Mehmet Mutlu

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23 March 1988
Turkish & Bulgarian
Married
B residence permit until 2028
A, B, C, D driving licence

Strengths: Systems architecture, systems engineering, electronics design, control of dynamic robots, locomotion models, computer vision.

Professional Experience

ANYbotics — Principal Systems Engineer — Switzerland — Oct 2024 - Present

Leading and ensuring the functional completeness and coherence of ANYmal X [LINK] architecture & electrical systems roadmap. Defining and facilitating the consolidation of ANYmal X requirements among company-wide stakeholders. Proposing and evaluating system concepts to satisfy requirements. Running and coordinating de-risking tests to verify selected concepts. Bridging the project design team to other departments such as product, verification, industrialization and particularly certification. Evaluating and facilitating discussions around design trade-offs to ensure successful product delivery within company budgets.

ANYbotics — Project Manager, ANYmal X — Switzerland — Sep 2023 - Mar 2024

Crisis management upon the departure of the founding project manager of ANYmal X. Delivering ANYmal X to the certification phase. Restructuring the project for a complete redesign following the discovery of compliance gaps.

ANYbotics — Electrical & Systems Engineer — Switzerland — Dec 2019 - Sep 2024

Designing and releasing world's first quadrupedal industrial inspection robot for IECEx zone 1 hazardous gas environments [LINK]. The first and only electrical engineer in ANYmal X project until 2022. Leading and ensuring functional coherence of electrical systems on ANYmal X. Inventing engineering solutions to enable the IECEx and ATEX certifications of quadrupedal industrial inspection robots. Designing all electrical needs of ANYmal X by reworking ANYmal PCBs such as wireless carrier (WiFi & 5G), power distribution, power switch, ethercat juntion, gas sensor interface, IEPE microphone interface, various interface boards and their testing/diagnostics boards. Designing battery management systems and the entire battery pack for ANYmal and ANYmal X. Defining and maintaining electrical design and component library guidelines. Collaborating with functional safety design owners. Maximizing reuse of subsystems between ANYmal & ANYmal X via modular design practices while staying within time and investment budgets. Designing cables and harnesses. Coordinating and running system and sub-system level verification campaigns such as IECEx type, EMC, CE, UN 38.3 and functional tests. Coordinating and running product care investigations on reported ANYmal X robots.

EPFL — Biorobotics Laboratory — Switzerland — Oct 2014 - Dec 2019

Designing, prototyping, producing and maintaining 13 Roombots self reconfigurable robot modules, world's first solid state self reconfigurable modules Kubits, Arbiter, and Envirobot's head. Integrating sensors such as optical and event-based cameras, force sensor, IMU and associated computational hardware on robots. Developing firmware, local control, communication protocols (on SPI, I2C, UART, RS-485), user interfaces, computer vision solutions, and higher-level motion planning. Modeling bio-inspired terrestrial and aquatic locomotion for various morphologies of modular robots. Parameter optimization in simulation and hardware. Data analysis in experiments.

IST — Computer and Robot Vision Laboratory — Portugal — Jul 2016 - Sep 2017

Developing visual servo control for manipulators made out of Roombots. Developing novel user interfaces for SRMR.

METU — Robotics Laboratory — Turkey — Dec 2010 - Sep 2014

Motion modeling of dynamical mechanisms, design of stabilization platform controllers, implementing hardware and software approaches for compensating motion blur, gait optimization and hardware improvements on bio-inspired, RHex variant, hexapod robot SensoRHex.

ASELSAN	REHIS	Turkey	Jun 2010 - Jul 2010

Internship. Array antenna design, measurements and tests for military radar and electronic warfare systems.

MedSav	R&D Department	Turkey	Jun 2009 - Jul 2009

Internship. RS485 communication board design for medical drug storage systems.

