Oguzhan Oruc

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EDUCATION

University of New Hampshire - Durham, NH **2023**
Ph.D. in Mechanical Engineering

- Major in Underwater Robotics. Research topics are nonlinear modeling, nonlinear system identification, and motion control system design for underwater vehicles.
- Relevant coursework includes Nonlinear Control Systems, Robust and Optimal Control, Digital Signal Processing, Statistical Methods for Research.
- Conducted research at Jere A. Chase Ocean Engineering Laboratory, focused on advanced control system design for autonomous unpiloted underwater vehicles.

Istanbul Technical University - Istanbul, Turkey **2017**
M.Sc. in Mechanical Engineering

- Major in System Dynamics and Control. Research focused on system identification and control system design of thermal systems.

Istanbul Technical University - Istanbul, Turkey **2005**
B.Sc. in Mechanical Engineering

- Major in System Dynamics and Control Department.

EXPERIENCE

University of New Hampshire - Durham, NH **2018-2023**
Research Assistant

- Led Experimental Measurement and System Dynamics Laboratory classes. Advised final projects and conducted recitation classes and lectures. The classes taught are:
  - ME 747 Experimental Measurement and Modeling of Complex Systems.
  - ME 646 Experimental Measurement and Data Analysis.
  - ME 670 Systems Modeling, Simulation and Control.
  - IAM 550 Introduction to Engineering Computing.

Ford Otosan - Izmit, Turkey **2007-2012**
Maintenance and Project Engineer

- Robotized manufacturing line projects were planned, utilized and supervised.
- Robotic and manual spot-welding systems were designed. MIG-MAG and TIG machines were renovated.
- Anthropomorphic manufacturing robots were periodically maintained, including ABB, Comau and KUKA.
- Advanced breakdown analysis on pneumatic and hydraulic control systems were conducted.
- Manufacturing systems were adjusted and repaired according to specifications.
- Maintenance and repair activities of all equipment were planned and executed, according to TPM and FTPM procedures.

PROJECTS

White River Technologies-UNH - Durham, NH **2022 - 2023**
Research Assistant

- Title: Demonstration of Highly Integrated Autonomous ROV-based 3DEM for Underwater Advanced Geophysical Classification.
- The research is granted by DoD under the scope of the environmental research program (MR22-7454).
- The topic of the research is detection, classification, localization, and remediation of military munitions in underwater environments.
- Autonomous surface/underwater vehicle control systems are being developed to provide an autonomous mission realization. Adaptive control algorithms based on NARMAX identification to compensate for different payload skids and geometrical changes on the vehicle are being developed.
- Field tests will be conducted with the implemented control systems.

Naval Sea Systems Command-UNH - Durham, NH **2020 - 2023**

Independent Researcher

- Title: Coordination of multi-platform UUV/ASV system.
- The research is granted by Naval Sea Systems Command (FY20-FY23: DoD N00174-20-1-0006).
- A multi-domain network of collaborative autonomous vehicles for unpiloted missions including ASVs, AUVs, UUVs are developed.
- Dynamic nonlinear modeling and control of the concerned vehicles based on NARMAX identification methodology are being developed.
- Formation control for collaborative multi-platform ASV/UUV and fish-like biomimetic vehicle swarms are being developed.
- Autonomous real-time path planning with obstacle avoidance and autonomy of the vehicles are being designed.
- Currently 24 undergraduate students were assisted for participation to the project and senior design projects.

Naval Sea Systems Command-UNH - Durham, NH **2018 - 2020**

Independent Researcher

- Title: Development of a multi-domain network of collaborative autonomous vehicles for unpiloted missions.
- The research was granted by Naval Sea Systems Command FY17-FY20: DoD N00174-17-1-0002.
- Vehicles under examination were modeled using nonlinear modeling techniques such as nonlinear system identification.
- Simulation studies for ASVs, UUVs, AUVs were done to analyze the behavior of the vehicles in different environmental conditions.
- Process, simulation and control models were developed.
- Navigation systems with EKF and UKF for each different type of vehicles were designed.
- Undergraduate research and senior design projects of 26 students were advised.

PUBLICATIONS

- Oruc, O., Cook, A., Thein, M-W., Mu, B. Nonlinear System Identification for Heading and Pitch Control of a Tethered Uncrewed Underwater Vehicle in Changing and Uncertain Environments. Oceans 2022 Hampton Roads Conference.
- Oruc, O., Thein, M-W., Mu, B. Nonlinear system identification and motion control system design for an unmanned underwater vehicle. Oceans 2022 Chennai Conference.