AI on the Edge

Hidden Layers: AI & Design Summer School
July 20, 2022

Tim Becker, Matthias Krauß
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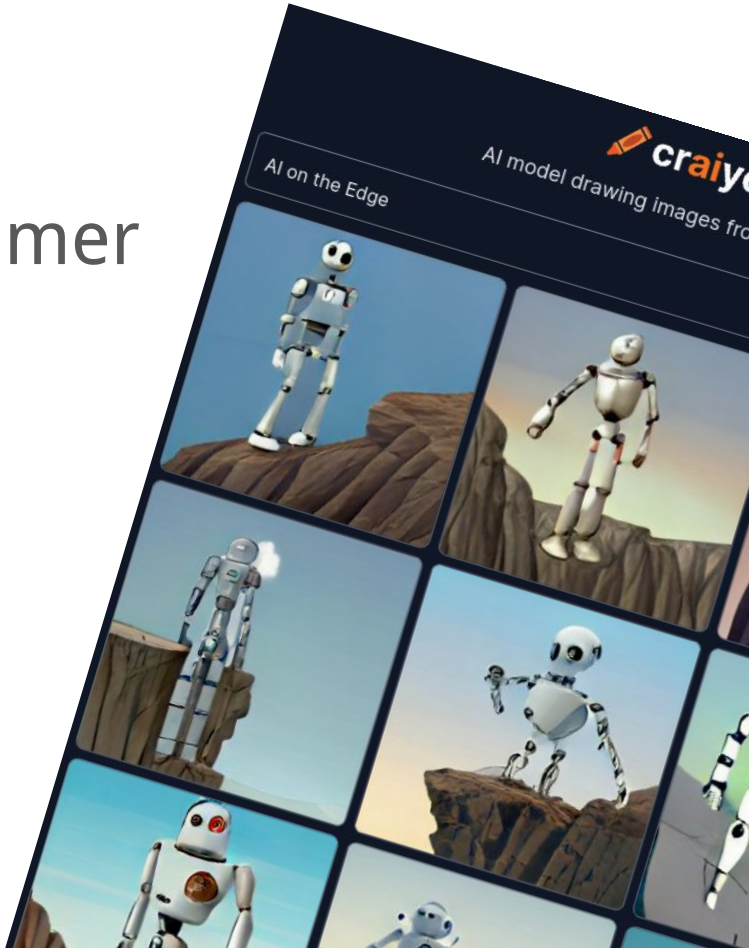

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Plan for Today

- Who we are
- Intro: Edge? What and Why?
- How AI is implemented (on the Edge)?
- Hands-on: Running AI on the Edge
- Hands-on: Try to trick it
- Questions and Discussion at any time …

