

Mahmut Semih Akkoc

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EDUCATION

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| • University of Maryland, College Park | College Park, Maryland |
| Ph.D. at Electrical and Computer Engineering - Advisor: Prof. Sennur Ulukus | Sep. 2025 - Aug. 2030 (Expected) |
| • Bilkent University | Ankara, Türkiye |
| B.Sc. Electrical and Electronics Engineering - GPA: 3.92/4.00 | May 2025 |
| • National University of Singapore | Singapore |
| Exchange Student in Electrical and Computer Engineering | May 2024 |
| <i>Relavent Courses:</i> Quantum Communication and Cryptography, Quantum Mechanics I, Probability | |

EXPERIENCE AND PROJECTS

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| Bilkent University | Ankara, Türkiye |
| <i>Undergraduate Researcher</i> | Feb. 2023 - Present |

- **Semantic Signal Processing:**

- Engaged as an undergraduate researcher within the research group led by Professor Orhan Arikan, specializing in Semantic Signal Processing.
- Concentrated efforts on the hardware demonstration of semantic signal processing through the utilization of Raspberry Pi.

- **Computational Electromagnetics:**

- Participated as an undergraduate researcher in Professor Vakur Erturk's research group, focusing on Computational Electromagnetics.
- Implemented and simulated plane wave scattering by a perfectly conducting strip using method of moments.

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| Aselsan | Ankara, Türkiye |
| <i>Summer Intern</i> | Aug. 2024 - Sep. 2024 |

- **Development and Simulation of a Suspended Ring Resonator Model for Dielectric Permittivity Measurement Using MATLAB and CST Studio:**

- Implemented a MATLAB-based simulation to estimate the dielectric constant and loss tangent of materials, providing a low-cost solution for measuring antenna-related materials.
- Modeled and simulated the resonator in CST Studio, comparing results with MATLAB simulations to enhance accuracy.
- Created a flexible lookup table and polynomial fits for material property estimation, making the tool adaptable for a range of dielectric materials.

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| Huawei | Ankara, Türkiye |
| <i>R&D Intern</i> | Jun. 2023 - Aug. 2023 |

- **Practical Hardware Implementation of a Multi-Sensor Homogeneous Goal-Oriented Semantic Communications Network:**

- Designed a network of two Raspberry Pi devices equipped with camera modules to capture and process visual data through on-device semantic extraction which achieved 143% data reduction compared to conventional methods.
- Implemented a network protocol that utilizes TCP protocol for transmitting locally processed camera data between the Raspberry Pi devices.
- Developed a fusion algorithm to merge incoming data streams from the Raspberry Pi devices, enhancing data integration and accuracy by 67.2% relative to non-fused data.

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| BITES - Defence & Aerospace Technologies | Ankara, Türkiye |
| <i>Summer Intern</i> | Jun. 2022 - Aug. 2022 |

- **Multifunctional File Transfer System with Socket Networking and Design Patterns Integration:**

- Developed a file transfer program using sockets and threads as part of an internship course.
- Implemented the program to read and write files in binary mode, allowing for the transfer of any file type.
- Utilized various design patterns, including the factory method pattern for socket creation and initialization and the observer (listener) pattern to notify the socket when the worker has completed its task.
- Demonstrated proficiency in networking concepts, multithreading, and design patterns through the successful completion of the project.

PUBLICATION - PERSONAL PROJECT

Akkoc, S., Cinar, A., Ercan, B., Kalfa, M., Arikan, O. (2024). Practical Hardware Demonstration of a Multi-Sensor Goal-Oriented Semantic Signal Processing and Communications Network. *The Journal of the Franklin Institute*, Volume 362, Issue 1.

- First author (with equal contribution) on a paper demonstrating a goal-oriented semantic signal processing framework, leading the practical implementation on Raspberry Pi setups to validate efficient multi-sensor data fusion and semantic extraction techniques, showcasing the feasibility of low-cost hardware solutions for next-generation communication systems.

Li-Fi Implementation on BASYS3 Board

- Developed a LiFi protocol on the **BASYS3 Xilinx Artix-7** board using **VHDL**, enabling modular encoding and decoding of sound and text files for LED transmission and LDR reception. Encoded data was stored in ROMs, with decoded data displayed on a seven-segment display.

HONORS AND AWARDS

Academic Excellence Award Bilkent University Department of Electrical and Electronics Engineering - 2025

Recognized as a top-performing student for exceptional academic achievement.

Research Excellence Award Bilkent University Department of Electrical and Electronics Engineering - 2025

In recognition of outstanding research contributions.

Best Project Award Bilkent University Department of Physics - 2022

Awarded the Physics Department's Best Project Award at Bilkent University for project excellence and originality.