

# MEHMET MUTLU

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23 March 1988  
Turkish & Bulgarian  
Married  
B residence permit until 2023  
A, B, C, D driving licence



## Strengths

Control of dynamic robots

Electronics design

Locomotion models

Computer vision

## 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

## Professional Experience

EPFL	Biorobotics Laboratory	Switzerland	Oct 2014 - Oct 2019	Designing, prototyping, producing and maintaining 13 Roombots modules, 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 on 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.

## Technical Skills

PCB design	Altium Designer (primary), Ares, Eagle
Electronic simulation	Multisim, LT Spice, Isis
Microcontroller programming	Microchip PIC (XC16 and PIC-C), Arduino (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, Premiere Pro, Microsoft Office, Latex

## Language Skills

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

## Scholarships & Awards

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

## Extracurricular Training

Business Concept - entrepreneurship course	InnoSuisse	Sep-Dec 2018
Safety Security and Rescue Robotics Summer School	IEEE-RAS	Sep 2012

## Teaching Experience

EPFL	Teaching/laboratory assistant for “ <i>Computational Motor Control</i> ”	Spring 2017-18 Spring 2015-16
IST-Lisbon	Laboratory assistant for “ <i>Distributed Real-Time Control</i> ”	Fall 2016-17
EPFL	Teaching assistant for “ <i>Electrotechnic I</i> ”	Fall 2015-16
METU	Laboratory head-assistant for “ <i>Laboratory of Feedback Control Systems</i> ”	Spring 2013-14 Spring 2012-13
METU	Laboratory assistant for “ <i>Electrical Circuits Laboratory I</i> ”	Fall 2013-14
METU	Organizing assistant for “ <i>Laboratory of Feedback Control Systems</i> ”	Fall 2012-13
	Course was given for the first time in Spring 2012 period	
METU	Teaching assistant for “ <i>Engineering Design I</i> ”	Fall 2012-13
METU	Laboratory assistant for “ <i>Electrical Circuits Laboratory II</i> ”	Spring 2011-12
METU	Laboratory assistant for “ <i>Analog Electronics Laboratory</i> ”	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
Rowing (amateur level)	2016 - Present
Skiing (amateur level)	2014 - Present
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 backpacking Europe tour	2009 Summer
Work & Travel Program in Ohio, the USA (First salary in an unqualified job)	2007 Summer

## References

Prof. Auke Ijspeert	Ph.D. supervisor	auke.ijspeert@epfl.ch	(+41) 21 693 26 58
Prof. Alexandre Bernardino	Ph.D. co-supervisor	alexandre.bernardino@tecnico.ulisboa.pt	(+351) 21 841 82 93
Dr. Massimo Vespignani	Postdoc	massimo.vespignani@nasa.gov	(+1) 312 468 28 37
Prof. Afşar Saranlı	M.Sc. supervisor	afsars@metu.edu.tr	(+90) 312 210 45 29

## 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, **(Accepted)**

### 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

### Journal Articles

1. S. Hauser, **M. Mutlu**, P-A Leziart, H. Khodr, A. Bernardino, A. Ijspeert, “*Roombots Extended: Challenges of the Next Generation of Self-Reconfigurable Modular Robots and Their Application in Adaptive and Assistive Furniture*” **(Submitted)**
2. 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 (with IROS presentation), 2019. **(Accepted)**
3. **M. Mutlu**, S. Hauser, A. Bernardino, A. Ijspeert, “*Effects of Passive and Active Joint Compliance in Quadrupedal Locomotion*”, Advanced Robotics, 19 July 2018
4. S. Hauser, **M. Mutlu**, P. Banzet, A. Ijspeert, “*Compliant Universal Grippers as Adaptive Feet in Legged Robots*”, Advanced Robotics, 27 July 2018
5. B. Rohani, Y. Yazicioglu, **M. Mutlu**, O. Ogucu, E. Akgul and A. Saranlı, “*Lagrangian Based Mathematical Modeling and Experimental Validation of a Planar Stabilized Platform for Mobile Systems*”, Journal of Computational and Applied Mathematics, 21 October 2013

### International Conference Proceedings

1. **M. Mutlu**, S. Hauser, M. Rickert, J. Santos-Victor, A. Ijspeert, A. Bernardino, “*Vision Based Autonomous Docking with Self-Reconfigurable Modular Robots*” **(In Preparation)**
2. I. Youssef, **M. Mutlu**, B. Bayat, A. Crespi, S. Hauser, J. Conradt, A. Bernardino, A. Ijspeert, “*Event-Based Spiking Neural Network Visual Control of an Autonomous Robotic Lamprey*” **(In Preparation)**
3. **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.
4. 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.
5. 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.
6. 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.
7. **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.
8. **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.
9. M. Vespignani, K. Melo, **M. Mutlu** and A. Ijspeert, “*Compliant Snake Robot Locomotion on Horizontal Pipes*”, IEEE, SSRR, Chicago, October 2015.
10. **M. Mutlu**, A. Saranlı and U. Saranlı, “*A Real-Time Inertial Motion Blur Metric: Application to Frame Triggering Based Motion Blur Minimization*”, IEEE, ICRA, Hong Kong, June 2014.
11. E. Akgul, **M. Mutlu**, A. Saranlı and Y. Yazicioglu, “*A Comparative Evaluation of Adaptive and Non-Adaptive Sliding Mode, LQR & PID Control for Platform Stabilization*”, IEEE, MSC, Dubrovnik, October 2012.
12. B. Rohani, E. Akgul, **M. Mutlu**, A. Saranlı 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. 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 **(Accepted)**
2. S. Hauser, M. Dujany, M. van der Saar, **M. Mutlu** and A. Ijspeert, “*Learning to Walk in Arbitrary Morphologies*”, AMAM, Lausanne, August 2019 **(Accepted)**
3. **M. Mutlu**, S. Hauser, A. Bernardino and A. Ijspeert, “*Effects of Joint Compliance in Quadrupedal Locomotion*”, AMAM, Sapporo, June 2017.
4. 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	Supervising a robot competition team	2018-19
A. Chassignet		
S. Montadon		
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	Supervising a robot competition team	2017-18
W. Gilles		
Y. Jian		
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	Supervising a robot competition team	2015-16
M. Jean		
C. Marie		
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
<i>Statistical Robotics</i> project. Comparing open source SLAM algorithms.	2013
AI project. Ms. Pacman vs. Ghosts Competition - Ghosts' AI.	2012
<i>Robot Vision</i> project. Improving watershed segmentation with resolution pyramids.	2012
<i>Computer Graphics</i> project. Custom design CAD program.	2012
Implementing Pong game on a FPGA board.	2012
<i>Pattern Recognition</i> project. Combining classifiers.	2011
<i>Intelligent Control</i> 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
<i>Mechatronics</i> final project. Emco CNC mill & lathe renovation.	2011
<i>Mechatronics</i> project. Image processing based color-target shooting robotic mechanism with laser.	2010
<i>Mechatronics</i> project. Building DC brushed motor using scrap material from scratch.	2010
Sokoban variant game design and implementing a solver for it.	2010
<i>Digital Electronics Laboratory</i> project. Sudoku solver on FPGA board.	2010
<i>Analog Electronics Laboratory</i> 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.	2007-∞
Rotating led signs, basic room entrance logging system and many basic microcontroller experiments.	