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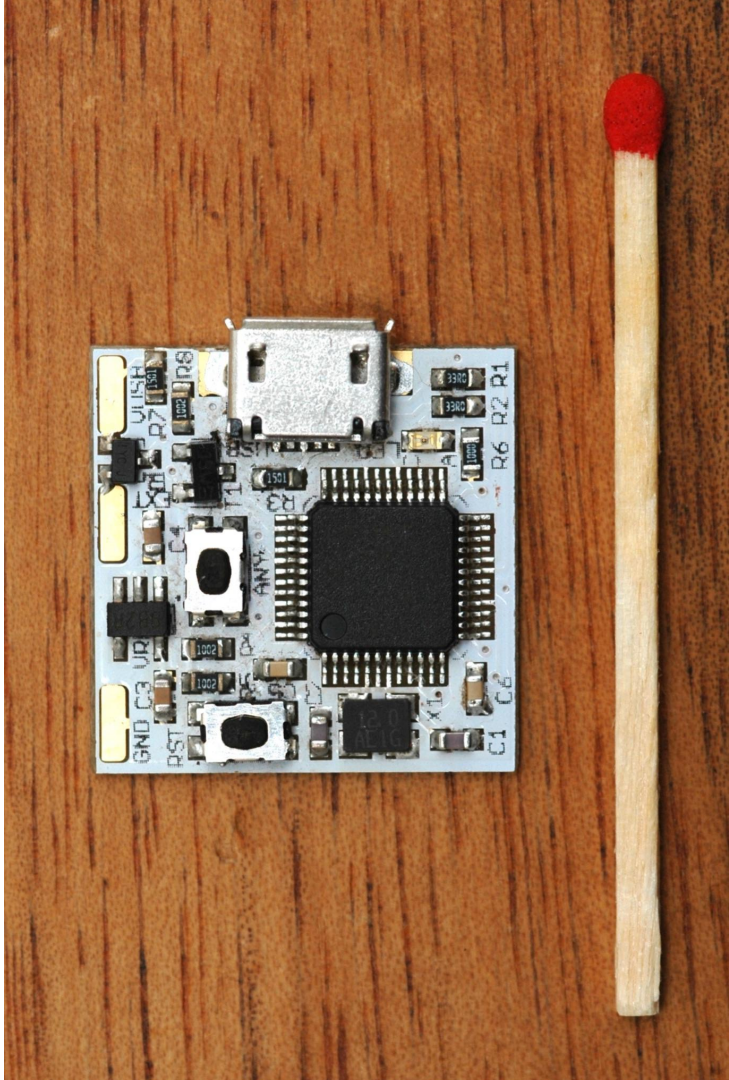
About us

- Prototyping since 2012
- Hardware, Software, Firmware
- Open Source preferred, not always possible
- Working for startups, big companies, government, research, agencies, media
- It does without saying: We are not designers. We build stuff.



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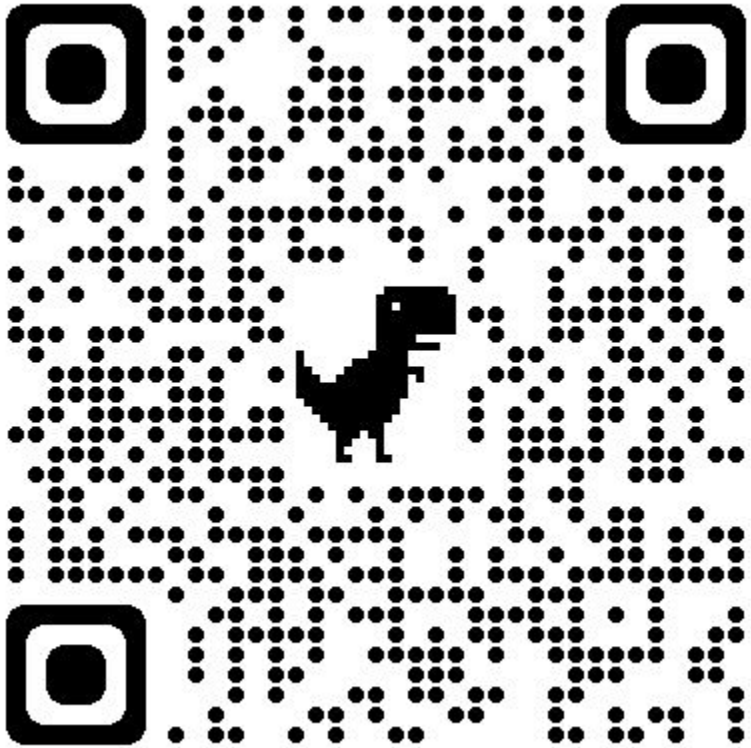
Short Introduction

in the meantime…

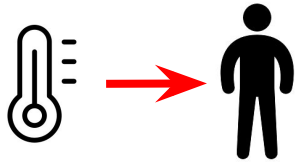
https://github.com/presseverykey
/esp32cam-nn-example



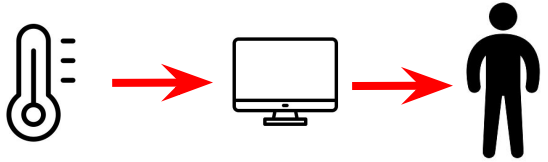
Big Questions

- What is AI?
- What is “the Edge”?
- What is AI on the Edge?
- Why?
- What can we do there?

