

Arduino Accelerators

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Motivation

- Traditional touch screens and buttons are often inefficient in busy environments such as driving or lecturing. While early gesture-control systems existed, they lacked the low latency and responsiveness needed for practical use.
- Our project deploys an AI-based gesture recognition system on embedded hardware, enabling users to control music functions without physical interaction.

Things we want to accomplish

- **Hands-free media controller**
 - Skip Forward
 - Skip Backward
 - Pause
 - Resume
- **Accuracy**
 - 85% Accuracy

Task Division

- Hardware Setup and data collection - Will
- Code Implementation and debugging - Mehnaz
- Video work and final report- Mehnaz + Will

Planned approach

- **Hardware setup:**
 - Data captured on built in IMU on the Arduino BLE 33 Sense. An LED is included for real-time visual feedback to indicate system status and gesture detection.
- **Software Tools:**
 - Edge Impulse is used for data collection, data labeling, model training, and deployment to embedded hardware.
 - Arduino IDE/CLI is used to upload firmware and run real-time inference directly on the microcontroller.
 - Edge Impulse CLI is used to connect the Arduino to the Edge Impulse platform for live data collection and testing.

Planned approach cont.

- **Performance Metrics:** The system will be evaluated using the following metrics:
 - Latency : Measures real-time responsiveness of the system
 - Accuracy : Measures correctness of gesture classification
 - Memory Usage : Measures how efficiently the model uses microcontroller resources

Current Status

- Completing data collection on the embedded hardware
- Training the gesture recognition model
- Next Step: Finalize inference code and complete implementation on hardware for testing and make video presentation

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Thank you!

Github link:

https://github.com/Mircea-s-classes/ai-hardware-project-proposal-mehnaz-will_ai.git