Education

Ph.D. (Joint)	École Polytechnique Fédérale de Lausanne (EPFL) Instituto Superior Técnico - Lisboa (IST)	Robotics, Control & Intelligent Systems Robotics, Brain & Cognition	2019
M.Sc.	Middle East Technical University (METU)	Electrical & Electronics Eng. w/ Robotics	2014
B.Sc.	Middle East Technical University (METU)	Electrical & Electronics Eng. w/ Control	2011
B.Sc. Minor	Middle East Technical University (METU)	Mechatronics	2011

Extracurricular Training

Architecture and Systems Engineering: Models and Methods to Manage Complex Systems	MIT xPRO	Apr-Sep 2025
Business Concept - entrepreneurship course	InnoSuisse	Sep-Dec 2018
Safety Security and Rescue Robotics Summer School	IEEE-RAS	Sep 2012

Technical Skills

PCB design	KiCad, Altium Designer
Systems Engineering	MagicDraw, Polarion
Electronic simulation	LT Spice, Multisim
Microcontroller programming	ST (C++), Microchip PIC (XC16 and PIC-C), Motorola 68HC11 (Assembly)
Embedded PCs	NanoPi, RaspberryPi, Intel Joule, Odroid
Electronics debugging	Oscilloscope, logic analyzer, spectrum analyser, multimeter, firmware debugging tools
Programming languages	C, C++, C#, MATLAB, Simulink, Java, Python
FPGA programming	Verilog and schematic level design with Xilinx Spartan 3
VLSI chip design	Cadence
Technical drawing	Inventor, KeyCreator, Solidworks
Physical simulation	Webots, Robotics Library, Ansys Workbench
OS	Ubuntu, Windows
Other tools	Git, SVN, Inkscape, Gimp, Blender, Microsoft Office, Latex

Language Skills

	Written Proficiency	Spoken Proficiency
English	Fluent (C2)	Fluent (C1)
Turkish	Native (C2)	Native (C2)
German	(Pre-)Intermediate (A2-B1)	Beginner (A2)
French	Beginner (A1)	Beginner (A1)
Russian	Beginner (A0)	N/A

Scholarships & Awards

Engineering PhD Summit, Intelligent Systems	Best poster award	2019
The Foundation for Science and Technology in Portugal (FCT)	Ph.D. grant	2014-19
Masters' Regatta Lisbon - amateur rowing competition, 8+1 category	2nd out of 4 teams	2018
The Scientific and Technological Research Council of Turkey	Graduate project scholarship	2011-14
METU Foundation	Undergraduate scholarship	2006-11
Coşkunöz Holding Foundation	Undergraduate scholarship	2006-11

Teaching Experience

EPFL	Teaching/laboratory assistant for "*Legged Robotics*"	Fall 2018-19
EPFL	Teaching/laboratory assistant for "*Computational Motor Control*"	Spring 2017-18 Spring 2015-16
IST-Lisbon	Laboratory assistant for "*Distributed Real-Time Control*"	Fall 2016-17
EPFL	Teaching assistant for "*Electrotechnic I*"	Fall 2015-16
METU	Laboratory head-assistant for "*Laboratory of Feedback Control Systems*"	Spring 2013-14 Spring 2012-13
METU	Laboratory assistant for "*Electrical Circuits Laboratory I*"	Fall 2013-14
METU	Organizing assistant for "*Laboratory of Feedback Control Systems*" Course was given for the first time in Spring 2012 period	Fall 2012-13
METU	Teaching assistant for "*Engineering Design I*"	Fall 2012-13
METU	Laboratory assistant for "*Electrical Circuits Laboratory II*"	Spring 2011-12
METU	Laboratory assistant for "*Analog Electronics Laboratory*"	Fall 2011-12

Selected Public Events

Exhibiting Roombots as an art piece in Ars Electronica (technological art exhibition)	Sep 2016
Promoting Swiss robotics in Bay Area Science Festival	Oct 2015

Interests & Activities

Motorcycle enthusiast	2017 - Present
Skiing (amateur level)	2014 - Present
Rowing (amateur level)	2016 - 2019
Collecting plastic bottle caps to be exchanged for a wheelchair in a recycling plant	Sep 2012-13
IEEE METU Student Branch, Robotics & Automation Society chairman	May 2009-10
Preparing and giving 30 hours, theoretical and practical robotics lessons for RAS	May 2009 - Jan 2010
IEEE METU Student Branch, Robotics & Automation Society vice chairman	May 2008-09
InterRail Europe backpacking tour	2009 Summer
Work & Travel Program, Ohio, the USA	2007 Summer

Publications

Ph.D. Thesis

- **M. Mutlu**, "*Vision Based Control and Perception Methods in Self Reconfigurable Modular Robots*", École Polytechnique Fédérale de Lausanne (EPFL), Expected: June 2019, supervised by Auke Ijspeert and Alexandre Bernardino.

