

Dr. Mehmet Efe Tiryaki
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[Research Group](#) / [Google Scholar](#) / [GitHub](#) / [LinkedIn](#)

Objective

Robotics researcher with 10+ years of experience committed to developing medical image-guided robotic platforms by exploring the physical principles of novel sensing mechanisms and robotic actuation and integrating control, perception, and intelligence for medical robotic autonomy.

Research Interest

Robotics, Medical robots, Magnetic actuation, Medical imaging, Surgical robots

Education

- 2018-2023** Ph.D. in Institute for Biomedical Engineering, ETH, Zurich, Switzerland
Thesis title: MRI-powered magnetic microrobotics Advisor: Prof. Dr. Metin Sitti
- 2016-2018** M.Sc. Robotics, Systems and Control, ETH Zurich, Switzerland
Thesis: Skating with a force-controlled quadrupedal robot
- 2011-2016** B.Sc. Physics, Middle East Technical University (METU), Ankara, Türkiye,
Thesis: Simulation of short pulse laser beams in a nonlinear medium
- 2011-2015** B.Sc. Mechanical Engineering, Middle East Technical University (METU), Ankara, Türkiye,
Graduation Project: Design of a Frequency Adjustable Tuned Vibration Absorber
- 2015-2016** B.S. Physics (Exchange), Technische Universität Darmstadt, Darmstadt, Germany

Research Experience

- 2025-** Assistant Professor in Mechanical Engineering at Middle East Technical University (METU), Ankara, Türkiye
Principal Investigator of Medical Robotic Systems Lab in the Center for Robotics (ROMER)
- 2023-2025** Postdoctoral researcher, Max-Planck Institute for Intelligent Systems, Stuttgart, Germany
Research on MRI-guided robotic systems
- 2018** Research Internship, Nanyang Technological University (NTU), Singapore
6 months research internship on concrete 3D printing with mobile robotic printers

Grants & Scholarships

- 2026-2028** Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellowship
ME Tiryaki, "MR-Strokebot", in METU
Grant Amount: 149,000 €
- 2025-2028** TÜBİTAK 2232 International Fellowship for Early Stage Researchers
ME Tiryaki, "Magnetically actuated robotic catheter with ultrasound guidance,"
Grant Amount: 265,000 €
- 2025-2027** METU BAP Career Funding
ME Tiryaki, "MRI-Compatible stereoscopic positioning system for robotic catheters."
Grant Amount: 40,000 €

- 2024-2025 MPI-IS Grassroots Internal Funding Program**
ME Tiryaki, P Esmaeili-Dokht, K. Prüssmann, M Sitti, "*Ultrahigh Field Magnetic Positioning System for MRI-guided Stereotactic Neurosurgery Robot*,"
 Grant Amount: 20,000 €
- 2024-2025 MAXimize Start-up Incubation Program**
 SO Demir, SF Baltaci, **ME Tiryaki**, I Bianchini, *start-up incubation of Max Planck Innovation for science-based entrepreneurship*,
 Grant Amount: 50,000 €
- 2023-2024 MPI-IS Grassroots Internal Funding Program**
ME Tiryaki, P Esmaeili-Dokht, K. Prüssmann, M Sitti, "*NMR Magnetometer Array for Magnetic Microrobot Tracking and Control in MRI Scanner*,"
 Grant Amount: 22,000 €
- 2013-2016 TÜBİTAK 2205- National Undergraduate Scholarship Program**
Scholarship for double-major students in areas of fundamental science by the Scientific and Technological Research Council of Türkiye (TÜBİTAK)

Awards

- 2024 Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellowship Seal of Excellence**
 Received for **the MR-Strokebot** project with an evaluation score of 93.8/100
- 2023 IEEE ICRA Best Paper Runner in Healthcare and Medical Robotics**
 ME Tiryaki, F Doğançün, CB Dayan, P Wrede, M Sitti "MRI-powered magnetic miniature capsule robot with HIFU-controlled on-demand drug delivery,"

Publications (ORCID ID:0000-0002-2646-1775)

First Author Papers (*: equal contribution)

- 2025** ME Tiryaki, P Esmaeilli-dokht, J Lazovic, KP Pruessmann, M Sitti "Nuclear Magnetic Resonance for Wireless Magnetic Tracking," **Nature Communications**, **2025**, 16 (1), 10840
- 2023** ME Tiryaki, Y.G. Elmacioğlu, M Sitti "Magnetic Guidewire Steering at Ultrahigh Magnetic Fields," **Science Advances**, **2023**, 9 (17), eadg6438
- 2023** ME Tiryaki, F Doğançün, CB Dayan, P Wrede, M Sitti "MRI-powered magnetic miniature capsule robot with HIFU-controlled on-demand drug delivery," **2023 IEEE International Conference on Robotics and Automation (ICRA)**, 5420-5425, **Best paper runner in Healthcare and Medical Robotics**.
- 2022** MB Bilgin*, ME Tiryaki*, J Lazovic, M Sitti "RF sensing-based in-situ temperature measurements during MRI interventional procedures," **Advanced Material Technologies** **2022**, 7 (9), 2101625.
- 2022** ME Tiryaki, SO Demir, M Sitti "Deep learning-based 3D magnetic microrobot tracking using 2D MR images", **IEEE Robotic Automation Letters**, **2022**, 7 (3), 6982-6989.
- 2022** ME Tiryaki, M Sitti "Magnetic resonance imaging-based tracking and navigation of submillimeter-scale wireless magnetic robots," **Advanced Intelligent Systems**, **2022**, 4 (4), 2100178
- 2020** ME Tiryaki, O Erin, M Sitti "A realistic simulation environment for MRI-based robust control of untethered magnetic robots," **IEEE Robotic Automation Letters**, **2020**, 5 (3), 4501-4508.
- 2019** ME Tiryaki, Z Xu, QC Pham "Printing-while-moving: a new paradigm for large-scale robotic 3D Printing", **2019 IEEE/RSJ International Conference on Intelligent Robots and Systems**, 2286-2291.

