 2R44CA099374-02 (Cliff Burdette, PI),
Institution: Johns Hopkins University
Amount: $253,000 (Johns Hopkins University)
Summary: Utilize C-arm fluoroscopy to determine seed locations in prostatic implants and register them to ultrasound space, to provide intra-operative implant optimization
Role: Senior Research Staff

29. Title: Ultrasound Ablation of Bone Cancer with CT Fluoroscopy Guidance
Dates: 9/21/2005 – 9/31/2007
Grantor: National Institutes of Health
Grant #: 1R43CA112852-01 (Burdette)
Institution: Johns Hopkins University
Amount: $22,000 (Johns Hopkins University)
Summary: Develop a system for interstitial ultrasound ablation of metastatic bone cancer
Role: Senior Research Staff

30 Title: Robotic Needle Placement and Injection in Rodents
Dates: 9/10/2003 – 08/31/2005
Grantor: National Institutes of Health
Grant #: R01 CA84596
Institution: Memorial Sloan Kettering Cancer Center

Amount: $167,000 (Johns Hopkins University)
Summary: This is a subcontract from Memorial Sloan Kettering Cancer Center to develop an image-guided robot system for small animal research. Specifically, the robot is used to insert a measurement probe into anatomic targets that are identified in a preoperative PET image.
Role: Senior Research Staff

31. Title: Image Overlay for MRI-Guided Needle Insertions
Dates: 10/01/2002 – 9/30/2006
Grantor: National Institutes of Health
Grant #: R01 CA118371
Institution: Siemens Corporate Research
Amount: $219,000 (Johns Hopkins University)
Summary: The goal of this project is make diagnostic closed high-field MRI scanners available for guiding needle placement with 2D Image Overlay technique
Role: Senior Research Staff

32. Title: Studies on Surgical Robotics
Dates: 10/01/2002 – 09/31/2003
Grantor: Japan Society for the Promotion of Science, a Japanese Government agency
Institution: Graduate School of Frontier Science, the University of Tokyo, JAPAN
Amount: $68,000
Summary: The goal of this project is to develop new robotic devices for medical applications.
Role: co-Investigator

33. Title: Studies on Biologically Inspired Mechanisms for Locomotion
Dates: 06/1993 – 09/1997
Grantor: Ministry of Education/Ministry of Research and Youth, Romania
Grant #: 5006/1993, 468C/1994, 798B/1995, 663/1996, 663/1997
Institution: University of Craiova, Romania
Summary: The goal of this project is to evaluate the possibility of developing new mechanisms for robots' locomotion based on animals' locomotion.
Role: co-Investigator

34. Title: Speed Transducers for Locomotives
Dates: 1988 – 1989
Grantor: SC "Electroputere" SA, Craiova, Romania
Grant #: 2601
Institution: ICSIT-MTAE Craiova, Romania
Role: Project manager

35. Title: Electrical Locomotive for 5000-6000 kW with Thyristors EB-01
Dates: 1988 – 1989
Grantor: SC "Electroputere" SA, Craiova, Romania
Grant #: 2559
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

36. Title: Transformation of Electrical Diesel Locomotive 4000 CP in Electrical Locomotive with Diodes 2900 kW
Dates: 1988 – 1989
Grantor: SC "Electroputere" SA, Craiova, Romania
Grant #: 4119
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

37. Title: Electrical Shunting Diesel Locomotive type 623-BS2

Dates: 1987 – 1988
Grantor: SC “Electroputere” SA, Craiova, Romania
Grant #: 4114
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

38. Title: Electrical Shunting Locomotive LEM-1200 kW
Dates: 1986 – 1989
Grantor: SC “Electroputere” SA, Craiova, Romania
Grant #: 4105
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

39 Title: Electrical Diesel Locomotive 3000 CP ca-ca
Dates: 1985 – 1986
Grantor: SC “Electroputere” SA, Craiova, Romania
Grant #: 4106
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

40. Title: Electrical Locomotive for 3000-4000 kW (Bo-Bo) type Erc 438 CL1
Dates: 1985 – 1986
Grantor: SC “Electroputere” SA, Craiova, Romania
Grant #: 4102
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

41. Title: Electrical Diesel Locomotive, Tropical Climate, DE 626 BL2 and DE 633 BL2
Dates: 1984 – 1986
Grantor: SC “Electroputere” SA, Craiova, Romania
Grant #: 4103
Institution: ICSIT-MTAE Craiova, Romania
Role: Research Staff

PROFESSIONAL ORGANIZATIONS AND SERVICE

Member

- Romanian Association for Machines and Mechanisms Theory 1992- present
- Romanian Society for Robotics (SRR) 1996 - present
- Institute of Electrical and Electronics Engineers (IEEE, SM14) 2008 - present
- America Society of Mechanical Engineers (ASME) 2010 - present

Editor

Journals

- Journal of Medical Robotics Research: Editor, 2015 - present
- IEEE Robotics and Automation Letters *(RA-L):* Associate Editor, 2015 – 2018
- Sensors, MDPI, Guest Editor for Special Issue "Force and Pressure Based Sensing Medical Application," 2017, 20 papers.
- Sensors, MDPI, Editorial Board Member, 2018 - present

Conference and Workshop Program Committees

- International Symposium on Medical Robotics (ISMR), Co-Chair, 2020, 2021, 2022, 2023
- International Symposium on Medical Robotics (ISMR), 2018, 2019, 2020, 2021 (two workshops), 2022.
- IEEE BioRob 2010

Reviewer

Grant Proposal Peer Reviews

- National Science Foundation, USA: 2014
- European Research Council, Frontier Research Grants, 2016
- National Institutes of Health, USA: 2019, 2021, 2022

Journals (partial list)

- International Journal of Robotics Research: 2011, 2013; 2014; 2015, 2017, 2018
- IEEE Transactions on Robotics: 2011, 2012, 2015; 2019
- IEEE Transactions on Mechatronics: 2015; 2016, 2017, 2018, 2019, 2020, 2021
- Robotica: 2008, 2011; 2015, 2018, 2020, 2021
- International Journal of Computer Assisted Radiology and Surgery: 2009, 2011; 2016, 2017, 2018, 2019, 2020, 2021
- International Journal of Medical Robotics and Computer Assisted Surgery: 2011, 2012, 2013; 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022
- Transactions on Biomedical Engineering: 2010, 2012; 2016, 2017, 2019, 2020, 2021
- Sensors & Actuators: A. Physical: 2012; 2018, 2022
- Investigative Ophthalmology & Visual Science: 2009, 2010; 2019
- Physics in Medicine and Biology: 2010;

Conferences (partial list)

- IEEE International Conference on Robotics and Automation: 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2019, 2020, 2021, 2022
- IEEE International Conference on Intelligent Robots and Systems: 2011; 2014; 2015, 2017, 2018, 2019, 2020, 2021, 2022
- IEEE EMBS International Conference: 2010, 2011, 2012, 2013; 2014; 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022
- IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics: 2010, 2012, 2014,

Service

- WSE Machine Shop Advising Committee 2011 - present
- ERC/LCSR Safety Committee 2005 - present

CONTACT INFORMATION

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