tinyML Vision Challenge Sponsors

Executive Sponsors

arm

tinyML Strategic Partner

EDGE IMPULSE

tinyML Strategic Partner

Himax

intel

Qualcomm

tinyML Strategic Partner

Platinum Sponsors

LATTICE SEMICONDUCTOR

PixArt Imaging Inc.

SynSense

Additional Sponsorships available – contact sponsorships@tinyML.org for info

Arm: The Software and Hardware Foundation for tinyML

Connect to high-level frameworks **1**

Supported by end-to-end tooling **2**

Connect to Runtime **3**

Profiling and debugging tooling such as Arm Keil MDK

1 Application

2 Optimized models for embedded

3 Runtime (e.g. TensorFlow Lite Micro)

Optimized low-level NN libraries (i.e. CMSIS-NN)

RTOS such as Mbed OS

Arm Cortex-M CPUs and microNPUs

AI Ecosystem Partners
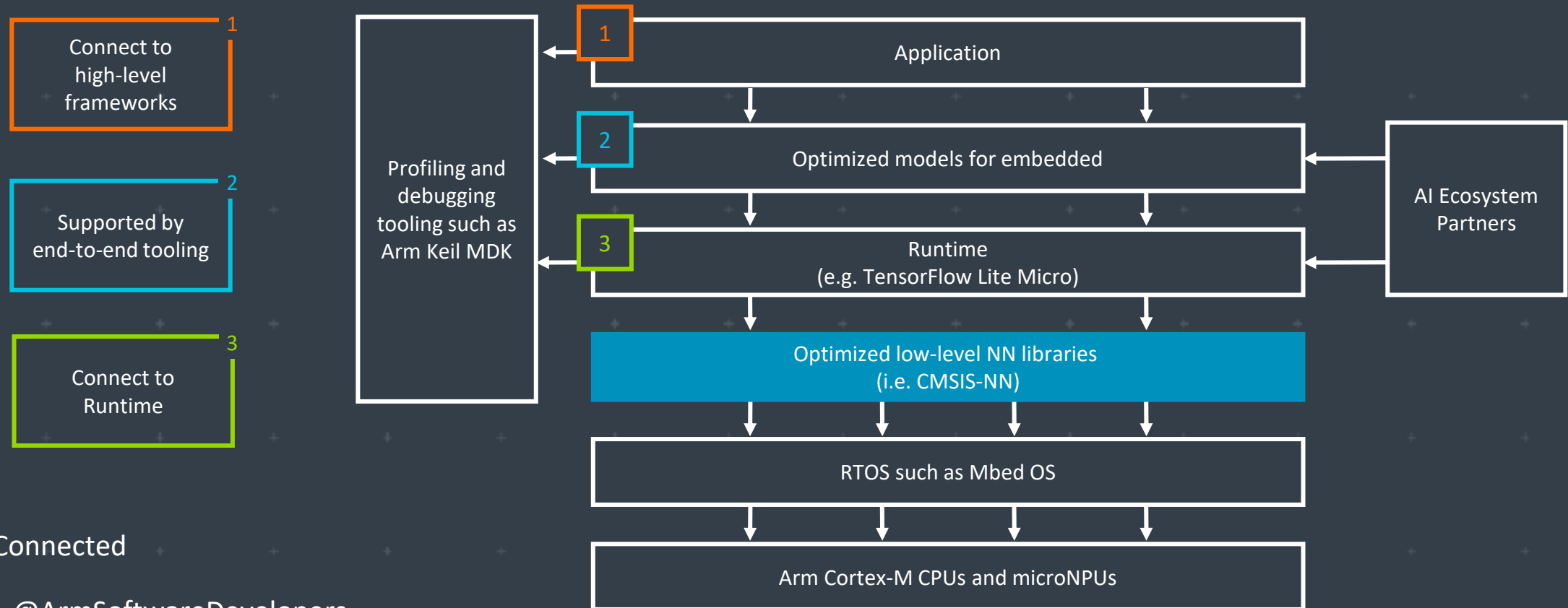
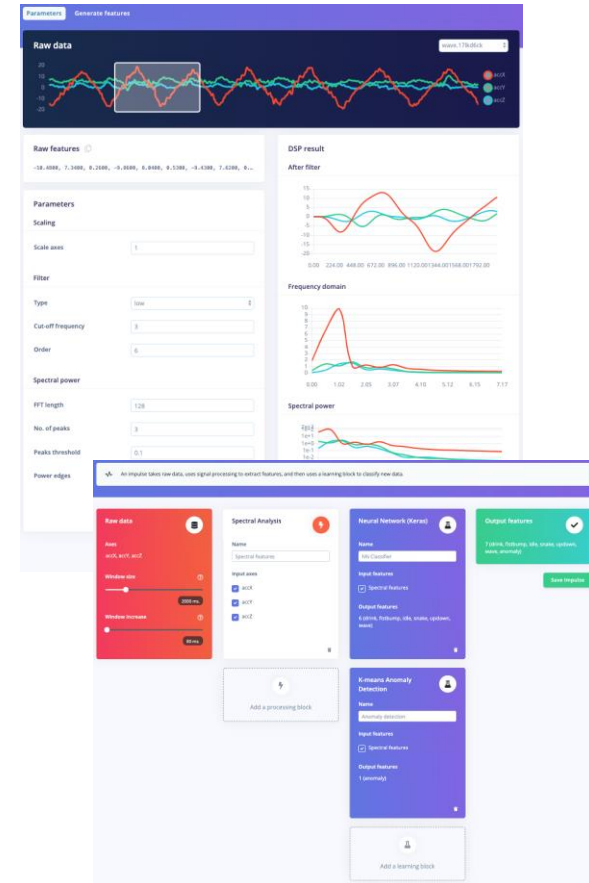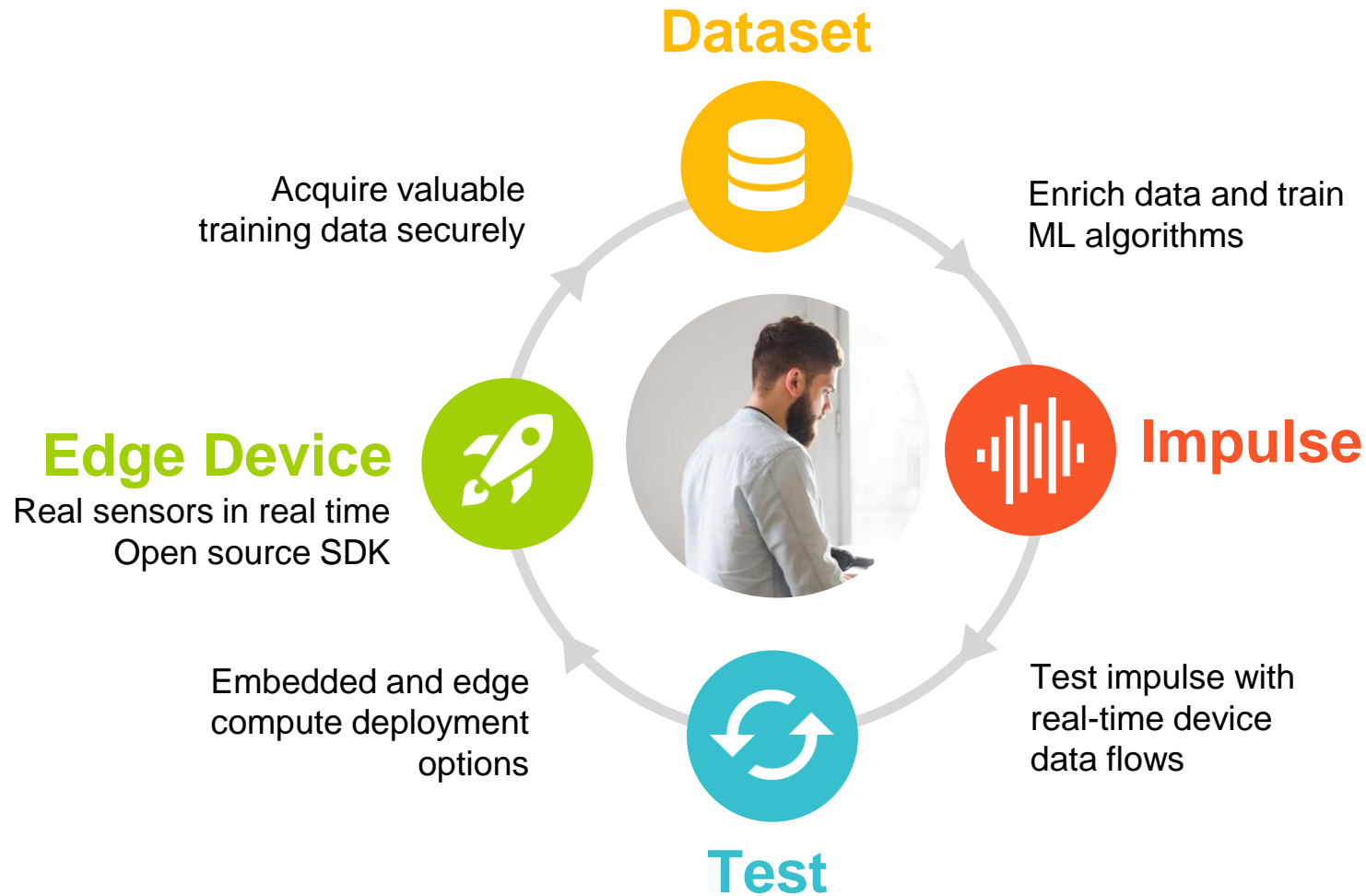## Stay Connected

