WALC 2023
Applied AI

About the Track & Syllabus

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UNIFEI - Federal University of Itajuba, Brazil
TinyML4D Academic Network Co-Chair

Marcelo Rovai is an educator and professional in the field of engineering and technology, holding the title of Professor Honoris Causa from the Federal University of Itajubá, Brazil. His educational background includes an Engineering degree from UNIFEI and an advanced specialization from the Polytechnic School of São Paulo University. Further enhancing his expertise, he earned an MBA from IBMEC (INSPER) and a Master's in Data Science from the Universidad del Desarrollo in Chile.

With a career spanning several high-profile technology companies such as AVIBRAS Airspace, ATT, NCR, and IGT, where he served as Vice President for Latin America, he brings a wealth of industry experience to his academic endeavors. He is a prolific writer on electronics-related topics and shares his knowledge through open platforms like Hackster.io.

In addition to his professional pursuits, he is dedicated to educational outreach, serving as a volunteer professor at UNIFEI and engaging with the TinyML4D group as a Co-Chair, promoting TinyML education in developing countries. His work underscores a commitment to leveraging technology for societal advancement.

What will We learn?

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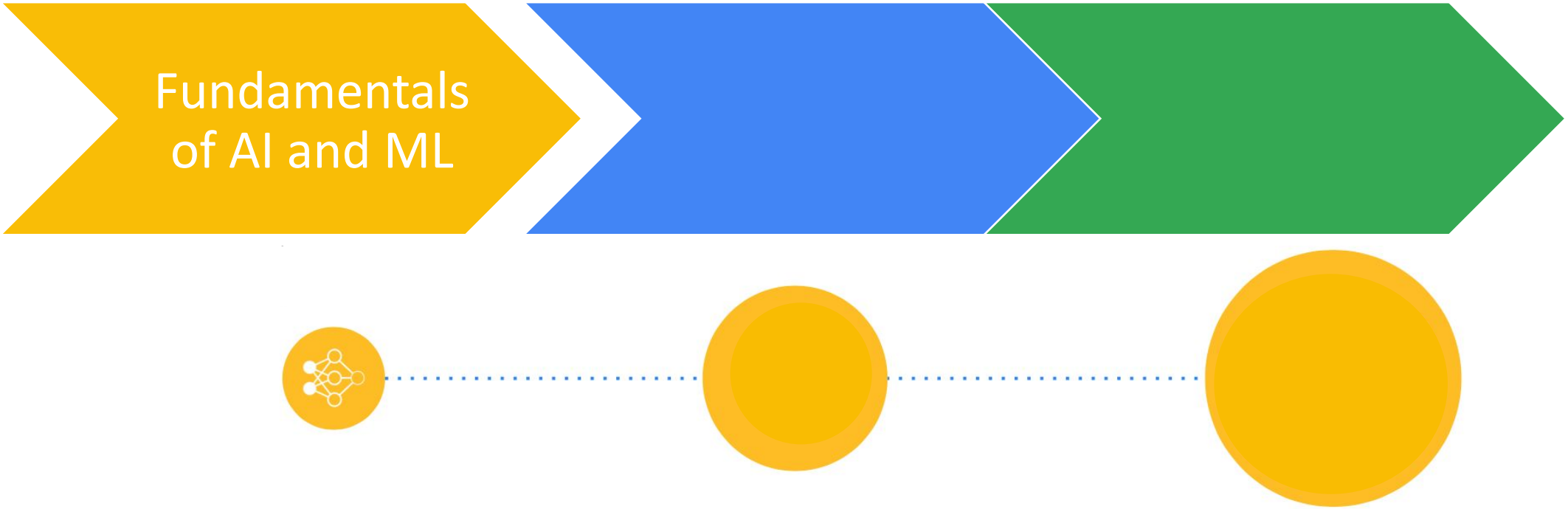
Part 1 (2 days)