M.Sc. Thesis

- **M. Mutlu**, "*A Novel Real-Time Inertial Motion Blur Metric with Applications to Motion Blur Compensation*", Middle East Technical University (METU), August 2014, supervised by Afşar Saranlı and Uluç Saranlı

Patents

- **M. Mutlu**, T. Ueno, E. Scioni, I. A. Mahmood, "*Method to Reduce the Risk of Explosion of a Battery for a Mobile Robot*", ANYbotics AG, PETRONAS, 2022, granted.
- T. Wiesand, T. Ueno, S. M. Holt, A. S. Scafato, **M. Mutlu**, A. Mansor, I. A. Mahmood M., "*Explosion Proof Legged Robot*", ANYbotics AG, PETRONAS, 2022, granted.
- T. Ueno, A. Watsuji, **M. Mutlu**, J. Schlienger, "*Legged Robot with Electrostatic Discharging Assembly and Robot Leg*", ANYbotics AG, PETRONAS, 2022, granted.

Journal Articles

1. Simon Hauser, **Mehmet Mutlu**, Auke Ijspeert, "*Kubits: Solid-State Self-Reconfiguration with Programmable Magnets*", IEEE, Robotics and Automation Letters, Oct 2020. Also presented in IEEE IROS 2020.
2. S. Hauser, **M. Mutlu**, P-A Leziart, H. Khodr, A. Bernardino, A. Ijspeert, "*Roombots Extended: Challenges in the Next Generation of Self-Reconfigurable Modular Robots and Their Application in Adaptive and Assistive Furniture*", Elsevier, Robotics and Autonomous Systems, May 2020.
3. I. Youssef, **M. Mutlu**, B. Bayat, A. Crespi, S. Hauser, J. Conradt, A. Bernardino, A. Ijspeert, "*A Neuro-inspired Computational Model for Visually Guided Robotic Lamprey Using Frame and Event Based Cameras*", IEEE, Robotics and Automation Letters, April 2020. Also presented in IEEE ICRA 2020.
4. H. Khodr, **M. Mutlu**, S. Hauser, A. Bernardino, A. Ijspeert, "*An Optimal Planning Framework to Deploy Self-Reconfigurable Modular Robots*", IEEE, Robotics and Automation Letters, July 2019.
5. **M. Mutlu**, S. Hauser, A. Bernardino, A. Ijspeert, "*Effects of Passive and Active Joint Compliance in Quadrupedal Locomotion*", Taylor and Francis, Advanced Robotics, July 2018.
6. S. Hauser, **M. Mutlu**, P. Banzet, A. Ijspeert, "*Compliant Universal Grippers as Adaptive Feet in Legged Robots*", Taylor and Francis, Advanced Robotics, July 2018.
7. B. Rohani, Y. Yazicioglu, **M. Mutlu**, O. Ogucu, E. Akgul and A. Saranli, "*Lagrangian Based Mathematical Modeling and Experimental Validation of a Planar Stabilized Platform for Mobile Systems*", Elsevier, Journal of Computational and Applied Mathematics, October 2013.

