[별표1]

# Undergraduate Research Program Report

| Department | Full name | Student number |
|---|---|---|
| Information and Communication Engineering | Satiyev Elton | 12244853 |
| Research title | Intelligent Embedded Sytem Laboratory | |
| Research period | (24.09.02) ~ (24.12.12) | |

## Summary of Research Findings

During our participation in the Intelligent Embedded System Laboratory, our team, which included myself and another student, engaged in hands-on research and development activities that integrated edge computing and artificial intelligence using modern hardware and software tools. The main projects we worked on are as follows:

**Gesture-Controlled Bulb using YOLO and Arduino Nano 33 BLE Sense**:

Developed a system to control a bulb through hand gestures recognized via a YOLO-based AI model.

**Fall Detection System using Arduino Nano 33 BLE Sense, Raspberry Pi 4, and AI with TensorFlow**:

Designed a wearable fall detection system to recognize and respond to accidental falls.
Utilized TensorFlow to train a lightweight AI model for accurate fall recognition, ensuring efficient processing.
Used a Raspberry Pi 4 as an edge device for data acquisition and processing.

Additionally, we worked on configuring the **NVIDIA Jetson AGX Xavier** and deploying AI models, focusing on optimization for real-time inference. These projects provided insights into: AI model deployment on edge devices and cloud integration. Optimizing AI models for efficient processing on NVIDIA platforms.

2024.12.24

Name : (sign)

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[별표2]

# Undergraduate Research Program Activity Journal

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|---|---|---|---|---|---|
| Department | Information and Communication Engineering | Student number | 12244853 | Name | Satiyev Elton (sign) |
| Participation program name | 2024-2 (Electrical and Computer Engineering Department, IESL813 Laboratory, Professor in charge: Prof. Deok-Hwan Kim) | | | | |
| Main role | AI and Data Processing Engineer | | | | |

| Activities | Date/time (activity hours) | Place | Activity details | Note |
|---|---|---|---|---|
| | 2024.9.6 14:00~17:00 (3H) | IESL 816 | Introduction to edge computing concepts and Arduino basics. | |
| | 2024.9.13 13:00~17:00 (4H) | IESL 816 | Worked on setting up Arduino IDE and basic LED control projects. | |
| | 2024.9.26 13:00~18:00 (5H) | IESL 816 | Completed Arduino sensor integration and tested real-time data logging. | |
| | 2024.10.4 14:00~22:00 (8H) | IESL 816 | Implemented and tested gesture recognition with YOLO and Arduino Nano 33 BLE Sense. | |
| | 2024.10.11 16:00~22:00 (6H) | IESL 813 | Set up RaspberryPi and performed GPIO programming for sensor interfacing. | |
| | 2024.10.18 13:00~18:00 (5H) | IESL 813 | Developed edge AI integration using Raspberry Pi as an intermediate device for gesture control. | |
| | 2024.11.1 14:00~20:00 (6H) | IESL 813 | Worked on integrating Raspberry Pi withcloud platforms for data logging and | |

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|---|---|---|---|---|
| | | | visualization. | |
| | 2024.11.15<br>13:00~**19**:00 (**6**H) | IESL 813 | Designed and validated a fall detection system using AI, Raspberry Pi 4, and Arduino Nano 33 BLE Sense. | |
| | 2024.11.22<br>13:00~18:00 (5H) | IESL 813 | Conducted testing of AI models for gesture and fall detection on edge devices. | |
| | 2024.11.29<br>15:00~19:00 (4H) | IESL 813 | Reviewed and finalized code optimizationfor edge AI systems. | |
| | 2024.12.6<br>13:00~**19**:00 (**6**H) | IESL 813 | Configured NVIDIA Jetson Xavier hardware and software using NVIDIA JetPack SDK. | |
| | 2024.12.12<br>16:00~22:00 (6H) | IESL 813 | Deployed and optimized AI models on NVIDIA Jetson Xavier using TensorRT. | |
| Total activity time | **64** Hours **in total** | | | |
| Professor<br>Check and sign | (sign) | | | |

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