Tersoo Samuel **Awai**

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EDUCATION

Mechatronics Engr MSc (GKS Awardee) September 2023 - February 2026
Korea University of Technology and Education (KoreaTech) *Cheonan, South Korea*

Mechatronics Engr BSc (Honours) (Türkiye Burslari Awardee) September 2018- July 2022
Necmettin Erbakan University (NEU) *Konya, Türkiye*

EXPERIENCE

Research Associate (Incoming Doctoral Researcher), IE University, IE School of Science and Technology
July 2026 - present

- I joined the RoboCooperatives research line in the Cyber-Physical Life (CyPhy Life) Research Group, which studies decentralized cooperation between robots, AI agents, and humans, where the central question is how a group of heterogeneous agents can agree on tasks and share information reliably without depending on a central coordinator.
- I approach the project from a control standpoint, framing the agreement and task-allocation problem as a coordination question among networked agents and working toward mechanisms that stay stable and safe when the communication between agents is intermittent or unreliable.

Algorithm Engineer, Robot Control - 4DiVISION, South Korea November 2025 - July 2026

- I adapted a point-cloud injection method to the π0 vision-language-action family on an SO-101 arm, cutting the frame-edge failure rate from 40% to 10% under appearance and viewpoint shift on a single 12 GB GPU. This work won the best poster award at the IEEE ARM 2026 Workshop on Safety-Critical Software, Control and Learning for Robotics.
- I built a LeRobot-to-ROS 2 bridge that runs LeRobot-trained policies on a Yaskawa MH5LF through ros2_control, since Yaskawa is not natively supported, and set up Gazebo and Isaac Sim environments to compare policy transfer across simulators.
- I performed eye-in-hand calibration on a real Yaskawa MH5LS arm, solving the AX = XB hand-eye transformation in MATLAB and reaching sub-millimetre accuracy against a Zivid benchmark, then integrated it into a ROS 2 and MoveIt 2 pipeline for perception-guided control.

Graduate Research Assistant - Nonlinear Systems and Control Lab, KoreaTech February 2024 - February 2026

- My MSc thesis extends robust control strategies to dynamic systems. I developed a canonical internal‑model filter to embed known disturbance dynamics on a robust DOB-style output-regulation controller that asymptotically cancels matched disturbances via feedforward cancellation and stabilizes the uncertain integrator-chain plant under bounded gain and perturbation uncertainties.
- I was also attached to the project “Nonlinear Oscillator Synchronization Analysis & Robust Control Technique in Dynamic Networks” where I attended seminars on the research topic and contributed to literature review.

Erasmus+ Traineeship - University of Wuerzburg, Germany July 2022 - October 2022

- I developed and tested magnetic components by designing magnet holding ports analyzed in a Helmholtz cage. I also did coil wounding for the electromagnets.
- I worked within an international team to document experimental data and contribute insights for next-generation docking mechanism designs.

PUBLICATIONS

Internal-model-based Design of Disturbance Observers for a Class of Linear Systems with Modeled Disturbances. IFAC World Congress 2026.

RELEVANT PROJECTS

Hybrid Q-Learning + LQR control. Github_QIP_System October 2024

- I combined a Q-learning policy with an LQR regulator to balance a multi-link inverted pendulum, utilizing discretized state variables, epsilon-greedy exploration, and real-time angle wrapping and matrix calculations.
- By implementing a dynamic threshold-switching strategy between Q-learning (for swing-up) and LQR (for refined stability), I earned a Bronze Medal at the 2nd Koh Young AI Competition.

Autonomous Navigation and Logging (ROS 2 Jazzy) Github_Autonomous_logging August 2025

- I built an autonomous navigation system for a mobile robot in Gazebo Harmonic, performing mapping, localization, and waypoint navigation with LiDAR, SLAM Toolbox, and the Nav2 stack, and implemented a ROS 2 logging node that records pose, timestamp, and goal status at each waypoint to produce a tamper-resistant audit trail of robot behavior.

MPC Design for Steam-Turbine-Based Electrical System, Korea Tech (Master Course Project).

- I developed a constrained MPC controller in MATLAB for a steam-turbine-based electrical system by constructing cost matrices for quadratic programming, enforcing input and state constraints, and incorporating time-varying disturbances to ensure stability and safety.
- I then tested the controller over 1000 steps, visualizing state trajectories and control signals to confirm effective disturbance rejection and consistent constraint satisfaction.

ViTDepthNet: Vision-Transformer-Based Depth Estimation (Master Course Project) July 2024

- I designed and implemented a hybrid ViT–CNN architecture (ViTDepthNet) in Python and CUDA for monocular depth estimation, combining convolutional local feature extraction with Vision Transformer global context encoding and evaluating on the NYUv2 indoor dataset.
- I developed the full training and evaluation pipeline with configurable loss functions (reconstruction, smoothness, blur), checkpoint management, and visualization, targeting applications in robotics perception and augmented reality.

SKILLS AND COMPETENCIES

Programming & Tools: C++, Python, ROS 1/2, Git, OpenCV, Gazebo, Isaac Sim, MATLAB/Simulink
Machine Learning & AI: Vision Transformers (ViT), CNNs, Reinforcement Learning (Q-Learning), Vision-Language-Action (VLA) Models, PyTorch, LeRobot
Control & Robotics: Optimal Control (MPC, LQR), Disturbance Observers, PID Tuning, Robust Control, Hand-Eye Calibration, MoveIt 2
Hardware & Systems: Raspberry Pi, ESP32, Arduino, Sensor Fusion (LiDAR, GPS, Cameras)
Systems Integration & Deployment: TCP/IP interfacing with industrial manipulators and networked cameras (Yaskawa, Tessaravue), Docker
Software Engineering: Docker, Git, modular ROS 2 package design, dataset validation pipelines (LeRobot)
Languages: English (Fluent), Korean (TOPIK 3), Turkish (C1)

REFERENCES

Eduardo Castello Ferrer PhD (Doctoral Thesis Supervisor)
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