CEC Continuing Education Center

DesignNews

Developing Machine-Learning Applications on the Raspberry Pi Pico

DAY 5 : Deploying Machine-Learning Models and Next Steps

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Webinar Logistics

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- Participate in ‘Group Chat’ by maximizing the chat widget in your dock.
- Submit questions for the lecturer using the Q&A widget. They will follow-up after the lecture portion concludes.

THE SPEAKER

Jacob Beningo

Visit ‘Lecturer Profile’

Beningo Embedded Group - President

Focus: Embedded Software Consulting

An independent consultant who specializes in the design of real-time, microcontroller based embedded software.
He has published two books:

- Reusable Firmware Development
- MicroPython Projects
- Embedded Software Design (https://bit.ly/3PZCtNO)

Writes a weekly blog for DesignNews.com focused on embedded system design techniques and challenges.

Visit www.beningo.com to learn more …

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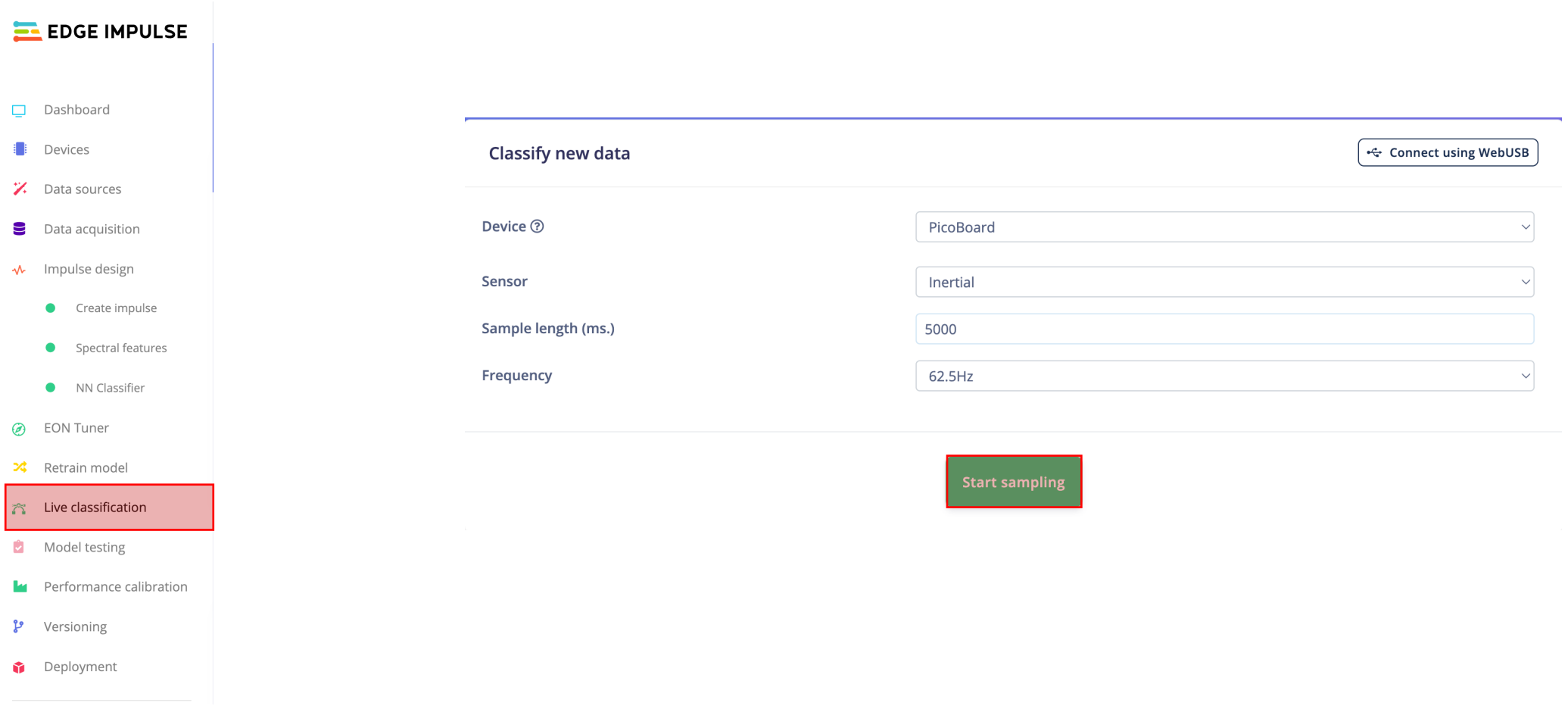
Course Sessions

