

# Seamless TinyML lifecycle management

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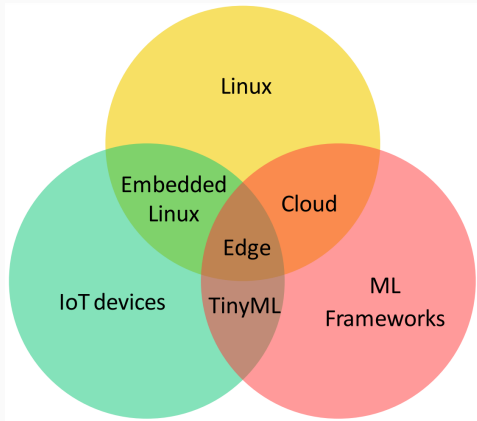
In Software Engineering Project with University of Helsinki CS

16/1/2023

Origami@NEXUS: Hiroshi Doyu, Roberto Morabito, Michihito Mizutani

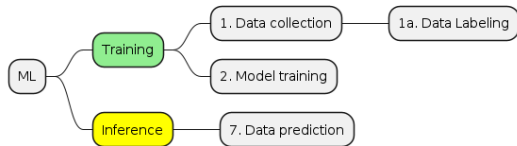
## Project goal

*“The main goal of this software engineering project is to develop a solution that enables a seamless **TinyML lifecycle management**. In particular, the idea is to build a framework that **in an automated fashion** performs the different steps of the TinyML lifecycle management.”*

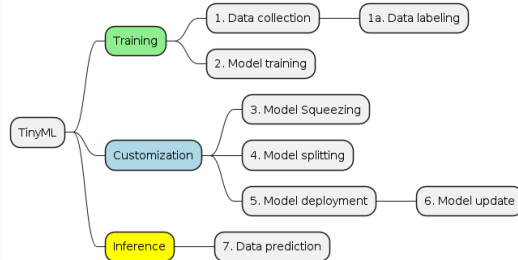


# Lifecycle of: ML vs TinyML

## (Cloud) ML

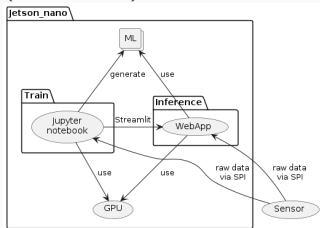


## TinyML

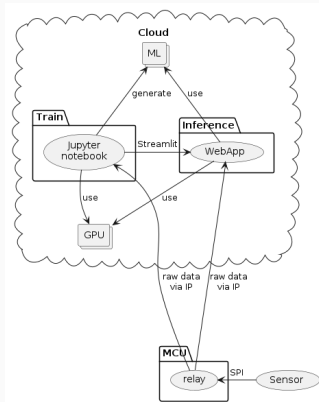


# Arch: Edge ML vs Cloud ML vs TinyML

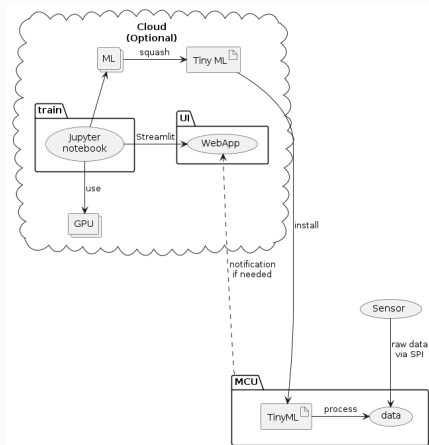
## Edge ML (Local ML)



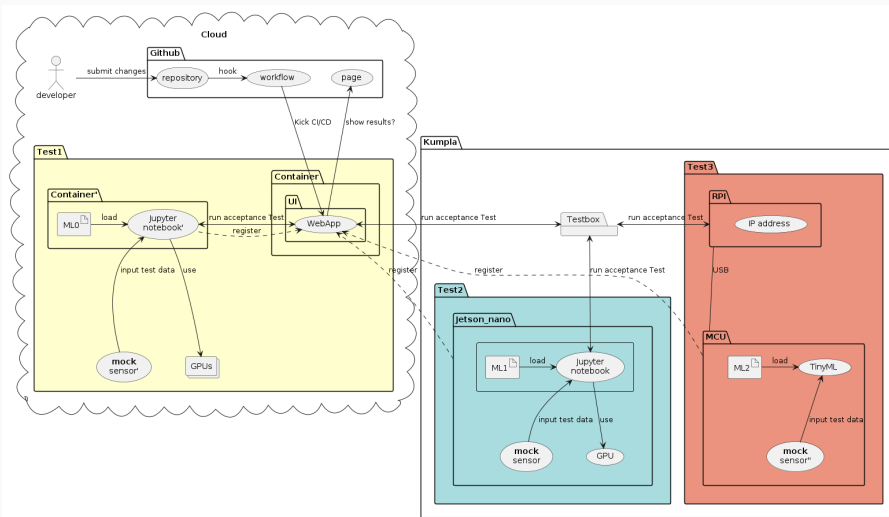
## Cloud ML



## TinyML



# CI / CD / ATDD

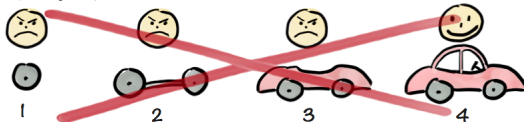


The simplest **Test1** can run the *TFLite micro Hello World* in a container w/o HW.

