UNNAS HUSSAIN

Senior Software Engineer | Robotics | Medical Devices | Control Systems

unnashussain.com
Email: uwh547@gmail.com
Phone: (518) 331-3146

TECHNICAL SKILLS

Programming Languages:	Python, C++, C#, C, Simulink, MATLAB, Bash, Java, SQL/MySQL, Go Lang, Arduino, Racket, Rust, ACL2, LaTex, JavaScript, CSS, HTML, CMake, Gradle
Robotics	ROS, Unix/Linux, QNX, Gazebo, CoppeliaSim, Isaac Sim, Unity, Google Golab, OpenCV, WPILib
Tools & Systems	Git, Docker, PowerShell, OnShape, Autodesk, Solidworks, KiCAD, Icarus Verilog, PSpice, BITalino, Raspberry Pi, Jetson,

EDUCATION

Johns Hopkins University, *Baltimore, MD* — *Expected Dec 2027*
M.S.E in Robotics & Autonomous Systems — Current GPA: 4.0

- Engineering for Professionals - Cohort of part-time students working in industry simultaneously
- Dynamics & Kinematics, Intro to Robotics, Mathematical Modeling, Advanced Algorithms & Data Science

Northeastern University, *Boston, MA* — May 2021
B.S.E in Computer Engineering & Computer Science with Honors — GPA: 3.44

- Undergraduate Research Assistance in Field Robotics Lab, configuring ROS for land, sea, and air AVs
- Head Teaching Assistant for Fundamentals of Computer Science, teaching Java and introductory OOD
- Robotics Science & Systems, Navigation, Dynamics, Computer Systems, Software Development, AI, OOD, Algorithms, Healthcare Technology, Electronics, Discrete Structures, Logic & Computation

EXPERIENCE

Medtronic Inc., *Boston, MA* — Aug 2023 – Present
Senior Software Engineer

- Developing control software, kinematics, and ML computer vision for endoluminal robot (ELR) with continuum articulation joints for navigation in complex anatomy. Delivering medical-grade teleoperation software.
- Designed and implemented torque-based homing algorithm to autonomously straighten ELR instruments.
- Developing 6DOF Kalman Filter estimator for EM-based tip configuration of ELR system intraoperatively.
- Leading key decisions in controls and embedded software architecture as Senior Software Developer.
- Implementing multi-threaded characterizing and tuning tools for real-time control loop tuning on QNX OS.
- Leading software efforts for Robotics Development Center to implement ground-zero projects to solve unique cross-organization problems with innovative uses of robotic technologies, controls software, and/or simulation.
- Certified in DRM Software development for physics-based simulation of tool-to-tissue interactions.
- Implemented reliable torque trajectories to test surgical claspers designs with variations on cables or tendons.

Hologic Inc, *Marlborough, MA* — Dec 2022 – July 2023
Embedded Software Engineer

- Implemented and updated embedded control logic for motorized and pneumatic subsystems within the ThinPrep 5000 (TP5000) system for fully automatic processing of gynecology, oncology, and Pap test samples.
- Developed custom Galil motion-control firmware, and a software API to command a robotic arm-guided laser that etches fiducials onto slides, and integrated Cognex cameras to read slide labels for sample tracking.
- Designed and implemented robust TP5000 “power-on” tests on for motor reachability and Galil processors to guarantee the power system and motor packs can reach full range-of-motion with the available current.

Amazon Robotics, *North Reading, MA* June 2021 – Nov 2022
Software Development Engineer

- Implemented software across navigation stack for over 520K Robotic Units, including task assignment with Min Cost Flow optimizers, AprilTag-based localization, and real-time driving adjustments for human interactions.
- Developed AWS Coral interceptors to compare computational load between base and optimized algorithms.
- Owned and developed internal tools to visualize live and historical metrics of robotic equipment, including real-time state updates for over 1500 daily users (Amazon Engineers and Warehouse Associates).

Medtronic Inc., Surgical Innovations, *Boston, MA* Sept 2019 – Nov 2020
Controls Engineering Co-op

- Owned full development of physics-enabled simulator of Hugo Robot-Assisted Surgeries to explore, define, and validate new clinical surgeries or indications with inverse kinematic-based pathing and log playback.
- Developed 6-joint hardware-in-the-loop testing software using Simulink to inject data into live DDS topics.
- Developed PID tuning tool in Python using PyQt5 with multi-threaded smart suggestions for tuning guidance.

SERVICE & VOLUNTEERING

FIRST Robotics, *(Melrose, MA & Boston, MA)* 2021 – Present
Software & Electrical Mentor

- Mentoring over 250 high school students to design, build, and code competition-level robot in fast-paced competitive environments, fostering a welcoming learning environment for teamwork and problem solving.
- Teaching wide range and advanced topics in STEM: controls software, software design, Object-Oriented Design, Java, and electrical engineering, ML pipelines, path planning, feedback loops, and computer vision.
- Co-developed V-SLAM pipeline, integrating Intel RealSense depth cameras and IMU data for pose estimation.

PATENTS & RECOGNITIONS

- SYSTEMS AND METHODS FOR CLINICAL WORKSPACE SIMULATION — *Patent # US 2024/0256723 A1*
- HARDWARE-INDEPENDENT ADAPTIVE AUTO HOMING ALGORITHM — *Provisional Patent # 64/157,090*
- ARTICULATION TUBE ASSEMBLIES WITH TORQUE-BASED INDICATIONS OF ARTICULATION ANGLE — *Provisional Patent # 63/983,943*
- STRATEGIES TO ADJUST PROXIMAL ROLL ANGLE OF A ROBOTIC CONTINUUM DEVICE WHILE PRESERVING DISTAL ARTICULATION SECTION TIP POSITION — *Provisional Patent # 63/953,627*
- SYSTEMS AND METHODS FOR SHAPE SENSING OF CONTINUUM MANIPULATORS — *Provisional Patent # 64/123,507*
- TRANSMISSION HOUSING FOR ROBOTIC CATHETER ARTICULATION AND TOOL INSERTION — *Provisional Patent # 64/122,853*
- SYSTEMS AND METHODS FOR FORCE SENSING AND ESTIMATION WITH CONTINUUM MANIPULATORS — *Provisional Patent # 64/122,849*
- SYSTEMS AND METHODS FOR PROVIDING PREDICTICE CATHETER PATH OVERLAYS — *Provisional Patent # 64/122,847*
- Medtronic Global Design for Reliability & Manufacturing (DRM) Green Belt Certification — 2026
- Medtronic Technical Contributor of the Year Award nomination — 2020
- Northeastern University Honors College Dean's List — 2018 – 2021
- U.S. Department of Homeland Security Gordan-CenSISS Scholarhsip — 2017 – 2018