Faris Khalil Ur Rehman

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SUMMARY

Computer Engineering graduate specializing in embedded systems, autonomous robotics, and networked communication systems. Hands-on experience with embedded firmware (C/C++), wireless communication protocols, and full system integration from hardware to application layer. Currently working as a Research Assistant at Qatar University.

TECHNICAL SKILLS

Programming & Firmware
C, C++, Java, Python, ARM Assembly, Shell Scripting, Multithreading (Java), Socket Programming (TCP/UDP), WebSockets, Ladder Logic, FBDs, Arduino C

Embedded Systems & Hardware
ESP32, Arduino, Raspberry Pi, Sensor Integration (IR, Environmental, ADC), Motor Control (DC, PWM), Power Management, I2C, SPI, UART, PZEM, IR Protocol Analysis

Robotics & Autonomous Systems
SLAM (Mapping and Localization), A* Path Planning, LiDAR Obstacle Detection, Sensor Fusion, Differential Drive Control, Real-Time System Debugging

AI & Machine Learning
Python (NumPy, Pandas, scikit-learn), TensorFlow/Keras (Neural Networks), Model Evaluation & Hyperparameter Tuning (GridSearchCV, Cross-Validation), OpenCV (Real-Time Computer Vision, Color & Shape Detection)

Networking & Communication
LAN/WAN, Routing & Switching, TCP/IP, BGP Fundamentals, VLANs, Network Monitoring, Incident Escalation, LoRa, BLE 5.0, MQTT

Tools & Platforms
MATLAB, Fedora/Ubuntu Linux, Cisco Packet Tracer, NI LabVIEW, Arduino IDE, HPSM, SMAX, Siemens TIA Portal, KiCad, Siemens LOGO, Git/GitHub

Industrial Automation & Control
PLC Programming, SCADA Systems, HMI Development, Industrial Communication Protocols, Troubleshooting & System Diagnostics, Automation System Integration, Process Control

EDUCATION

Qatar University
Bachelor of Science in Computer Engineering
Aug 2022 – May 2026
Full-Ride Scholarship Recipient

EXPERIENCE

Research Assistant | *Qatar University · Doha, Qatar* | ***Sep 2026 – Present***

- Contributing to a collaborative research project with Sultan Qaboos University focused on secure software and communication systems for autonomous drone operations.
- Supporting system requirements and application architecture for drone management, package tracking, offline-capable operation, and secure authentication under intermittent connectivity.
- Evaluating implementation constraints for GNSS-denied operation, data protection, and synchronization between field devices and backend services.

Embedded Systems Engineer | *Vora · Doha, Qatar* | ***Jun 2026 – Sep 2026***

- Led end-to-end hardware development for Vora's first smart AC controller prototypes, from schematic design through 10 manufactured units.
- Designed production PCBs in KiCad, selected and justified sensors, built the BOM, performed component calculations, and managed fabrication through JLCPCB.
- Wrote production-grade firmware in C++ (Arduino) implementing IR protocol identification across dual-receiver configurations with real-time signal analysis.
- Integrated PZEM energy monitoring and built a multi-protocol wireless stack using Wi-Fi, BLE, MQTT, Telnet, and OTA update support.
- Contributed to architectural decisions by evaluating hardware tradeoffs, identifying design risks, and shaping the technical direction of the product.

NOC Engineer Intern | *MEEZA-QSTP · Doha, Qatar* | ***June 2025 – Aug 2025***

- Monitored and analyzed network operations across diverse client infrastructures, identifying and escalating incidents (P2–P5) including node failures, BGP alerts, and interface issues.
- Coordinated with network engineers to resolve incidents within SLA timelines, ensuring service continuity for major clients such as Qatar Foundation.
- Delivered first-line support via service desk, resolving account and connectivity issues while maintaining SLA compliance and professional client communication.

PROJECTS

Senior Design Project: Navi-Qart – Autonomous Smart Shopping Cart with A* Navigation

- Designed and implemented an autonomous shopping cart for indoor retail navigation using a Raspberry Pi 5, RPLIDAR A1M8, DC motor actuation, and a pre-downloaded grid map.
- Implemented A* path planning to route the cart to selected product destinations and integrated LiDAR-based obstacle detection for dynamic navigation.
- Designed the embedded control architecture and performed system-level integration across motor drivers, power systems, RFID hardware, and onboard sensing.
- Integrated a UHF RFID-based checkout workflow with a Flutter/Firebase application for product selection, shopping lists, navigation commands, and online checkout.
- Validated system performance through obstacle-avoidance, RFID-read, battery-runtime, and hardware integration testing.

MasterPi Autonomous Robot – Camera-Guided Pick, Line-Follow & Drop-Off System

- Rebuilt the Raspberry Pi 5 robot around custom-selected motor drivers, servo controllers, camera hardware, and custom control software.
- Developed a Python/OpenCV autonomous control system for real-time color detection, line following, and triangle-marker recognition to guide navigation and turns.
- Architected a modular multi-task pipeline for pickup, color confirmation, line following, turn guidance, and drop-off detection with concurrent perception and control.
- Achieved 2nd place in the course competition and completed the challenge with the second-fastest run.

Gene Expression Cancer Classification – Machine Learning (CMPS 460)

- Built an end-to-end machine learning pipeline in Python using scikit-learn and TensorFlow/Keras to classify RNA-seq gene-expression samples as cancerous or healthy under severe class imbalance.
- Reduced approximately 45,000 gene features to the 1,000 highest-variance features and compared Naive Bayes, Random Forest, and neural-network models.
- Evaluated models using F1-macro and AUC-ROC, tuned Random Forest with GridSearchCV and stratified 5-fold cross-validation, and analyzed feature importance.

Decentralized Mesh Networking for Disaster Communication

- Designed and implemented a decentralized mesh communication network using ESP32 microcontrollers and LoRa transceivers for peer-to-peer and multi-hop messaging without internet or cellular infrastructure.
- Developed a custom routing protocol with packet de-duplication and cooldown mechanisms for reliable, loop-free, congestion-controlled message delivery.
- Built a responsive web chat application hosted on ESP32 access points, integrating HTML/CSS/JavaScript with C++ firmware and WebSockets for off-grid communication.

Electric Delivery and Howitzer Firing System Challenge

- Designed and built a motorized howitzer system with precise shooting mechanisms using 555 timers, sensors, LEDs, DC motors, IR sensors, and a 3D-printed flywheel dart blaster.
- Implemented voltage regulation, visual indicators, and sound feedback for real-time responsiveness.
- Achieved 2nd place in the Computer Engineering Practicum final project competition.

Environment Creation on Fedora – Multi-Room Chat Server Implementation

- Developed automated server-client configuration using shell scripts and configured SSH, MOSH, HTTP, NGINX, and SFTP for secure communication.
- Implemented password-less SSH authentication and a TCP-based multi-room chat server using Java multithreading.
- Added synchronization against race conditions, ticket-based authentication, user moderation, and timestamped real-time messaging.

ADDITIONAL INFORMATION

- Languages: English (Fluent), Urdu (Mother Tongue), Arabic (Elementary), French (Elementary)
- Certifications: CCNA Introduction to Networks I, Arabian Infotech: PLC Automation (HMI, SCADA, VFD) – accredited by Qatari Govt.