Ali Ibrahim A Albazroun

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Education

University of Illinois at Urbana-Champaign (UIUC)

PhD in Mechanical Engineering 2022-present, GPA: 3.77

Concentration : Computational Science and Engineering

Relevant Coursework: Numerical Analysis, Control System Theory & Design, Computational Design & Dynamics of Soft Systems, Optimization in Computer Vision, Interactive Computer Graphics.

BS in Mechanical Engineering & BSLAS in Mathematics 2018-2022, GPA: 3.90

Relevant Coursework: Robot Dynamics & Control, Mechatronics, Humanoid Robotics, Principles of Safe Autonomy, Computational Mechanics, Nonlinear Programming, Intro to Machine Perception.

Research Experience

Graduate Research Assistant

Gazzola Lab,UIUC 2022 - present

Advisor: Mattia Gazzola

- Extended the capability of the open-source software PyElastica for simulating assemblies of Cosserat rods to include contact with imported triangluar meshes.
- Modeled and simulated twisted and coiled polymer actuators using Cosserat rod theory and PyElastica, and validated models with experimental data.
- Trained RL policies using PyTorch for limbless navigation on hetreogenous 3D terrains.

Undergraduate Research Assistant

Bretl Research Group, UIUC 2019 - 2022

Mentors: David Hanley and Timothy Bretl

- Designed PCBs and parts for a data collection rig used for a Magnetic Positioning Indoor Estimation (MagPIE) Dataset.

Research Intern

Integrated Circuits and Systems Group, KAUST Summer 2021

Mentors: Hussein Hussein and Hossein Fariborzi

- Developed forward and inverse kinematic models for a V-shape actuator-based microrobot leg, and experimentally validated models using a probe station.

Research Scholar
DASLAB, Discovery Partners Institute Spring 2021
Mentors: Sri Theja Vuppala and Girish Chowdhary

- Selected computers, sensors, and actuators to automate a tractor.
- Installed operating systems and set up ROS on the computers for communication and collecting sensor data.

Summer Scholar
IRIS, Carnegie Mellon University Robotics Institute Summer 2020
Mentors: Connor Colombo, Raewyn Duvall, and William (Red) Whittaker

- Developed a rock detection method for localization purposes using edge detection and superpixels, and implemented it in MATLAB.

Teaching Experience

Graduate Teaching Assistant
ME 370: Mechanical Design I, UIUC Spring 2023 & Fall 2024

- Directed mechanical design labs for 80+ students across 5 lab sections.
- Prepared lab materials, held office hours and graded student presentations and reports.

Publications

1. Zhang, Albazroun, Wang, Mehta, Gazzola. Navigation of slithering bodies on 3D, heterogeneous terrain through bio-inspired sensing and physics-informed learning, Submitted to Advanced Intelligent Systems
2. H. Hussein, A. A. Bazroun and H. Fariborzi. Microrobotic Leg With Expanded Planar Workspace, IEEE Robotics and Automation Letters, 2022.
3. A. Albazroun, R. Duvall, and W. L. Whittaker. Rock Detection and Accurate Boundary Localization Through Non-Learning Based Superpixel Optimization. CMU Robotics Institute Summer Scholars Working Papers Journal, 2020

Skills

Programming:	Python, MATLAB, C++, ROS, Javascript
Libraries:	NumPy, SciPy, matplotlib, Three.js
Machine Learning:	PyTorch, TensorFlow
Markup:	Latex, Markdown, HTML5, CSS
CAD:	PTC Creo, SOLIDWORKS, Autodesk Fusion 360
EDA:	Autodesk EAGLE, Cadence OrCAD