@ArmSoftwareDevelopers

@ArmSoftwareDev

Resources: developer.arm.com/solutions/machine-learning-on-arm

arm

TinyML for all developers

C++ library

Arduino library

WebAssembly

Dataset

Acquire valuable training data securely

Enrich data and train ML algorithms

Edge Device
Real sensors in real time
Open source SDK

Impulse

Embedded and edge compute deployment options

Test impulse with real-time device data flows

Test

www.edgeimpulse.com

Always-On Ultra Low Power Edge AI
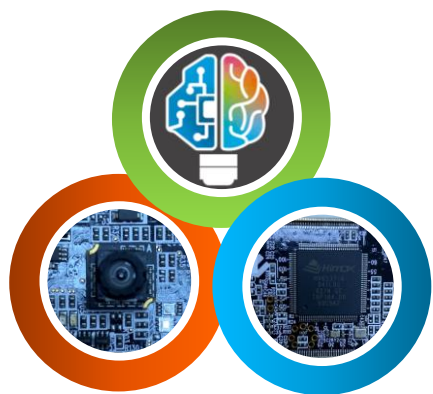
Himax Technologies, Inc. provides semiconductor solutions specialized in computer vision. Himax's WE-I Plus, an AI accelerator-embedded ASIC platform for ultra-low power applications, is designed to deploy CNN-based machine learning (ML) models on battery-powered AIoT devices. These end-point AI platforms can be always watching, always sensing, and always listening with on-device event recognition.

https://www.himax.com.tw/products/intelligent-sensing/

INTEL® DEVCLOUD FOR THE EDGE

YOUR LAPTOP
HOST
DEVICE

Inference Engine
BLOB
Input

DEPTHAI

LUX-ESP32
TARGET
DEVICE

Develop AI Applications with Intel Pre-Trained Models
- OpenVINO™ toolkit already installed
- Learn with Jupyter Notebooks
- Upload models, datasets, code
- Develop inference engine input blob
- Download to your host device

- 1280x800 60FPS Depth
- 12MP 30FPS Color Camera
- 4 TOPS AI + CV Processing

Operating Modes:

Standalone   **USB**
Power off USB Battery OR USB-C to SBC

Interfaces

- Bluetooth/BLE
- Wi-Fi
- Direct IO drive (GPIO, SPI, etc.)
- USB3.0

GitHub
INTEL OPEN MODEL ZOO

100+ Pre-Trained Models
- Object Detection
- Object Recognition
- Semantic & Instance Segmentation
- Human Pose Estimation
- Action Recognition
- Text Detection & Recognition
- More…

intel.

LUXonis

Qualcomm AI research

Advancing AI research to make efficient AI ubiquitous

Power efficiency

Model design, compression, quantization, algorithms, efficient hardware, software tool

Personalization

Continuous learning, contextual, always-on, privacy-preserved, distributed learning

Efficient learning

Robust learning through minimal data, unsupervised learning, on-device learning

A platform to scale AI across the industry

Perception
Object detection, speech recognition, contextual fusion

Reasoning
Scene understanding, language understanding, behavior prediction

Action
Reinforcement learning for decision making

IoT/IIoT

Edge cloud

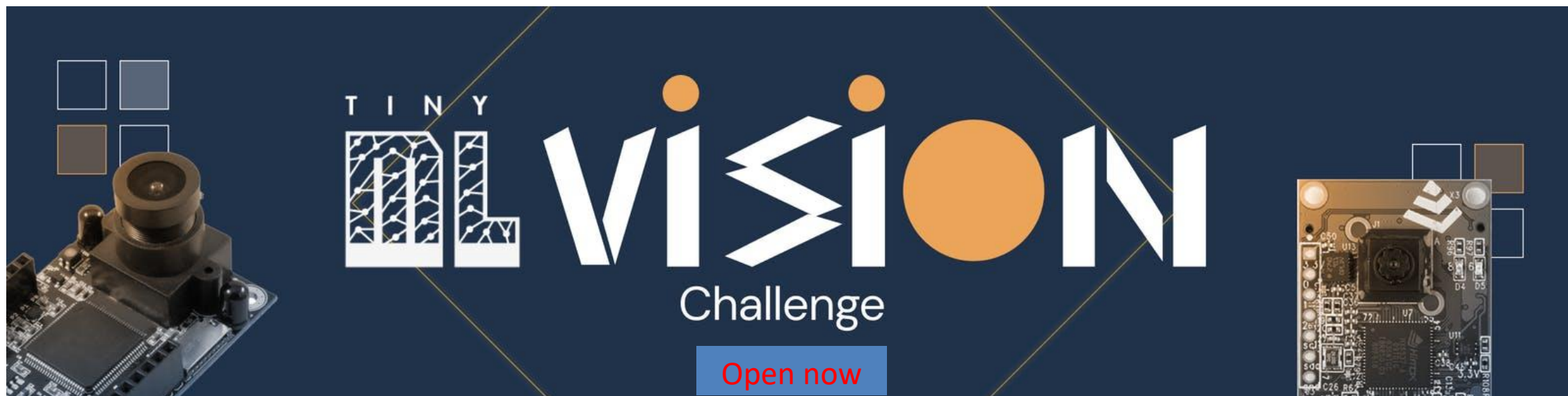Automotive

Cloud

Mobile

collaboration with hackster.io AN AVNET COMMUNITY

Focus on:
(i) developing new use cases/apps for tinyML vision; and (ii) promoting tinyML tech & companies in the developer community