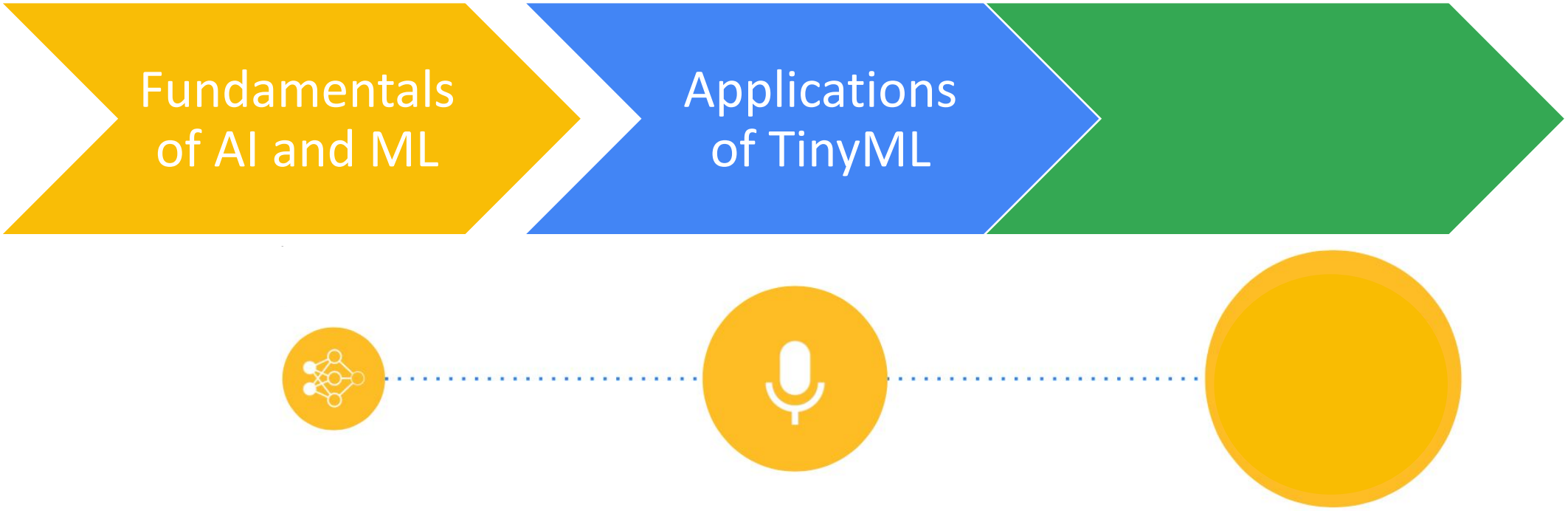


Part 1 is all about talking about what is the language of **Artificial Intelligence (AI)** and **Machine Learning (ML)**

What will We learn?

