Asian regional workshop on SciTinyML: Scientific Use of Machine Learning on Low-Power Devices

Marco Zennaro,
mzennaro@ictp.it

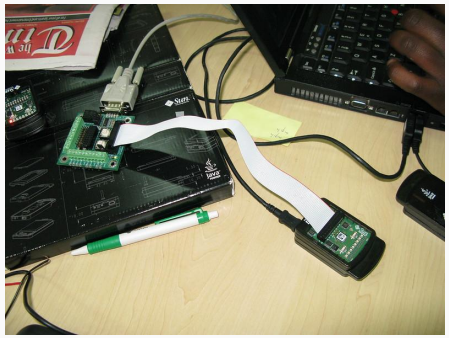
About myself

Research Scientist at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

I have been working on IoT since 2006.

Organized training activities in IoT in +30 countries.

IoT evolution



2007
$550

2022
$5.40

Workshop Team

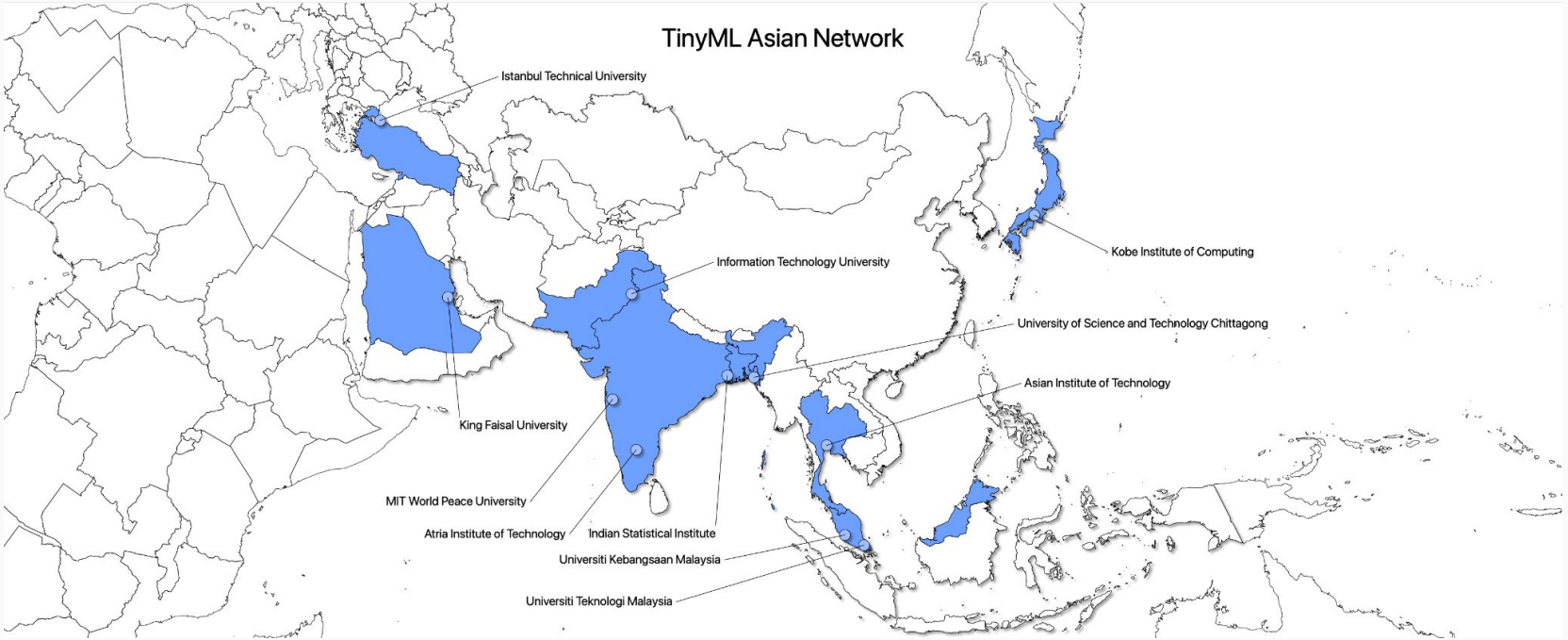
Marco Zennaro
ICTP

Rosdiadee Nordin
UKM

Vijay Janapa Reddi
Harvard

Organizers

100 participants from 8 Asian countries



100 participants from 8 Asian countries

Bangladesh: University of Science and Technology Chittagong
India: Indian Statistical Institute, Atria Institute of Technology, MIT World Peace University
Japan: Kobe Institute of Computing
Malaysia: Universiti Kebangsaan Malaysia, Universiti Teknologi Malaysia
Pakistan: Information Technology University
Saudi Arabia: King Faisal University
Thailand: Asian Institute of Technology
Turkey: Istanbul Technical University

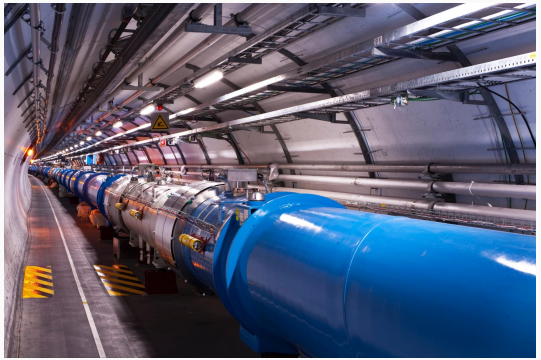
100 participants from 8 Asian countries

Junior	69	69%
Regular	21	21%
Senior	10	10%
N/A	0	0%

Female	30	30%
Male	70	70%
N/A	0	0%

Why a workshop on SciTinyML at ICTP

By Sebastiandoe5 - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=107917499



By Maximilien Brice (CERN) - CERN Document Server, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=29068933