Submissions accepted until August 20th, 2021
Winners announced on September 1, 2021 ($6k value)

www.hackster.io/contests/tinyml-vision

Tutorial: Add Sight to Your Sensors
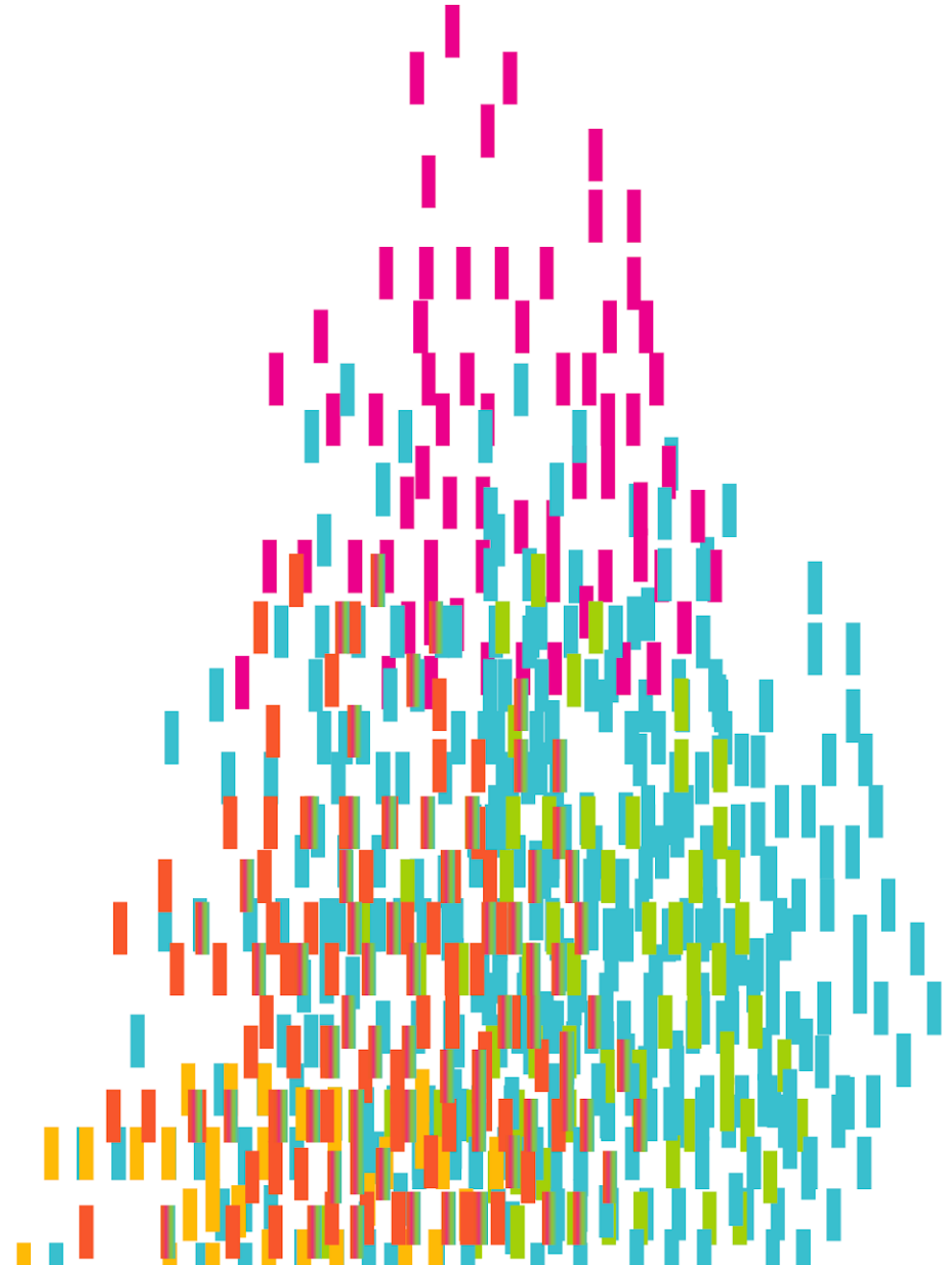## Computer Vision with Edge Impulse & Himax

Presenter: David Schwarz
As a User Success Engineer at Edge Impulse, David helps customers build and deploy products powered by machine learning.

