

Track7

Inteligencia Artificial Aplicada



14. Applied AI Track Wrap-up

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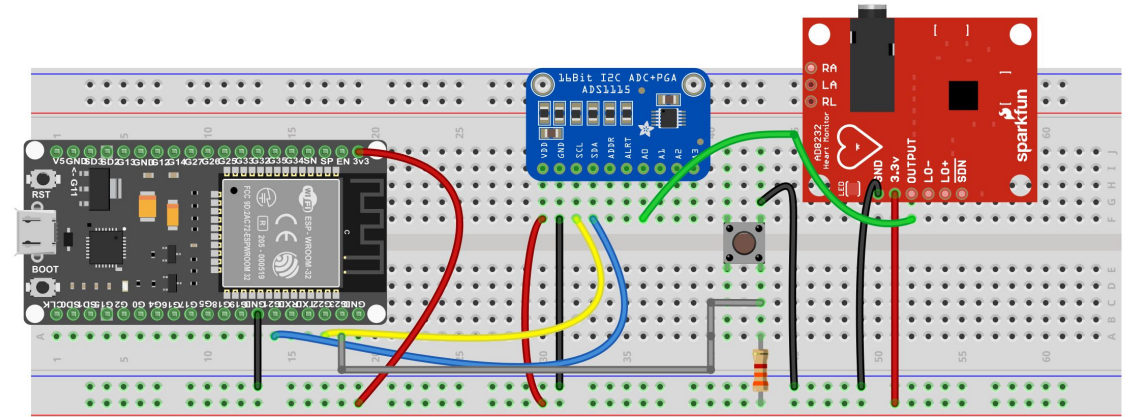
UNIFEI - Universidade Federal de Itajubá, Brazil