Part 1

Part 2

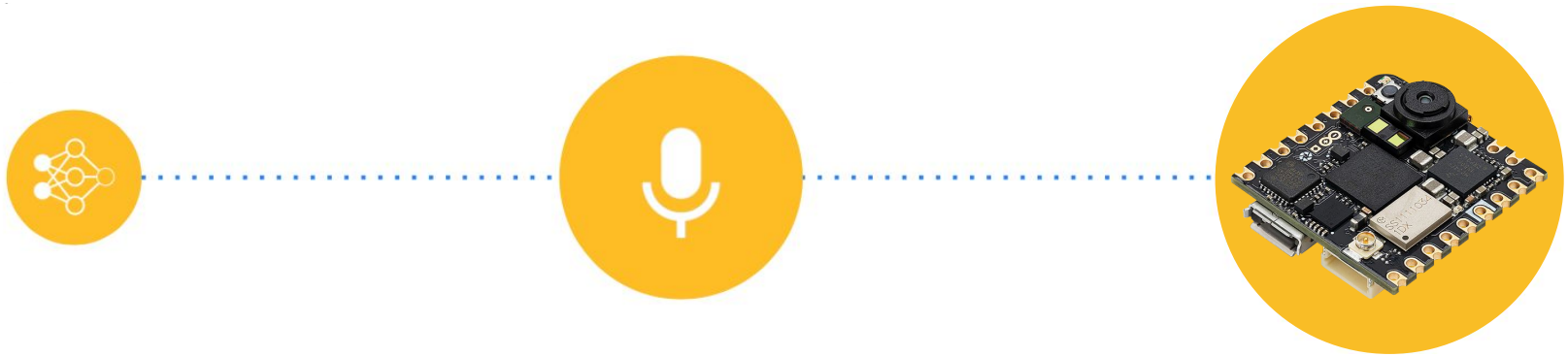


In Part 2, we will get a sneak peek into the variety of different **TinyML (Embedded Machine Learning)** applications, as keyword spotting (“Alexa”), gesture recognition, understand how to leverage the sensors, and so forth.

What will We learn?

Part 1 (2 days)

Part 2 (3 days)

