Maaz Ahmad

Software Engineer — MASc Mechatronics (University of Waterloo: AI/ML)

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EXPERIENCE

AI & Robotics Software Engineer　　　　　　　　　　　　　　　　　Sept. 2025 – Present
Cobionix Corporation　　　　　　　　　　　　　　　　　　　　　　　　*Kitchener, Canada*
- AI algorithm development for computer vision pipeline on NVIDIA Jetson Orin (ONNX) for real-time perception.
- CI/CD pipeline main contributor of perception and AI/ML software development (C++) within the company.
- Optimizing TensorRT models with quantization and GPU/APU profiling to hit strict edge power−latency targets.
- Implementing firmware-style loops that monitor GPU/CPU load and adapt AI inference rates on-device with gRPC.

Research Assistant: Software Engineering　　　　　　　　　　　　January. 2024 – July 2025
Apple　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　*Waterloo, Canada*
- Confidential project (NDA). Optimization of SDR WiFi/OTA data paths in on embedded Linux, cutting end-to-end latency.
- Profiled CPU, memory, and I/O to pinpoint bottlenecks and guide low-level code optimizations.
- Collaboration with RF, firmware, and embedded software teams to validate wireless performance over-the-air.

Autonomy (SLAM) Software Graduate Student [Preprint: Link, Video: Link, Git: Link]　　January. 2024 – September 2025
UW ROBOHUB　　　　　　　　　　　　　　　　　　　　　　　　　　*Waterloo, Canada*
- Developed multi robot SLAM algorithm with 85% improvement vs baseline SOTA in C++/ROS2 on embedded Linux.
- Sensor fusion mmWave 4D RADAR with RGB-D in low-latency pipelines for perception and achieved 92% accuracy.
- Implemented TSDF-octree mapping in Docker on edge GPUs, tuning CPU/GPU load for real-time updates.
- Trained and deployed ML-NeRF and YOLO model on constrained GPUs, optimizing dataflow for real-time AI.
- Developed Python tooling to log SLAM accuracy/latency and used ML analysis to tune algorithms.

5G Connected Robotics Engineer | **MITACS Research Internship**　　　January. 2024 – August 2025
ROGERS Communications Canada Inc　　　　　　　　　　　　　　　　*Waterloo, Canada*
- Integrated 5G wireless with SLAM on embedded Linux (Nvidia Jetson), used C++ stacks for latency and telemetry.
- Achieved 37% improvements, applied Python/ML models predict congestion and tune network parameters.
- Achieved real-time edge compute over 5G mmWave 28GHz channel vs Wifi 5Ghz channel.
- Containerized ROS2 services in Docker and added metrics hooks to drive data-informed optimization of pipelines.

Research Assistant: Software Engineer [Preprint: Link, Git: Link, Video: Link]　　September. 2024 – December 2024
KEYSIGHT TECHNOLOGIES　　　　　　　　　　　　　　　　　　　　　*Waterloo, Canada*
- Developed software pipeline with OMPL library for 7-DoF COBOT - ML model for Motion planning algorithm.
- Deployed ML-augmented RRT planners via Python APIs with CI-friendly benchmarking across custom scenarios.
- Achieved 100% joint/collision avoidance constraints using auto-generated config launch trees.
- Validated deployment across sim-to-real environments with versioned motion plans and hardware-in-the-loop.

Asset Integrity Engineer II: Software　　　　　　　　　　　　　　　May 2022 – December 2023
ABYSS Solutions Inc　　　　　　　　　　　　　　　　　　　　　　　　Isb (Onsite) & Australia
- Developed C++/Tensor flow CV pipelines for sonar and camera data to detect structural defects offshore rigs.
- Optimized batch inference and preprocessing to run large inspection jobs within tight memory and time budgets.
- Fused multi-sensor ROV/AUV data streams to improve anomaly detection robustness in low-visibility conditions.
- Led a 10-engineer team processing 18,000+ assets for BP Clair Ridge, achieving 91% high-quality digital inspection.