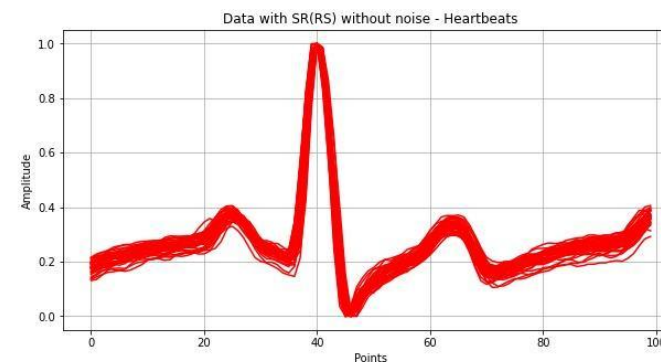
Other Sensors / MCUs / Models

Examples

AD8232 - Single Lead Heart Rate Monitor



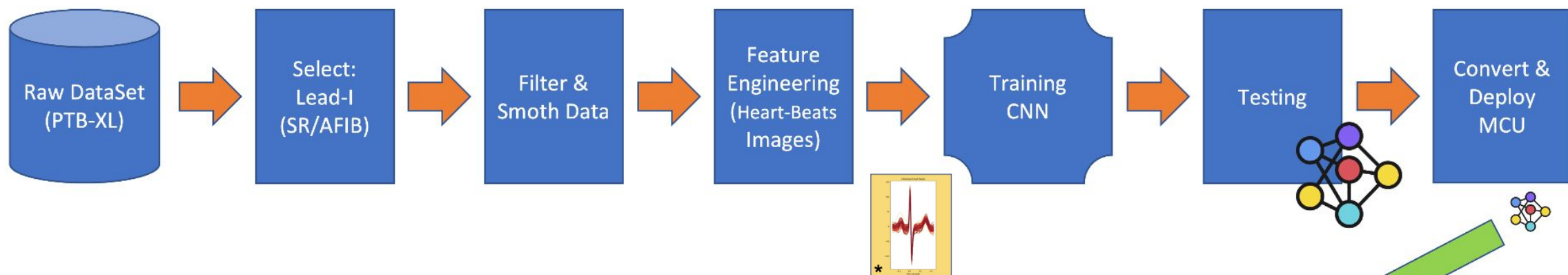
fritzing



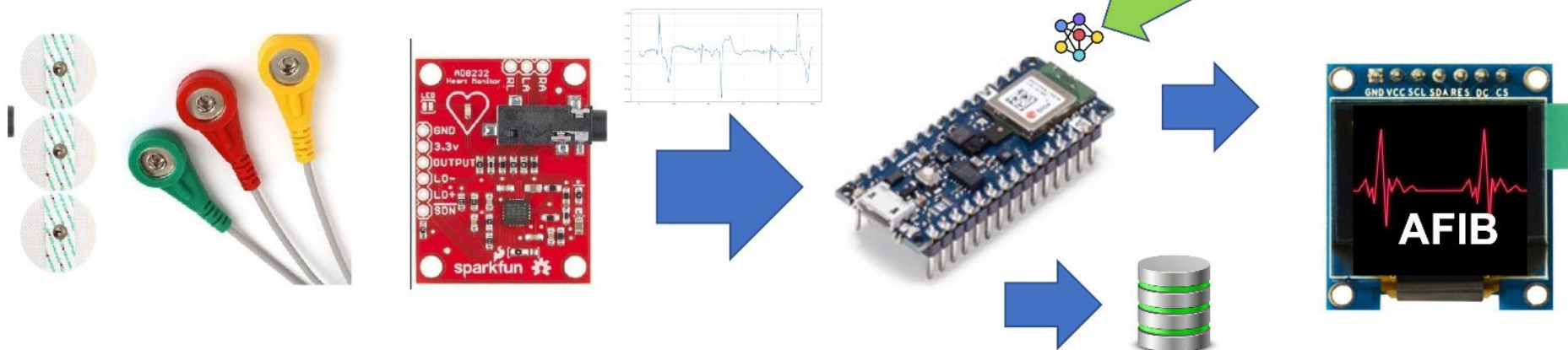
Guilherme Silva
Engenheiro - UNIFEI

[Atrial Fibrillation Detection on ECG using TinyML](#)
[Silva et al. UNIFEI 2021](#)

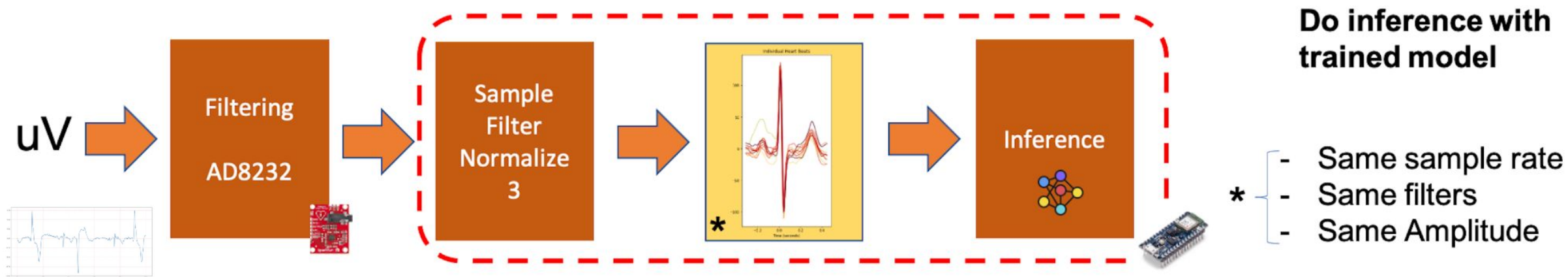
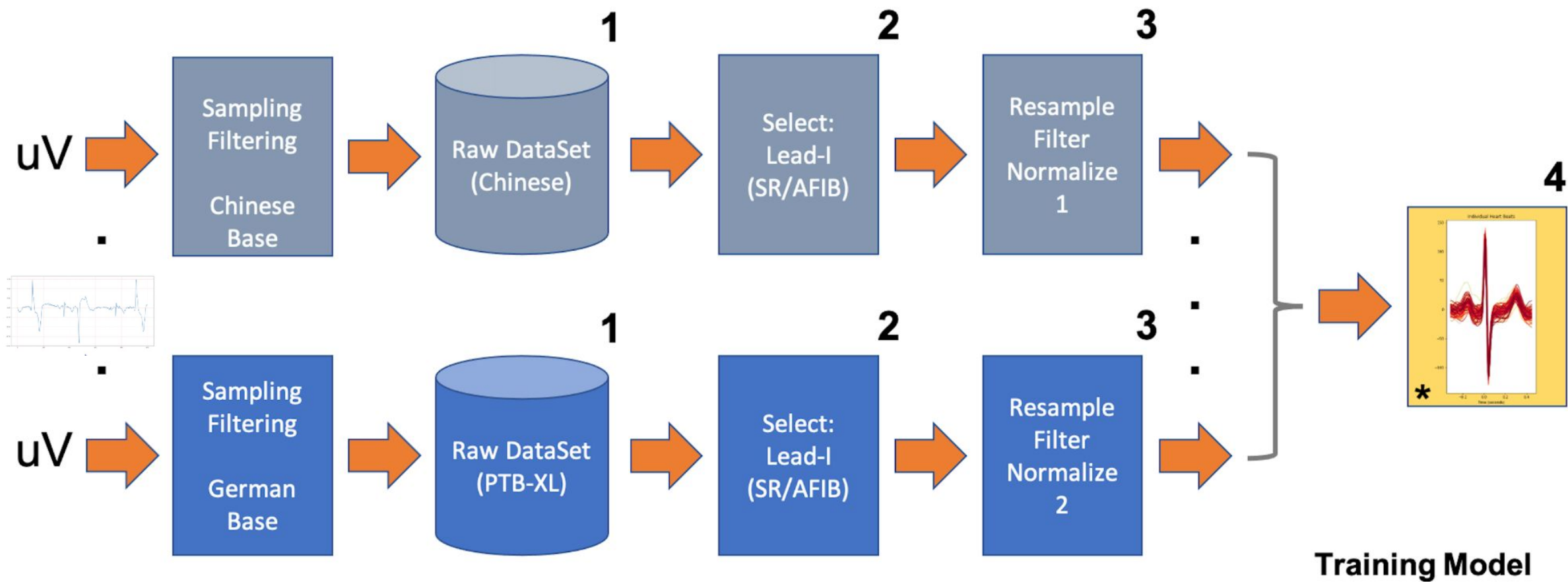
AD8232 - Single Lead Heart Rate Monitor