Co-author Papers

- 2024** SO Demir, ME Tiryaki, AC Karacakol, M Sitti "Learning Soft Millirobot Multimodal Locomotion with Sim-to-Real Transfer," **Advanced Science**, 2024.
- 2023** RH Soon, Z Yin, MA Dogan, NO Dogan, ME Tiryaki, et al. "Pangolin-inspired untethered magnetic robot for on-demand biomedical heating applications," **Nature Communications** **2023**, 14 (1), 3320.
- 2022** M Phelan, ME Tiryaki, J Lazovic, M Sitti "Heat-mitigated design and Lorentz force-based steering of an MRI-driven microcatheter toward minimally invasive surgery," **Advanced Science**, **2022**, 9 (10), 2105352
- 2022** U Bozuyuk, E Suadiye, A Aghakhani, NO Dogan, J Lazovic, ME Tiryaki *et al.* "High-performance magnetic FePt (L10) surface microrollers towards medical imaging-guided endovascular delivery applications", **Advanced Functional Materials**, **2022**, 32 (8), 2109741.
- 2021** O Erin, M Boyvat, J Lazovic, ME Tiryaki, M Sitti "Wireless MRI-powered reversible orientation-locking capsule robot," **Advanced Science**, **2021**, 2100463.
- 2020** O Erin*, D Antonelli*, ME Tiryaki*, M Sitti "Towards 5-dof control of an untethered magnetic millirobot via MRI gradient coils", **2020 IEEE International Conference on Robotics and Automation (ICRA)** , 6551-6557.
- 2020** O Erin, M Boyvat, ME Tiryaki, M Phelan, M Sitti "Magnetic resonance imaging system-driven medical robotics," **Advanced Intelligent Systems**, **2020**, 2 (2), 1900110.
- 2019** BB Kocer, ME Tiryaki, M Pratama, T Tjahjowidodo, GGL Seet "Aerial robot control in close proximity to ceiling: A Force Estimation-based Nonlinear MPC," **2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, 2286-2291.
- 2018** M Bjelonic, CD Bellicoso, ME Tiryaki, M Hutter, "Skating with a force controlled quadrupedal robot," **2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**, 7555-7561

Professional Activities

Editorial

- Associate Editor in IEEE Robotic and Automation Letter (RAL)

Leadership & Coordination

- EuRobotics National Coordinator for Türkiye, 2025–present
- METU-ROMER Robotic Internship Program Coordinator, METU-ROMER, 2025–present

Memberships

- IEEE Robotics and Automation Society Membership

Reviewer

- Science Advances
- Nature Communication
- Advanced Science
- IEEE Transactions of Mechatronics (T-MECH)
- IEEE Robotics and Automation Letters (RA-L)
- Scientific Reports
- Frontiers in Artificial Intelligence
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- International Symposium on Robotics Research (ISRR)

Invited Talks

2023 Young Researcher Seminar in Bilkent University, Ankara, "MRI-powered Magnetic Robotics"

2023 ROMER Seminar in METU Ankara, "MRI-powered magnetic microrobotics"

2022 MR Seminar in ETH Zurich, "MRI-powered magnetic microrobotics"

Conferences

- IEEE ICRA, 2026 Vienna, 2024 *Yokohama*, 2023 *London*, 2020 *Paris*
- IEEE/RSJ IROS, 2022 *Kyoto*, 2020 *Vegas*, 2019 *Macao*, 2018 *Madrid*
- Hamlyn Symposium on Medical Robotics, 2023, London
- Material Research Society, 2023 Boston
- European Ph.D. days on Miniaturized Robotics, 2022
- Turkish Robotics Conference, 2018, *Istanbul*

Teaching Experience

Teaching

2025 ME 302 Theory of Machines II, ME 208 Dynamics

2025 ME 301 Theory of Machines I, ME 310 Numerical Methods

2025 Robotic Summer School, Center for Robotics and Artificial Intelligence (ROMER), METU

2018 ROS Tutorial for undergraduates, Nanyang Technological University

2015 Undergrad. Assistantship, Mechanical Engineering Department, METU

Supervising & Mentoring

Ph.D. Mentee (Junior Ph.D. students I mentored with)

2022 P Esmaili-Dokht: "NMR Magnetometer array design."

Master's Theses (Six months full-time research project)

2025 E Demirkaya: Continuous

2025 S Yetim: Continuous

2025 M Arefin: Continuous

2025 AB Cakmakci: Continuous

2021 MB Bilgin: "Remote sensing, tracking, and imaging inside MRI systems."

Skills

Language skills

Turkish (native), English (fluent), German (B1 level)

Technical Skills

Robotics/Programming: C++ (over +10 years of experience with real-time robotic applications), python (over +10 year experience), Git, Docker, ROS, robotic simulation (Gazebo, OpenRAVE), leg robotics (ANYmal), mobile robotics (Clearpath), robotic manipulators (Denso), deep learning (PyTorch, libtorch), image processing (OpenCV), controller design, estimator design, robot kinematics/dynamics, magnetic actuation

Medical imaging: MRI and sequence programming (Biospec 70/30 Bruker), ultrasound imaging (Vevo 3100)

Animal Experiments: Felasa B certificate for planning and participating in small animal experiments

Others: 3D design, vibrating-sample magnetometer, finite element analysis (COMSOL), additive manufacturing, micro-fabrication/assembly, two-photon lithography (Nanoscribe), focus ultrasound, radioactive material, and x-ray radiation handling (certificated)