# Auntu Gain

SOFTWARE ENGINEER

## Summary

Embedded Systems Engineer with 4+ years of experience in real-time control, firmware, and perception systems for autonomous robotics and IoT. Experienced with computer vision and multi-sensor integration on embedded devices under resource constraints. Research interests include resource-efficient AI, computer vision, and embedded autonomy for human-centered applications.

(+82)-10-2818-6879
gainauntu@gmail.com
Suwon, Gyeonggi-do, South Korea.

## Research Interests

- On-device AI and resource-efficient deep learning
- Edge computing and real-time inference optimization
- Computer vision and sensor fusion for autonomous systems

## Skills

- Programming: C, C++, Python (NumPy, pandas, scikit-learn)
- AI/ML & CV: TensorFlow, PyTorch, OpenCV, MediaPipe, OpenPose; model optimization (TensorRT, ONNX)
- Embedded/Robotics: RTOS, STM32, Jetson Nano/Orin, PX4, MAVLink, ROS2, Gazebo Sim, sensor fusion (LiDAR, camera, ultrasonic)
- Systems & Tools: Qt/QML, CAN/LIN, Docker, Git, Linux Device Drivers

## Education

### SECONDARY SCHOOL

Notre Dame College, Dhaka, Bangladesh
2013 - 2015

### B.SC. IN COMPUTER SCIENCE AND ENGINEERING.

Jeonbuk National University, Jeonju, Korea
2017- 2021

## Awards

2016 Korean Government Scholarship Program (GKS) Recipient – Undergraduate

## Professional Experience

### ASSOCIATE RESEARCH ENGINEER

GT System Inc. (2024 - Present)

- Designed **real-time HMI architectures** (Qt/QML, C++) for Hyundai clusters under strict latency/memory limits.
- Built and benchmarked **CAN/LIN ECU pipelines**, validated via simulation and on-vehicle tests.
- Introduced **AI-driven unit testing**, boosting reliability to >90% and reducing validation time by 70%.
- Led an international team, delivering modular embedded solutions.

### RESEARCH ENGINEER

Approtec Inc. (2023 - 2024)

- Developed **IoT control software** for water intake/recharge systems on **Raspberry Pi (RS485, Qt, MySQL, Google Cloud).**
- Built **BMS monitoring solutions** for large-scale **Vanadium redox flow batteries**, adding predictive fault detection to improve lab safety and energy efficiency.
- Engineered **low-latency communication frameworks** for autonomous agricultural transport vehicles, ensuring reliable real-time operation.

### RESEARCH ENGINEER

Fluton Inc. (2021 - 2023)

- Developed **TensorFlow-based victim detection** with pose estimation on **Jetson** for a life-saving USV.
- Enhanced **obstacle avoidance** via LiDAR, ultrasonic, and vision sensor fusion using **ROS2.**
- Built **RTOS firmware** in C for shared-bike lock and BLE modules with GPS-based NFC payments.
- Created autonomous **scum-cleaning drone** (Pixhawk, RTK GPS) with **AprilTag docking+charging** for 24/7 operation.

### UNDERGRAD. RESEARCH ASSISTANT

DATA MINING RESEARCH LAB, JBNU (2018 - 2019)

- Analyzed **TREC Twitter dataset** with feature engineering + supervised ML for text classification.
- Built short-text preprocessing pipelines (tokenization, stop-word removal, n-gram modeling), improving classification accuracy.
- Assisted in preparing **top-ranked submission** for TREC competition, and contributed to writing/structuring graduate-level publications.

## Relevant Coursework

- Machine Learning (A)
- Artificial Intelligence (A)
- Image Processing (A)
- Information Retrieval (A)
- Embedded Computing (B+)

## Language

- Korean (Fluent)
- English (Fluent)
- Bengali (Native)

## Highlighted Projects

- **Hyundai Motors - Commercial Vehicle Cluster HMI**
  - Developed HMI features (telltales, indicators, diagnostics) using **Qt/QML, C++**.
  - Integrated **CAN/LIN ECU data pipelines;** validated via simulation, automated testing, and on-vehicle trials.
  - Optimized UI rendering for compliance with Hyundai UX and real-time safety standards.

- **LIFEGUARD USV - Autonomous Rescue Drone**
  - Built real-time **drowning victim detection** with **TensorFlow** pose estimation deployed on Jetson Nano; integrated automated alerts during survey missions.
  - Improved **multisensor obstacle avoidance** (LiDAR, ultrasonic, RealSense) via **ROS2.**
  - Added **automated survey missions** through Windows-based GCS.

- **Shared Bicycle Firmware (Contract Project)**
  - Designed **RTOS-based firmware** in C for lock control and BLE connectivity.
  - Implemented GPS-based NFC payments, cloud modem communication, and real-time location/sensor monitoring.

- **Skimmer Drone - Water Treatment (Korea Water Collaboration)**
  - Developed **autonomous drone** with Pixhawk flight control and RTK GPS for **1–2 cm precision cleaning**.
  - Implemented **AprilTag-based docking** and charging using a companion computer, enabling 24/7 unattended operation.

- **Smart Water Meter - Anomaly Detection on Embedded AI (ongoing)**
  - Developed edge ML pipelines (Isolation Forest, Autoencoder) to detect leaks and abnormal water usage on STM32 Edge AI Hardware.
  - Designed **lightweight models** optimized for low-power deployment, integrating real-time sensor streams into embedded firmware.
  - Demonstrated **>85% anomaly detection accuracy** in lab tests, reducing detection time compared to traditional threshold methods.