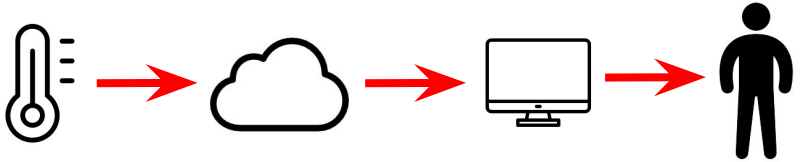
Analog



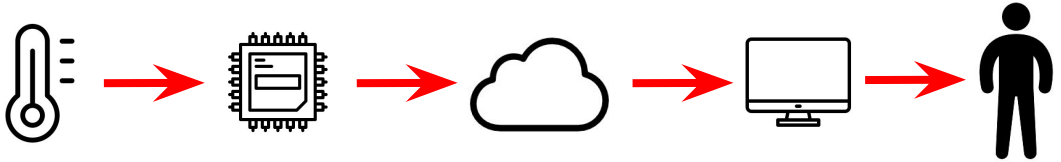
Digital



Cloud Computing



Edge Computing



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PRO

Privacy

Bandwidth

Latency

Availability

CON

Buzzwords

Control

Limited Resources

Power

Expectation management

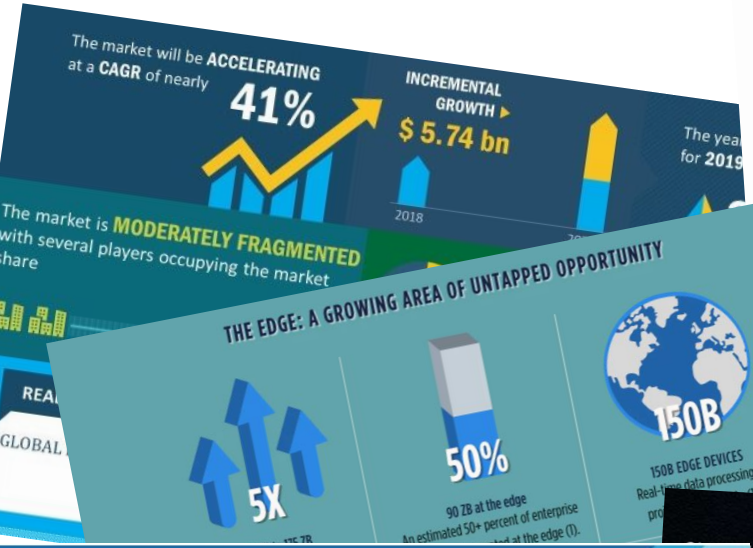
Why do you need AI?

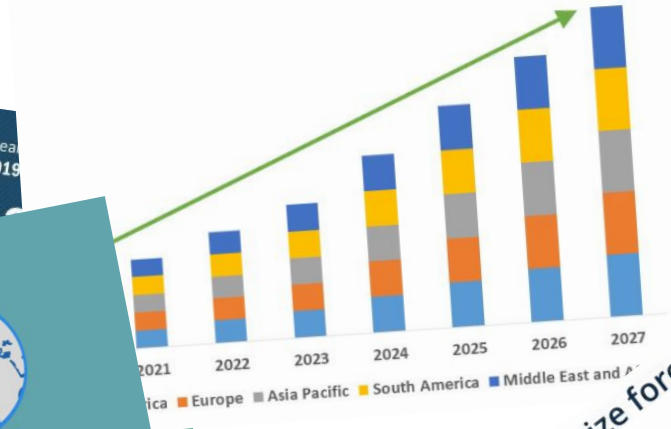
AI does not replace domain expertise.

Some problems are computationally expensive.