Training Model



Do inference with trained Model



Other TinyML / MCUs Project Examples

Vision

- Image Classification with **ESP32-CAM**
- Image Classification with **Portenta H7**
- Object Detection with **Portenta H7**

[\[Doc\]](#)

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Sound

- Listening Temperature with **Nano 33**
- COPD Detection with **Nano 33**
- Sound Classification with **XIAO BLE Sense**

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Vibration

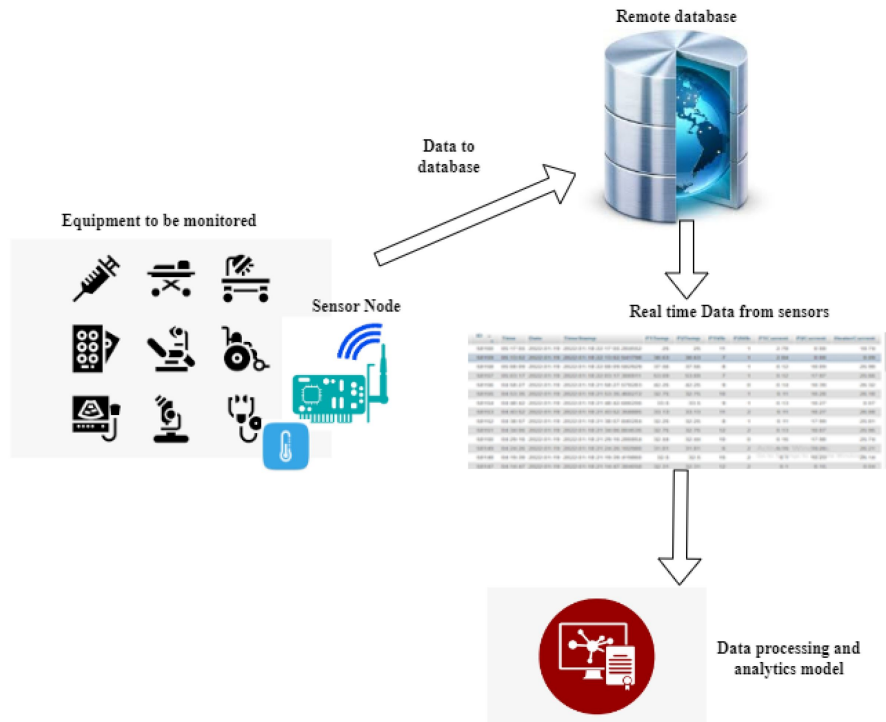
- Motion Recognition with **RPi Pico**
- Gesture Recognition with **Wio Terminal**
- Anomaly Detection with **XIAO BLE Sense**

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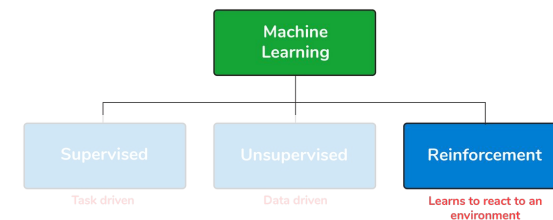
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Regression on TinyML



Reinforcement on TinyML



Deep Reinforcement Learning for Autonomous Source Seeking on a Nano Drone

Bardienus P. Duisterhof^{1,3} Srivatsan Krishnan¹ Jonathan J. Cruz¹ Colby R. Banbury¹ William Fu¹