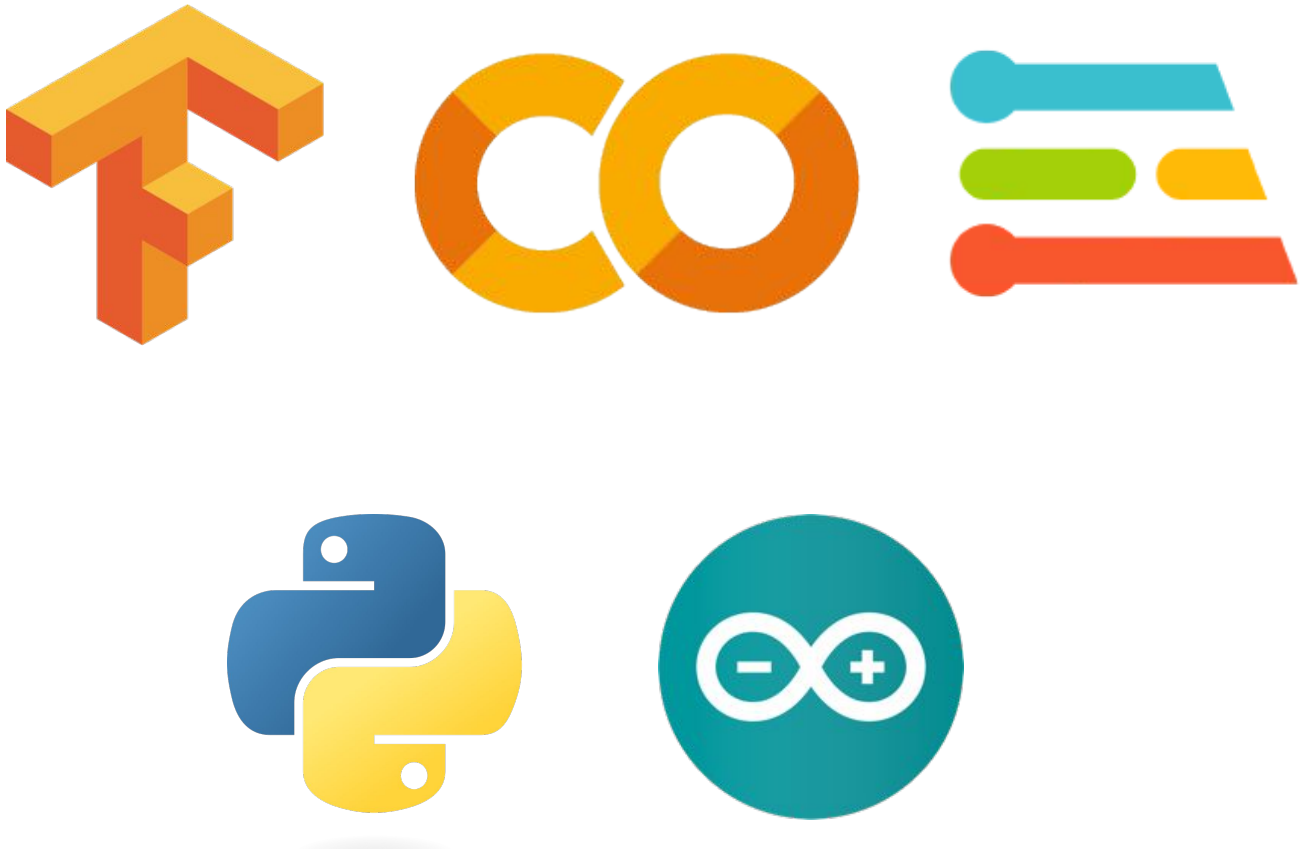


In Part 2, we will **also** learn how to deploy models on real devices such **as smartphones and microcontrollers**. Along the way, we will explore the challenges unique to and amplified by TinyML (e.g., preprocessing, post-processing, and dealing with resource constraints).

How are we going to get there?

Lectures and Hands-on Learning

- **Lectures**
  - Jesus Lopez (AI)
  - Diego Mendez (ML/DL)
  - Marcelo Rovai (TinyML)
- **Software**
  - Python, C/C++
  - Machine Learning (TensorFlow)
  - Programming environment
    - Google Colab
    - Edge Impulse Studio
    - Arduino IDE
- **Hardware**
  - SmartPhone
  - Arduino Nicla Vision



TinyML4D/WALC_2023 at ma

github.com/Mjrovai/TinyML4D/tree/main/WALC_2023

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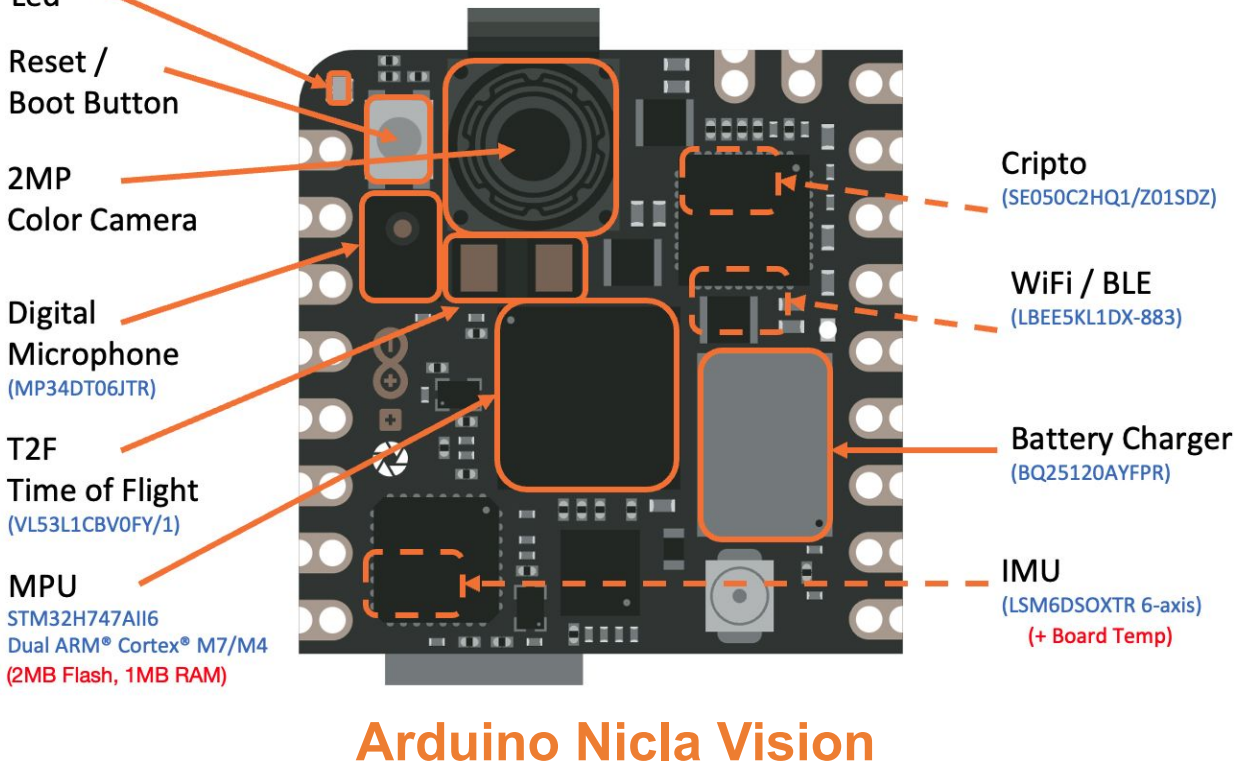
WALC_2023-Applied_AI