EDGE IMPULSE

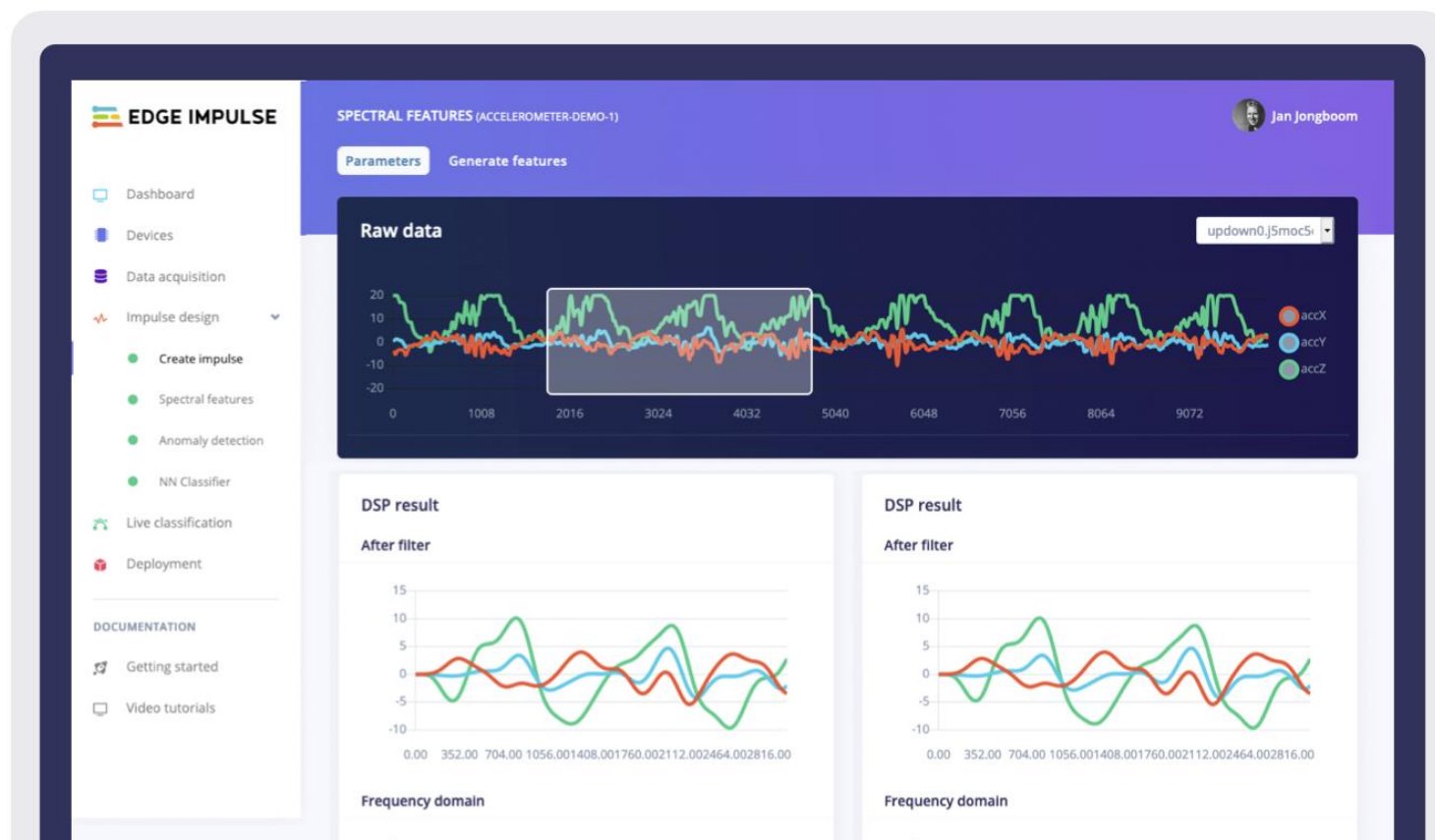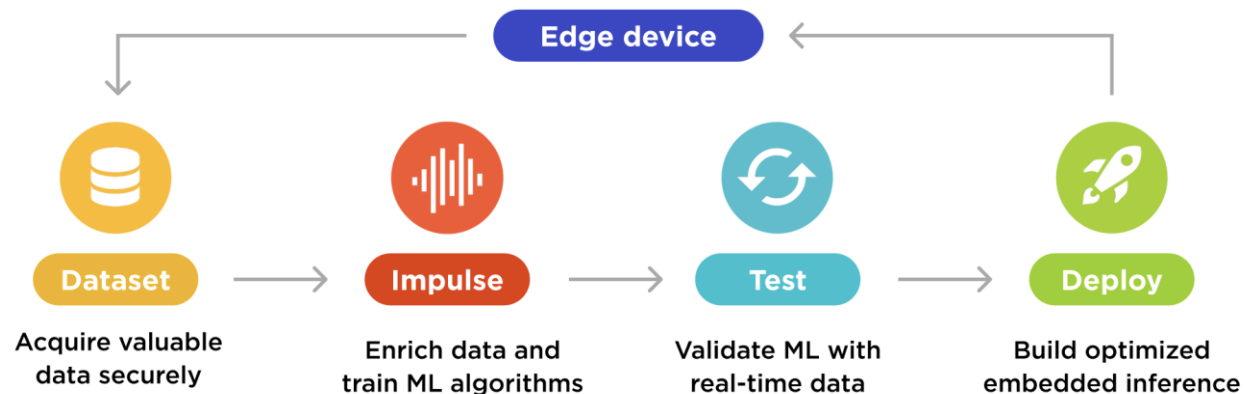# Making things smarter