Aleksandra Faust² Guido C. H. E. de Croon³ Vijay Janapa Reddi^{1,4}

¹Harvard University, ²Robotics at Google, ³Delft University of Technology, ⁴The University of Texas at Austin



<https://arxiv.org/abs/1909.11236>

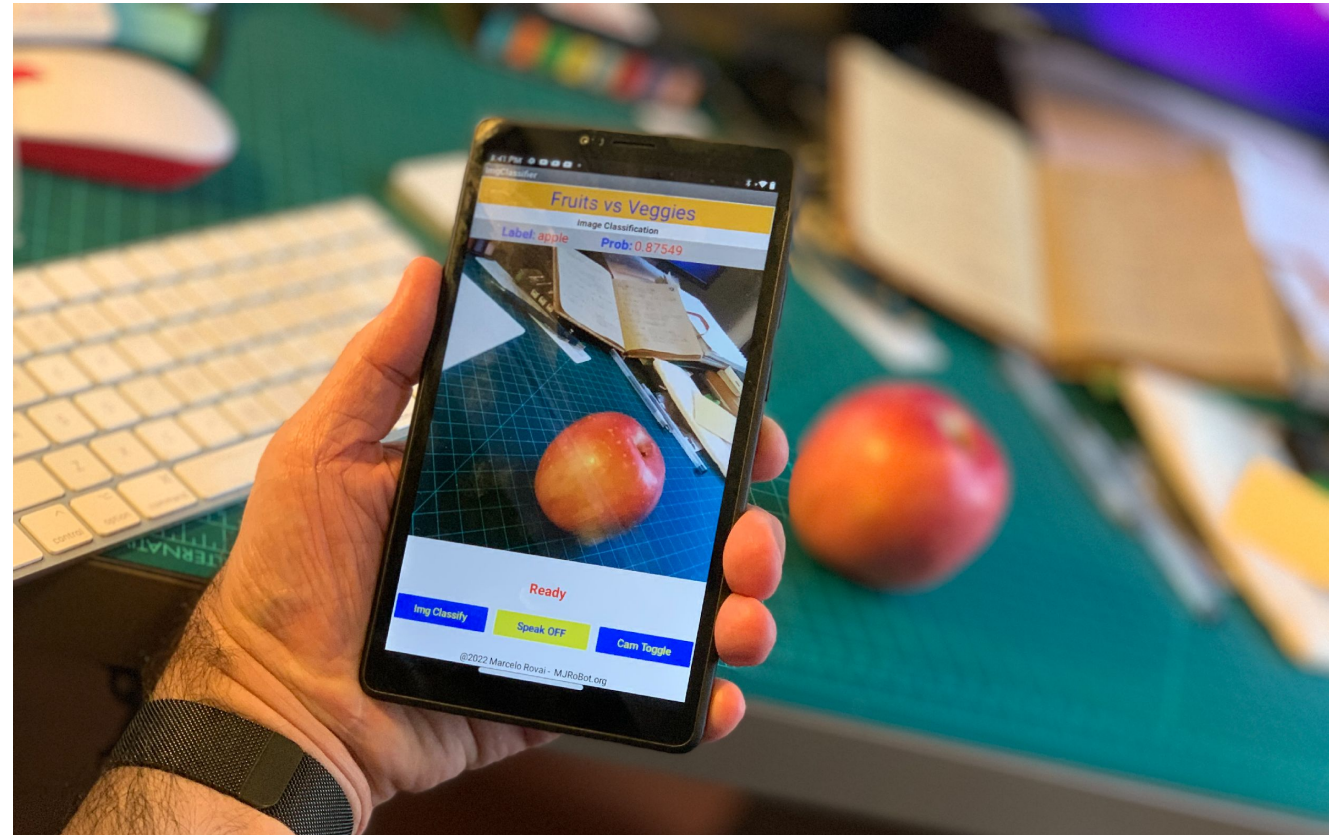
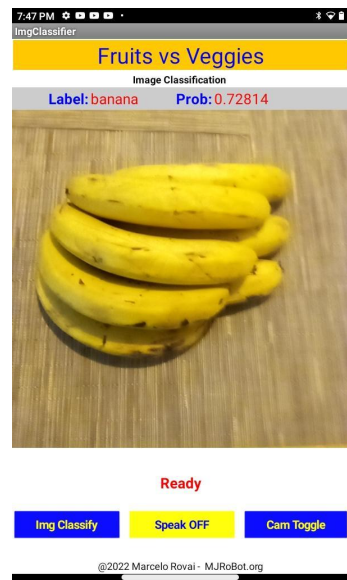
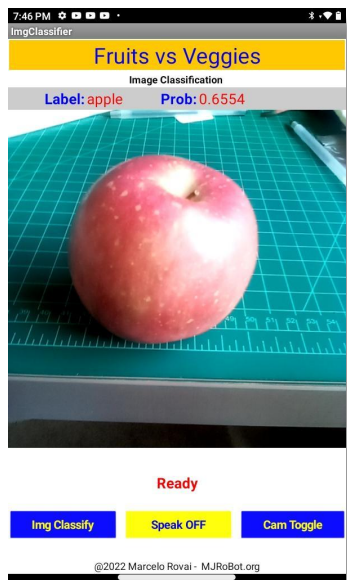
<https://youtu.be/wmVKbX7MOnU>