International Conference Proceedings

1. M. Dujany, S. Hauser, **M. Mutlu**, M. van der Sar, J. Arreguit, T. Kano, A. Ishiguro and A. Ijspeert, "*Emergent Adaptive Gait Generation through Hebbian Sensor-Motor Maps by Morphological Probing*, IEEE, IROS, Las Vegas (virtual), October 2020. **Finalist for the Best Paper Award on Cognitive Robotics.**
2. **M. Mutlu**, S. Hauser, A. Bernardino and A. Ijspeert, "*Playdough to Roombots: Towards a Novel Tangible User Interface for Self-Reconfigurable Modular Robots*", IEEE, ICRA, Brisbane, May 2018.
3. S. Hauser, **M. Mutlu**, F. Freundler and A. Ijspeert, "*Stiffness Variability in Jamming of Compliant Granules and a Case Study Application in Climbing Vertical Shafts*", IEEE, ICRA, Brisbane, May 2018.

4. R. Vasconcelos, S. Hauser, F. Dzeladini, **M. Mutlu**, T. Horvat, K. Melo, O. Paulo and A. Ijspeert, "*Active Stabilization of a Stiff Quadruped Robot Using Local Feedback*", IEEE, IROS, Vancouver, September 2017.
5. V. Nigolian, **M. Mutlu**, S. Hauser, A. Bernardino and A. Ijspeert, "*Self-Reconfigurable Modular Robot Interface Using Virtual Reality: Arrangement of Furniture Made Out of Roombots Modules*", IEEE, RO-MAN, Lisbon, August 2017.
6. **M. Mutlu**, S. Bonardi, M. Vespignani, S. Hauser, A. Bernardino and A. Ijspeert, "*Natural User Interface for Lighting Control: Case Study on Desktop Lighting Using Modular Robots*", IEEE, RO-MAN, New York City, August 2016.
7. **M. Mutlu**, K. Melo, M. Vespignani, A. Bernardino and A. Jan Ijspeert, "*Where to Place Camera on a Snake Robot: Focus on Camera Trajectory and Motion Blur*", IEEE, SSRR, Chicago, October 2015.
8. M. Vespignani, K. Melo, **M. Mutlu** and A. Ijspeert, "*Compliant Snake Robot Locomotion on Horizontal Pipes*", IEEE, SSRR, Chicago, October 2015.
9. **M. Mutlu**, A. Saranli and U. Saranli, "*A Real-Time Inertial Motion Blur Metric: Application to Frame Triggering Based Motion Blur Minimization*", IEEE, ICRA, Hong Kong, June 2014.
10. E. Akgul, **M. Mutlu**, A. Saranli and Y. Yazicioglu, "*A Comparative Evaluation of Adaptive and Non-Adaptive Sliding Mode, LQR & PID Control for Platform Stabilization*", IEEE, MSC, Dubrovnik, October 2012.
11. B. Rohani, E. Akgul, **M. Mutlu**, A. Saranli and Y. Yazicioglu, "*A Nonlinear Dynamic Strategy for Mathematical Modeling and Simulation of Stabilized Platform in Planar Motion in One Body and Three Bodies*", IAM, ICACM, Ankara, October 2012.

Poster Presentations

1. **M. Mutlu**, S. Hauser, A. Bernardino, A. Ijspeert, "Roombots: Self-reconfigurable Modular Robots". Engineering PhD Summit, Intelligent Systems, October 2019. **Best poster award.**
2. J. Nguyen-Duc, **M. Mutlu**, S. Hauser, A. Bernardino and A. Ijspeert, "*Cooperative Bridge Building by Self-Reconfigurable Modular Robots Based on Ants' Stigmergic Behaviour*, AMAM, Lausanne, August 2019.
3. S. Hauser, M. Dujany, M. van der Saar, **M. Mutlu** and A. Ijspeert, "*Learning to Walk in Arbitrary Morphologies*, AMAM, Lausanne, August 2019.
4. **M. Mutlu**, S. Hauser, A. Bernardino and A. Ijspeert, "*Effects of Joint Compliance in Quadrupedal Locomotion*", AMAM, Sapporo, June 2017.
5. S. Hauser, K. Melo, **M. Mutlu** and A. Ijspeert, "*Fast State-Switching of a Jamming-Based Foot*", AMAM, Sapporo, June 2017.