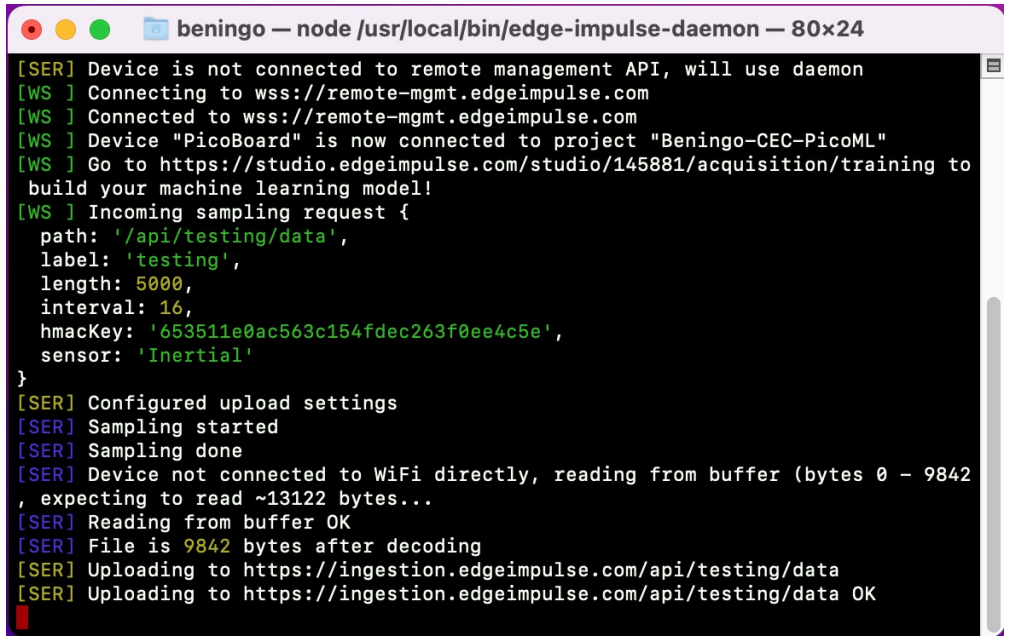
- Getting Started with the Raspberry Pi Pico and Machine Learning
- Machine-Learning Tools and Process Flow
- Collecting Sensor Data Using Edge Impulse
- Designing and Testing a Machine-Learning Model
- **Deploying Machine-Learning Models and Next Steps**

