Çetin Meriçli

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RESEARCH INTERESTS

My long term vision is to create completely autonomous robots that work in collaboration with humans and other robots, continuously learning and updating their behaviors through interacting with and learning from humans as well as self exploration. My work is interdisciplinary, drawing from the methods and theory of artificial intelligence, robotics, and machine learning. My current research focus is on developing algorithms, representations, and interfaces for robots to learn, update, and correct their behaviors through interaction. My research interests also include developmental robotics, interactive learning, sliding autonomy through learning, mixed-initiative human-robot collaboration, human behavior understanding, robot vision, and multi-robot coordination and learning.

EDUCATION

Boğaziçi University, İstanbul, Turkey

Ph.D., Computer Engineering   **2011**

- Thesis Title: Multi-resolution Model Plus Correction Paradigm for Task and Skill Refinement on Autonomous Robots
- Advisors:
  - Professor H. Levent Akın
  - Professor Manuela Veloso, Carnegie Mellon University

M.S., Computer Engineering   **2005**

- Thesis Title: Developing a Novel Robust Multi-agent Task Allocation Algorithm for Four-Legged Robot Soccer Domain
- Advisor: Professor H. Levent Akın

Marmara University, İstanbul, Turkey

B.S., Computer Engineering   **2002**

- Thesis Title: Sensor Optimization in a Virtual Landscape with Genetic Algorithms
- Advisor: Professor Haluk Topçuoğlu

Research Experience

Carnegie Mellon University, Pittsburgh PA, USA

Post-doctoral Fellow **2011 - Present**

- My work mainly focuses on expanding the capabilities and the overall performance of mobile service robots operating in complex real world environments by complementing and updating the existing robot controllers with corrective human feedback. I also co-teach an undergraduate introductory course, and supervise a team of students who work on related projects such as fast and robust human detection using depth images, realistic 3D simulation of indoor environments including simulated crowds, and updating robot behavior using corrective feedback.

Member, CMurfs RoboCup Standard Platform League Team **2010**

- I worked on the ball dribbling challenge where I utilized learning from corrective demonstration methods I contributed in my PhD thesis. I also developed a modular software infrastructure, an effective motion interface, and a faster vision module. CMurfs finished 3rd in the technical challenges out of 25 teams, and 4th in the SPL soccer competitions out of 24 teams in RoboCup 2010.

Member, CORAL Research Group **2009 - Present**

- I conduct research on learning and refining complex tasks and low level skills on various robot platforms including humanoids and mobile service robots using corrective human demonstration.

Boğaziçi University, İstanbul, Turkey

Research Assistant **2007 - 2009**

- As a member of the project "Development of Decentralized Partially Observable Markov Decision Process Algorithms for Multi-robot Teams", I developed appropriate metrics that build upon my MS thesis for the learning and evaluation of soccer playing skills, and I implemented approximate DEC-POMDP solutions.

Member, Cerberus RoboCup Standard Platform League Team **2003, 2009**

Team leader, Cerberus RoboCup Standard Platform League Team **2004 - 2008**

- I applied multi-agent task allocation algorithms I developed in my MS thesis to both Aibo four-legged robots and Nao humanoid robots. I also led and participated in the development of sophisticated debugging tools, high performance low-level robot vision, planning and behavior, wireless communication, and probabilistic self-localization modules. Cerberus won the technical challenges in 2005, and reached the quarterfinals in 2006 and 2008.

Teaching Experience

Carnegie Mellon University, Pittsburgh PA, USA

15-491 - CMRoboBits, an undergraduate course **2009 - Present**

- I have been assisting (2009) and co-teaching (2011, 2012) with Professor Manuela Veloso. In the class, we challenge the students with simplified versions of actual research problems. I supervise the student teams and oversee the class projects. I also work closely with the teaching assistants to provide access to various low-level functionalities like object detection and motion primitives. Providing such functionalities helps the students focus on the actual research problem instead of dealing with engineering issues. Every year, the students succeed remarkably in completing sophisticated concrete projects using a diverse set of real robots.

Boğaziçi University, İstanbul, Turkey

CmpE49A - Introduction to Robotics, an undergraduate course   **2007 - 2010**

- I helped creating the course from scratch. In particular, I was in charge of designing, supervising, and evaluating the laboratory sessions and the term projects of the course as well as covering some topics in the lectures. The course received very positive student feedback for four years in a row after its inception in 2007, and became a regular elective course in 2011.