WALC 2023 - Guayaquil, Ecuador - Track 2 – Inteligencia Artificial Aplicada

Introduction

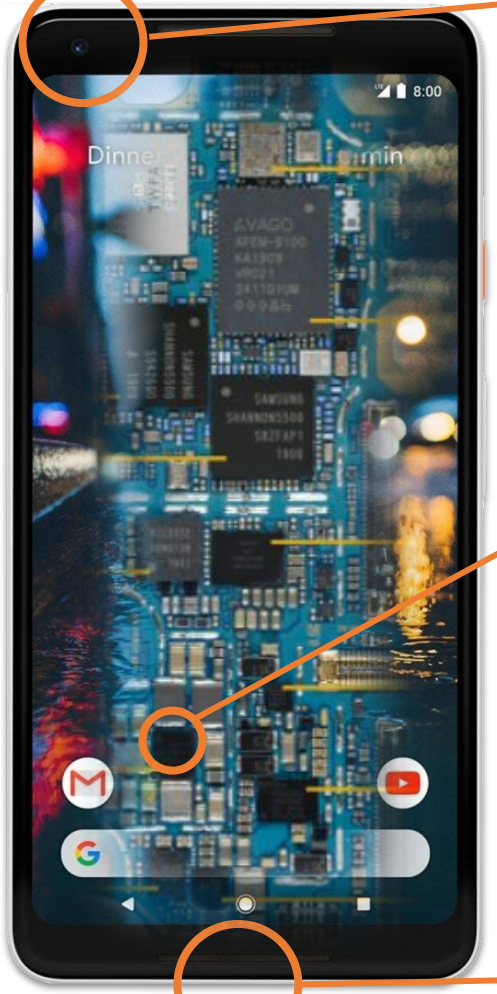
Microcontrollers (MCUs) are cheap electronic components, usually with just a few kilobytes of RAM, and designed to consume small amounts of power. Today, MCUs can be found embedded in all residential, medical, automotive, and industrial devices. Over 40 billion microcontrollers are estimated to be marketed annually, and hundreds of billions are currently in service. But, curiously, these devices receive little attention because, many times, they are used just to replace functionalities that older electromechanical systems face in cars, washing machines, or remote controls.

