



Project - Motion Detection

Introduction

Welcome to the first project of the course! In this project, we will ask you to employ many of the concepts from the previous modules to create a fully-functioning embedded machine learning system. The process involves performing feature extraction, training a model, and deploying that model to an embedded system.

We will classify the motion and vibration data from a machine of your choice. This is to mimic using a sensor in an industrial environment. We want to be able to determine if a machine is off, on, low, high, or normal.

Please note that at this time, we do not have a way to grade your project. As such, this project is considered a bonus for the course. However, we strongly encourage you to go through these steps to get hands-on experience with machine learning as well as using the Edge Impulse tool.

Required Hardware

You may use either your smartphone or Arduino Nano 33 BLE Sense to complete the project. Which device you use will depend on that device for data collection and deployment. Please do not mix them (e.g. collect data with the smartphone and deploy to the Arduino).

We recommend using the Arduino board, if you have access to it. There will be an optional section at the end of the project to modify the Arduino code. We encourage you to try this challenge to get a feel for working with embedded systems.

You will also need some tape (recommended: electrical tape) to secure your board or smartphone to a surface.

Setup

Before we start collecting data, we must first figure out what we want to monitor! In the previous lecture, we saw a “magic wand” demo that classified person-made hand movements. In this project, we will work with different operating modes and look for anomalies. While the “magic wand” is a fun way to interact with machines, we will focus on industrial uses for embedded machine learning in this project.

To begin, choose a machine in your home, office, or school that produces some kind of vibration data that you can collect and classify. Here are some ideas of things you may want to monitor:

- Washing machine