CmpE565 - Autonomous Robots, a graduate course   **2005 - 2009**

- I was in charge of designing, supervising, and grading the term projects as well as lecturing on some topics such as kinematics and probabilistic self-localization.

FUNDING EXPERIENCE

- Co-author, NSF small grant on "Natural Language-Based Human Instruction for Task Embedded Robots", 2012 ($300,000)

- Co-chair, Republic of Turkey Prime Ministry promotion fund for RoboCup 2011 (€300,000)

- Researcher, The Scientific and Technological Research Council of Turkey (TÜBİTAK) grant on "Development Of Decentralized Partially Observable Markov Decision Process Algorithms For Multi-Robot Teams", 2007 ($100,000)

SERVICE

- Guest editor, IEEE Transactions on Autonomous Mental Development "Special Issue on Behavior Understanding and Developmental Robotics" (2013)

- Program committee member, ICAR (2013)

- Program committee member, IJCAI (2013)

- Program committee member, AAAI Cognitive Systems Track (2013)

- Program committee member, AAAI Robotics Track (2013)

- Program committee member, International Conference on Advanced Robotics (ICAR) (2013)

- Chair, AAAI Fall Symposium on "Robots Learning Interactively from Human Teachers (RLIHT)" (2012)

- Organizer, "Third International Workshop on Human Behavior Undertanding (HBU'12)" at IROS'12 (2012)

- Co-chair, RoboCup 2011 (more than 2800 participants from 41 countries, with an estimated budget of ∼€700.000)

- Founding member, RoboCup Turkey National Committee (2011 - Present)

- Co-chair, Workshop on "Humanoid Robots Learning from Human Interaction" at IEEE/RAS Humanoids'10 (2010)

- Local organization committee member, "NATO ASI 2010: Advanced All-Terrain Autonomous Systems" (2010)

- Local organization committee member, CLAWAR'09 (2009)

- Program committee member, RoboCup Symposium (2009 - Present)

- Organization committee chair, RoboCup Standard Platform League (2009)
- Organization committee member, RoboCup Standard Platform League (2007-2008)
- Referee, FIRST Lego League Turkey (2008)
- Editor, Journal of Unmanned System Technology (JUST)
- Reviewer, IEEE Transactions on Robotics, Autonomous Robots, International Journal of Social Robotics, International Journal of Humanoid Robots, IEEE Transactions on Education, Environmental Modelling and Software, IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), American Control Conference (ACC), ACM International Conference on Multimodal Interaction (ICMI), Computational Intelligence

Invited Talks

- "Closing the Loop in Autonomous Robotic Systems: From Scientific Ideas to Implementation Details", National Robotics Engineering Center, The Robotics Institute, Carnegie Mellon University, 2013 (Host: Dr. Peter Rander)
- "An Overview of Contemporary Robotics Research", Computer Engineering Department, Okan University, Turkey, 2012 (Host: Dr. Aslı Uyar)
- "An Overview of Contemporary Robotics Research", Computer Engineering Department, Galatasaray University, Turkey, 2011 (Host: Serhan Daniş)
- "Multi-resolution Model Plus Correction Paradigm for Task and Skill Refinement on Autonomous Robots", TAM Research Center, Boğaziçi University, Turkey, 2011 (Host: Dr. Özlem Durmaz İncel)
- "Robotics Research at Carnegie Mellon University", Computer Engineering Department, Boğaziçi University, Turkey, 2010 (Host: Professor Lale Akarun)
- "Improving Biped Walk Stability Using Real-time Corrective Human Feedback", Learning, Artificial Intelligence, and Robotics Laboratory (LAIRLab), Carnegie Mellon University, 2010 (Host: Professor Drew Bagnell)
- "Cerberus RoboCup 4-Legged Robot Soccer Team", Computer Engineering Department, Istanbul Technical University, Turkey, 2007 (Host: ITU Robotics Club)
- "RoboCup 4-Legged Soccer League: Challenges and Approaches", Computer Engineering Department, Marmara University, Turkey, 2007 (Host: Marmara University IEEE Student Branch)
- "An Overview of RoboCup", The Chamber of Mechanical Engineers, Turkey, 2007 (Host: Devrim Kartal)

