

MELIHA DENİZ ALBAYRAK

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Education

ETH Zurich

Doctor of Philosophy (Ph.D.) at Soft Robotics Lab

Boston University

Master of Science (MS) in Mechanical Engineering

- Focus Area: Dynamics, Systems and Controls
- GPA: 4.00/4.00

Sabancı University

Bachelor of Science in Materials Science and Nano Engineering

- Minor in Energy
- GPA: 3.96/4.00 (Ranked 1st) - Dean's High Honour List
- Sakıp Sabancı 100% Encouragement Scholarship

July. 2024 – Current

Zurich, CH

Sep. 2022 – May 2024

Boston, MA

Sep. 2018 – June 2022

Istanbul, Turkey

Publications

Gaeta, L.T., **Albayrak, M.D.**, Kinnicutt, L., Aufrichtig, S., Sultania, P., Schlegel, H., Ellis, T.D., Ranzani, T. “A Magnetically-Controlled Soft Robotic Glove for Hand Rehabilitation”, | *Device*, 2(9) -

<https://doi.org/10.1016/j.device.2024.100512>

Sultania, P., **Albayrak, M.D.**, Yan, W., Ranzani, T. “Towards Self-adaptive and Generalised Controls for Soft Robots Using Artificial Intelligence” | *Work-in-Progress*

Research Experience

Member of Morphable Biorobotics Lab | Boston, MA

May 2023 - May 2024

- Designed a variety of actuators through heat-sealing thermoplastic thin films and modeled the actuation on Abaqus.
- Found a new design to integrate sensors to soft balloon actuators with minimal hindrance to its mechanical properties.
- Used inkjet printing to create a precisely controlled masking layer for heat-sealed actuators.
- Worked with magnetorheological fluid and electropermanent magnets to create electronically controlled stiffening.
- **Supervisor:** Prof. Tommaso Ranzani

Modeling the piezoelectric response of AGO reinforced PVDF-TrFE | Istanbul, Turkey

Jan. 2022 - Aug. 2022

- Incorporated AGO into PVDF-TrFE matrix with different weight ratios by modeling the system in Materials Studio software.
- Measured the piezoelectric performance and compared it with the experimental data.
- Worked in collaboration with Prof. Shweta Agarwala from Aarhus University.
- **Supervisor:** Prof. Canan Atilgan

Member of Akbulut Lab | Istanbul, Turkey

Oct. 2021 - Jun. 2022

• Formulating Ceramic Inks for 3D Printing

- * Developed single additive inks (magnesium oxide and zirconia) for near-net fabrication of ceramics through 3D printing.
- * Gained knowledge in polymer synthesis, sonication and characterization tools such as rheometer and zeta potential analyzer.

• Recycling of and Surface Machining of Green Ceramics

- * Worked on a recycling route to incorporate waste ceramics that are produced during mechanical machining back into the design process.
- * Used CO₂ laser for the surface machining of recycled green ceramics.
- * Analysed the surface structures through SEM.

• Designing Dielectric Resonator Antenna for 5G Applications

- * Used ceramics as dielectric materials due to their high-quality factors.
- * Created a manufacturing method to minimize energy consumption while manufacturing the desired antenna shapes.

• **Supervisor:** Prof. Ozge Akbulut

Designing an approach to neutralizing the COVID-19 virus | Istanbul, Turkey

May 2020 - Nov. 2020

- Aimed to neutralized the Covid-19 virus by attacking the spike protein with its resonance frequency.
- Developed computational methods using Python to calculate the slowest mode frequency of the spike protein.
- **Supervisors:** Prof. Cleva Ow-Yang and Prof. Canan Atilgan

Work Experience

Sabancı University

Mar 2021 – Jan 2022

Learning Assistant

Istanbul, Turkey

- ENS 202 - Thermodynamics (Fall 2021)
 - * Held weekly recitations, and discussions of concepts during office hours.
 - * Graded homeworks and pre-lectures.
 - * **Instructor:** Prof. Canan Atilgan
- MAT 204 - Electrical Optical and Magnetic Properties of Materials (Spring 2021)
 - * Held weekly office hours for the discussion of concepts.
 - * Supervised team projects.
 - * **Instructor:** Prof. Cleva Ow-Yang

Google WTM

Nov. 2020 – June 2022

Women Techmakers Ambassador

Istanbul, Turkey

- Organized publicly available webinars and mentorships for women.

Appsilon Enterprise

May 2021 – Sep. 2021

Business Innovation Intern

Istanbul, Turkey

- Conducted advanced material characterization of MPCVD diamonds.
- Worked on university and high-tech institution partnerships.

Socrates Sports Magazine

Oct. 2020 – July 2021

Data Analyst Intern

Istanbul, Turkey

- Conducted analysis on social media data and compared the performance with other sports magazines.
- Estimated the optimum platforms for advertisement.

Sabancı University

Sep. 2018 – Oct. 2020

Academic Support Programme

Istanbul, Turkey

- Senior Session Coordinator (January 2020 - October 2020)
 - * Coordinated Math courses and provided additional support to the students who required assistance in Math and Natural Sciences courses in Academic Support Programme (ADP).
- NS Senior Session Moderator (September 2019 - January 2020)
 - * Explained the contents of Natural Sciences course to the students who had difficulties in passing the course several times.
- SPS Moderator (September 2018 - June 2019)
 - * Explained and revised the contents of Social and Political Sciences course to other freshman students in order to support active learning environment between peers.

Technical Skills

Languages: Python, R, MATLAB

CAD, Simulations, Design: Comsol, SolidWorks, OnShape, Abaqus, Adobe Illustrator

Electronic Equipment: CO₂ and Nd:YAG lasers, Plasma Asher, UV-Vis, Instron