Exploring AI at the edge (Computer Vision)



[Exploring AI at the Edge!](#)

Classifying Images using Smartphones



<https://www.hackster.io/mjrobot/app-inventor-edgemi-image-classification-fruit-vs-veggies-b671da>

Detecting Diseases in the Bean plants



AIR Lab Makerere University
UGANDA



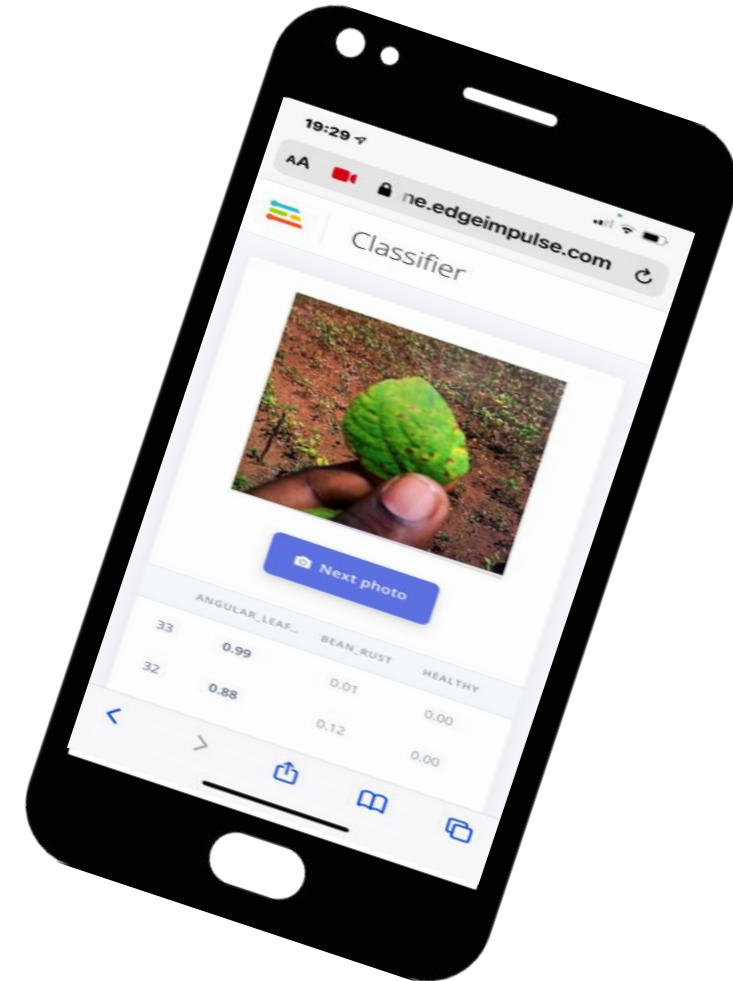
Angular Leaf Spot



Bean Rust



Healthy

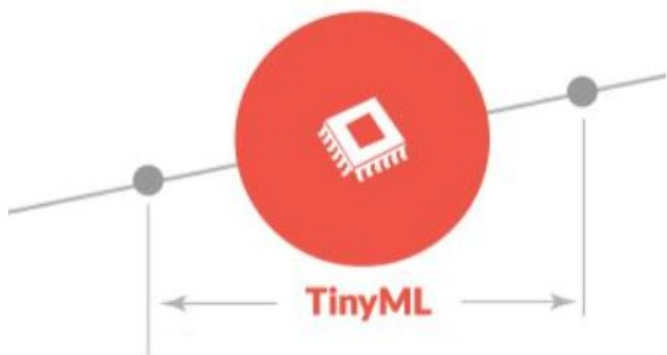


Dataset: <https://github.com/AI-Lab-Makerere/ibean/>

[Learn the steps to build an app that detects crop diseases](#)

