From Classroom to Community: Five Years of TinyML Academic Network Impact.

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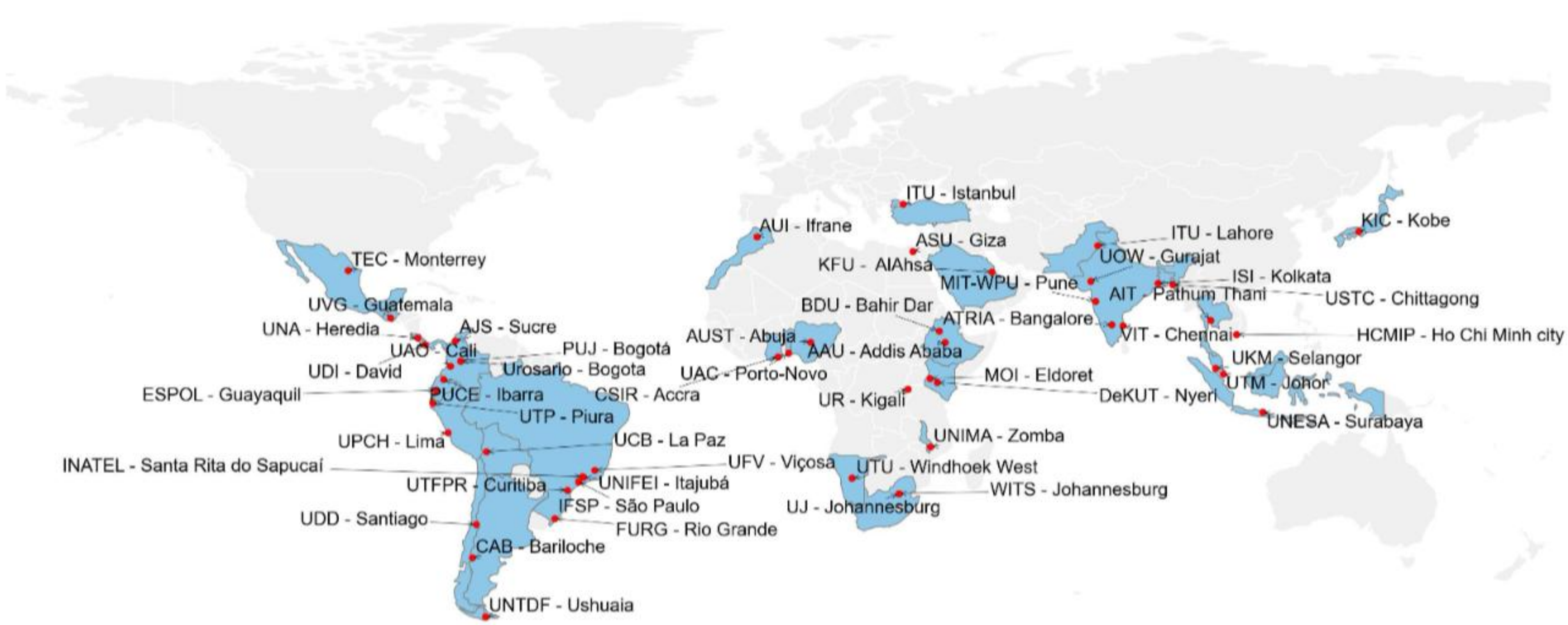
TinyML4D: why?

ICT4D researchers claim that there are four technological requirements for an ICT4D project to be successful:

- **Autonomous Connectivity** ✔
- **Low-cost equipment** ✔
- **Power resilience** ✔
- **Appropriate User Interface** ✔

Brewer, Eric, et al. "The case for technology in developing regions." ***Computer*** 38.6 (2005): 25-38.

TinyML4D Academic Network - May 2025



More than 2000 people trained!