CambridgeBayWeather assumed

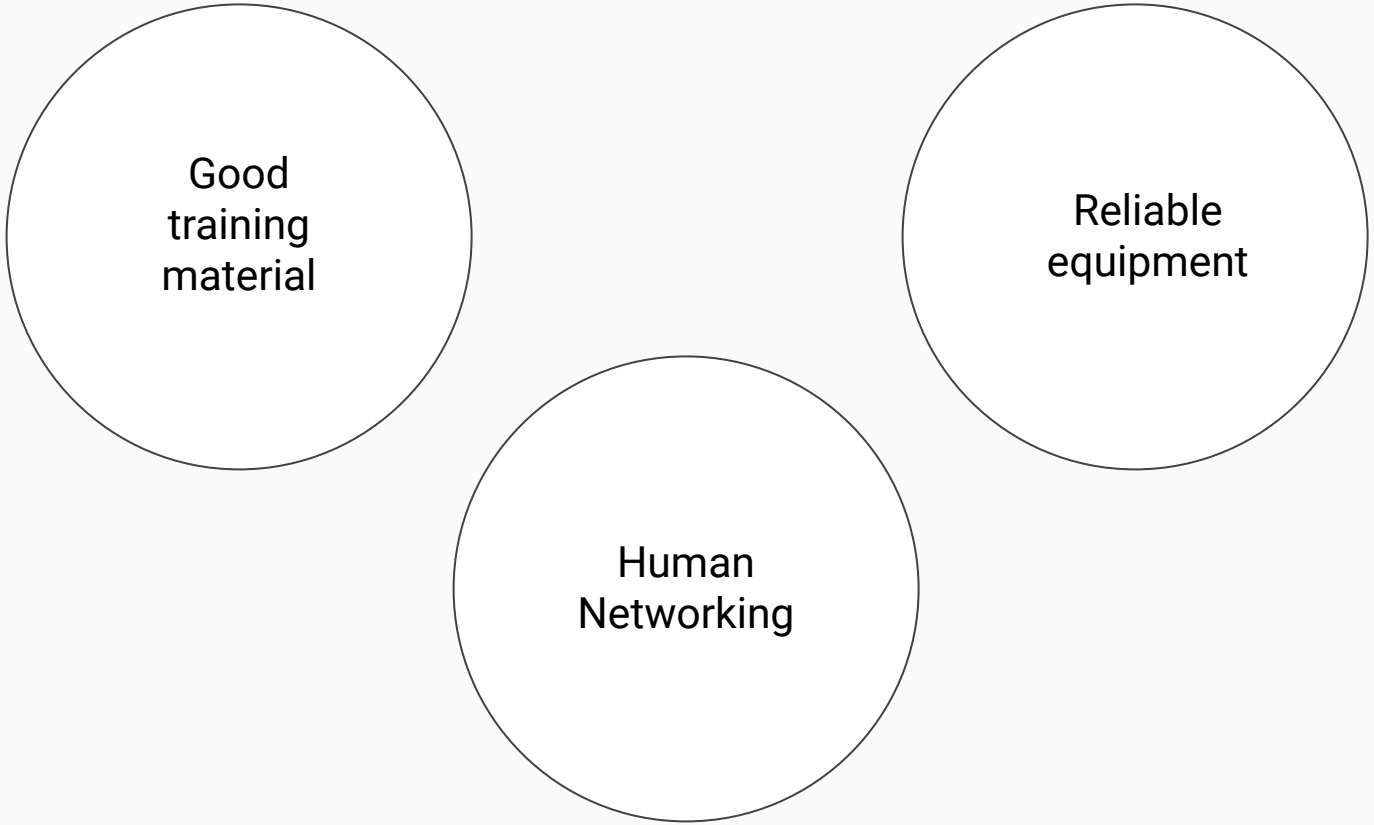
Why a TinyML Academic Network

We aim to develop a **community of researchers and practitioners** focused on both improving **access to TinyML education** and **enabling innovative solutions** for the unique challenges faced by Developing Countries.

- Joint **workshops and seminars** on TinyML with lab sessions
- An **online forum** to consolidate the TinyML community
- **Open exchange** of student projects, lesson plans, real-world deployments and outreach materials