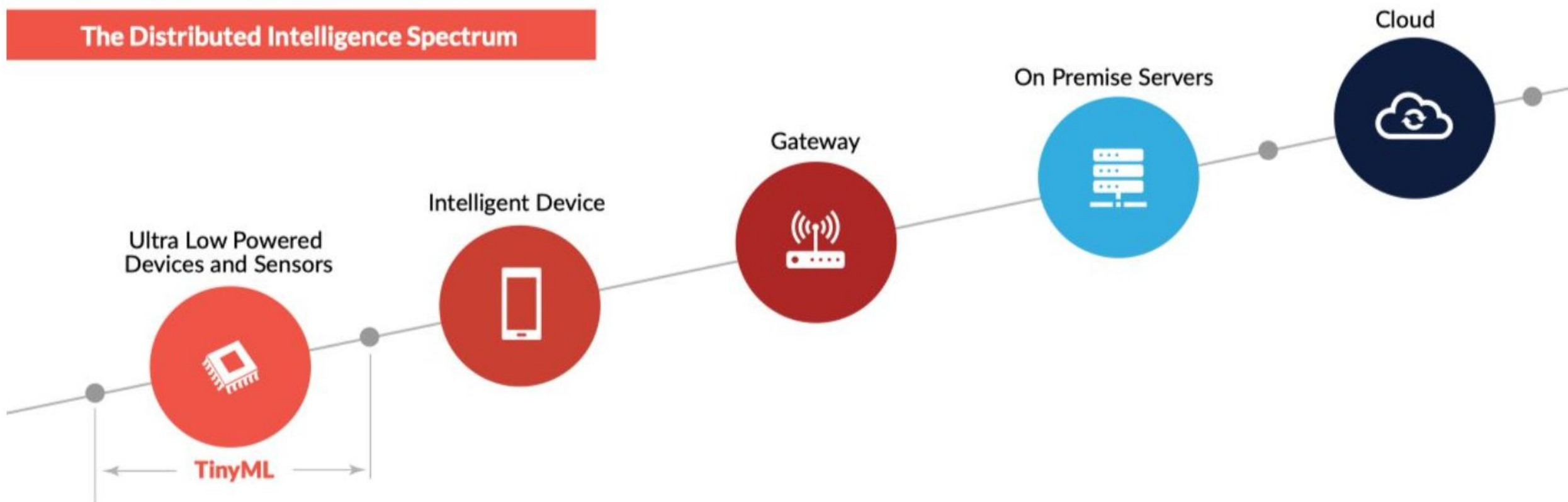
The Future of the TinyML (Embedded ML)