Open Access Article

Design and Development of a Family of Integrated Devices to Monitor Animal Movement in the Wild

by Laila Daniela Kazimierski [1,*,†], Andrés Oliva Trevisan [2,3,†], Erika Kubisch [4], Karina Laneri [1] and Nicolás Catalano [2,3]

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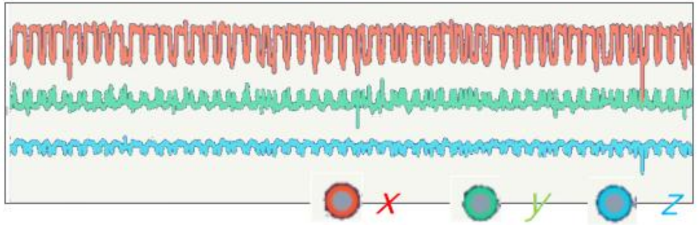
† These authors contributed equally to this work.

https://www.mdpi.com/1424-8220/23/7/3684

Example of accelerometer signal of a female digging a nest to lay eggs:



Classifying mosquito wingbeat sound using TinyML

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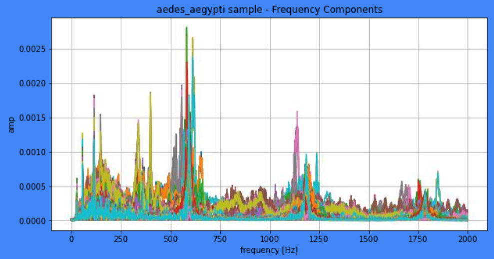
ABSTRACT

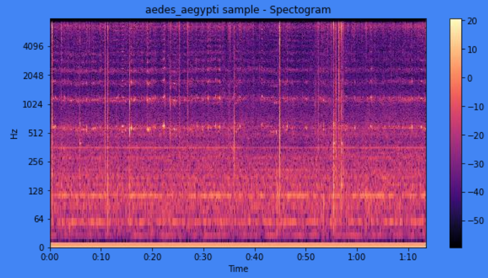
Every year more than one billion people are infected and more than one million people die from vector-borne diseases including malaria, dengue, zika and chikungunya. Mosquitoes are the best known disease vector and are geographically spread worldwide. It is important to raise awareness of mosquito proliferation by monitoring their incidence, especially in poor regions. Acoustic detection of mosquitoes has been studied for long and ML can be used to automatically identify mosquito species by their wingbeat. We present a prototype solution based on an openly available dataset, on the Edge Impulse platform and on three commercially-available TinyML devices. The proposed solution is low-power, low-cost and can run without human intervention in resource-constrained areas. This insect monitoring system can reach a global scale.

affected. People from poor communities with little access to health care and clean water sources are also at risk. Although anti-malarial drugs exist, there's currently no malaria vaccine.

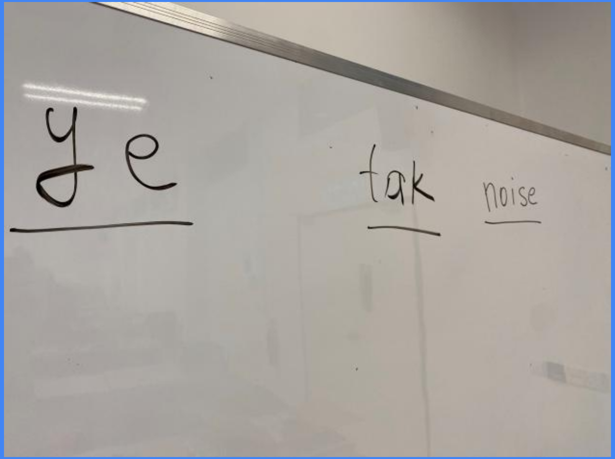
Vector-borne diseases also exacerbate poverty. Illness prevent people from working and supporting themselves and their families, impeding economic development. Countries with intensive malaria have much lower income levels than those that don't have malaria.

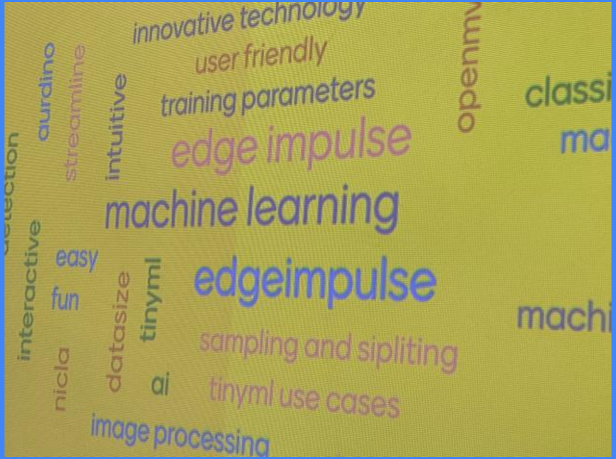
Countries affected by malaria turn to control rather than eradication. Vector control means decreasing contact between humans and disease carriers on an area-by-area basis. It is therefore crucial to be able to detect the presence of mosquitoes in a specific area. This paper presents an approach based on TinyML and on low power embedded devices.

