

ÜMRAN YUNGUCU

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EDUCATION

PhD, Electrical and Computer Engineering , Boston University	Sep 2024- Current
Bachelor of Electrical and Electronics Engineering , Bogazici University, GPA: 3.61 /4.0 Track: Digital Communications, Signal Processing, Machine Vision, Digital Sytems Design	Sep 2018- Jan 2024
Bachelor of Physics , Bogazici University, GPA:3.61 /4.0	Sep 2018- Jan 2024
High School Diploma , Izmir Science High School, GPA: 97.02 /100	Sep 2014- Jun 2018

SCHOLARSHIPS AND ACHIEVEMENTS

Scholarship from The Scientific and Technological Research Council of Turkey	2020
Turkey University Entrance Exam: The "11th ranked" student among 2.5 million competitors	2018

SKILLS

Hardware Description Languages:	VHDL, Verilog, High Level Synthesis (HLS)
High-level Languages:	C, C++, Python
FPGA & CPU Boards:	DE1-SOC Computer System with ARM Cortex A-9, Virtex UltraScale+, Kintex UltraScale+, Xilinx Spartan-6
Tools&Technologies:	Channel Coding, Computer Vision, Machine Learning, FPGA&CPU Programming Xilinx ISE/Vivado/Vitis HLS, MATLAB & Simulink, Lt-Spice, OrCAD
Languages:	Turkish (Mother Tongue), English (C1)

RESEARCH AND DEVELOPMENT EXPERIENCES

Graduate Research Assistant Boston University, Integrated Circuits, Architectures & Systems Group	Sep 2024 - Current <i>Boston, Massachusetts, United States</i>
<ul style="list-style-type: none">Conducting research in high-performance computing, focusing on cutting-edge solutions for scientific applications.Implementing fully homomorphic encryption techniques on GPUs, enhancing security in computational processes.	
FPGA Developer Bull Technologies	Jun 2023 - Sep 2024 <i>Istanbul, Turkey</i>
<ul style="list-style-type: none">Implemented Reed-Solomon encoder/decoder pair on Verilog for IEEE 100 Gb/s Ethernet standards.Sole developer of the project, presented at FPGA Conference Europe 2024FPGA efficient and pipelined solutions for implementing Reed-Solomon decoder such as Syndrome calculation, Berlekamp-Massey algorithm, Chien Search and Forney algorithm.Technical and theoretical understanding of other functions within RS-FEC sublayer such as lane block synchronization, alignment lock and deskew, 64B/66B to 256B/257B transcoder etc.	
Summer Research Intern CERN, The European Organization for Nuclear Research	Jun 2022 - Sep 2022 <i>Geneva, Switzerland</i>
<ul style="list-style-type: none">Successfully completed a novel project for reliably imitating CMS detector data flow at 40MHz to test the upgraded data acquisition and trigger systems.Developed and trained a Generative Adversarial Network (GAN) model in Python to accurately reproduce CMS simulation data. Implemented the GAN's generator model algorithm on Virtex UltraScale+ FPGA using the hls4ml library developed by Fast Machine Learning Lab, VHDL, and Xilinx Vivado.Implemented a standard normal random number generator on FPGA to feed the GAN's generator model firmware, achieving low latency, high speed, and low resource usage through High-Level Synthesis, C/C++, and VHDL.	

- Managed floating-point arithmetic on Vitis HLS using C++ and arbitrary data types to optimize scaling concerning resource usage and latency.

Research and Development Intern

Kivi Technologies

Jan 2023 - Jun 2023

Istanbul, Turkey

- Developed a 3D point cloud generation algorithm from scratch in C++, utilizing stereo images for depth estimation.
- Implemented phase-shifting structured light methods with gray code to ensure accurate correspondence matching between stereo cameras for dental scanning.
- Addressed speed and accuracy challenges while creating a real-time phase unwrapping algorithm and disparity map calculation algorithm, utilizing unwrapped phase values.

Undergraduate Research Assistant

Boğaziçi University, Nanonetworking Research Group

Jun 2021 - Dec 2022

Istanbul, Turkey

- Conducted simulation-based research on the index modulation of diffusion-based molecular communication systems involving multiple transmitters and receivers.
- Focused on solving the localization problem of transmitters using graph neural network techniques adapted from computer vision.
- Developed a triangulation method for the spherically modelled receiver surface to estimate the direction and distance of transmitters, treating the problem as grid-wise received molecules in every timestamp.
- Constructed datasets by simulating multiple transmitter single receiver molecular communication systems where the propagation is modelled as Brownian motion, varying receiver radius, transmitter numbers, and distances using Python.

VOLUNTEER ACTIVITIES

Elementary School Educator

Introducing the concept of algorithms involving binary numbers and algorithm complexity to elementary school students.

Sep 2023 - Jun 2024

Educator at ODD(School Assistance Charity)

Lecturing basic science lessons to secondary school students to catch their fancy to the science.

Sep 2020 - May 2022

Education Program Coordinator at Code of Future Project- Çelikel Education Foundation

Dec 2018 - Sep 2021
By aiming diversity in future engineering programs, teaching programming languages to high school students living in urban areas who are disadvantaged from technological information. Responsible for preparing and teaching the lecture content,organizing project members.