Hashem Altujar

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EDUCATION

King Fahd University of Petroleum and Minerals — **Dhahran, Saudi Arabia**
B.S., Electrical Engineering — GPA 3.94/4.00 — *Expected 05/2028*

EXPERIENCE

Research Intern — Soft Robotics & Embedded Control — **06/2026 – Present**
Hong Kong University of Science and Technology (HKUST) — Summer UG Research Program — *Hong Kong*

- Developed bare-metal C firmware (STM32H7) for a water-hydraulic soft robotic arm driving 2 PWM pumps, 5 CAN servo drives, and a Modbus RS485 flow sensor in a real-time loop.
- Reverse-engineered an undocumented CAN 2.0B protocol with a custom firmware bus sniffer, fixing frame-encoding faults that had left 4 of 5 drives inoperable.
- Designed an asymmetric-margin tendon synchronization algorithm that eliminated the system's primary mechanical failure mode.
- Implemented sensorless closed-loop positioning by integrating flow-sensor data against a calibrated volume-to-displacement regression — validated to 3.5 mm mean absolute error (RMSE 4.9 mm, $R^2 = 0.99$) across a 315 mm stroke over 10 trials.
- Built a layered safety system (stall detection, travel limits, pump interlock) halting actuation within 600 ms of a jam.

Design & Assembly Lead — **10/2025 – 02/2026**
KFUPM Robotics Team — VEX U Pushback — *Dhahran, Saudi Arabia*

- Qualified the team for the VEX U National stage; directed a 14-member sub-team across CAD, fabrication, and integration.
- Designed and assembled a 22 in. competition robot (AutoCAD) with intake, outtake, and scoring mechanisms driven by motors, flex wheels, and pneumatics.

Undergraduate Researcher — Robotics & Assistive Technology — **09/2025 – 05/2026**
KFUPM Research and Innovation — *Dhahran, Saudi Arabia*

- Engineering a 16-DOF robotic hand that translates spoken input into ASL fingerspelling across 24 letters of the manual alphabet (excluding the two motion-dependent letters).
- Built the speech-to-gloss-to-motion pipeline on Jetson Orin Nano with ROS actuator control; designed the full mechanical CAD assembly.

Undergraduate Researcher — Acoustic UAV Detection — **05/2025 – 10/2025**
KFUPM Telecommunications Research Lab — *Dhahran, Saudi Arabia*

- Developed a hybrid acoustic drone-detection pipeline on NVIDIA Jetson Nano with real-time inference at 15–20 FPS.
- Trained a ResNet acoustic classifier (TensorFlow) to 92% precision; implemented microphone-array Direction-of-Arrival localization with full 360° coverage.
- First-authored a systematic review of 20+ studies (2018–2024) on acoustic UAV detection.

PUBLICATIONS

- H. Altujar et al., "A Review of Acoustic Techniques for Drone Detection," *IEEE Smart Cities Conference (SCC)*, 2025.

TECHNICAL SKILLS

- **Languages:** C (embedded, bare-metal), Python, MATLAB
- **Embedded & Protocols:** STM32 / ARM Cortex-M7, Arduino, NVIDIA Jetson (Nano, Orin Nano); CAN 2.0B / FDCAN, Modbus RTU, RS485, UART, I2C, SPI, PWM
- **Control & Robotics:** PI/PID control, closed-loop feedback, sensor fusion, encoder feedback, real-time state machines, Simulink, ROS
- **ML, Tools & Design:** TensorFlow, NumPy, scikit-learn, CNN/ResNet; Git, Linux, STM32CubeIDE, Segger Ozone; AutoCAD, Fusion 360, 3D printing

AWARDS & HONORS

- **1st Place**, KFUPM Venture Tank — SAR 15,000 seed funding for Elecure
- **Finalist**, SCI UK Bright SCIdea Challenge 2025 — youngest international team and first KFUPM freshman to qualify
- **Bechtel Corporation Scholarship** — academic and extracurricular excellence
- **3rd Place** (of 10 teams), Autonomous Aerial Systems Competition, KFUPM — led embedded and electronics integration for an autonomous drone performing AI human detection and 3-axis camera tracking with laser targeting
- **First Honors & Dean's List**, KFUPM — awarded for academic distinction