Salih Marangoz

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EXPERIENCE

Humanoid Robots Lab (University of Bonn) **Jun. 2021 – Feb. 2024**
Student Research Assistant *Bonn, Germany*

- Enhanced 3D mapping of agricultural plants using TSDF-based approaches.
- Developed a fast and robust optimization method for modeling sweet peppers using superellipsoids, achieving a 10x increase in processing speed compared to previous methods. Published the code as an open-source project.
- Designed a fast superellipsoid surface sampling algorithm for next-best-view planning, ensuring surface points are uniformly distributed for shape completion in fruit mapping and 3D reconstruction tasks.
- Fine-tuned YOLOv8 deep learning models for real-time sweet pepper detection, segmentation, and tracking, serving as a drop-in replacement for previous models. Published the code as an open-source project.
- Optimized a depth image noise filtering pipeline for the RealSense L515 sensor, reducing CPU utilization by 20x and improving accuracy. Published the code as an open-source project.
- Implemented a depth image averaging and filtering solution, improving performance by 17x using OpenCL. Published the code as an open-source project.

Polonom Robotics **Jan. 2018 – Sep. 2019**
Research and Development Engineer *Istanbul, Türkiye*

- Designed a robot vacuum cleaner path planning algorithm capable of operating without an initial occupancy grid map.
- Developed an efficient 2D laser sensor filter with minimal CPU utilization for low-power development boards, achieving over a 10x speed improvement compared to open-source libraries.
- Integrated, enhanced and maintained 2D mapping, navigation, and mission planning packages for mobile robot platforms.

YTU Probabilistic Robotics Group **Jul. 2017 – Aug. 2017**
Software Developer Intern *Istanbul, Türkiye*

- Optimized UI/UX, mapping, navigation, and mission controller packages for multi-robot cases.
- Achieved mission control reaction times faster than those of experienced human operators in the RoboCup competition, reducing response times from minutes to milliseconds using a new approach.

Garanti Technology **Aug. 2016 – Sep. 2016**
Software Developer Intern *Istanbul, Türkiye*

- Implemented a use-case for the new ATM user interface project using Java, Javascript, and PL2

EDUCATION

University of Bonn | *Master of Science, Computer Science* *Bonn, Germany* | **Oct. 2020 – Feb. 2024**

- Thesis: *DawnIK: Decentralized Collision-Aware Inverse Kinematics Solver for Heterogeneous Multi-Arm Systems*

Yıldız Technical University | *Bachelor of Engineering, Computer Engineering* *Istanbul, Türkiye* | **Sep. 2014 – Jun. 2018**

- Thesis: *Developing a New Navigation Module in ROS for Dynamic Environments*
- Graduated as an Honour Student
- Joined a student exchange program at Riga Technical University for one semester.

SKILLS

Programming: Python, C/C++, SQL, Bash, Ubuntu/Linux, Github Actions, Docker, Qt

Machine Learning: Numpy, Seaborn, Matplotlib, Pandas, SciPy, Scikit-Learn

Deep Learning: PyTorch, Wandb, Optuna, Langchain

Robotics: ROS1, MoveIt, Gazebo, PCL, OpenCV, OpenCL, Eigen, STL, Boost, Ceres Solver, Arduino, Raspberry Pi

Personal Skills: Flexibility, Creative Thinking, Active Learning, Problem Solving, Time Management, Data Analysis, Research, Probability and Statistics, Linear Algebra, Pattern Recognition

Team Skills:: Collaboration, Teamwork, Pair Programming, Decision Making, Brainstorming

Languages: English (Fluent), Turkish (Native), German (Beginner)

PROJECTS *(Check my GitHub profile for more projects.)*

TurtleBot Maze Solver | *C++, ROS, Qt, Eigen, PCL, OpenCV* **Spring 2022**

- Solved the "find the object in maze" problem with real and simulation robots with the highest grade (1.0).
- Developed 2D grid mapping, costmap, A* path planning, pure pursuit steering, and a mission controller modules.

Stereo Depth Estimation | *Python, PyTorch, Tensorboard, Optuna* **Spring 2021**

- Implemented PSM-Net and GC-Net state-of-the-art deep learning models and trained using SceneFlow and KITTI datasets.
- Achieved 65% higher performance compared to the base-line model and attained the highest grade (1.0).

CERTIFICATES

Deep Learning Specialization *by deeplearning.ai on Coursera* **Apr. 2019**

- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
- Structuring Machine Learning Projects
- Convolutional Neural Networks
- Neural Networks and Deep Learning
- Sequence Models

EXTRACURRICULAR

Yıldız Team **Oct. 2015 – Jun. 2018**

Team Member *Yıldız Technical University*

- Developed an operator UI/UX for operating real/simulation robots in competitions, including real-time video transmission, sensor data visualization, multi-robot management features, and quick hotkeys.
- Built a double Ackermann RC car that can drive sideways and implemented a custom controller for driving.
- Took an active part in RoboCup 2017 (Nagoya), RoboCup German Open 2017 (Magdeburg), and RoboCup, 2016 (Leipzig).

PUBLICATIONS

- S. Marangoz, R. Menon, N. Dengler, and M. Bennewitz, "Dawnik: Decentralized collision-aware inverse kinematics solver for heterogeneous multi-arm systems," in *2023 IEEE-RAS 22nd International Conference on Humanoid Robots (Humanoids)*, pp. 1–8, IEEE, 2023
- S. Marangoz, T. Zaenker, R. Menon, and M. Bennewitz, "Fruit mapping with shape completion for autonomous crop monitoring," in *2022 IEEE 18th International Conference on Automation Science and Engineering (CASE)*, pp. 471–476, 2022
- S. Marangoz, M. F. Amasyalı, E. Uslu, F. Çakmak, N. Altuntaş, and S. Yavuz, "More scalable solution for multi-robot–multi-target assignment problem," *Robotics and Autonomous Systems*, vol. 113, pp. 174–185, 2019
- S. Marangoz, E. E. Ergün, E. Uslu, F. Çakmak, N. Altuntaş, *et al.*, "A fast 3d exploration algorithm for autonomous aerial robots," in *2017 25th Signal Processing and Communications Applications Conference (SIU)*, pp. 1–4, IEEE, 2017
- E. Uslu, F. Cakmak, N. Altuntaş, S. Marangoz, M. F. Amasyalı, and S. Yavuz, "An architecture for multi-robot localization and mapping in the gazebo/robot operating system simulation environment," *Simulation*, vol. 93, no. 9, pp. 771–780, 2017
- F. Çakmak, E. Uslu, N. Altuntaş, S. Marangoz, *et al.*, "Deformable part model and deep learning comparison on victim detection," in *2016 24th Signal Processing and Communication Application Conference (SIU)*, pp. 1513–1516, IEEE, 2016
- M. Balcılar, E. Uslu, F. Çakmak, N. Altuntaş, S. Marangoz, *et al.*, "An architecture for multi-robot hector mapping," in *2016 International Symposium on INnovations in Intelligent SysTems and Applications (INISTA)*, pp. 1–5, IEEE, 2016