Sami Alperen Akgün

Robotics Software Engineer
Waterloo, ON

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Education

2019 – 2021	**University of Waterloo**, Waterloo, ON Canada *Department of Systems Design Engineering* Master of Applied Science Supervisor: Prof. Kerstin Dautenhahn Co-supervisors: Dr. Mark Crowley and Dr. Moojan Ghafurian **CGPA: 91.5/100.0**
2014 – 2019	**Middle East Technical University**, Ankara, Turkey *Department of Electrical and Electronics Engineering* Bachelor of Science, Control Theory and Automation **CGPA: 3.84/4.00**

Relevant Experience

1. Professional Experience

Dec 21 – Present	**Robotic Assistance Devices** Waterloo, ON, Canada ***Robotic Software Engineer*** • Analysed the performance of sensor fusion approaches with various sensors • Implemented auto building & testing approaches for CI/CD pipelines • Data handling between CAN and ROS • Improved the performance of ROS Navigation stack with customized planners • Integrated real time obstacle detection and segmentation with navigation stack
Oct – Nov 21	**Merq** Hamilton, ON, Canada ***Robotics Design Engineer*** • Surveyed indoor navigation with ROS • Designed the communication architecture between ROS, PLC and IoT devices
Sept 19 – Aug 21	**Social and Intelligent Robotics Research Laboratory** University of Waterloo, ON, Canada ***Graduate Researcher*** • Conducted research on robot-assisted search and rescue and HRI projects • Developed algorithms for MiRo, Husky & QT robot using ROS with Python/C++
May 21 – Aug 21	**SYDE 252 - Signals and Systems** University of Waterloo, ON Canada ***Teaching Assistant***
Jan 21 – Apr 21	**SYDE 352 - Introduction to Control Systems** University of Waterloo, ON Canada ***Teaching Assistant***
Sep 20 – Dec 20	**SYDE/BME 411 - Optimization and Numerical Methods** University of Waterloo, ON Canada ***Teaching Assistant***

May 20 – Aug 20	**ECE 493 - Reinforcement Learning Course** University of Waterloo, ON Canada ***Teaching Assistant***
Jan 20 – Apr 20	**Social and Intelligent Robotics Research Laboratory** University of Waterloo, ON Canada ***Graduate Research Assistant*** • Writing a bridge for communication between YARP and ROS in C++ language • Set up the robots and servers in the lab and created tutorial documents
Feb 19 – Jun 19	**New Holland Agriculture** Ankara, Turkey ***Part Time Software Engineer*** • Automating the process in Purchasing Department • Python: Pandas, Scipy
Oct 18 – Jan 19	**EE 314 - Analog Electronics Laboratory** Middle East Technical University, Turkey ***Teaching Assistant***
July 18 – Sept 18	**Personal Robotics Laboratory** Imperial College London, United Kingdom ***Research Intern*** • Dataset of motion of real robots for 3D motion segmentation created. • Kinematic structure correspondence code written in MATLAB and R transferred to C++ to use for real time imitation learning on iCub. • The supervisor of the project was Prof. Yiannis Demiris.
June 17 – Sept 17	**Distributed Artificial Intelligence Laboratory (DAI-Labor)** The Technical University of Berlin, Germany ***Research Intern*** • Created simulation environment for human-robot collaboration for smart factory environment using MORSE simulator. • Applied ROS meta-package TOASTER for spatial temporal reasoning. • Implemented Partially Observable Markov Decision Process (POMDP) for robots in the simulation.

2. Service & Leadership

Jan 20 – Jun 20	**CARIZON** Kitchener, ON, Canada ***Volunteer Math and Science Tutor*** • Pathways to Education Program is a national charitable organization breaking the cycle of poverty through education.
Mar 20 – Apr 20	**The ACM CHI Conference on Human Factors in Computing Systems (CHI 2020)** ***Volunteer External Reviewer*** • Acted as an external reviewer for CHI Late-Breaking Works submission stream.

3. Course Work

Time	Course Name	Course Provider
2021	CS50: Introduction to Computer Science	Edx – Harvard University
2020	Reinforcement Learning Course by David Silver	DeepMind (Online)
2020	Pattern Recognition & Optimization Methods	University of Waterloo
2019	Embodied Intelligence & Social Robotics	University of Waterloo
2019	Nonlinear Control Systems & Control System Design and Simulation	Middle East Technical University
2018	Process Control & Discrete Time Systems & Digital Signal Processing	Middle East Technical University
2018	Feedback Systems & Signals and Systems	Middle East Technical University
2017	Deep Learning for Self-Driving Cars	MIT Courseware
2017	Machine Learning Taught by Andrew Ng	Coursera – Stanford University
2016	Machine Learning for Data Science and Analytics	Edx – Columbia University
2016	Fundamentals of Digital Image and Video Processing	Coursera – Northwestern University
2016	Computer Aided Engineering Graphics	Middle East Technical University
2015	Embedded Systems: Shape the World	Edx – The University of Texas
2015	Introduction to C Programming	Middle East Technical University

Manuscripts in Preparation, or Under Review

• Sami Alperen Akgun, Hamza Mahdi, Shahed Saleh, and Kerstin Dautenhahn. A Systematic Literature Review of The History of Social Robots — Past, Present and Future. Under review.

• Sami Alperen Akgun, Hamza Mahdi, Shahed Saleh, Moojan Ghafurian, Mark Crowley, and Kerstin Dautenhahn. Design and Implementation of Affective Expressions for Appearance Constrained Robots. In preparation.

• Sami Alperen Akgun, Moojan Ghafurian, Mark Crowley, and Kerstin Dautenhahn. Emotion Modelling for Robot to Human Communication in Search and Rescue contexts. Under review: IEEE Transactions on Affective Computing.