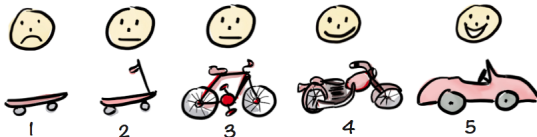
# MVP iteration

## Always runnable MVP at Day 1

Not like this....

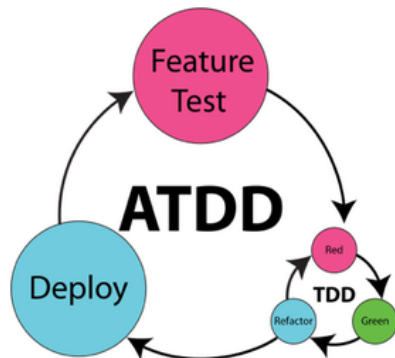


Like this!



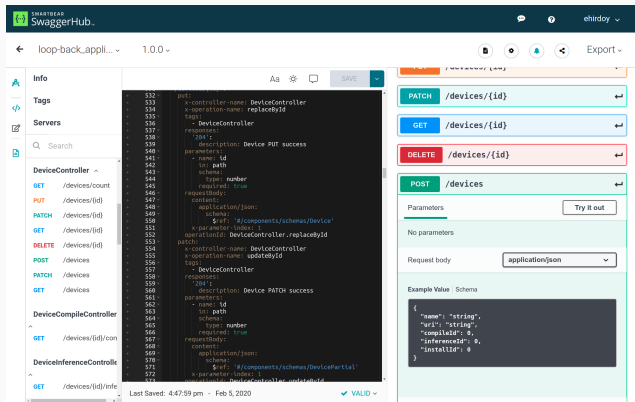
Henrik Kniberg

## Acceptance Test Driven Development

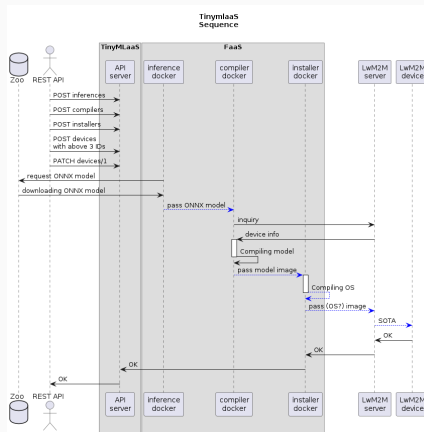


## Automate with TinyMLaaS API

## OpenAPI spec over simple IoT system



## Function as-a-Service (FaaS)



## Streamlit vs Pyscript+API server depends on how to demonstrate user story?

# TensorFlow Lite for Microcontrollers\*

## ML model Examples

- hello\_world
- magic\_wand
- memory\_footprint
- micro\_speech
- mnist\_lstm
- network\_tester
- person\_detection

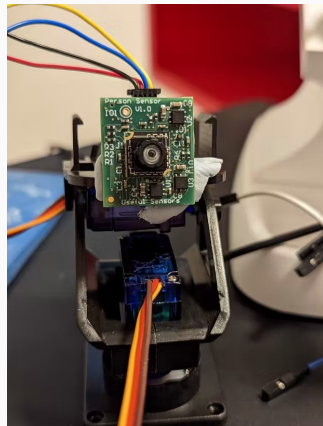
## Supported platforms

TensorFlow Lite for Microcontrollers is written in C++ 11 and requires a 32-bit platform. It with many processors based on the [Arm Cortex-M Series](#) architecture, and has been ported including [ESP32](#). The framework is available as an Arduino library. It can also generate pre environments such as Mbed. It is open source and [can be included in any C++ 11 project](#).

The following development boards are supported:

- [Arduino Nano 33 BLE Sense](#)
- [SparkFun Edge](#)
- [STM32F746 Discovery kit](#)
- [Adafruit EdgeBadge](#)
- [Adafruit TensorFlow Lite for Microcontrollers Kit](#)
- [Adafruit Circuit Playground Bluefruit](#)
- [Espressif ESP32-DevKitC](#)
- [Espressif ESP-EYE](#)
- [Wio Terminal: ATSAM51](#)
- [Himax WE-I Plus EVB Endpoint AI Development Board](#)
- [Synopsys DesignWare ARC EM Software Development Platform](#)
- [Sony Spresense](#)

## Face-Following Pan/Tilt Stand





### **Origami**

<https://Origami-TinyML.github.io/blog/about.html>