

Education in TinyML

Q&A Session with Marco Zennaro

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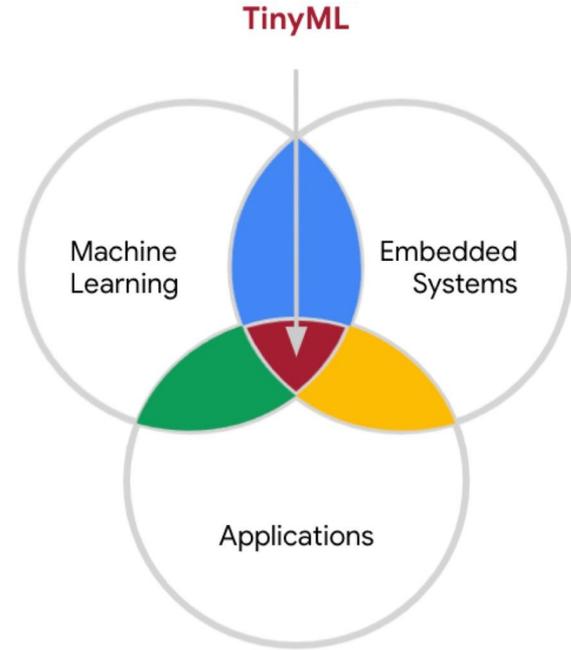


Introduction to TinyML in Education

What exactly is TinyML, and how does it relate to education?

Why is TinyML gaining momentum in the field of education?

What age groups can benefit from TinyML education and outreach?

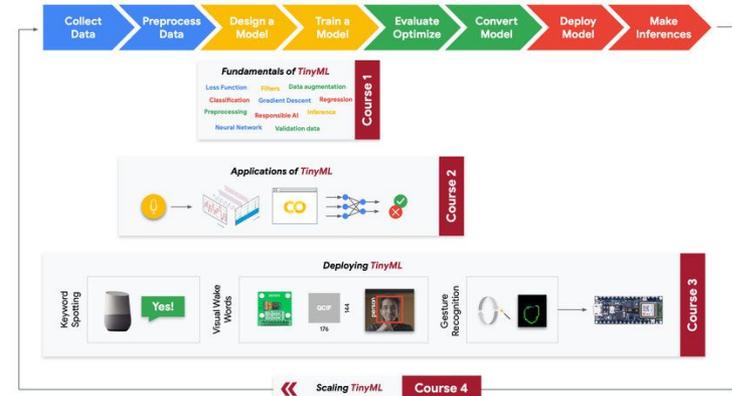


Integration and Applications of TinyML in Edu.

How does TinyML enhance traditional educational methods?

What are some practical applications of TinyML in educational settings?

Can you provide examples of how TinyML is being integrated into curriculum development?



Challenges and Considerations

What are the challenges educators might face when implementing TinyML in the classroom?

Are there any ethical or equity considerations surrounding the use of TinyML in education?



RASPBERRY PI 5

With 2-3x the performance of the previous generation, faster CPU, GPU, Wi-Fi, USB, and microSD, the Raspberry Pi 5 represents a giant leap forward for the credit-card-



ARDUINO UNO R4 WIFI

Originally announced at Maker Faire, the Arduino UNO is probably the single most recognizable dev board in the maker-space. And now it's back, more powerful than ever.



SEEED XIAO ESP32S3 ESSENTIAL

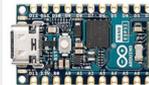
Dual-core 240MHz MCU? Check. 8MB each of PSRAM and Flash? Yep. Built-in Wi-Fi/BLE, and charger? Uh-huh. On-board camera and microphone. You got it. Must be

MICROCONTROLLERS (MCU)						
Board Name	Price	Dimensions	Software	Clock Speed	Processor	Memory
Adafruit ATtiny1616 Breakout with Seesaw	\$5	1.2"×0.5"	Arduino IDE, C/C++	20MHz	8-bit ATtiny1616 (single-core AVR)	16kB Flash, 2kB RAM, 256 byte EEPROM
Adafruit ESP32-52 Feather with BME280 Sensor	\$25	2.1"×0.9"	CircuitPython, Arduino			
Adafruit ESP32-52 TFT Feather	\$25	2.1"×0.9"	CircuitPython, Arduino			
Adafruit ESP32-53 Feather	\$18	2.1"×0.9"	CircuitPython, Arduino			
Adafruit Feather M0 with RFM95 LoRa Radio 900MHz (RadioFruit)	\$35	2.0"×0.9" ×0.3"	CircuitPython, Arduino			
Adafruit Feather RP2040 with DVI	\$15	2.1"×0.9"	CircuitPython, MicroPython, Arduino IDE, C			
Adafruit Feather RP2040 Scorpio *NEW & NOTABLE*	\$15	2.0"×0.9" ×0.3"	CircuitPython, MicroPython, Arduino IDE			