Appendix

(Co-)Supervised Student Projects

I. Youssef	(M.Sc. Thesis) A Biologically Inspired Visuo-Motor Controller for Robotic Lamprey	2018-19
H. Khodr	(M.Sc. Thesis) Collaborative Locomotion in Self-Reconfigurable Modular Robots	2018-19
M. Riou A. Chassignet S. Montadon	Supervising a robot competition team	2018-19
F. Efremov	A Novel Self-Reconfigurable Modular Robot Concept	2017-18
M. Dujany	Localization of an Underwater Swimming Robot	2017-18
E. Klauser	EnVision, a Vision System for Envirobot: Hardware Aspects	2017-18
R. Fong	EnVision, a Vision System for Envirobot: Control	2017-18
H. Kohli	Stereo Vision in Self-Reconfigurable Modular Robotics	2017-18
E. Clément W. Gilles Y. Jian	Supervising a robot competition team	2017-18
R. Vasconcelos	(M.Sc. Thesis) CPG & Tegotae-Based Locomotion Control of Quadrupedal Modular Robots	2016-17
T-T Denisart	Hardware Integration of a Universal Gripper to the Roombot Module	2016-17
Pol Banzet	Integration of Variable Stiffness Granular Feet in a Quadruped Robot	2016-17
Q. Golay	Passing Objects: Robot-Robot Interaction with Universal Grippers	2016-17
F. Freundler	Young's Modulus Variation of a Variable Stiffness Element Based on Jamming of Compliant Granules	2016-17
V. Nigolian	User Interface for Virtual Assembly of Self-Reconfigurable Modular Robots	2016-17
A. Häfliger	Autonomous Vision Based Docking of Roombots	2015-16
A. Vardi	Self-Reconfigurable Robots For Space Exploration	2015-16
R. Dryzner	From Play-Doh to Roombots	2015-16
V. Nigolian	Immersive Interaction Framework for Self-Reconfigurable Modular Robots	2015-16
S. Bussier	Multi-Sensory Autonomous Docking Approach for a Self-Reconfigurable Robots	2015-16
A. Öztürk	Universal Gripper Controller Design with Visual Feedback	2015-16
M. Félix M. Jean C. Marie	Supervising a robot competition team	2015-16
M. Moret	Hybrid Brain Computer Interface to Control Modular Robots	2014-15

Selected Educational & Hobby Projects

Case study on discrete time multi-variable control of a quadcopter. Simulation in Matlab.	2016
3D swimming and terrestrial locomotion with snake & lamprey-like robot in Webots simulation.	2016
Vector field based formation control with E-Pucks (differential drive mobile robots) in Webots.	2015
Implementing an autonomous navigation on SensoRHex based on the first order logic planner.	2013
Implementing an information metric based exploration algorithm to enhance SLAM performance.	2013
Statistical Robotics project. Comparing open source SLAM algorithms.	2013
AI project. Ms. Pacman vs. Ghosts Competition - Ghosts' AI.	2012
Robot Vision project. Improving watershed segmentation with resolution pyramids.	2012
Computer Graphics project. Custom design CAD program.	2012
Implementing Pong game on a FPGA board.	2012
Pattern Recognition project. Combining classifiers.	2011
Intelligent Control project. Simulating proxy based sliding mode controller for a hip node of RHex.	2011
B.S. final project. A real-life Sokoban solving and playing robot.	2010-11
Mechatronics final project. Emco CNC mill & lathe renovation.	2011
Mechatronics project. Image processing based color-target shooting robotic mechanism with laser.	2010
Mechatronics project. Building DC brushed motor using scrap material from scratch.	2010
Sokoban variant game design and implementing a solver for it.	2010
Digital Electronics Laboratory project. Sudoku solver on FPGA board.	2010
Analog Electronics Laboratory project. Automatic gain controller.	2010
Sensor based light emitting target shooting robotic mechanism with laser.	2009
Mechaboard design. An education board that is used to teach microcontroller programming in ME220, ME461 and ME462 mechatronics courses for 3 years in METU. All design by myself.	2009
RoboCup SSL. First prototypes for robots.	2008-09
Mini projects. Sumo and line following robots to participate in local robotics competitions. Rotating led signs, basic room entrance logging system and many basic microcontroller experiments.	2007-∞

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