Arducam Pico4ML TinyML Dev Kit
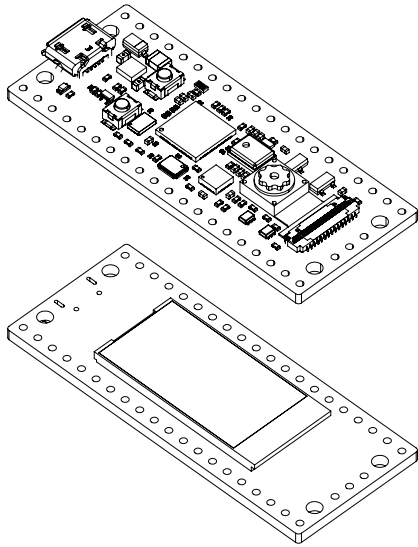
RP2040 Board w/ QVGA Camera, LCD Screen, Onboard Audio, Reset Button & More

Instruction Manual

Introduction

Pico4ML is a microcontroller board based on RP2040 for on-device machine learning. It also packs a camera, microphone, IMU, and display to help you get started with TensorFlow Lite Micro, which has been ported toRP2040.

We've included 3 pre-trained TensorFlow Lite Micro examples, including Person Detection, Magic Wand, and Wake-Word Detection. You can also build, train and deploy your models on it.

Specs

Microcontroller	Raspberry Pi RP2040
IMU	ICM-20948
Camera Module	HiMax HM01B0, Up to QVGA (320 x 240@60fps)
Screen	0.96 inch LCD SPI Display (160 x 80, ST7735)
Operating Voltage	3.3V
Input Voltage	VBUS:5V+/-10%.VSYS Max:5.5V
Dimension	51x21mm
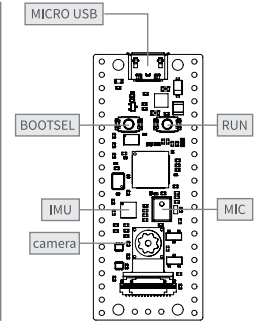
Quick Start

We've provided some pre-built binaries that you can just drag and drop onto your Pico4ML to make sure everything is working even before you start writing your code.

Pre-trained Models

Wake-word detection

A demo where Pico4ML provides always-on wake-word detection on whether someone is saying yes or no, using its onboard microphone and pre-trained speech detection model.

Magic Wand (Gesture Detection)

A demo where Pico4ML casts several types of spells in one of the following three gestures: "Wing", "Ring" and "Slope", using its IMU and pre-trained gesture detection model.

Person Detection

A demo where pico4ml predicts the probabilities of the presence of a person with a Himax HM01B0 camera module.

First Use

Go to the **https://github.com/ArduCAM/pico-tflmicro/tree/main/bin** page, then you will find the .uf2 files for the 3 pre-trained models.

Wake-word Detection

1. Click on the corresponding uf2. file
2. Click on the "Download" button. This file will be downloaded to your computer.
3. Go grab your Raspberry Pi or laptop, then press and hold the BOOTSEL button on your Pico4ML while you plug the other end of the micro USB cable into the board.
4. Release the button after the board is plugged in. A disk volume called RPI-RP2 should pop up on your desktop.
5. Double-click to open it, and then drag and drop the UF2 file into it. The volume will automatically unmount and the screen should light up.
6. Hold your Pico4ML closer and say "yes" or "no". The screen will display the corresponding word.

Magic Wand (Gesture Detection)

1. Repeat the first 5 steps mentioned in "Wake-word Detection Using" to light up the screen with the .uf2 file for magic wand.
2. Wave your Pico4ML quickly in a W (wing), O (ring), or L (slope) shape. The screen will display the corresponding mark.

Person Detection

1. Repeat the first 5 steps mentioned in "Wake-word Detection Using" to light up the screen with the .uf2 file for person detection.
2. Hold your Pico4ML to capture images. The screen will display the image and the probabilities of the presence of a person.

What's Next

Build models on your own

If you are developing your own models on Pico4ML with the Raspberry Pi 4B or Raspberry Pi 400, you can refer to:

https://github.com/ArduCAM/pico-tflmicro

Source file for 3D-printable enclosure

If you've got a 3D printer, you can print your own enclosure for Pico4ML with the source file in the link below.

https://www.arducam.com/downloads/arducam_pico4ml_case_file.stp

Contact Us

Email: support@arducam.com
Website: www.arducam.com
Skype: arducam
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