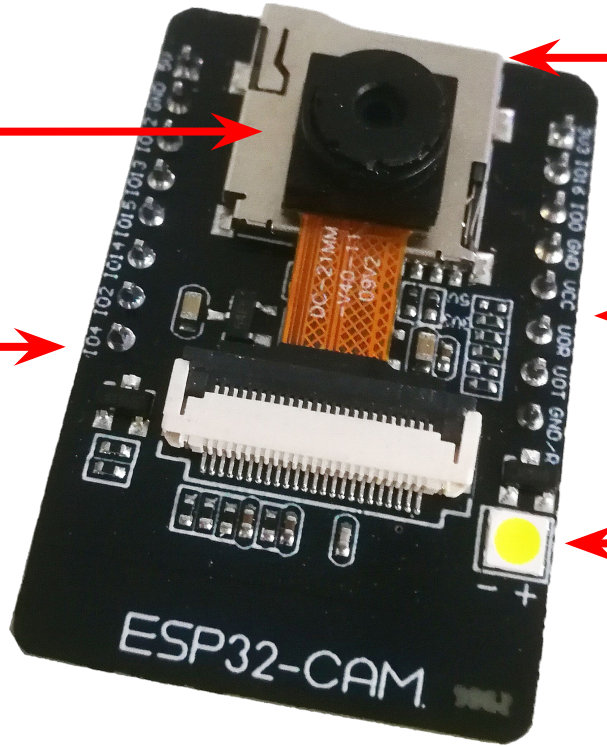
Garbage in, garbage out.

All these business graphs can’t be wrong





Hardware today: ESP32-CAM



SD Card Slot
(not used)

Cheap 2MPix camera
Omnivision OV2640

External IO
(not used)

Backside: ESP32

4 MB RAM
4 MB Flash
2 x Xtensa LX6@240MHz
Bluetooth, WIFI

“Flash” LED
(used to annoy people)

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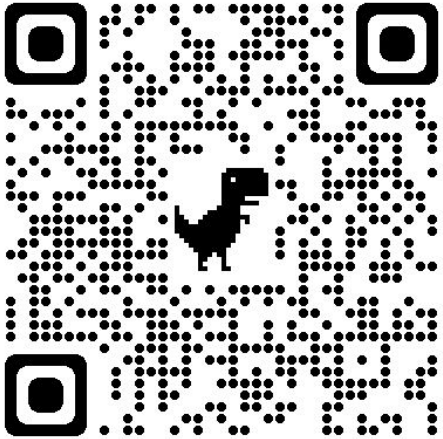
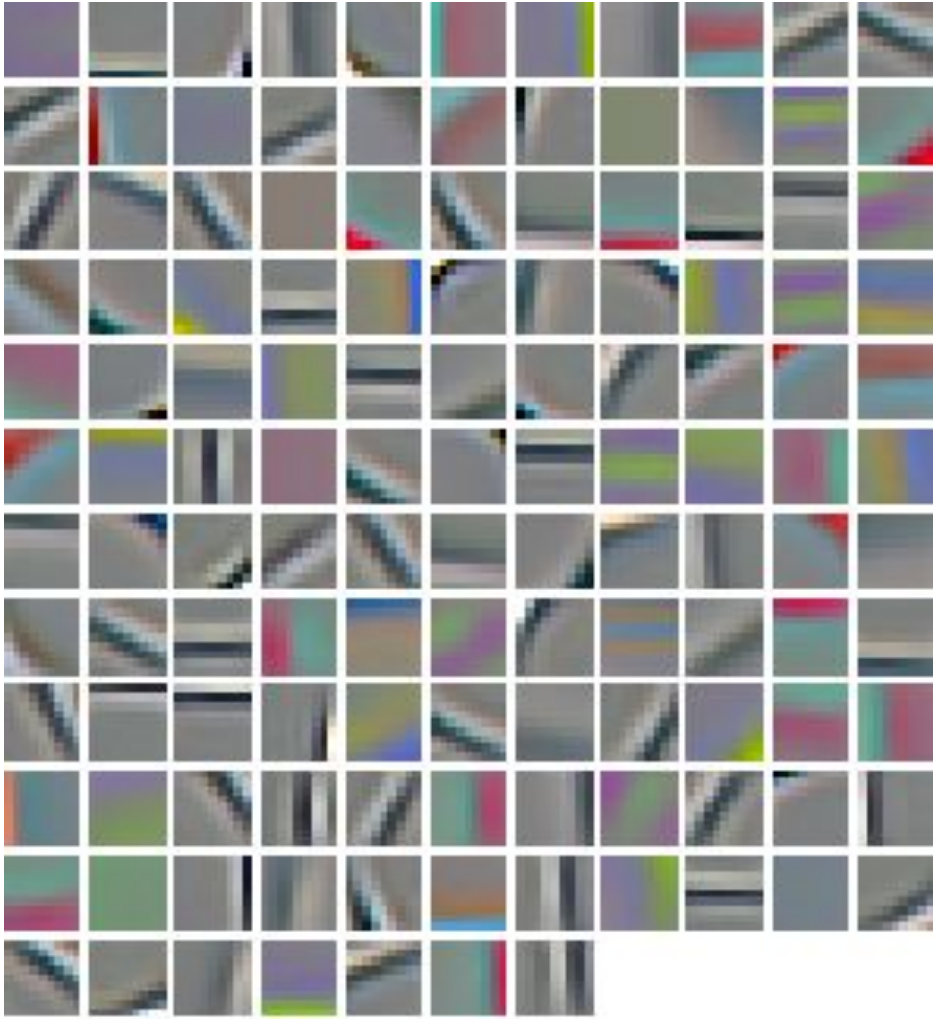
Let’s get started.