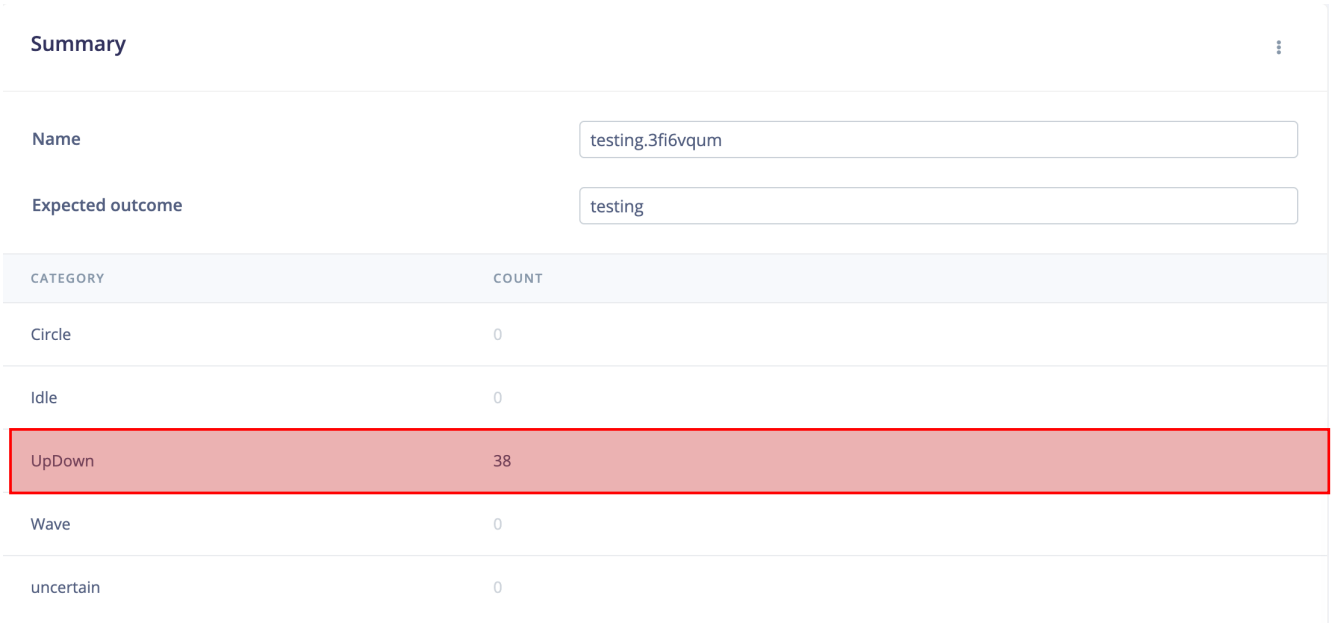
1 Live Classification

Live Classification

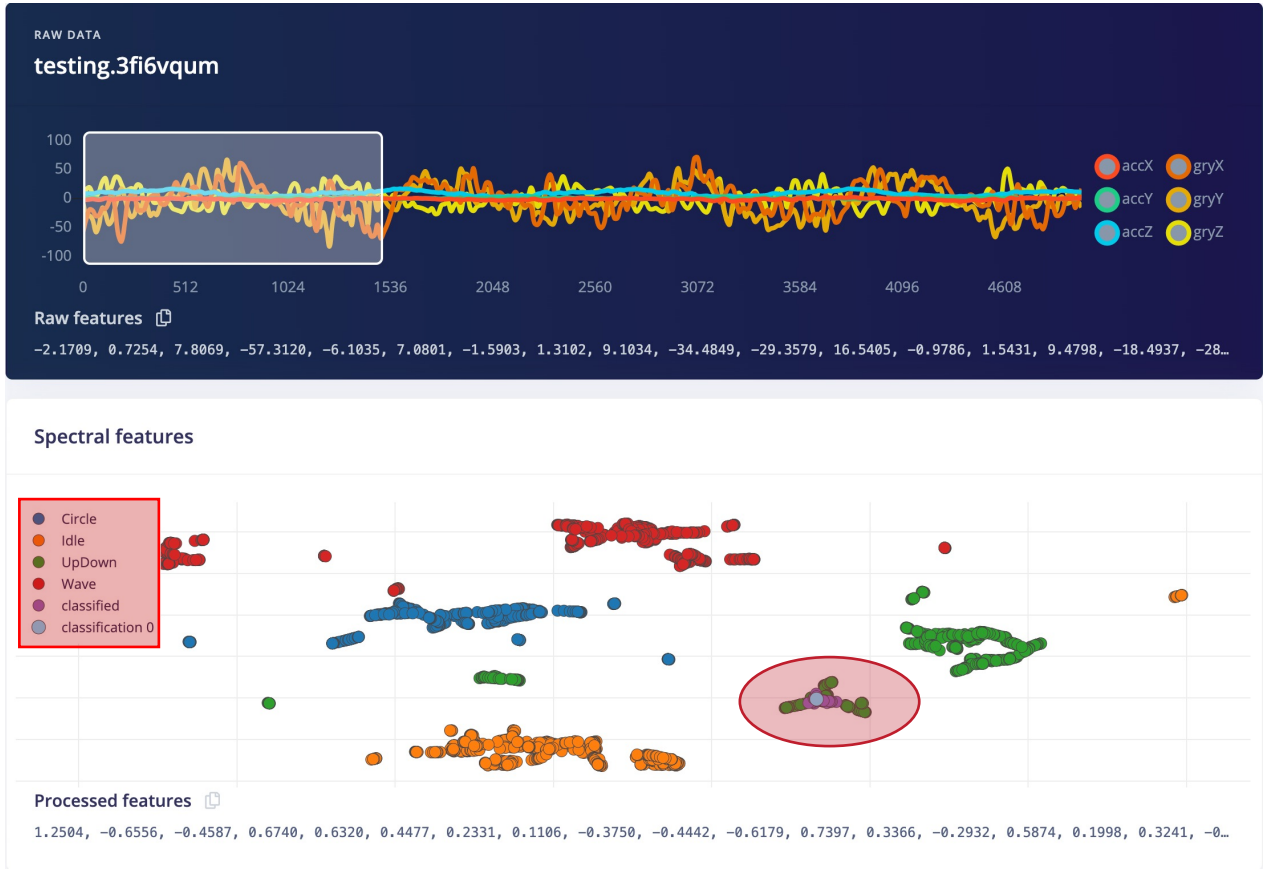


Live Classification





Live Classification

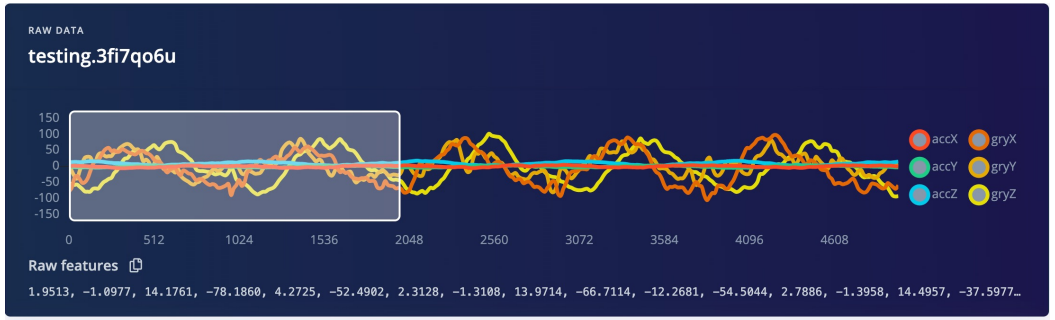


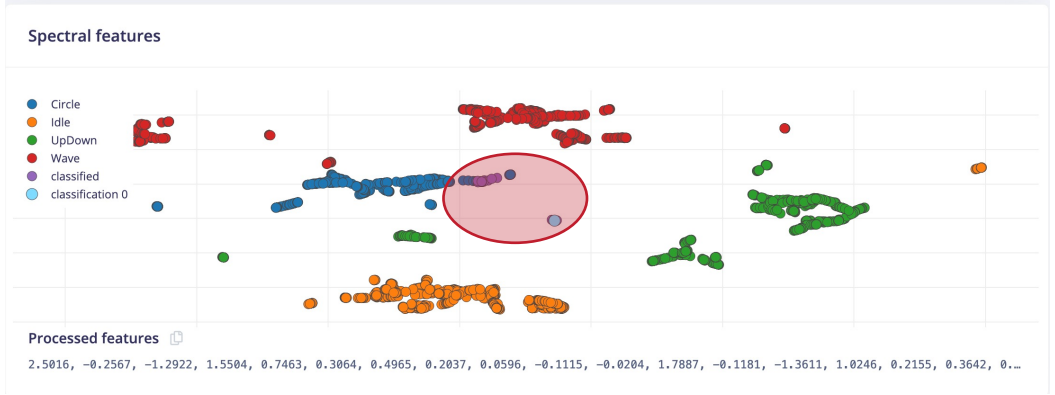
Live Classification

Summary

Name	testing.3fi7qo6u