Ultra Low Powered
Devices and Sensors



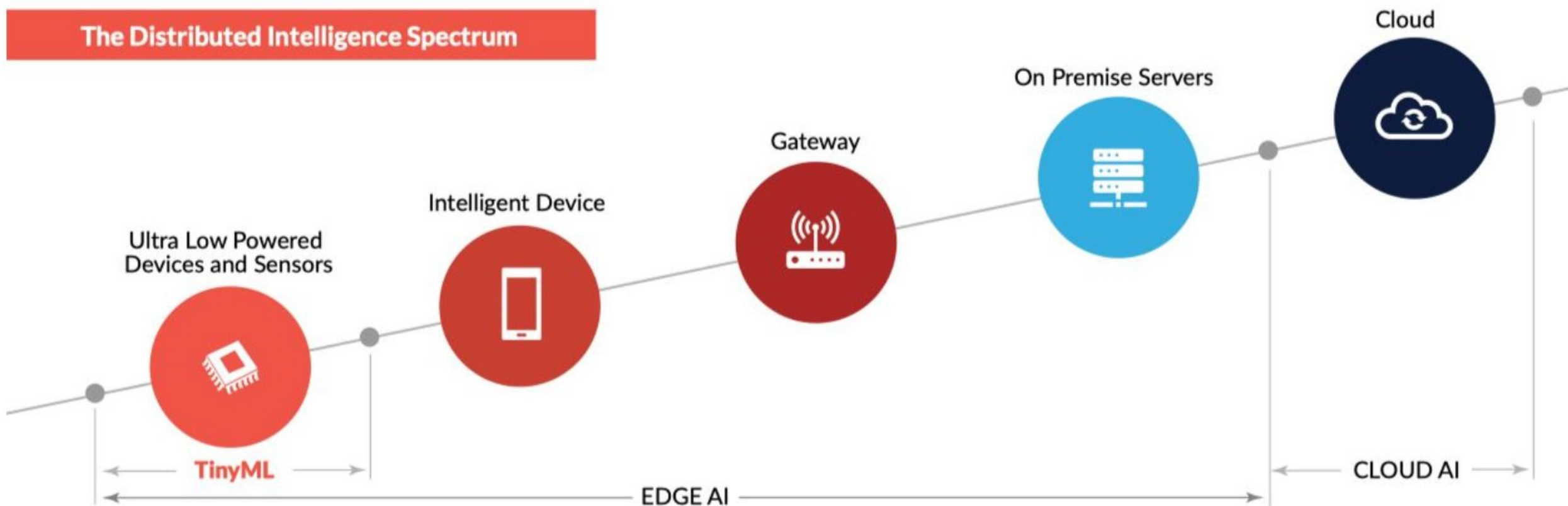
Source: ABI Research: TinyML

The Distributed Intelligence Spectrum



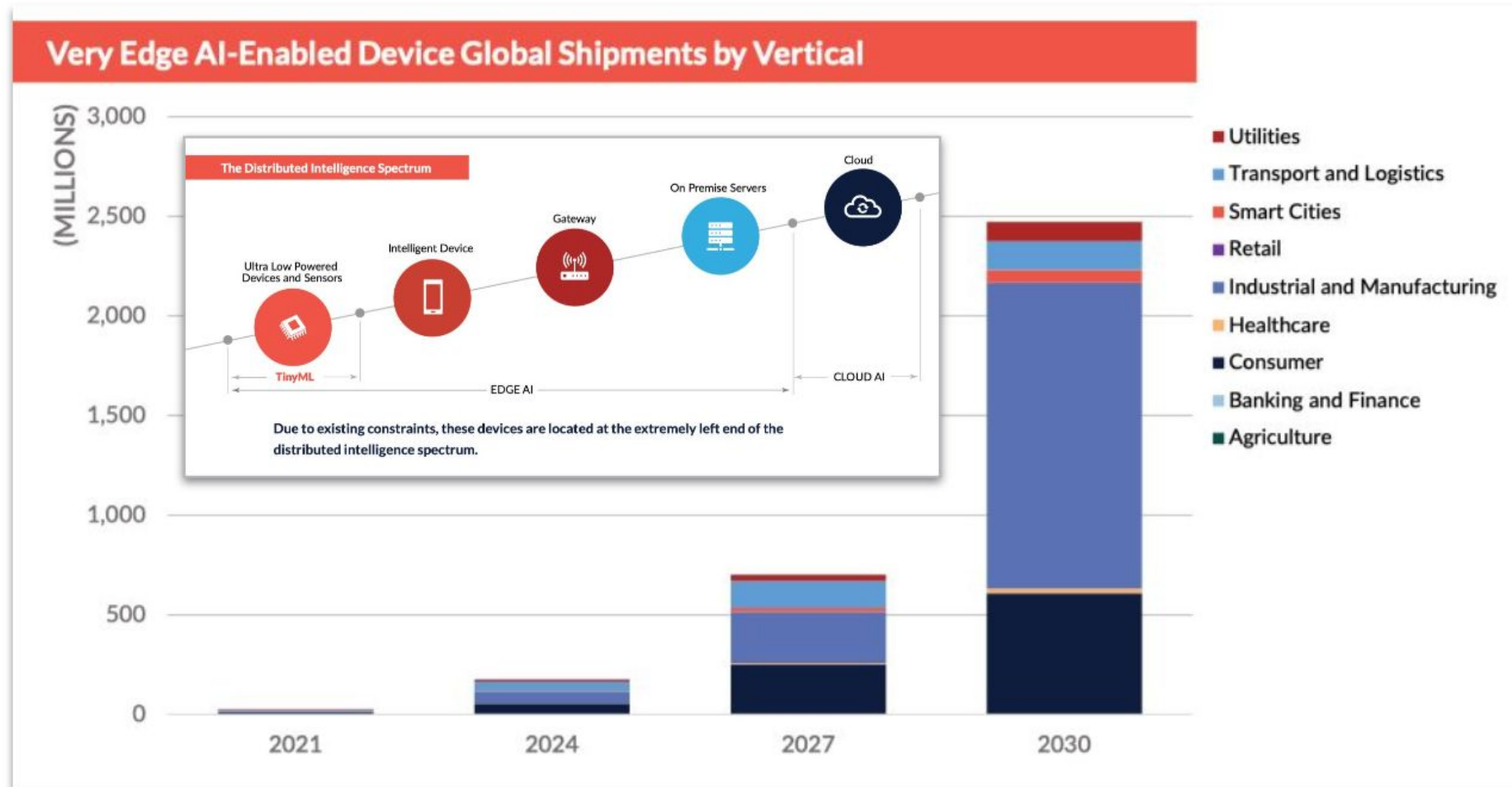
Source: ABI Research: TinyML

The Distributed Intelligence Spectrum



Source: ABI Research: TinyML

Massive Potential for Impact



Source: ABI Research: TinyML

Conclusion



The Future of ML is Tiny and Bright

*Vijay Janapa Reddi, Ph. D. | Associate Professor |
John A. Paulson School of Engineering and Applied Sciences | Harvard University |*



Responsible AI

Suzan Kennedy, Ph.D.