https://github.com/presseverykey/esp32cam-nn-example



https://www.researchgate.net/publication/267244277_Convolutional-Recursive_Deep_Learning_for_3D_Object_Classification

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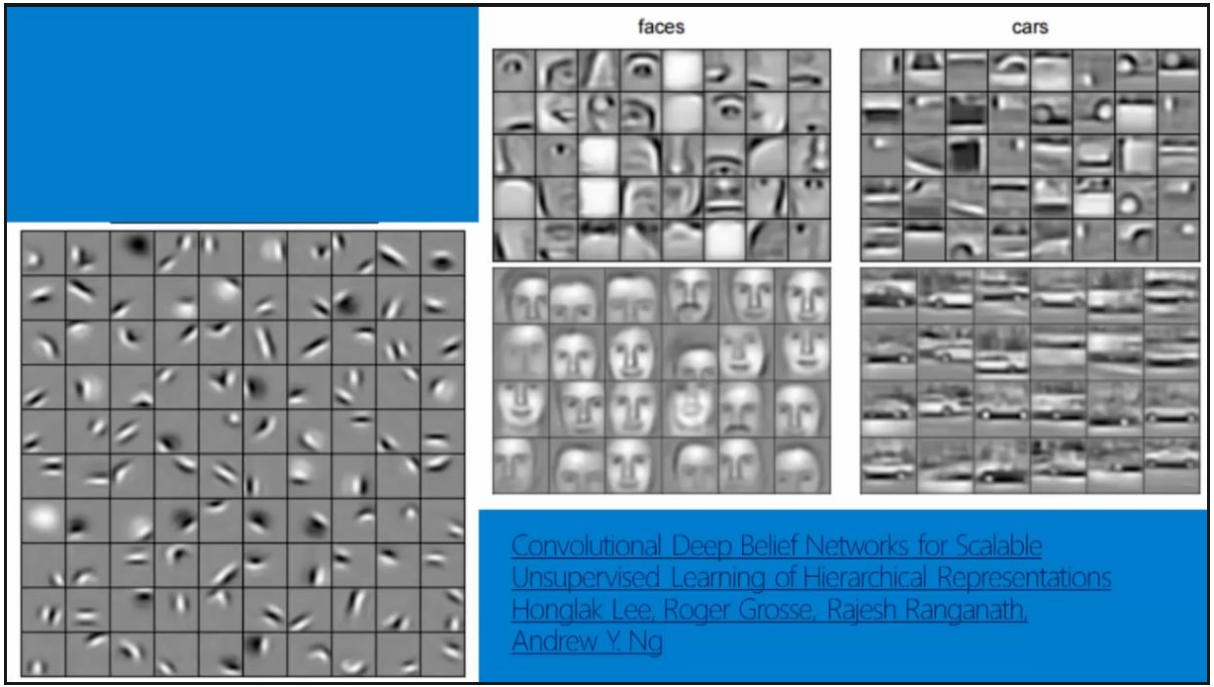

