

The oily sizzle of an egg in a hot frying pan, the melodic birdsong coming from the tree beside our house, the obnoxious rev of a pickup truck as it speeds down our street, and the gasoline-powered roar of our neighbor's weedwhacker and leaf blower.

My family and I hear these sounds every day, and aside from being annoying, the last two sounds mentioned can have harsh repercussions, causing slower mental development in children, higher stress levels, and even hearing damage or loss. This isn't uncommon, either! The CDC reports that hearing loss is twice as common as diabetes or cancer, and that 14.9% of children are subject to it.

So how can a concerned citizen help? With the help of my device, the Noise Recorder using the Pi Zero (or NRP0 for short), they can be empowered to make a lasting impact on their community.

The NRP0 is made using a Pi Zero, an AIY Voice Bonnet, a speaker, a 4" microphone, and a color-changing button. When the sound-recording Python program, the button turns yellow, and the device checks the noise level - measured in RMS - every 0.3 seconds. If the RMS exceeds 0.5, then the device makes a recording with a duration of 5 seconds which hopefully captures the source of the noise.

Another part of the project was another Python program, this one used to split up long audio clips recorded on other devices into smaller 5-second ones.

The final part was a supervised machine learning model. It was trained with 206 audio clips classified into the 10 categories "Dog", "Cars", "Power Tool", "Crashing", and others. This model yielded an accuracy of 89%, but had the most trouble identifying birds and cars.

Of course, this was just a prototype, and not very easy to use for someone with no technology experience. A very useful addition would be an app that connects to the device through bluetooth and lists recordings and predictions for what the source might be, to make the entire process more seamless and user-friendly.