The leading embedded ML platform

Learn more at:

http://edgeimpulse.com

EDGE IMPULSE

A world-class team of industry leaders, delivering the ultimate developer experience for embedded machine learning solutions, at scale.
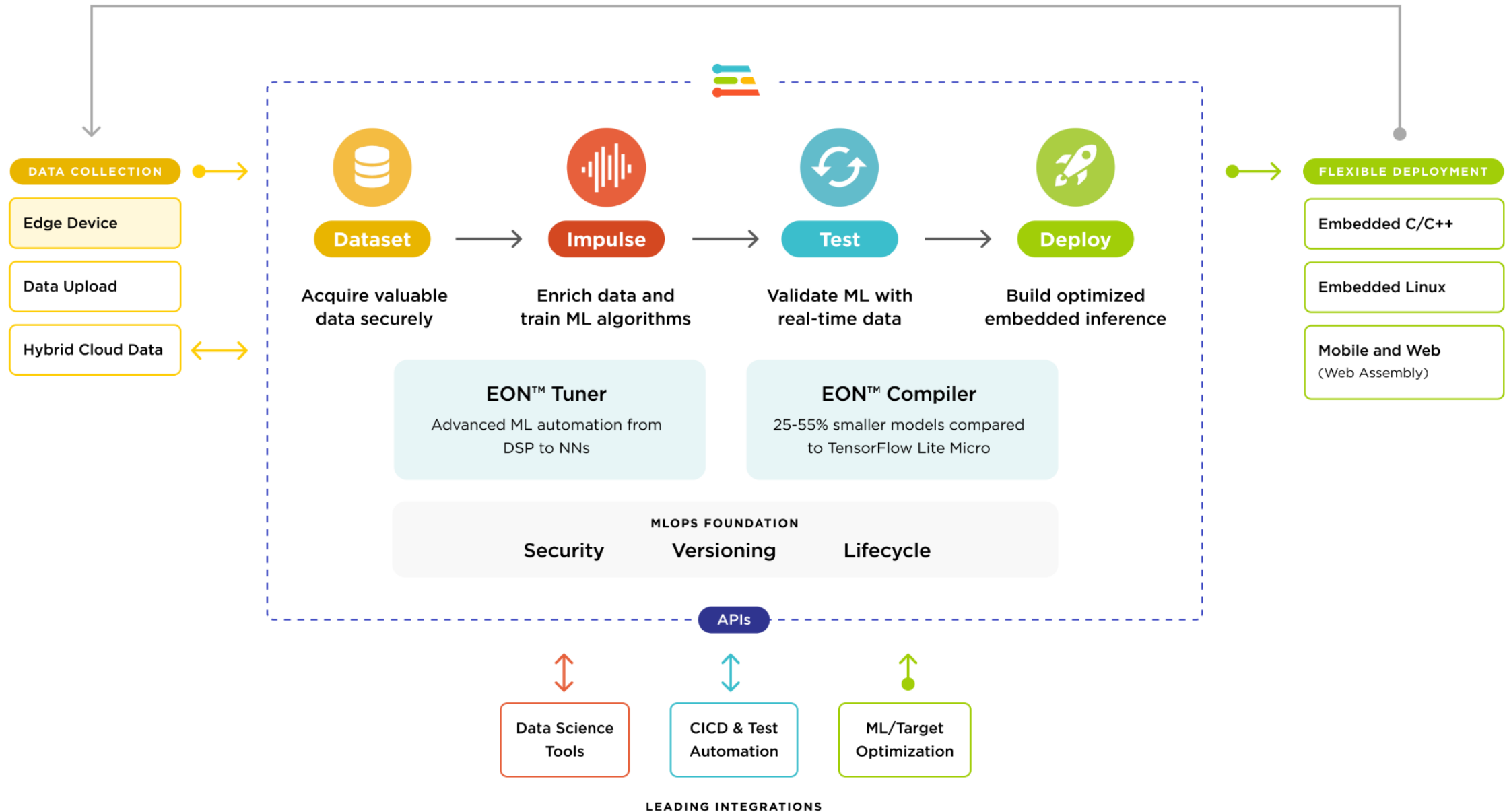
1,500+
Enterprises

