“Introduction to TinyML (Herning/København)”

Morten Opprud, Steffen Breinbjerg, Jørgen Kragh, Gustaf Hammerberg
TinyML Copenhagen & IDA

November 20, 2023
Thank you, tinyML Strategic Partners, for committing to take tinyML to the next Level, together
Executive Strategic Partners
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

Perception
- Object detection, speech recognition, contextual fusion

Reasoning
- Scene understanding, language understanding, behavior prediction

Action
- Reinforcement learning for decision making

A platform to scale AI across the industry
Accelerate Your Edge Compute

SYNTIANT
Making Edge AI A Reality

www.syntiant.com
Platinum Strategic Partner
DEPLOY VISION AI
AT THE EDGE AT SCALE
Gold Strategic Partners
Build the Future of tinyML on ARM
EDGE IMPULSE

The Leading Development Platform for Edge ML

dgeimpulse.com
Driving decarbonization and digitalization. Together.

Infineon serving all target markets as Leader in Power Systems and IoT

www.infineon.com
NEUROMORPHIC INTELLIGENCE FOR THE SENSOR-EDGE
Renesas is enabling the next generation of AI-powered solutions that will revolutionize every industry sector.
STMicroelectronics provides extensive solutions to make tiny Machine Learning easy
ENGINEERING EXCEPTIONAL EXPERIENCES

We engineer exceptional experiences for consumers in the home, at work, in the car, or on the go.

www.synaptics.com
Join Growing tinyML Communities:

**Meetup**
17.6k members in 49 Groups in 41 Countries

 tinyML - Enabling ultra-low Power ML at the Edge

**LinkedIn**
4k members & 13k followers

 The tinyML Community
 https://www.linkedin.com/groups/13694488/
tinyAI Forum on PdM & Anomaly Detection 2023

Interactive live webinar December 5, 2023 at 8AM Pacific Time
Registration is free of charge
tinyML Research Symposium
April 22, 2023
Call for Papers
tinyML Summit April 23-24, 2024
Call for Presentations and Posters
2023 Edge AI Technology Report

The guide to understanding the state of the art in hardware & software in Edge AI.

https://www.wevolver.com/article/2023-edge-ai-technology-report
Agenda - Workshop 1

17:30 : Welcome, workshop series introduction (All)
17:45 : An introduction to Tiny Machine Learning, TinyML (Morten)
18:30 : Break, Sandwich, Networking
19:15 : Hardware hand-out, introduction, Workshop (Steffen + All)
20:45 : Summary & homework for next meetup
Who’s who

Morten Opprud Jakobsen
PhD student, embedded
HW/SW development
TinyML CPH lead

Jørgen Kragh Jakobsen
OSHW / Chip designer
HW/SW developer
Coding pirate

Steffen Breinbjerg
Tiny/edge ML engineer,
Embedded firmware developer

Gustaf Hammarberg
Tiny/edge ML engineer,
ML tool developer,
AI consultant
WS1: Introduction to TinyML & Hardware

WS2: Data preparation, training and deployment

WS3: TinyML Production model development

WS4: Monitoring / maintaining

MLOps

MODEL DEVELOPMENT

- Data Engineering
- ML Model Engineering
- Model Testing & Validation

OPERATIONS

- ML Model Deployment
- CI/CD Pipelines
- Monitoring & Triggering
We will be using

- C programming - ESP development tools
- Python, Google Colab / Jupyter Notebooks
- A browser
- Command line tools
November 20 - Introduction to TinyML

Workshop 1 - IDA København

Workshop 1 - AU Herning

December 4 - TinyML Data preparation, training and deployment

Workshop 2 - IDA København

Workshop 2 - AU Herning

December 18 - TinyML Production model development

Workshop 3 - IDA København

Workshop 3 - AU Herning
Copyright Notice

This multimedia file is copyright © 2023 by tinyML Foundation. All rights reserved. It may not be duplicated or distributed in any form without prior written approval.

tinyML® is a registered trademark of the tinyML Foundation.

www.tinyml.org
Copyright Notice

This presentation in this publication was presented as a tinyML® Talks webcast. The content reflects the opinion of the author(s) and their respective companies. The inclusion of presentations in this publication does not constitute an endorsement by tinyML Foundation or the sponsors.

There is no copyright protection claimed by this publication. However, each presentation is the work of the authors and their respective companies and may contain copyrighted material. As such, it is strongly encouraged that any use reflect proper acknowledgement to the appropriate source. Any questions regarding the use of any materials presented should be directed to the author(s) or their companies.

tinyML is a registered trademark of the tinyML Foundation.

www.tinyml.org