Graduate Instrumentation and PLC Engineer　　　　　　　　　　　　Sept 2021 – March 2022
Fauji Cement Industry Co Ltd　　　　　　　　　　　　　　　　　　　Wah Cantt (Onsite), Pak
- Familiarized with Siemens and ABB PLC industrial automation controls procedures. While working on plant rotation plan, observed troubleshooting, & calibrations of sensors i.e RTDs-Pyrometer, and load cells

EDUCATION

University of Waterloo | Thesis: AI/ML Autonomy Link 1 & Motion Planning Link 2   Waterloo, Canada
Masters of Applied Science (MASc), Mechatronics Engineering *(CGPA: 93.5%)*   Jan. 2024 – Aug. 2025
Courses: AI/ML Computational Intelligence | Autonomous Mobile Robots | Social Robotics | nanoBIOTECH

Advisor(s): Dr. William Melek ; Dr. George Shaker

Bahria University | Thesis: AMRs AI/Swarm Robotics Autonomy Link   Isb, PK
Bachelor of Science (BSc), Electrical Engineering *(CGPA: A+)*   Sept. 2017 – Aug. 2021

SKILLS

Languages: C++ | Python | Bash | Object-Oriented Programming ROS2 | gRPC | Data Structures & Algorithms | CUDA

AI/ML & Optimization: TensorRT (CUDA)| PyTorch | TensorFlow | Scikit-learn | Model deployment on edge devices | Latency & throughput optimization | Quantization & pruning (edge AI) | Classical ML (KNN, SVM)

Control, Perception & Autonomy: ADAS| Visual-Inertial SLAM | Sensor fusion (RGB-D, IMU, mmWave Radar) | Motion Planning (OMPL) | MPC | Multi-robot coordination

Embedded: | API Embedded Linux (Jetson Orin, Ubuntu) | Low-latency edge compute | Real-time data pipelines | HW/SW integration | Microcontroller/SOC bring-up (sensors, cameras, networks) | Bare-metal/firmware C on MCUs | Power/performance tuning

Tools & Build Systems: Linux | Git | Docker | CMake | CI/CD (GitHub, GitLab) | ROS2 | Jupyter | Matplotlib

SIDE PROJECTS

Humanoid Robotics: Non-Verbal Gesture | *Project Report: Link*
- Integrated LLaMA 3 with gesture and vision sensing for real-time multimodal control of NAO robot, enabling non-verbal HRI via IMU-based motion interpretation

Visual Feature Extraction using Machine Learning Models
- Applied regression models (KNN, SVM) on complex image datasets to improve automated visual feature extraction, enhancing perception algorithms and robustness key for camera data processing in autonomous systems.

AMRs in Health Care | *Project Video: Link*
- Designed an RFID-based autonomous nursing robot for pill dispensing and path-following in healthcare environments. Enabled simultaneous delivery of six types of medication and live video streaming.

ACHIEVEMENTS

- Best Performer Employee of the Month, Abyss Solutions Inc.
- Winner of 3 Hackathons on robotics and VR innovation at Abyss Solutions.
- Awarded full MASc Graduate funding award and recognized among top 3 undergraduate thesis projects.

PUBLICATIONS

M. Qureshi et al., "CRADMap: Applied Distributed Volumetric Mapping with 5G-Connected Multi-Robots and 4D Radar Perception," *IEEE ICARM 2025*. [arXiv]

M. Qureshi et al., "RAPTAR: Radar Radiation Pattern Acquisition through Automated Collaborative Robotics," *IEEE RA-L 2025 Robotics and Automation Letters Journal*. [arXiv]

ACADEMIC EXPERIENCE

ICARM 2025 Conference Presentation   *Portsmouth, United Kingdom*
Conference Publication Presentation   ***2nd August, 2025***

RoboHub Symposium Presentation   *Waterloo, Canada*
Presenter at RoboHub Symposium Research Presentation and Poster booth holder   ***17th Jan, 2025***

Beyond Connectivity Summit Conference   *Brampton, Canada*
Presenter at Rogers Technology Conference for Research work   ***July, 2024***

University of Waterloo   *Waterloo, Canada*
Teaching Assistant, MTE-203 Advanced Calculus — ME-360 Automatic Control Systems   ***May 2024 – Present***