20,000+
Developers
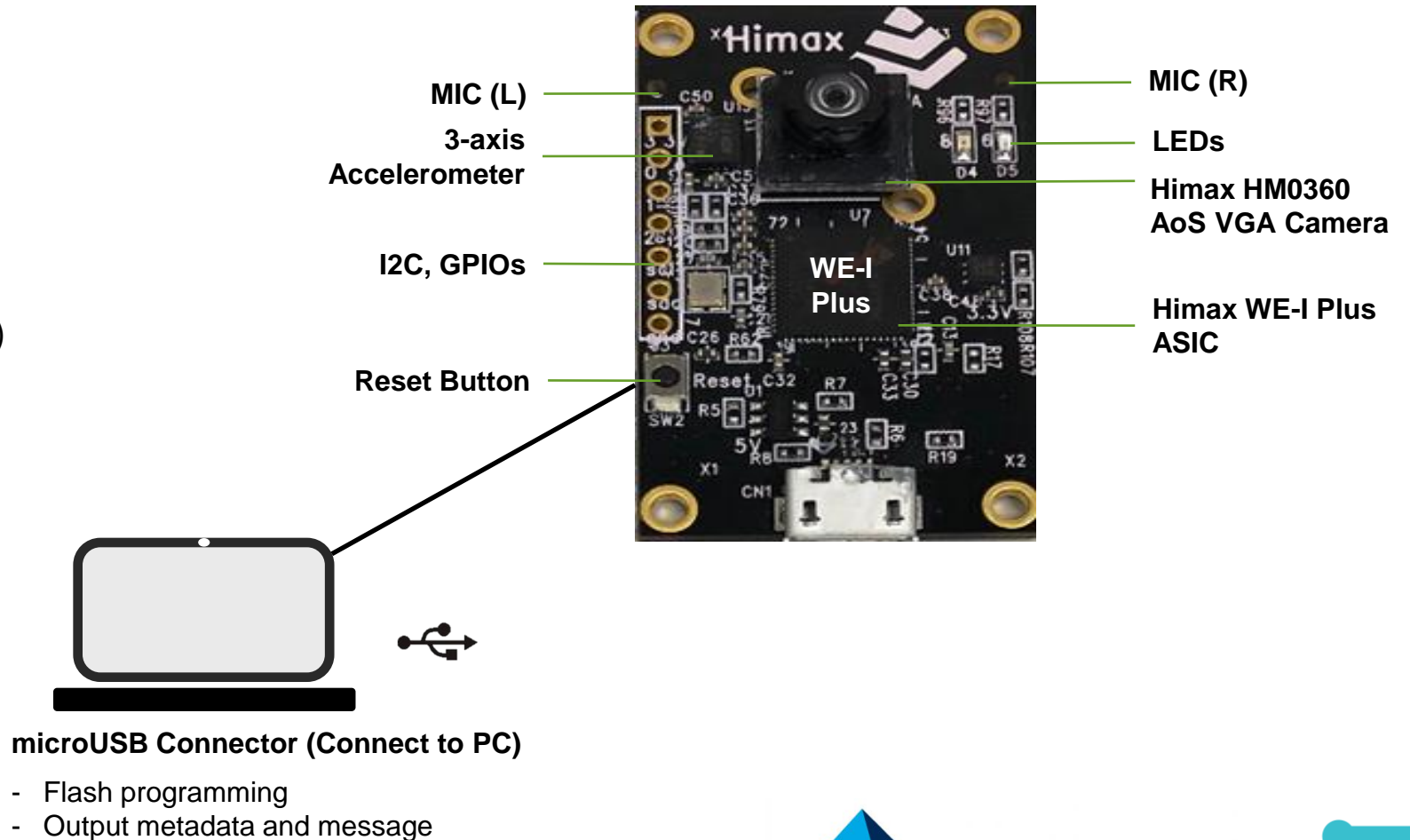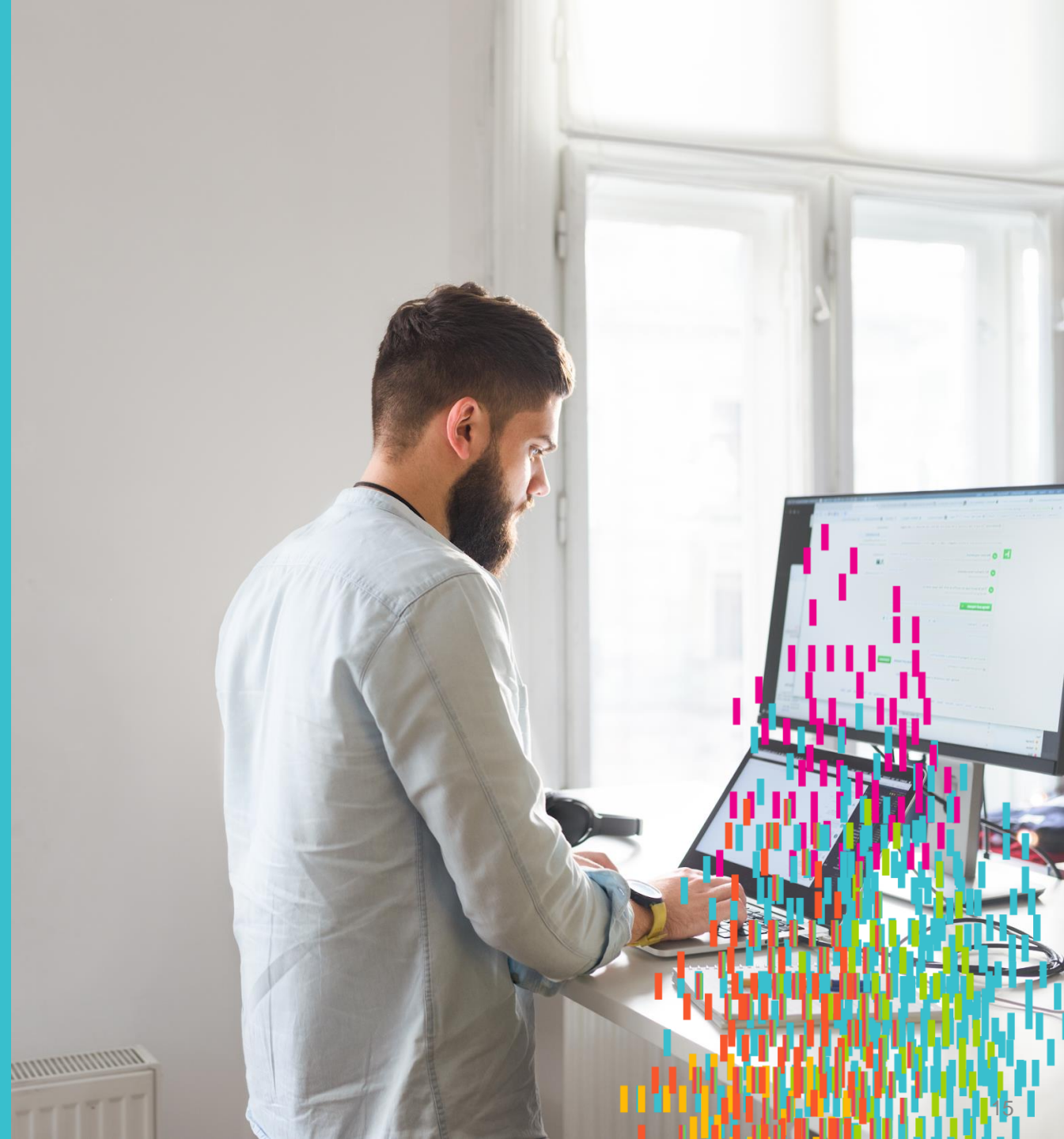
25,000+
Projects

