NESET UNVER Akmandor

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SUMMARY

I earned my PhD from Northeastern University in Computer Engineering, specialized in robotics, in April 2024. My research focuses on improving computational efficiency and robustness of motion generation and planning algorithms for mobile robots to enable time-dependent tasks in dynamic environments. I have been developing advanced algorithms by bridging classical planning/control and machine learning methods. My work has been tested on and applied to many robotic systems, both in physics-based simulations and actual setups, including wheel-driven mobile robots, unmanned aerial vehicles and mobile manipulators.

EDUCATION

Northeastern University   Jan 2018 − May 2024
Doctor of Philosophy in Computer Engineering   *Boston, Massachusetts, USA*

Middle East Technical University   Feb 2013 − Jan 2016
Master of Science in Electrical and Electronics Engineering   *Ankara, TURKEY*

Bilkent University   Aug 2007 − June 2011
Bachelor of Science in Electrical and Electronics Engineering *Ankara, TURKEY*

PROFESSIONAL EXPERIENCE

Motional   May 2022 − Sep 2022
Machine Learning Intern, Control Group   *Boston, MA, USA*

- Implemented grid-search and Bayesian Optimization to optimize the hyperparameters of an MPC-based trajectory generation algorithm.

Schlumberger-Doll Research   May 2019 − Aug 2019
Robotics Research Intern   *Cambridge, MA, USA*

- Implemented Python and macro scripts to perform; (1) the sensitivity analysis of a metrology software that enables CAD to 3D scan (mesh) data alignment, and (2) feature extraction from both CAD and 3D scan of the drilling tool part.

TUBITAK Space Technologies Research Institute   Jan 2017 − Dec 2017
Researcher, Real-time Software Group   *Ankara, TURKEY*

- Implemented (1) header files of the on-board computer devices, and (2) software-based test scripts of on-board computer applications for the satellite projects (i.e. TURKSAT-6A).

Pars Makina Ltd.   Aug 2011 − Feb 2013 & Aug 2015 − Jan 2017
Electrical and Electronics Research Engineer   *Ankara, TURKEY*

- Implemented hardware & software of data acquisition system of 80 meter wind measurement mast.
- Prepared wind measurement analysis and assessment reports of the area

ACADEMIC EXPERIENCE

Robotics and Intelligent Vehicles Research (RIVeR) Lab   Jan 2018 − May 2024
Graduate Research and Teaching Assistant   *Northeastern University, Boston, MA, USA*

- Performed research on **improving computational efficiency of motion planning algorithms for mobile manipulation tasks in dynamic environments**.
- Worked on the National Institute for Hometown Security project: "Automated Assessment of Damaged Environments due to Extreme Events using UAVs".
- Worked as teaching assistant of **EECE 2160 Embedded Design: Enabling Robotics** for five semesters by assisting students in labs, grading HWs and reports, holding office hours.

ATLAS Interdisciplinary Robotics Research Lab   Feb 2013 − Feb 2016
Graduate Student   *Middle East Technical University (METU), Ankara, Turkey*

- Wrote "METU Scientific Research Project" proposal with the budget of ∼$6400 to support my M.Sc thesis and completed successfully submitting a final report.

Mechatronics and Robotics Laboratory for Innovation (MeRLIn) Lab   June 2014 − Sep 2014
Graduate Student Summer Intern   *Politecnico di Milano, Milano, Italy*

- Quadrivio Project: Implemented the backstepping observer method on MATLAB to estimate the tire cornering stiffness, which is necessary to calculate rollover risk indicator of an all terrain vehicle.

PUBLICATIONS

- **N. Ü. Akmandor** et. al., (In Preparation) "Re4MPC: Reactive Formulation of Nonlinear Model Predictive Control for Multi-model Robot Motion Planning via Deep Reinforcement Learning.".

- **N. Ü. Akmandor**, "Enhancing Motion Planning Efficiency in Dynamic Environments through Advanced Algorithms for Mobile Robots." Order No. 31241443, Northeastern University, United States – Massachusetts, 2024.

- H. Li, Z. Li, **N. Ü. Akmandor**, H. Jiang, Y. Wang and T. Padır, "StereoVoxelNet: Real-Time Obstacle Detection Based on Occupancy Voxels from a Stereo Camera Using Deep Neural Networks," 2023 IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, 2023, pp. 4826-4833, doi: 10.1109/ICRA48891.2023.10160924.

- **N. Ü. Akmandor**, H. Li, G. Lvov, E. Dusel and T. Padır, "Deep Reinforcement Learning based Robot Navigation in Dynamic Environments using Occupancy Values of Motion Primitives," 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Kyoto, Japan, 2022, pp. 11687-11694, doi: 10.1109/IROS47612.2022.9982133.

- **N. Ü. Akmandor**, H. Li, G. Lvov, E. Dusel and T. Padır, "Reactive navigation framework for mobile robots by heuristically evaluated pre-sampled trajectories," 2021 International Journal of Robotic Computing (IJRC), vol. 3, no. 1, pp. 47-68, doi: 10.35708/RC1870-126265.

- **N. Ü. Akmandor** and T. Padır, "A 3D Reactive Navigation Algorithm for Mobile Robots by Using Tentacle-Based Sampling," 2020 Fourth IEEE International Conference on Robotic Computing (IRC), Taichung, Taiwan, 2020, pp. 9-16, doi: 10.1109/IRC.2020.00009.

- **N. Ü. Akmandor**, "Body attitude control of a planar one-legged hopping robot using a novel air drag assisted reaction wheel," M.S. - Master of Science, Middle East Technical University, 2016.

QUALIFICATIONS and SKILLS

- **Research**: Motion and Path Planning (Reactive, Sampling-based, Optimization-based), Deep Reinforcement Learning, Model Predictive Control

- **Programming Languages**: C (> 2 years), C++ (> 8 years), Python (> 6 years)

- **Developer Tools**: GitHub, ROS, MATLAB, MoveIt!, OMPL, OpenAI Gym, stable-baselines3, pyTorch, smac3, octomap, pcl, iGibson, Gazebo, pyBullet

- **Robot Platforms**: Turtlebot2, Turtlebot3 - Burger, Matrice 600 (DJI), HSR (Toyota), Stretch (Hello Robotics), Jackal (Clearpath), Jaco (Kinova), UR3 (Universal Robots)

- **Sensors**: 2D lidar (SICK), 3D Lidars (Velodyne, RoboSense), RGBD cameras (Intel RealSense, Microsoft Kinect, SteroLabs ZED2), IMU, GPS

AWARDS

Graduate Student Scholarship | *TUBITAK 2210-C*	**2014 − 2015**
Graduate Student Summer Internship Mobility Grant | *ERASMUS*	**June 2014**
Turkish National Chess Championship | *2nd place in 10-12 age group in consecutive years*	**1999 & 2000**