Neset Unver Akmandor, *PhD*

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SUMMARY

PhD in Computer Engineering from Northeastern University (2024), specializing in integrating classical planning/control with machine learning for robotic applications. Developed algorithms to enhance computational efficiency and robustness in motion planning for dynamic, time-sensitive tasks, applied to both simulated and real-world robotic systems, including mobile robots, UAVs, and manipulators. Industry experience has enriched my practical skills in robotics, control theory, computer vision, optimization, and machine learning, enabling impactful contributions to real-world applications.

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 **Sep 2024 – Current & May 2022 – Sep 2022**
Motion Control Engineer, Control Group *Boston, MA, USA*

- Enhancing the trajectory generation pipeline by integrating advanced machine learning methods to improve accuracy, adaptability, and computational efficiency.

Machine Learning Intern, Control GroupBoston, 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 2015 – Jan 2017 & Aug 2011 – Feb 2013**
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.

PROJECTS

- **Tentabot** code: Navigation Framework for Mobile Robots by Evaluating Motion Primitives (Tentacles)
- **StereoVoxelNet** code web: Real-Time Obstacle Detection Based on Occupancy Voxels From a Stereo Camera Using Deep Neural Networks
- **Mobiman** code (coming soon): Multi-Model Mobile Manipulation Framework

TOP QUALIFICATIONS AND SKILLS

- **Research and Coursework**:
  - **Robotics**: Motion Planning (Reactive, Sampling-based, Optimization-based), Trajectory Optimization, Kinematic and Dynamic Modelling, Probabilistic Robotics, Kalman Filters
  - **Control Theory**: PID Control, Linear and Nonlinear Model Predictive Control
  - **Computer Vision**: Image Segmentation and Classification, Point Cloud Processing (Iterative Closest Point)
  - **Machine Learning**: Partially Observable Markov Decision Process, Deep Reinforcement Learning, Deep Learning, Bayesian Optimization
- **Programming Languages**: C (> 2 years), C++ (> 8 years), Python (> 6 years), MATLAB (> 11 years)
- **Developer Tools**: GitHub, LaTex, VSCode, ROS, MATLAB, MoveIt!, OMPL, OpenAI Gym, stable-baselines3, pyTorch, smac3, octomap, pcl, iGibson, Gazebo, pyBullet, pyTorch
- **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

PUBLICATIONS

- **N. Ü. Akmandor** et. al., (Submitted to ICRA 25) "Re4MPC: Reactive Nonlinear MPC for Multi-model Motion Planning via Deep Reinforcement Learning".
- **N. Ü. Akmandor**, "Enhancing Motion Planning Efficiency in Dynamic Environments through Advanced Algorithms for Mobile Robots." PhD dissertation, Northeastern University, 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.

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**