Awards and Honors

- Recipient of The Scientific and Technological Research Council of Turkey (TÜBİTAK) Programme 2214 Scholarship (awarded to 5 CS PhD students nationwide) (2009)
- First place in RoboCup 2005 4-Legged League Technical Challenges as the student leader of the Cerberus team (2005)
- Third place in RoboCup 2010 Standard Platform League Technical Challenges as a member of the CMurfs team (2005)
- Completed undergraduate study with high honors, ranked 2nd out of 40 students (2002)

Industry Experience

i Bilişim Ltd. Şti., İstanbul, Turkey

Co-founder   **2007 - 2011**

- Developed a commercial robotic mannequin that can interact with humans and imitate motions. The mannequin has a soft body and a metal skeleton articulated with cable-driven joints. The main challenge there was to develop a thin but powerful enough skeleton that can fit in the smallest size female mannequin body.
- Developed an omni-directional mobile robot base equipped with an articulated stereo camera system for general purpose robotics research. We engineered a design that allowed us to replace some expensive equipment with low-cost counterparts without losing agility, payload, or robustness.
- Developed a robotic head with rich expressive abilities for human-robot interaction research. Instead of articulated eyes and mouth, we used high brightness LED matrices that enabled a richer set of expressions to be displayed.

Arçelik A.Ş., İstanbul, Turkey

Senior Software Engineer   **2004 - 2007**

- Developed several large-scale business workflow applications on the intranet web for approximately 1000 concurrent users.
- Designed the first distributed implementation of Microsoft SharePoint portal in Turkey as a part of the development team.
- Led the migration process of the entire IT department (approximately 150 developers) to the new project management framework using Microsoft Project Professional.

Memberships

- AAAI
- IEEE
- IEEE Robotics and Automation Society
- IEEE Computational Intelligence Society

Personal Information

Citizenship: Turkish

U.S. Visa Status: H1b

Publications

Book

- Çetin Meriçli. "Reading the Game: A Robust Layered Game Evaluation and Task Allocation Method for Robot Soccer" (Based on my MS thesis), LAP Lambert Academic Publishing, 2010.

Book Chapter

- Hatice Köse, Kemal Kaplan, Utku Tatlıdede, Çetin Meriçli, and H. Levent Akın. "Market-Driven Multi-Agent Collaboration in Robot Soccer Domain". In Vedran Kordic, Aleksandar Lazinica, and Munir Merdan, editors, *Cutting Edge Robotics*, Pro Literatur Verlag, 2005.

Edited Volume

- Albert Ali Salah, Javier Ruiz-del-Solar, Çetin Meriçli, and Pierre-Yves Oudeyer (Eds.). "Human Behavior Understanding - Third International Workshop, HBU 2012, Vilamoura, Portugal, October 7, 2012". Proceedings, Lecture Notes in Computer Science 7559, Springer, 2012.

Refereed Journal Articles

- H. Levent Akın, Çetin Meriçli, and Tekin Meriçli. Introduction to Autonomous Mobile Robotics using Lego Mindstorms NXT. Computer Science Education, 2013 (to appear).
- Zeynep Yücel, Albert Ali Salah, Çetin Meriçli, Tekin Meriçli, Roberto Valenti, and Theo Gevers. "Joint Attention by Gaze Interpolation and Saliency". IEEE Transactions on Systems, Man, and Cybernetics Part B, 43:829842, 2012.
- Çetin Meriçli, Manuela Veloso, and H. Levent Akın. "Improving Biped Walk Stability with Complementary Corrective Demonstration". Autonomous Robots, 32(4):419 - 432, Springer Netherlands, 2012.
- Çetin Meriçli, Manuela Veloso, and H. Levent Akın. "Multi-Resolution Corrective Demonstration for Efficient Task Execution and Refinement". International Journal of Social Robots, Volume 4, Issue 4, Page 423-435, Springer, 2012.
- Çetin Meriçli, Manuela Veloso, and H. Levent Akın. "Task Refinement for Autonomous Robots using Complementary Corrective Human Feedback". International Journal of Advanced Robotic Systems, 8(2), 2011.

Magazine Article

- Çetin Meriçli, Brenna D. Argall, Maya Çakmak, W. Bradley Knox, and Tekin Meriçli. "Robots Learning Interactively from Human Teachers", AI Magazine (to appear).