http://tinymledu.org

TinyML Academic Network



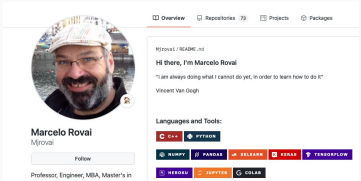
TinyML academic network

~~Good~~
Best
training
material

edX

coursera

EDGE IMPULSE



https://tinymledu.org/teach

Final goal is to provide

Open Educational Resources

TinyML academic network

Reliable equipment

Standard kit in each University

=

Exchange of code / tutorials / projects

TinyML academic network

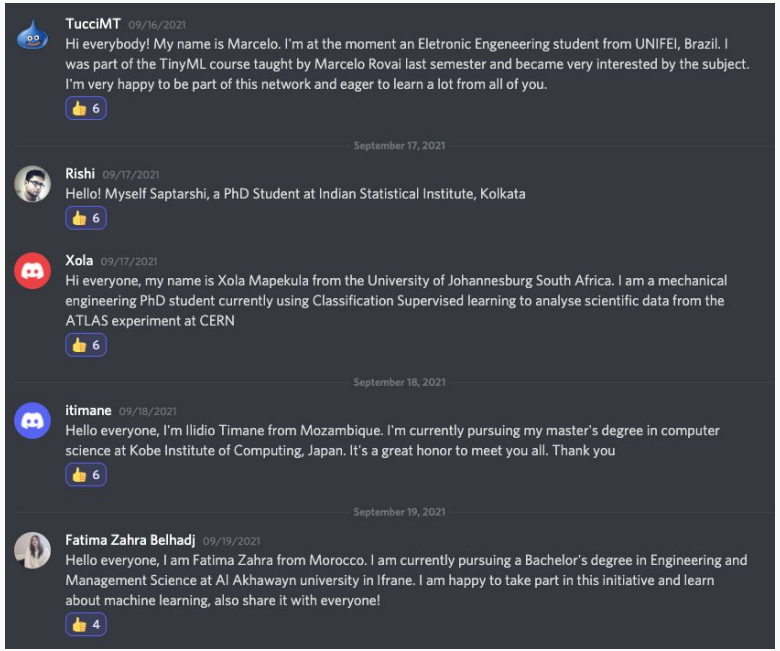
Thank you Seeed for the kind support!

seeed studio

TinyML academic network

Human Networking

+500 members!



