“tinyML Challenge 2022: Smart weather station”
Thomas Basikolo - Programme Officer, ITU
Marco Zennaro - Research Scientist, Abdus Salam International Centre for Theoretical Physics in Trieste
Alessandro Grande - Director of Product, Edge Impulse
June 29, 2022
Thank you, tinyML Strategic Partners*, for committing to take tinyML to the next Level, together
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Deploy TinyML into the Real World - Plug and Play ML

Sensors:
- modulated and ready-to-use sensors to simplify the setup process
- support 500+ grove modules

Wio Terminal:
- completed AI platform integrated with a 2.4" LCD Screen, onboard IMU (LIS3DHTR), microphone, buzzer, microSD card slot, light sensor, infrared emitter (IR 940nm)

Codecraft:
- no-code programming platform to Get Started With TinyML
- supports Arduino, Python, C or JavaScript, etc.

Edge Impulse:
- to optimize data utilization and enable deploy a machine learning model faster than ever

TensorFlow Lite:
- to easily train low memory usage machine learning models

Motion / Gesture / Speech / Smell / Sports
Barcode / Face / Image

Applications
- AI Thermal Camera for Safe Camping
- Azure IoT Squirrel Feeder
- Artificial Nose
The Right Edge AI Tools Can Make or Break Your Next Smart IoT Product

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https://SynSense.ai
Silver Strategic Partners
tinyML EMEA Innovation Forum 2022

Connect, Unify, and Grow the tinyML EMEA Community
October 10-12, 2022

https://www.tinymce.org/event/emea-2022

Event will be held in person in Cyprus.

EMEA 2022 Call for Presentations is open till August 1st, 2022.

More sponsorships are available: sponsorships@tinyML.org
Our next tinyML Trailblazers Series
Success Stories with Yoram Zylberberg
(CEO, Emza Visual Sense)

LIVE ONLINE July 6th, 2022 at 8 am PDT

Register now!
Join Growing tinyML Communities:

tinyML - Enabling ultra-low Power ML at the Edge

The tinyML Community
https://www.linkedin.com/groups/13694488/
Subscribe to tinyML YouTube Channel for updates and notifications (including this video)
www.youtube.com/tinyML
## Next tinyML Talks

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Webcast start time is 9:30 am Pacific time

Please contact talks@tinyml.org if you are interested in presenting
Reminders

Slides & Videos will be posted tomorrow

tinyml.org/forums    youtube.com/tinyml

Please use the Q&A window for your questions
Thomas Basikolo works with the ITU coordinating and managing the AI for Good’s ML5G activities and as an advisor of the ITU-T Focus Group on Autonomous Networks. He received a PhD in Electrical and Computer Engineering from Yokohama National University, Japan. During his studies, he was awarded the Japanese Government (Monbukagakushō) scholarship. He was also a recipient of grants for Non-Japanese Researchers from the NEC C&C Foundation, and a visiting researcher at the NEC Data Science Research Laboratories. Prior to joining ITU, he worked as a Research Engineer in the Engineering Department of Microwave Factory Co., Ltd, Tokyo, Japan. He is recipient of multiple Best Paper Awards, the IEEE AP–S Japan Student Award and the Young Engineer of the year award by IEEE AP–S Japan in 2018. He has co-authored peer-reviewed journal and conference papers, predominantly in the areas wireless communications and antenna engineering. He serves as a Reviewer of IEEE and IEICE Journals.
Marco Zennaro is a Research Scientist at the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy, a Category I UNESCO Institute, where he coordinates the Science, Technology and Innovation Unit. He received his PhD from the KTH-Royal Institute of Technology, Stockholm, and his MSc degree in Electronic Engineering from the University of Trieste in Italy. His research interest is in ICT4D, the use of ICT for Development, and in particular he investigates the use of Internet of Things for Development (IoT4D). He acts as TinyML4D Chair and TinyML Academic Network Co-Chair, in the framework of the TinyMLEdu initiative. Over the years he has organized more than 30 training activities on IoT in Developing Countries. Marco is a Visiting Professor at Kobe Institute of Computing (KIC) in Kobe, Japan.
Alessandro Grande

Alessandro is a physicist, an engineer, a community builder and a communicator with a visceral passion for connecting and empowering humans to build a more sustainable world through the aid of technology. Alessandro is the Director of Product at Edge Impulse and co-organizes the tinyML Meetups in UK and Italy. Prior to Edge Impulse, Alessandro worked at Arm as a developer evangelist and ecosystem manager with a focus on IoT and TinyML. While at Arm Alessandro launched a weekly live stream – Innovation Coffee with his colleague Robert Wolff. Alessandro holds a master’s degree in nuclear physics from the University of Rome “La Sapienza”.