Refereed Conference Papers

- Benjamin Choi, Çetin Meriçli, Joydeep Biswas, and Manuela Veloso. "Fast Human Detection for Indoor Mobile Robots Using Depth Images". In IEEE International Conference on Robotics and Automation (ICRA), 2013 (accepted).
- Çetin Meriçli, Manuela Veloso, and H. Levent Akın. "Efficient Task Execution and Refinement through Multi-Resolution Corrective Demonstration". In IEEE International Conference on Robotics and Automation (ICRA), 2012.
- Serhan Daniş, Tekin Meriçli, Çetin Meriçli, and H. Levent Akın. "Robot Detection with a Cascade of Boosted Classifiers Based on Haar-like Features". In RoboCup 2010: Robot Soccer World Cup XIV, LNCS Vol. 6556, pp.409-417, 2011.
- Çetin Meriçli and Manuela Veloso. "Biped Walk Learning Through Playback and Corrective Demonstration". In AAAI 2010: Twenty-Fourth Conference on Artificial Intelligence, 2010
- Çetin Meriçli, Manuela Veloso, and H. Levent Akın. "Complementary Humanoid Behavior Shaping using Corrective Demonstration". In Proceedings of 2010 IEEE-RAS International Conference on Humanoid Robots, December 6-8, 2010, Nashville, TN, USA, 2010.
- Brian Coltin, Somchaya Liemhetcharat, Çetin Meriçli, Junyun Tay, and Manuela Veloso. "Multi-Humanoid World Modeling in Standard Platform Robot Soccer". In Proceedings of 2010 IEEE-RAS International Conference on Humanoid Robots, December 6-8, 2010, Nashville, TN, USA, 2010.
- Çetin Meriçli and Manuela Veloso. "Improving Biped Walk Stability Using Real-time Corrective Human Feedback". In RoboCup Symposium 2010: Robot Soccer World Cup XIV, 2010.

- Çetin Meriçli, Tekin Meriçli, and H. Levent Akın. "A Reward Function Generation Method Using Genetic Algorithms: A Robot Soccer Case Study". In 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2010.
- Zeynep Yücel, Albert Ali Salah, Çetin Meriçli, and Tekin Meriçli. "Kafa Duruşu Kestirimlerinden Bakış Yönünün Türetilmesi" (In Turkish). In SIU 2010 Sinyal İşleme Uygulamaları Çevresel Zeka ve Sosyal Sinyal İşleme Özel Oturumu, 2010.
- H. Levent Akın, Çetin Meriçli, Tekin Meriçli, and Ertan Doğrultan. "Introduction to Autonomous Robotics with Lego Mindstorms". In CLAWAR'09, World Scientific, pp. 733-740, 2009.
- Tekin Meriçli, Çetin Meriçli, Ergin Özkucur, Can Kavaklıoğlu, Barış Gökçe, and H. Levent Akın. "Dealing with Uncertainty in Structured Environments: A Robot Soccer Case Study". In proceedings of CLAWAR'09, World Scientific, pp. 98-105, 2009.
- Tekin Meriçli, Çetin Meriçli, and H. Levent Akın. "A Robust Statistical Collision Detection Framework for Quadruped Robots". In RoboCup 2008: Robot Soccer World Cup XII, LNAI Vol. 5399, 2009., pp.145-156, 2009.
- Çetin Meriçli and H. Levent Akın. "A Layered Metric Definition and Validation Framework for Multirobot Systems". In proceedings of RoboCup'08: Robot Soccer World Cup XII, LNAI Vol. 5399, 2009., pp. 568-579, 2009.
- Zeynep Yücel, Albert Ali Salah, Çetin Meriçli, and Tekin Meriçli. "Joint Visual Attention Modeling for Naturally Interacting Robotic Agents". In proceedings of ISCIS'09, 2009.
- Kemal Kaplan, Buluç Çelik, Tekin Meriçli, Çetin Meriçli, and H. Levent Akın. "Practical Extensions to Vision-Based Monte Carlo Localization Methods for Robot Soccer Domain". In RoboCup 2005: Robot Soccer World Cup IX, LNCS Vol. 4020, pp. 420-427, 2006.
- Hatice Köse, Utku Tatlıdede, Çetin Meriçli, Kemal Kaplan, and H. Levent Akın. "Q-Learning based Market-Driven Multi-Agent Collaboration in Robot Soccer". In proceedings of TAINN'04, pp. 219-228, 2004.
- Çetin Meriçli, I. Osman Tufanoğulları, and H. Levent Akın. "World Modeling in Disaster Environments with Constructive Self-Organizing Maps for Autonomous Search and Rescue Robots". In RoboCup 2004: Robot Soccer World Cup VIII, LNCS, Vol. 3276, pp.594-601, 2005.
- Hatice Köse, Kemal Kaplan, Çetin Meriçli, and H. Levent Akın. "Genetic Algorithms Based Market-Driven Multi-Agent Collaboration in the Robot-Soccer Domain". In proceedings of FIRA Robot World Congress, 2003.
- Hatice Köse, Çetin Meriçli, Kemal Kaplan, and H. Levent Akın. "All Bids for One and One Does for All: Market-Driven Multi-agent Collaboration in Robot Soccer Domain". In proceedings of ISCIS'03, pp. 529-536, 2003.