Workshop Logistics

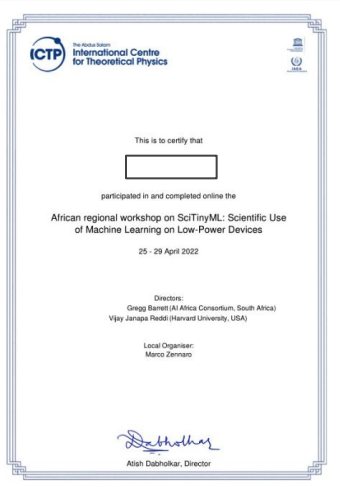
Three hours per day

UTC: 7am to 10am

Location	Local Time	Time Zone	UTC Offset
Trieste (Italy)	Monday, 6 June 2022, 09:00:00	CEST	UTC+2 hours
Istanbul (Turkey)	Monday, 6 June 2022, 10:00:00	TRT	UTC+3 hours
Bangkok (Thailand)	Monday, 6 June 2022, 14:00:00	ICT	UTC+7 hours
Riyadh (Saudi Arabia)	Monday, 6 June 2022, 10:00:00	AST	UTC+3 hours
Lahore (Pakistan)	Monday, 6 June 2022, 12:00:00	PKT	UTC+5 hours
Pune (India – Maharashtra)	Monday, 6 June 2022, 12:30:00	IST	UTC+5:30 hours
Dhaka (Bangladesh)	Monday, 6 June 2022, 13:00:00	BST	UTC+6 hours
Tokyo (Japan)	Monday, 6 June 2022, 16:00:00	JST	UTC+9 hours
Corresponding UTC (GMT)	Monday, 6 June 2022, 07:00:00		

Workshop Logistics

Attendance certificate only if you follow at least 80% of the lectures (according to Zoom's log file).



ICTP The Abdus Salam International Centre for Theoretical Physics

This is to certify that

participated in and completed online the

African regional workshop on SciTinyML: Scientific Use of Machine Learning on Low-Power Devices

25 - 29 April 2022

Directors:
Gregg Barrett (AI Africa Consortium, South Africa)
Vijay Janapa Reddi (Harvard University, USA)

Local Organiser:
Marco Zennaro

Atish Dabholkar, Director

Workshop Agenda

Day 1	Monday	**Introduction to Embedded ML (tinyML)** *9:00 AM* Conference Opening and Schedule *9:30 AM* Keynote - Vijay Janpa Reddi *10:30 AM* Introduction to Machine Learning *11:55 AM* Day Closing	Marco Zennaro of ICTP Vijay Janapa Reddi of Harvard University Slides | Video Mehran Behjati of National University of Malaysia

Workshop Agenda

Day 2	Tuesday	**Introduction to Embedded ML with Edge Impulse and the Seeed TinyML Kit** *9:00 AM* Day Opening *9:05 AM* Introduction to Machine Learning (Part 2) *10:00 AM* Introduction to Edge Impulse *11:00 AM* Introduction to the the Seeed TinyML Kit *11:55 AM* Day Closing	Marco Zennaro of ICTP Mehran Behjati of National University of Malaysia Louis Moreau of Edge Impulse Momodou B. Jallow of Seeed Studio

Workshop Agenda

Day 3	Wednesday	**Hands-on Motion Classification and Responsible AI** *9:00 AM* Day Opening *9:05 AM* Hands-on Motion Classification and Anomaly detection *10:30 AM* University Case Studies *11:00 AM* Responsible AI *11:55 AM* Day Closing	Marco Zennaro of ICTP Momodou B. Jallow of Seeed Studio Susan Kennedy of Santa Clara University Slides | Video