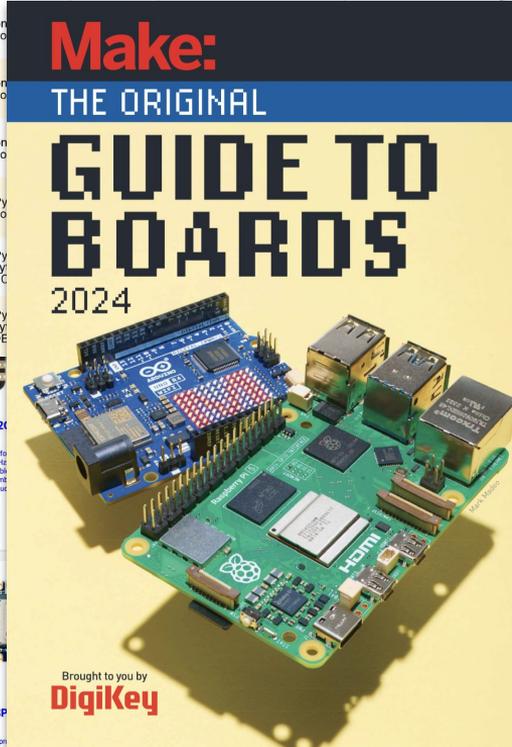
SEEED XIAO ESP32S3

We're enamored with the tiny little XIAO for this reason in particular: due to its compact size with built-in Wi-Fi and BLE, SPI Programmable MicroPython, and CircuitPython, this thumb phenom is a steal at just \$5, antenna included.



ARDUINO NANO ESP32

The Nano ESP32 represents the highest on a new partnership with Espressif. Features



Benefits and Impact

How can TinyML help personalize learning experiences for students?

How can students benefit from learning about TinyML, both academically and professionally?

What skills do educators need to effectively teach TinyML concepts to students?



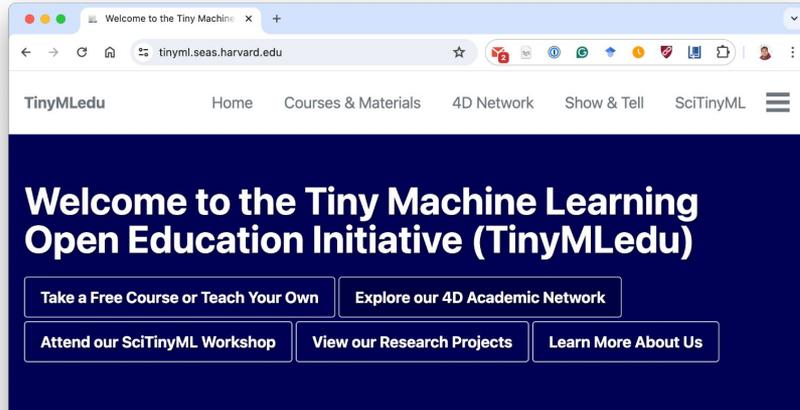
**K-12
Workshops**



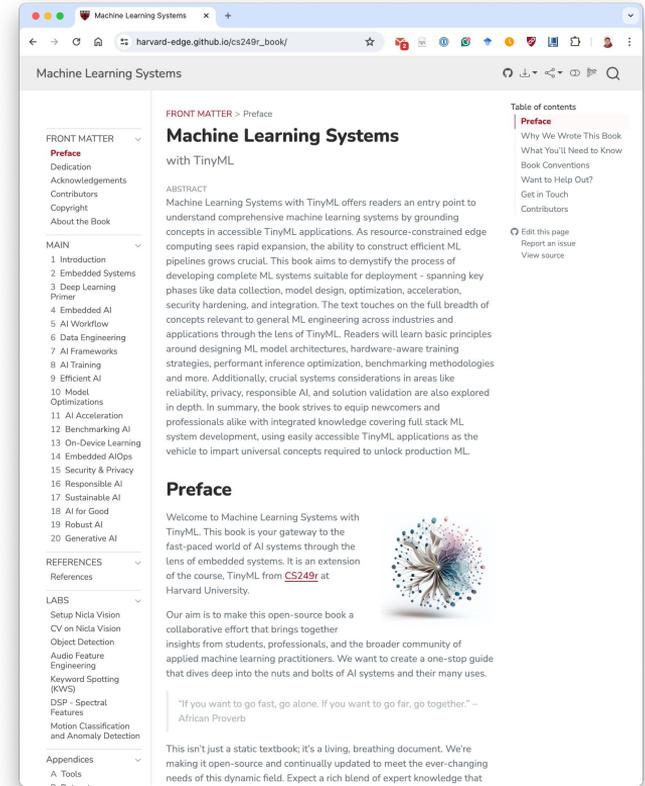
Resources and Support

What resources are available for educators who want to incorporate TinyML into their teaching?