Refereed Workshop Papers
- Çetin Meriçli, Steven D. Klee, Jack Paparian, and Manuela Veloso. An Interactive Approach for Situated Task Teaching through Verbal Instructions. In Workshop on Intelligent Robotic Systems, 27th Conference on Artificial Intelligence (AAAI 2013), 2013
- Albert Ali Salah, Javier Ruiz-del-Solar, Çetin Meriçli, and Pierre-Yves Oudeyer. Human Behavior Understanding for Robotics. In The Third Workshop on Human Behavior Understanding (HBU'2012) at IROS 2012, 2012.
- Brian Coltin, Somchaya Liemhetcharat, Çetin Meriçli, and Manuela Veloso. "Challenges of Multi-Robot World Modelling in Dynamic and Adversarial Domains". In Workshop on Practical Cognitive Agents and Robots, 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2010.
- Çetin Meriçli and Manuela Veloso. "Biped Walk Learning On Nao Through Playback and Real-time Corrective Demonstration" (extended abstract). In Workshop on Agents Learning Interactively from Human Teachers, 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2010.

Technical Reports

- Manuela Veloso, Somchaya Liemhetcharat, Brian Coltin, Çetin Meriçli, and Junyun Tay. "CMurfs 2010 Team Description Paper". Carnegie Mellon University, 2010.
- H. Levent Akın, Çetin Meriçli, Tekin Meriçli, Barış Gökçe, Can Kavaklıoğlu, and Ergin Özkucur. "Cerberus'09 Team Description Paper". Boğaziçi University, 2009.
- H. Levent Akın, Çetin Meriçli, Tekin Meriçli, Barış Gökçe, Can Kavaklıoğlu, and Ergin Özkucur. "Cerberus'08 Aibo Team Description Paper". Boğaziçi University, 2008.
- H. Levent Akın, Çetin Meriçli, Tekin Meriçli, Barış Gökçe, Can Kavaklıoğlu, Ergin Özkucur, and Olcay Taner Yıldız. "Cerberus'08 Nao Team Description Paper". Boğaziçi University, 2008.
- H. Levent Akın, Çetin Meriçli, Barış Gökçe, Barış Kurt, Can Kavaklıoğlu, and Abdullah Akçe. "Cerberus'07 Team Description Paper". Boğaziçi University, 2007.
- H. Levent Akın, Çetin Meriçli, Barış Gökçe, Fuat Geleri, Nuri Taşdemir, and Buluç Çelik. "Cerberus'06 Team Report". Boğaziçi University, 2006.
- H. Levent Akın, Çetin Meriçli, Tekin Meriçli, Kemal Kaplan, and Buluç Çelik. "Cerberus'05 Team Report". Boğaziçi University, 2005.
- H. Levent Akın, M. Kaan Baloğlu, Hatice Köse Bağcı, Suzan Bayhan, Çetin Meriçli, Damla Poslu, Ömer Sever, Olcay Taner Yıldız, Svetlozar Argirov, Boris Marinov, Petya Pavlova, Nikola Shakev, Jordan Tombakov, and Andon Topalov. Cerberus'03 Team Report. Boğaziçi University, 2003.