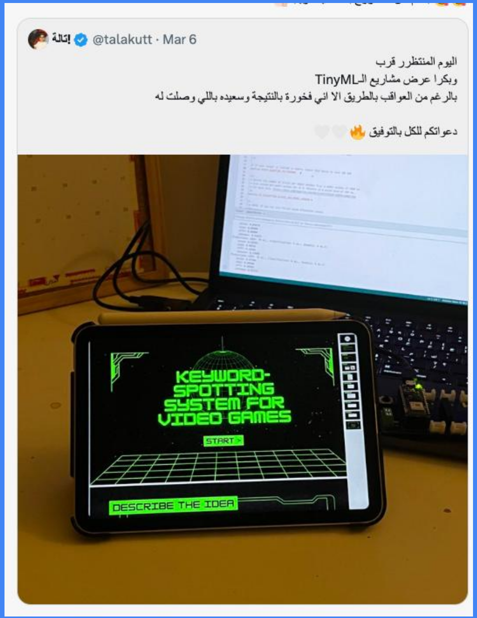




Malaysia 2023



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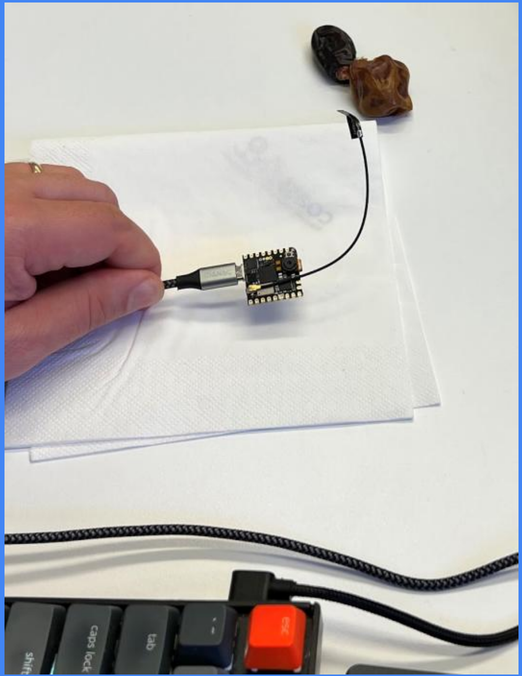
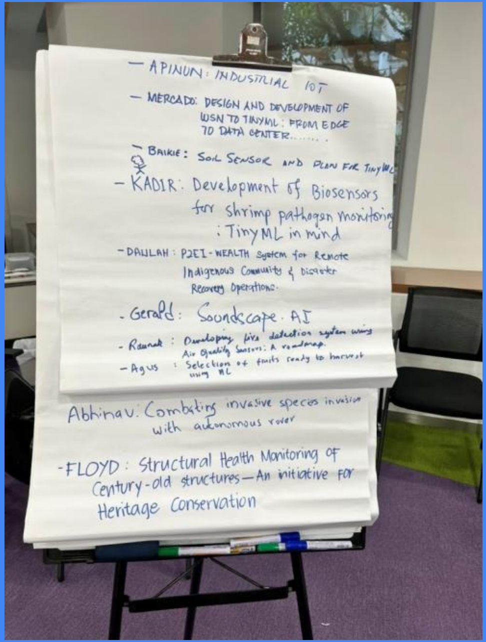


KAUST 2023

Macau 2024


Where we are so far...
(AND)
// elbows above shoulders
// wrists above elbows
// wrists above head
// wrists closer than elbows
// wrists very close or overlapping