<https://tinyml.seas.harvard.edu>

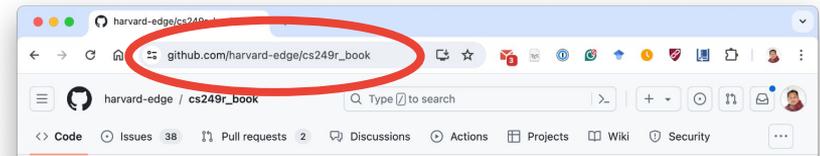


The screenshot shows the homepage of TinyMLedu. The header includes the site name and navigation links: Home, Courses & Materials, 4D Network, Show & Tell, and SciTinyML. The main content area features a large blue banner with the text "Welcome to the Tiny Machine Learning Open Education Initiative (TinyMLedu)". Below the banner are four buttons: "Take a Free Course or Teach Your Own", "Explore our 4D Academic Network", "Attend our SciTinyML Workshop", "View our Research Projects", and "Learn More About Us".



The screenshot shows the online version of the book "Machine Learning Systems with TinyML". The page includes a table of contents on the left, a preface section, and an abstract. The preface text reads: "Welcome to Machine Learning Systems with TinyML. This book is your gateway to the fast-paced world of AI systems through the lens of embedded systems. It is an extension of the course, TinyML from CS249r at Harvard University. Our aim is to make this open-source book a collaborative effort that brings together insights from students, professionals, and the broader community of applied machine learning practitioners. We want to create a one-stop guide that dives deep into the nuts and bolts of AI systems and their many uses." A quote from an African proverb is also visible: "If you want to go fast, go alone. If you want to go far, go together."

<https://mlsysbook.ai>

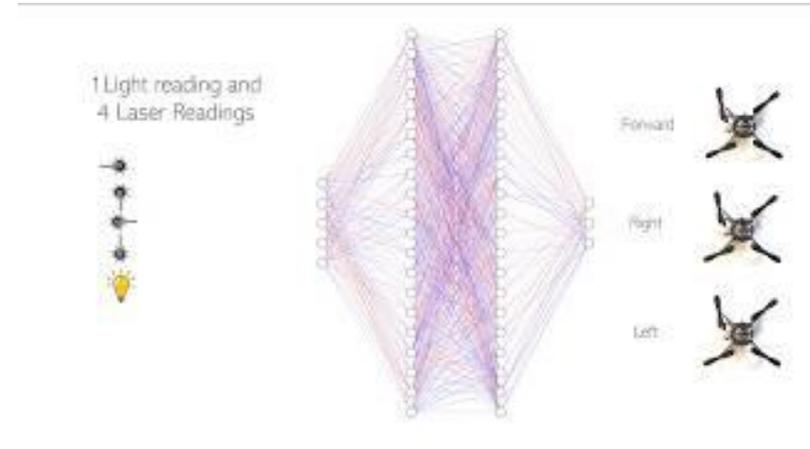


The screenshot shows the GitHub repository page for the book. The repository name is "harvard-edge/cs249r_book". The page includes navigation links for Code, Issues (38), Pull requests (2), Discussions, Actions, Projects, Wiki, and Security. The repository description is "harvard-edge / cs249r_book".

Innovation and Future Trends

In what ways can TinyML contribute to fostering innovation and creativity among students?

What are some potential future developments or trends in the intersection of education and TinyML?



Learn More!

Wednesday, 8 May 2024

09:00 - 12:00

Education & Applications

09:00 **Day Opening 5'**

09:05 **Educational Activities at TinyML Foundation 40'**

Speaker: Evgeni GOUSEV (TinyML Foundation)

09:45 **Experiences using TinyML tools in teaching biomedical engineering 40'**

Speaker: Moises MEZA RODRIGUEZ (Universidad Peruana Cayetano Heredia, Peru)

10:25 **TBD - Data Fusion in Tinyml, Model Compression, Model Aggregation, Weightless Neural Networks and applications in biology and federated learning 35'**

Speaker: Claudio MICELI (UFRJ, Brazil)

11:00 **Arduino and Education 55'**

Speaker: David CUARTIELLES RUIZ (Arduino (Co-Founder))

11:55 **Day Closing 5'**

“The future of machine learning is tiny and bright!”