Hardware



Arduino Nicla Vision

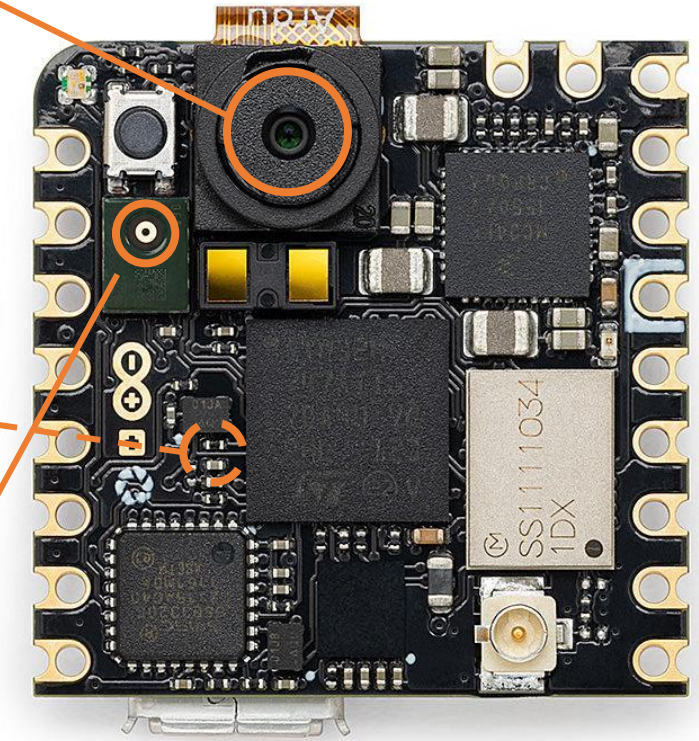
Edge Device & Sensors



Camera

Accelerometer

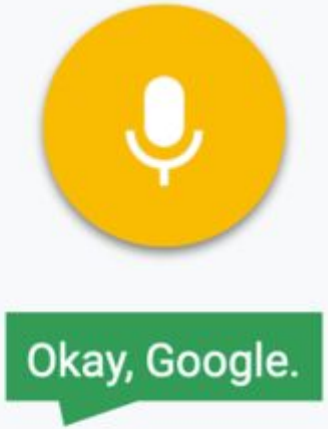
Gyroscope



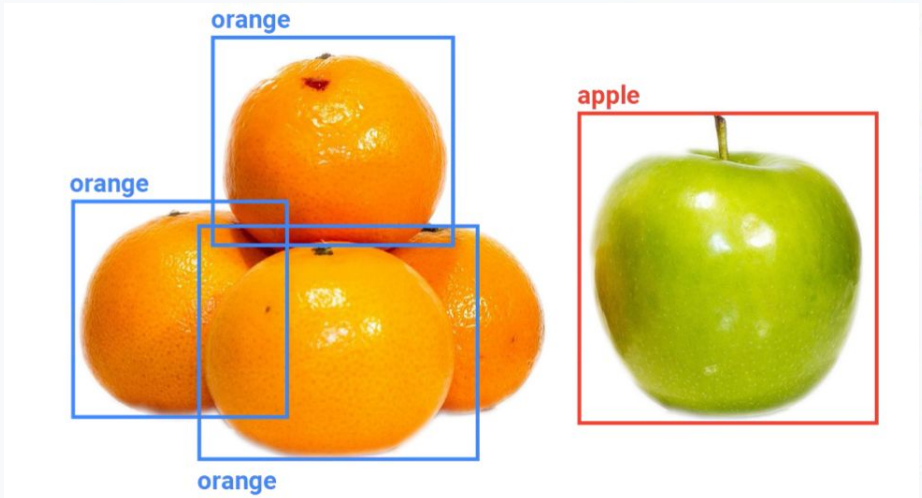
Microphone

Hands-on Activities

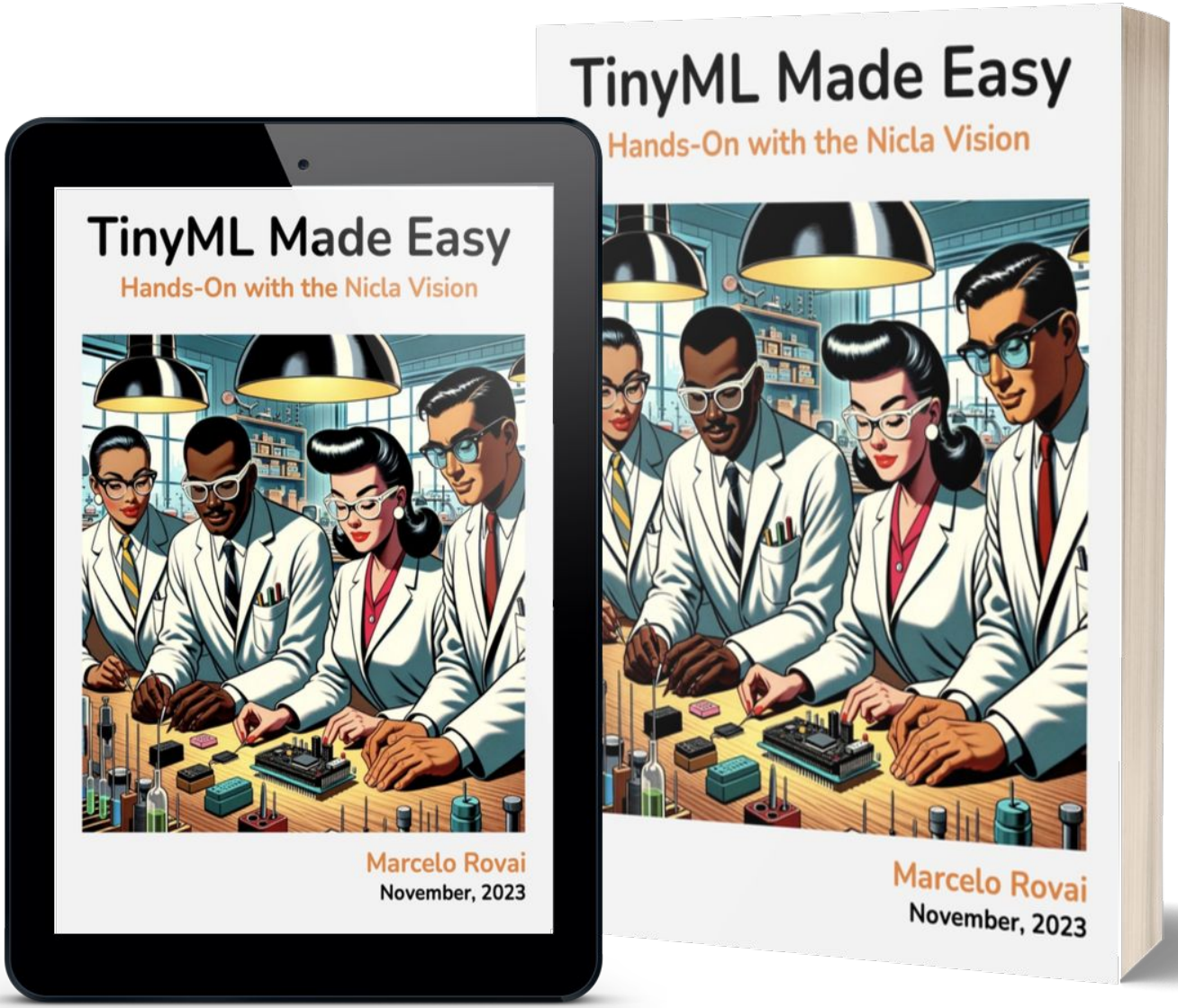
Speech



Vision



IMU


TinyML Made Easy
Hands-On with the Nicla Vision
Marcelo Rovai
November, 2023
TinyML Made Easy
Hands-On with the Nicla Vision
Marcelo Rovai
November, 2023

Tentative Agenda

- Monday
  - Artificial Intelligence Overview – J Lopez
  - About the Track & Syllabus – M Rovai
  - Tools Setup - M Rovai
- Tuesday
  - Introduction to Machine Learning – D Mendez
  - Introduction to Neural Networks – D Mendez
    - DNN – Regression – D Mendez
    - DNN – Classification – D Mendez
    - ML Metrics – D Mendez
  - Introduction to Convolutions– M Rovai
  - Image Classification using Convolutions (CNN) – M Rovai
  - Preventing Overfitting & DL Wrap-Up – M Rovai

Tentative Agenda

- Wednesday
  - Edge Impulse Studio – M Rovai
  - Embedded ML (TinyML) Intro & Applications – M Rovai
  - Computer Vision (CV) Applications – M Rovai
    - Image Classification
    - Object Detection)

- Thursday
  - Sound Classification – M Rovai
  - Motion Classification – M Rovai
  - Anomaly Detection – M Rovai

- Friday
  - AI Ethics – J Lopez
  - Sensor Fusion and Multiple Models – M Rovai
  - The future of the Edge AI – M Rovai
  - Applied AI Track Wrap-up – M Rovai

Thanks


WALC 2023
Guayaquil, Ecuador
13 al 17 de Noviembre
26°
Taller sobre
Tecnologías de Redes Internet
para América Latina y el Caribe
Fundación
EsLaRed
Organización General