Workshop Agenda

Day 4	Thursday	**Hands-on Computer Vision and Key Word Spotting** *9:00 AM* Day Opening *9:05 AM* Hands-on Keyword Spotting *10:30 AM* Convolutions for Hands-on Computer Vision *11:25 AM* University Case Studies *11:55 AM* Day Closing	Marco Zennaro of ICTP Momodou B. Jallow of Seeed Studio Brian Plancher of Barnard College, Columbia University and of Harvard University Slides as PDF | as Google Slides | Video

Workshop Agenda

Day 5	Friday	**Applications of TinyML for Asia** *9:00 AM* Day Opening *9:05 AM* FOMO *10:00 AM* Case Study: Our Experience Building an Industrial IoT (IIoT) Solution Business *10:30 AM* Case Study: Design and Deployment of IoT Devices: from Edge to Data Centers *11:00 AM* Artificial Intelligence for Sustainable Development: Disaster Risk Reduction *12:00 PM* Discussion: Challenges for TinyML Research Collaboration in Asian *12:50 PM* Workshop Closing	Shawn Hymel of Edge Impulse Apinun Tunpan of SMART Sense Industrial Design Company Limited, Thailand Reginald Juan Magpantay Mercado of GTek Research, Philippines Soichiro Yasukawa of UNESCO

Case studies

Are you working on a TinyML-based project?

Do you have a problem that **could** be solved using Tiny?

Do you have an ML project that could use TinyML for deployment?

We have up to **three awards** for the best presentations from early career/students from developing countries. Send me a message if you want to present (mzennaro@ictp.it) with a title, abstract and your name.

Open Material

The material used in the workshop (slides, videos, code) will be **openly available** for you to use a teacher/student/practitioner.

TinyMLedu webpage:

https://tinymledu.org/SciTinyML-22/asia/

(with videos, slides and code)

ICTP official webpage: https://indico.ictp.it/event/9800/

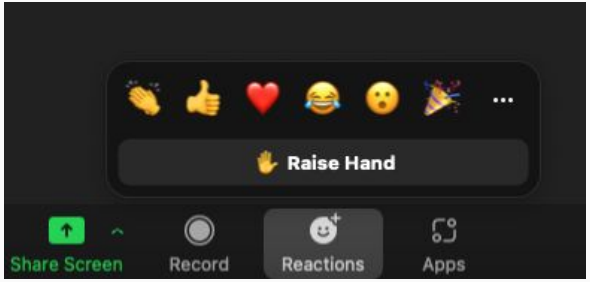
Tell me and I forget,
teach me and I may
remember, involve me
and I learn.
-- Benjamin Franklin

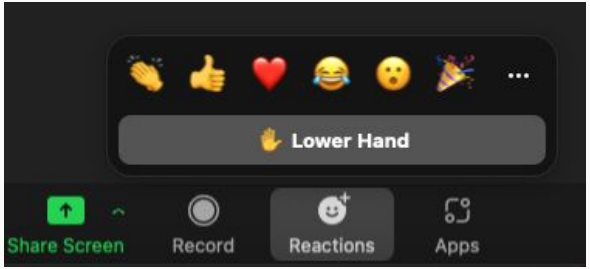
Interaction

You are more than welcome to ask questions!

Please raise your hand in Zoom to ask questions.

Unmute, turn on your camera and ask your question. Please lower your hand and mute yourself afterwards.





Interaction via Discord

If you have longer questions/ don’t want to talk, please use the “**ictp-workshop**” Discord channel. Questions and answers in Discord will remain after the workshop (--> good reference!).

Please join Discord by following this link: https://discord.gg/zKWgwhSAEY if you haven’t already done so!

We will use **Zoom chat only for announcements**.

Surveys (pre and post workshop)

We put together a short anonymous survey to try to get some background information from all of you so that we can try to update the materials to be as helpful as possible.

If you could fill it out that would be very helpful:

https://bit.ly/SciTinyML-22-Asia-Background

Thanks!

ICTP

Harvard John A. Paulson
School of Engineering
and Applied Sciences
TINY
ML
Google
EDGE
IMPULSE
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ARDUINO
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studio