

Motivation

- Improper waste management practices contribute to environmental degradation and pose significant health risks.
- Manual sorting processes are time-consuming and inefficient, especially when dealing with the high scale of global waste.

Objectives

- Utilizing Edge AI technology for real-time processing and analysis directly on the device.
- Train the FOMO model using Edge Impulse
- Deploy the trained model on hardware device
- Utilize the deployed model for object detection and classification

Dataset / Data collection

- Bottles and Cans images collected from internet and real objects
- Number of Classes: 2
- Number of Samples: 700
- Data Preprocessing: Bounding box labelling, Image resizing for the FOMO model

Edge AI Model

- FOMO (Faster Objects, More Objects) MobileNetV2 0.35
- Profiled from fp32 to int8 model
- Model characteristics
 - Size before compression: 83 KB After compression: 56 KB
 - Inferencing time: 89 ms
 - Peak RAM usage: 239.5 KB
 - Flash usage: 78.7 KB
 - Test Accuracy: 85%

Hardware and Software spec.

- Arduino Nicla Vision (Cortex-M7 480 MHz)
- Open MV firmware

Prototype & demonstration

The hardware device can be installed on a robot and can be utilized to automatically detecting and classifying the garbage items.