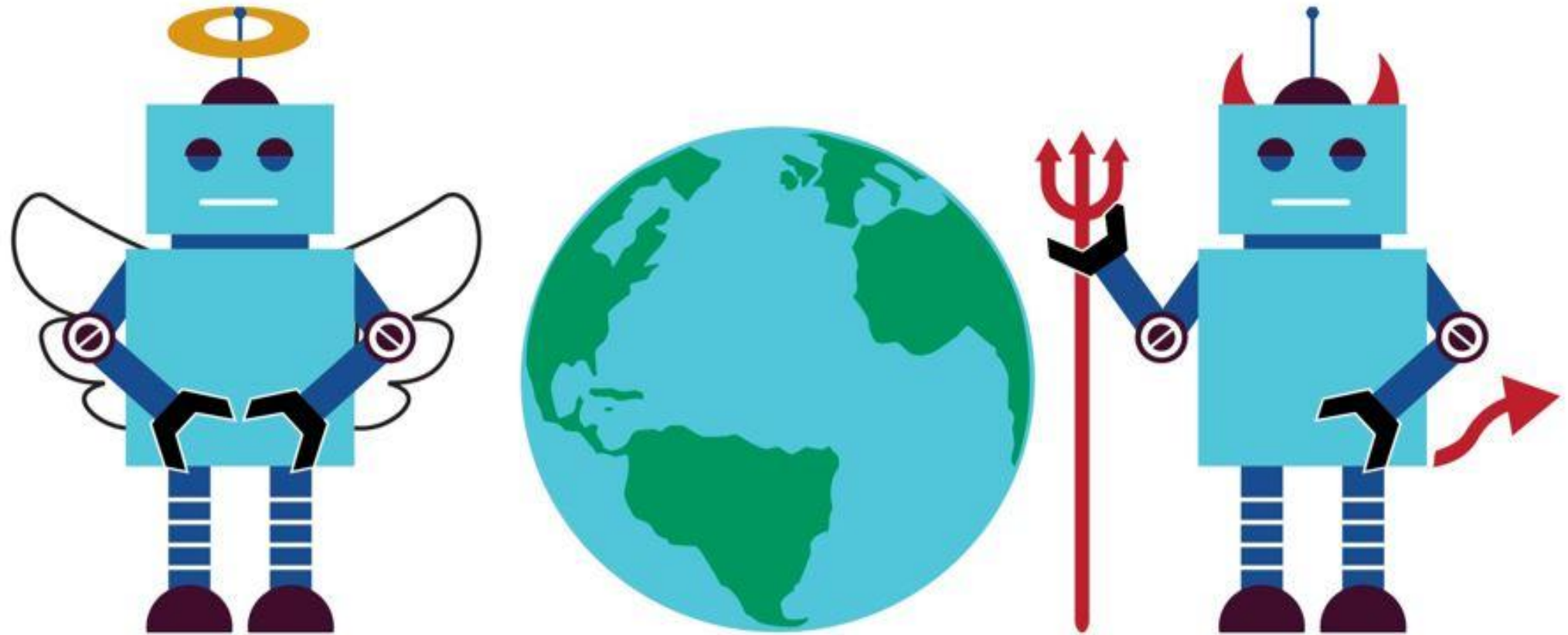
[SciTinyML Seminar - Slides](#)



[SciTinyML Seminar - Video](#)



Responsible AI



To learn more about Edge AI

- UNIFEI - IESTI01 TinyML - Machine Learning for Embedding Devices
- Professional Certificate in Tiny Machine Learning (TinyML) – edX/Harvard
- Introduction to Embedded Machine Learning - Coursera/Edge Impulse
- Computer Vision with Embedded Machine Learning - Coursera/Edge Impulse
- "Deep Learning with Python" book by François Chollet
- "TinyML" book by Pete Warden, Daniel Situnayake
- "TinyML Cookbook" by Gian Marco Iodice
- "AI at the Edge" book by Daniel Situnayake, Jenny Plunkett

Thanks



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