Expected outcome	testing

CATEGORY	COUNT
Circle	38
Idle	0
UpDown	0
Wave	0
uncertain	0



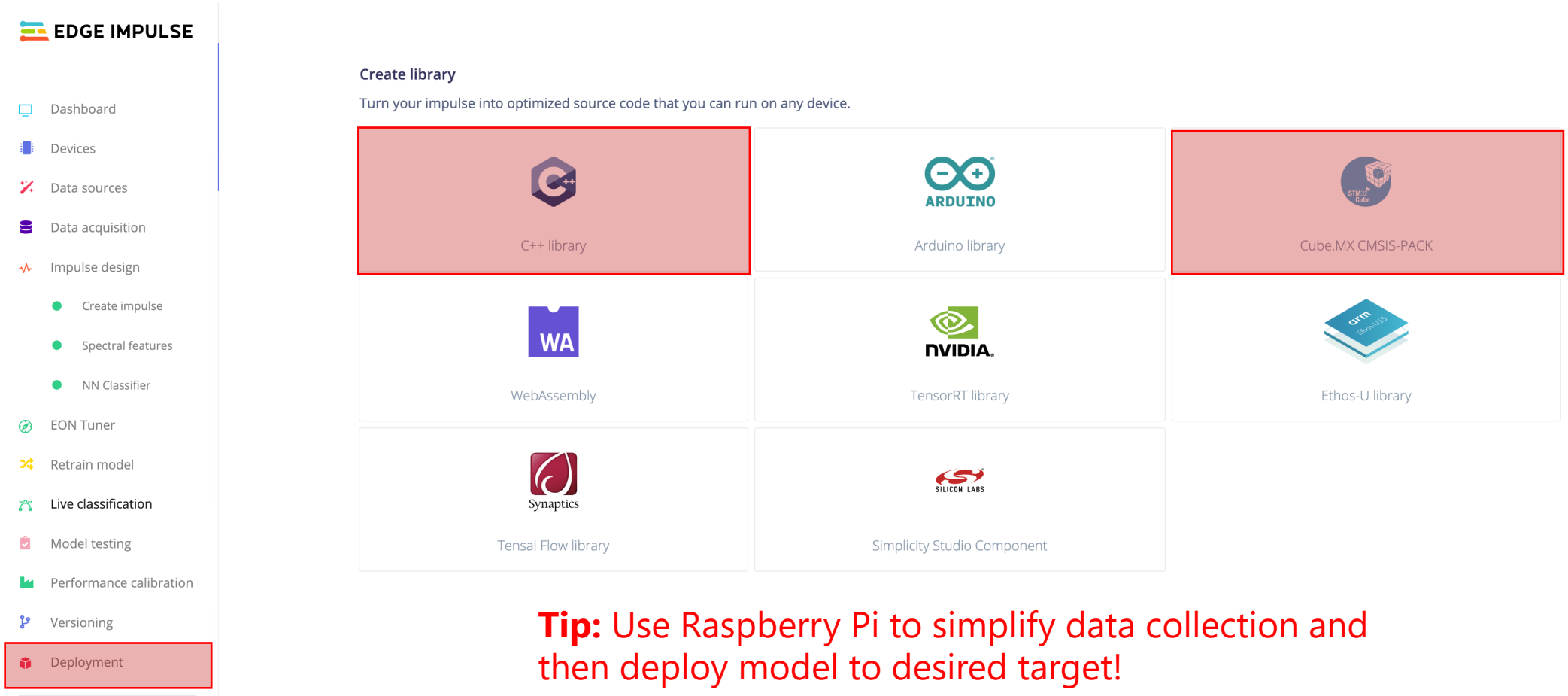


Is live classification deploying the model to the Pico?

1) Yes
2) No
3) Not sure

2 Deploying to the Pico

Deploying to the Pico



Tip: Use Raspberry Pi to simplify data collection and then deploy model to desired target!

Deploying to the Pico

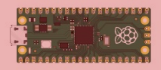
Build firmware

Get a ready-to-go binary for your development board that includes your impulse.


Arduino Nano 33 BLE Sense


Arduino Nicla Vision


Espressif ESP-EYE (ESP32)