https://www.youtube.com/watch?v=FmpDIaiMIeA

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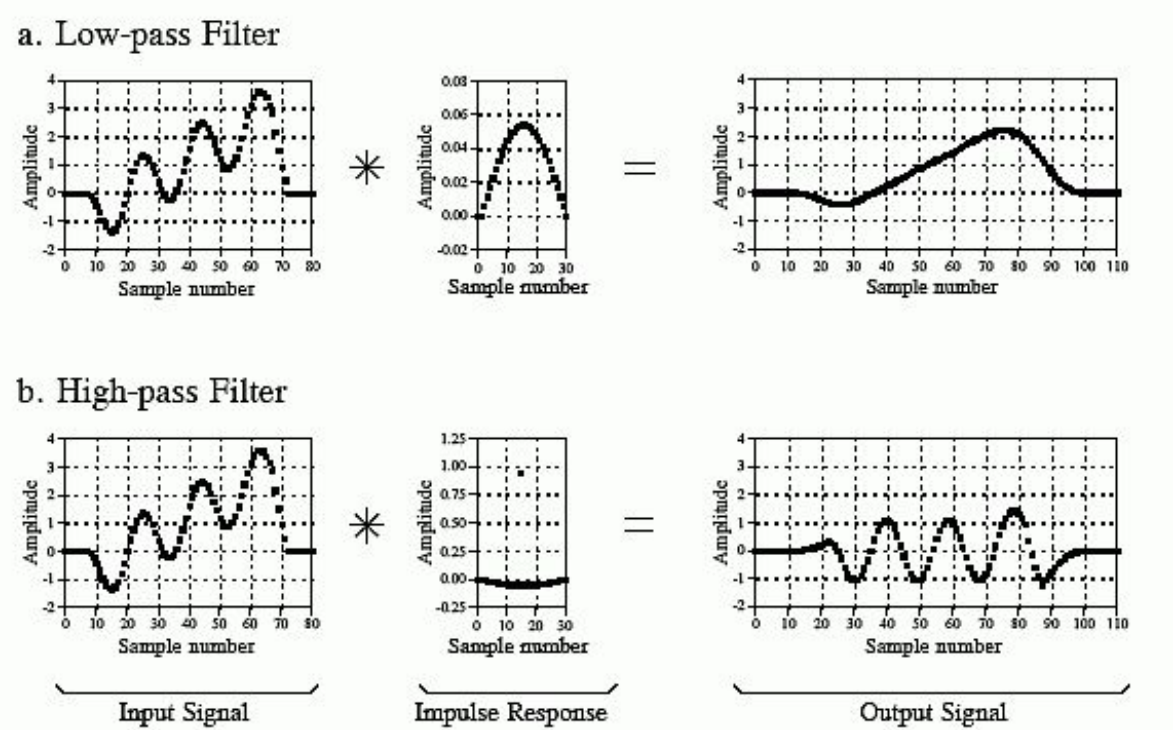

FIGURE 6-3
Examples of low-pass and high-pass filtering using convolution. In this example, the input signal is a few cycles of a sine wave plus a slowly rising ramp. These two components are separated by using properly selected impulse responses.

http://dspguide.com/ch6/2.htm

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AI model drawing images from any pro
AI on the Edge