tinyML Challenge 2022
Smart weather station

Kickoff June 29, 2022
Agenda

- Intro to ITU
- AI for Good and ITU Challenges
- Intro to tinyML Foundation
- Challenge overview
- Open discussion
ABOUT ITU

UN specialized agency for ICTs

‘Committed to Connecting the World’

Radiocommunication Sector
Allocation of radiofrequency spectrum and satellite orbits and Develop standards for radiocommunication

Development Sector
Bridging the digital divide

Standardization Sector
Establishing international standards for telecommunications, information and communication technologies

193 Member States 700+ Private Sector 164 Academia
ITU Standards Activities

• AI and IoT for **digital agriculture**
• AI for **natural disaster management**
• Autonomous networks
• AI for **assisted and autonomous driving**
• Environmental efficiency
• AI for health
AI & MACHINE LEARNING

Al for Good is the United Nations platform for AI

• All year, always online, Al for Good is the world’s premier platform to advance AI’s contribution to sustainable development
• Reached over 180,000 people from 183 countries in 2021

Identify practical applications of AI
Scale solutions for global impact
Accelerate progress towards the UN Sustainable Development Goals
ITU Challenges

- Creating a community of value
- Students and professionals
- Expert talks (webinars)
- Round-tables
- Hands on sessions
- Mentorship
- Baseline models
ITU Challenges

- Collaboration
- Networking
- Journal Publication
- Open Source
- Prizes
- Certificates
- Global Recognition
- Global Standards
tinyML Challenge - Registration

1) Register
2) Create or join a Team
3) work on your solution
4) Submit your solution
tinyML Foundation is a non-profit organization* with the mission to accelerate the growth of a prosperous and integrated Global Community of HW, SW and SYS scientists, engineers, designers, product and business application people developing leading edge energy efficient machine learning computing. The goal is to connect various technologies and innovations in this domain of machine intelligence to enormous product and business opportunities and value creation across the whole ecosystem.

* tinyML Foundation is a non-profit, 501c3, organization registered in Los Altos, CA, USA
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Vision

We see a new world with trillions of intelligent devices enabled by tinyML technologies that sense, analyze and autonomously act together to create a healthier and more sustainable environment for all.

*adopted at tinyML Strategy leadership meeting on Dec 14, 2019*
Climbing up the tinyML mountain

- **Step 0**: Tech Feasibility (before 2017)
- **Step 1**: Building Awareness (2018-21)
- **Step 2**: Initial tinyML Products and tools (now)
- **Step 3**: tinyML products (2-3 years)
- **Step 4**: tinyML everywhere (by 2030)

Explosive growth
Trillion of devices
tinyML meetups global growth

www.meetup.com/pro/tinyml
tinyML Challenge

Developing Countries is the area of the globe where land-based, in situ monitoring of weather and climate is at its scarcest, but at the same time has arguably the most potential to benefit society.
54% of Africa’s surface weather stations can’t capture data properly

With extreme weather events becoming the new normal, forecasting has become more important than ever. It’s time African nations invest in observation networks.

A lack of weather data in Africa is thwarting critical climate research

By Rachel Chanen and Rael Ombuor
September 24, 2021 at 8:30 a.m. EDT
Synthesis of assessment of observed change in **hot extremes** and confidence in human contribution to the observed changes in the world's regions.
Africa has just one-eighth the minimum density of weather stations recommended by the World Meteorological Organization, which means there is a problematic lack of data about dozens of countries that are among the most vulnerable to climate change.

Washington Post, 24/9/2021
tinyML Challenge

The goal of this challenge is to create a low-cost, low-power, reliable, accurate, easy to install and maintain weather station, with no mechanical moving parts for measuring all weather conditions with a focus on rain and wind measurement, based on ultra-low power ML at the edge.

Top prize $3,000
See contest page for additional prizes
Process

1. Collect local rain and wind acoustic or other types of sensor measurements
2. Develop an ML model to derive rain and wind values from acoustic measurements of rain and wind (eg compare with a local weather station)
3. Use tinyML techniques to optimize the model for embedded devices
4. Deploy to an embedded device in the field
5. Optimize overall power consumption
6. Show model results of deployed solution
7. Employ means to show when rain/wind are detected and intensity levels

Stretch goal: Integrate solution in a rugged working weather station
Challenge timeline

- Monday July 25, 2022 - Proposal submission
- Monday August 15, 2022 - Dataset checkpoint
- Monday September 5, 2022 - Model checkpoint
- Monday October 3, 2022 - Device checkpoint
- Monday November 14, 2022 - Final submission
Join us for the tinyML Challenge 2022!

Register now

https://challenge.aiforgood.itu.int/match/matchitem/71

Stay connected

https://forums.tinyml.org/c/challenge-2022/19
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