Raspberry Pi RP2040


SiLabs xG24 Dev Kit

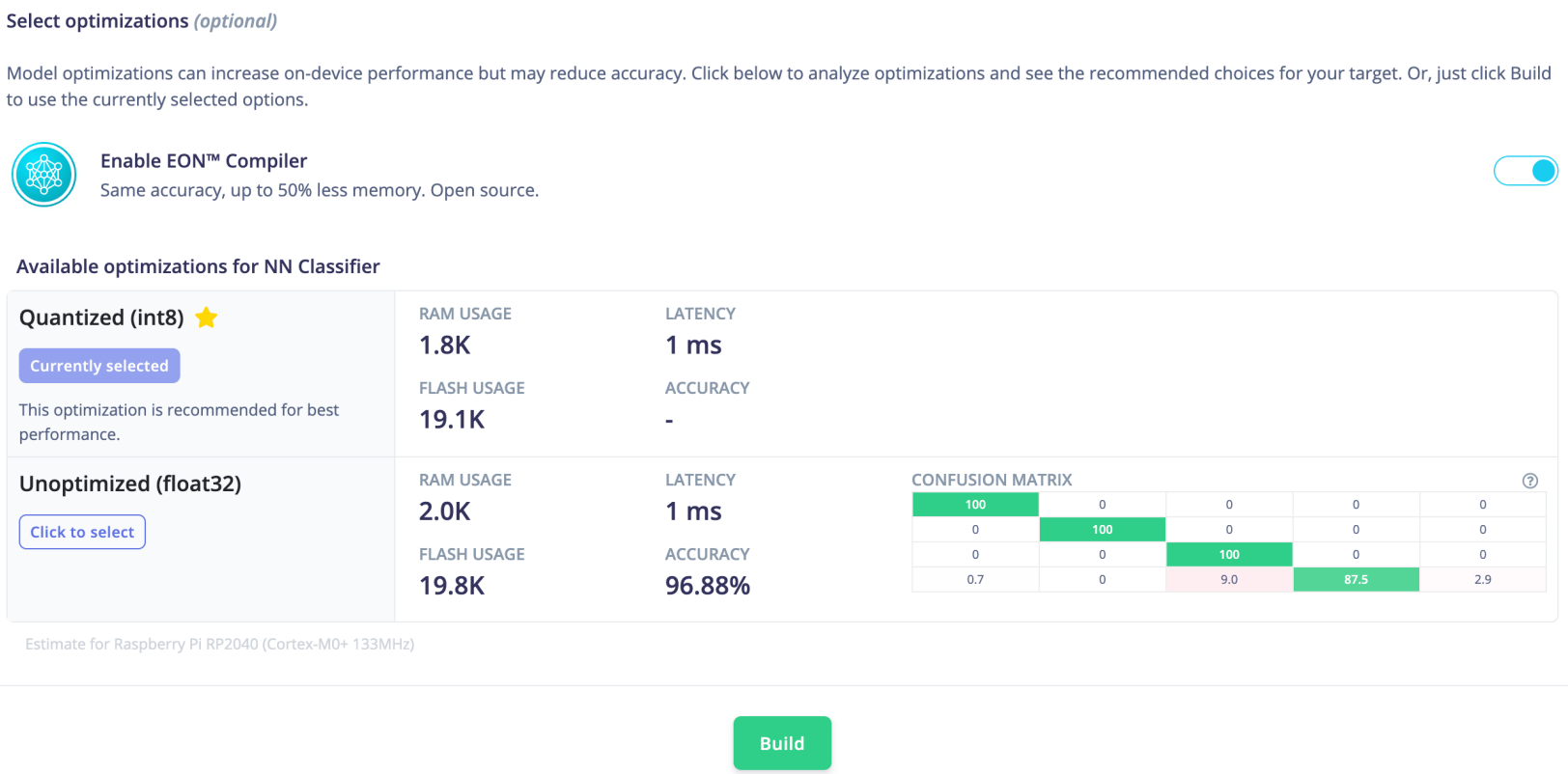

Infineon PSoC 62S2 Wi-Fi BT Pioneer Kit


Nordic Thingy:53

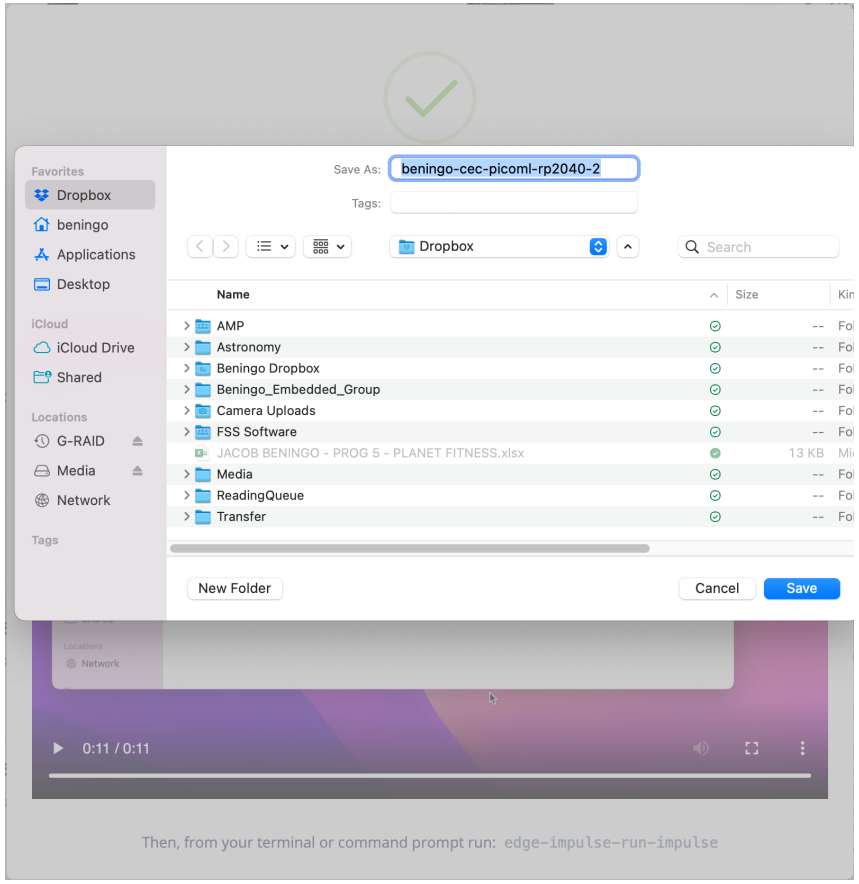

Linux boards

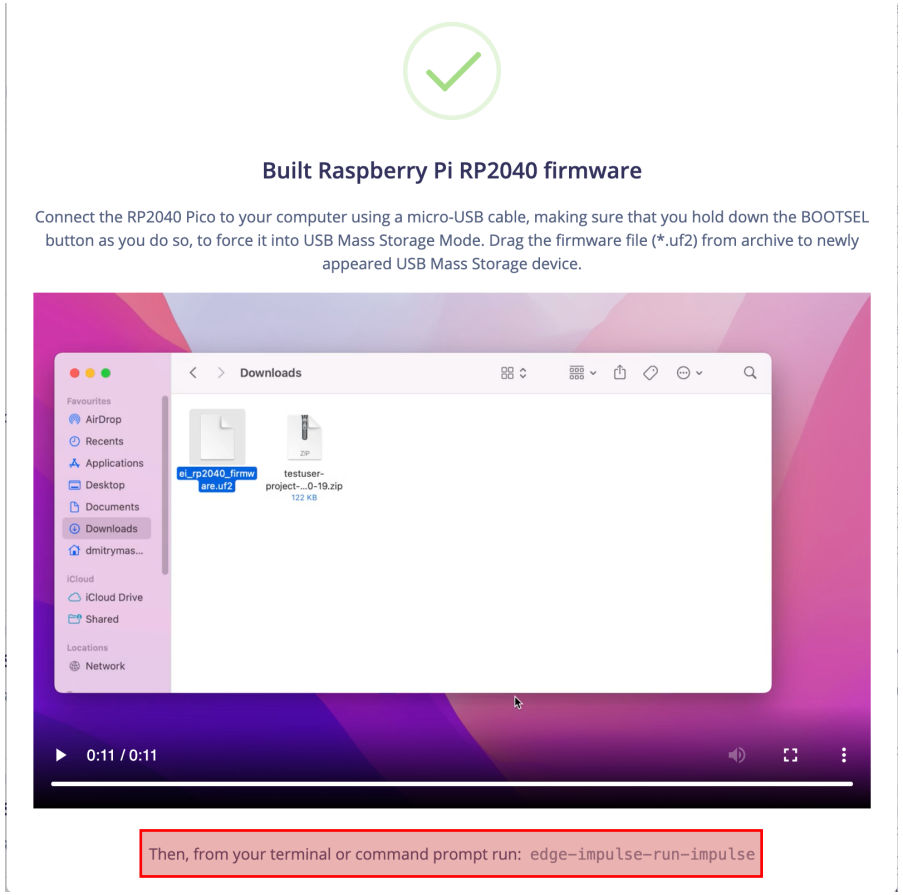

Custom firmware

Deploying to the Pico



Deploying to the Pico

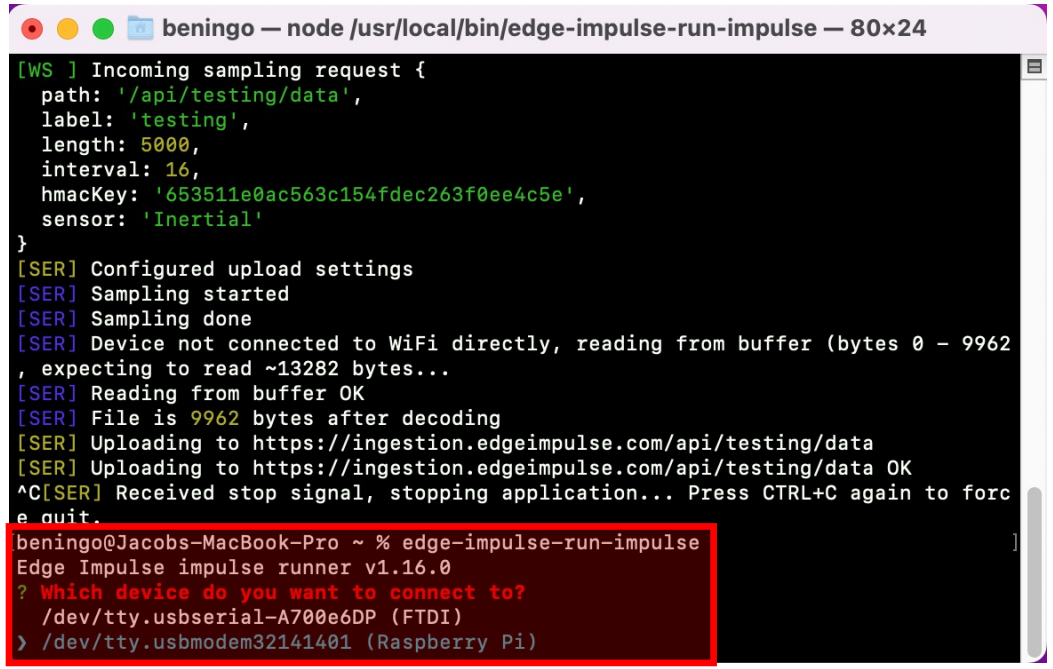


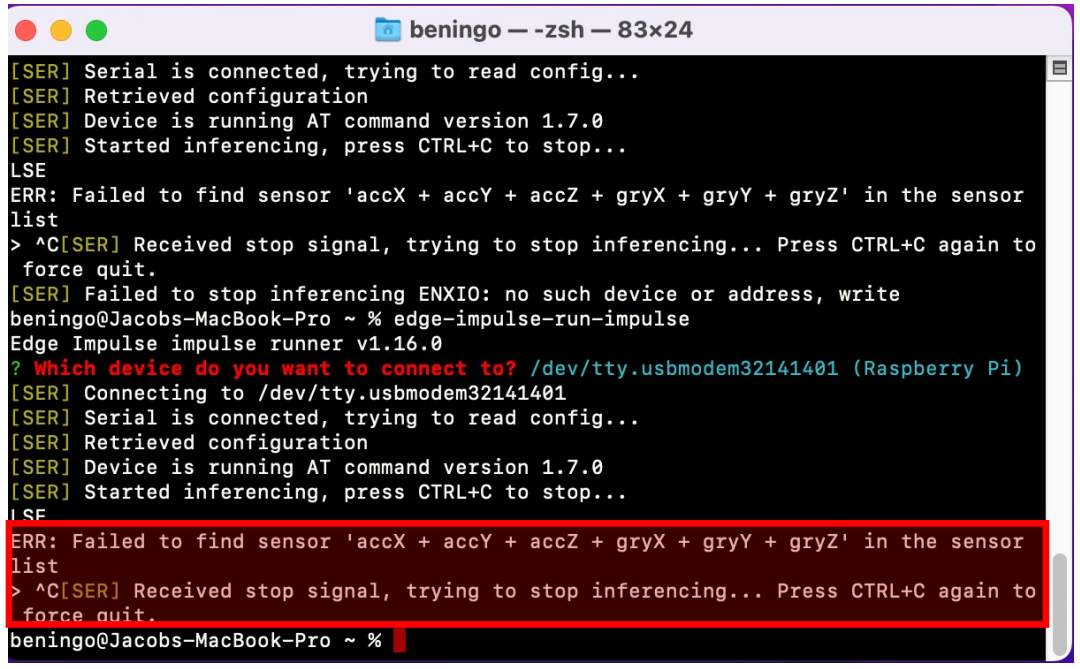


What deployment mechanism is most interesting to you?
- Library
- Compiled firmware
- Other

3 Running the Impulse

Running the Impulse





Running the Impulse

```
Starting inferencing in 2 seconds...
Sampling... Storing in file name: /fs/device-classification261
Tensor shape: 4
Predictions (DSP: 17 ms., Classification: 1 ms., Anomaly: 0 ms.):
    idle: 0.00004
    snake: 0.00012
    updown: 0.00009
    wave: 0.99976
    anomaly score: 0.032
Finished inferencing, raw data is stored in '/fs/device-classification261'. Use AT+UPL
```

How quickly will you pursue your next ML project?
- Next week
- Within the next 3 months
- Within the next 3 – 6 months
- More than 6 months from now
- I don't know

4 Going Further

Thank you for attending

Please consider the resources below:

- www.beningo.com
  - Blog, White Papers, Courses
  - Embedded Bytes Newsletter
    - http://bit.ly/1BAHYXm
  - Embedded Software Design
    - https://bit.ly/3PZCtNO

From www.beningo.com under

- Blog > CEC – Developing Machine-Learning Applications on the Raspberry Pi Pico

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