Publications

• Austin Kothig, John Munoz, Sami Alperen Akgun, Alexander M. Aroyo, and Kerstin Dautenhahn. 2021. Connecting Humans and Robots Using Physiological Signals - Closing-The-Loop in HRI. In 30th IEEE International Conference on Robot and Human Interactive Communication, RO-MAN 2021, Vancouver, BC, Canada, August 8 - 12, 2021

• Moojan Ghafurian, Sami Alperen Akgun, Mark Crowley, and Kerstin Dautenhahn. 2021. Recognition of a Robot's Affective Expressions under Conditions with Limited Visibility. In 18th International Conference promoted by the IFIP Technical Committee 13 on HCI (INTERACT 2021)

• Sami Alperen Akgun, Moojan Ghafurian, Mark Crowley, and Kerstin Dautenhahn. 2021. Integrating Affective Expressions into the Search and Rescue Context in order to Improve Non-Verbal Human-Robot Interaction. In Workshop on Exploring Applications for Autonomous Non-Verbal Human-Robot Interactions at HRI 2021, March 8th 2021, Virtual, 4 pages

• Sami Alperen Akgun, Moojan Ghafurian, Mark Crowley, and Kerstin Dautenhahn. 2020. Using Emotions to Complement Multi-Modal Human-Robot Interaction in Urban Search and Rescue Scenarios. In Proceedings of the 2020 International Conference on Multimodal Interaction (ICMI '20). Association for Computing Machinery, New York, NY, USA, 575–584.

• Oguz Ozdemir, Sami Alperen Akgun, and Ugur Acikgoz. 2019. Mobile Robotic Platform Design for Mapping and Autonomous Navigation Research. In Turkish National Robotic Conference (ToRK 2019), Istanbul, Turkey.

• Çetinkaya, M., Akgun, S. A., Erkmen, A. M., & Erkmen, İ. (2018, October). Exact Kalman Filtering of Respiratory Motion. In 2018 6th International Conference on Control Engineering & Information Technology (CEIT) (pp. 1-6). IEEE.

Selected Projects

2018 – 2019	**Mobile Robotic Platform Design and Implementation for 2D Map Extraction** *Bachelor Thesis* • Designed and built a robotic platform from scratch (including LIDAR sensor) for 2D simultaneous localization and mapping (SLAM). • Connected ARM based hardware to Robot Operating System (ROS) middleware and used ROS navigation + SLAM stack. • Won "Advanced Hardware Design Award" among 52 graduation projects within METU EEE department. • Awarded as "second best research project" in the competition organized by The Scientific and Technological Research Council of Turkey (Tubitak). • Supervisor of the project was Prof. Mustafa Mert Ankarali.
2018 – 2019	**Respiratory Motion Tracking** *METU EEE Mechatronics, Robotics and Control Laboratory* • A novel Exact Kalman Filter which outperforms Extended Kalman Filter and Uncented Kalman Filter was developed to track respiratory motion. • The supervisor of the project was Prof. Aydan Erkmen.
2015 – 2018	**Retinal Image Segmentation and Classification of a Retinal Disease** *METU EEE STAR Project* • Conventional image processing techniques and convolutional neural networks (CNN) were employed to segment vessels in retina images. • Classification of Retinopathy of Prematurity (ROP) was done with 96% accuracy using CNN. • The supervisor of the project was Prof. Ilkay Ulusoy.
2016 – 2017	**Human Action Recognition and Control of Robotic Manipulator** *IEEE METU Robotics and Automation Society* • Human action recognition with RGB-D video input was achieved using openNI2 and NITE libraries under ROS framework. • Recognized actions were used to control 4 DOF robotic arm with an end effector.
2016 – 2017	**Human Action Recognition and Control of Robotic Manipulator** *IEEE METU Robotics and Automation Society* • Human action recognition with RGB-D video input was achieved using openNI2 and NITE libraries under ROS framework. • Recognized actions were used to control 4 DOF robotic arm with an end effector.

Technical Skills

Skill Type	Applications
Neural Networks	TensorFlow , KERAS
Robotics	ROS, YARP, MORSE and Gazebo Simulations
Computer Vision	openCV, NITE, openNI2, MATLAB Image Processing Toolbox
Microcontroller Programming	ARM (TI, ST, mbed), Arduino, Microchip PIC, Raspberry Pi
Programming Languages	C, C++, Python, MATLAB & Simulink
PCB Design	Eagle, ARES
Electronic Simulation	ISIS, LTSpice
Technical Drawing	Solidworks, Keycreator
Organizing Tools	Git, LaTeX

Scholarships & Awards

2019 – 2021 | **Graduate Research Scholarship (GRS)**
University of Waterloo

2019 – 2021 | **International Master's Award of Excellence (IMAE)**
University of Waterloo

January 2020 | **University of Waterloo Grad Scholarship**
University of Waterloo, Systems Design Engineering

June 2019 | **Second Best Research Project**
University Students Research Projects Competition, Tubitak

June 2019 | **Advanced Hardware Design Award**
METU EEE Capstone Project Fair

Apr 17&Oct 19 | **METU EEE Bülent Kerim Altay Prize**
This award is given to students who get full GPA (4.0) for one semester.

December 2017 | **Travel Funding for KAIST EE Camp**
Selected as a visiting student for Korean Advanced Institute of Science and Technology (KAIST) Electrical and Electronics (EE) Department Camp

2016 Fall | **METU EEE Best Electrical Circuits 1 Laboratory Project**
Highest score for Electrical Circuits Laboratory Final Project

2015 – 2019 | **University Success Scholarships**

2015 – 2018 | **Türk Metal Union – Success Scholarship**

2014 – 2015 | **Vehbi Koç Foundation – Outstanding Success Scholarship**