— APINUN: INDUSTRIAL IOT
— MERCADO: DESIGN AND DEVELOPMENT OF WSN TO TINYML: FROM EDGE TO DATA CENTER.......
— BAIKIE: SOIL SENSOR AND PLAN FOR TinyML
- KADIR: Development of Biosensors for shrimp pathogen monitoring : TinyML in mind
- DAULAH: P2EI-WEALTH System for Remote Indigenous Community & Disaster Recovery Operations.
- Gerald: Soundscape AI
- Agus : Selection of fruits ready to harvest using ML
Abhinav: Combating invasive species invasion with autonomous rover
-FLOYD: Structural Health Monitoring of Century-old structures—An initiative for Heritage Conservation

Brazil 2024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HASTA
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BABY
ARDUINO PRO

Malawi 2025

Policy recommendations for TinyML

1. Invest in Local Capacity Building for Embedded AI

Support national and regional programs that develop local expertise in embedded AI through universities, vocational training, and continuing education. Prioritize funding for curricula co-developed with global partners like the TinyML Academic Network.

2. Promote Open, Low-Cost Infrastructure for TinyML Deployment

Subsidize access to open-source TinyML tools and low-power hardware for use in schools, research centers, and community projects. This lowers entry barriers and stimulates local innovation for SDG-related challenges.

Policy recommendations for TinyML

3. Integrate TinyML into National Digital and Innovation Strategies

Recognize TinyML as a key enabler of Edge AI for agriculture, health, climate monitoring, and education. Include TinyML in broader policies on digital transformation, AI governance, and smart infrastructure.

4. Fund Context-Aware Pilot Projects in Key Development Sectors

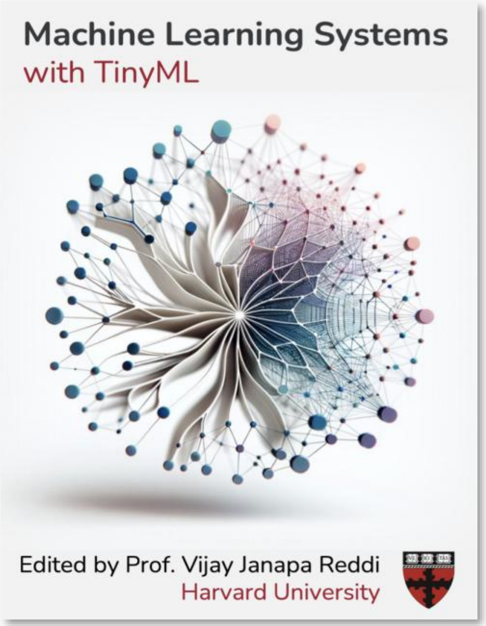
Support the scaling of pilot projects that apply TinyML to real-world needs—e.g., disease-vector monitoring, air quality sensing, or precision irrigation. Fund projects that demonstrate impact, replicability, and local ownership.

Policy recommendations for TinyML

5. Facilitate Regional Collaboration and Knowledge Sharing

Encourage South-South cooperation by funding regional centers of excellence and networks that share training resources, datasets, and deployment best practices, building on the TinyML4D community model.

Learning and Teaching



https://github.com/harvard-edge/cs249r_book

TinyML4D on Science!

FEATURES

CUTTING AI DOWN TO SIZE

A $14 chip incorporating tinyML AI models, actual size shown.

Many artificial intelligence models are power hungry and expensive. Researchers in the Global South are increasingly embracing low-cost, low-power alternatives

By Sandeep Ravindran

The small drone circles the cashew tree, its rotor arms splayed out from its compact body like a water strider's. As it rises, its camera captures a bird's-eye view of the foliage, which shades from a dark glossy green at the tree's bottom to a purplish green at the top. Meanwhile an artificial intelligence (AI) model built into the drone determines whether the leaves are diseased—based on telltale black or brown splotches—or healthy. If needed, the system can one day direct other drones toward individual sick plants to treat their disease with a spritz of pesticide.

This system is the handiwork of Bala Murugan, a computer scientist at the Vellore Institute of Technology in Chennai, India. Murugan comes from a family of cashew farmers, including his father and uncle. "They apply a lot of pesticides on the cashew," he says. "I wanted to build a so-

https://www.science.org/doi/epdf/10.1126/science.adw7713

Thanks!

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