30M+
Datasets

TINYML SUMMIT INNOVATION AWARD WINNER

Edge Impulse EON™

EDGE AI AND VISION PRODUCT OF THE YEAR

Edge Impulse
EON Compiler

A complete MLOps solution

DATA COLLECTION

- Edge Device
- Data Upload
- Hybrid Cloud Data

Dataset — Acquire valuable data securely

Impulse — Enrich data and train ML algorithms

Test — Validate ML with real-time data

Deploy — Build optimized embedded inference

EON™ Tuner
Advanced ML automation from DSP to NNs

EON™ Compiler
25-55% smaller models compared to TensorFlow Lite Micro

MLOPS FOUNDATION

Security Versioning Lifecycle

APIs

Data Science Tools

CICD & Test Automation

ML/Target Optimization

LEADING INTEGRATIONS

FLEXIBLE DEPLOYMENT

- Embedded C/C++
- Embedded Linux
- Mobile and Web (Web Assembly)

The WE-I Plus EVB Platform

- Himax WE-I Plus MCU
  - ARC 32-bit EM9D DSP with FPU
  - 400MHz clock frequency
  - 2MB SRAM
  - 2MB Flash

- On Board
  - Himax HM0360 AoS™ VGA camera
  - FTDI USB to SPI/I2C/UART bridge
  - LDO power supply (3.3/2.8/1.8/1.2V)
  - 3-asix accelerometer
  - 1x reset button
  - 2x microphones (L/R)
  - 2x user LEDs
  - microUSB connector

- Expansion Header
  - 1x I2C
  - 3x GPIOs
  - Power/Ground

(Board size: 40mm x 27mm)

MIC (L)

3-axis Accelerometer

I2C, GPIOs

Reset Button

MIC (R)

LEDs

Himax HM0360 AoS VGA Camera

Himax WE-I Plus ASIC

WE-I Plus

microUSB Connector (Connect to PC)

- Flash programming
- Output metadata and message

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Himax

Tutorial

EDGE IMPULSE

Next Steps

- Get the Himax WE-I EVB: www.sparkfun.com/products/17256

- Create a computer vision application: www.edgeimpulse.com

- Submit your entry: www.hackster.io/contests/tinyml-vision

- Questions?

    - david@edgeimpulse.com

    - https://forum.edgeimpulse.com

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