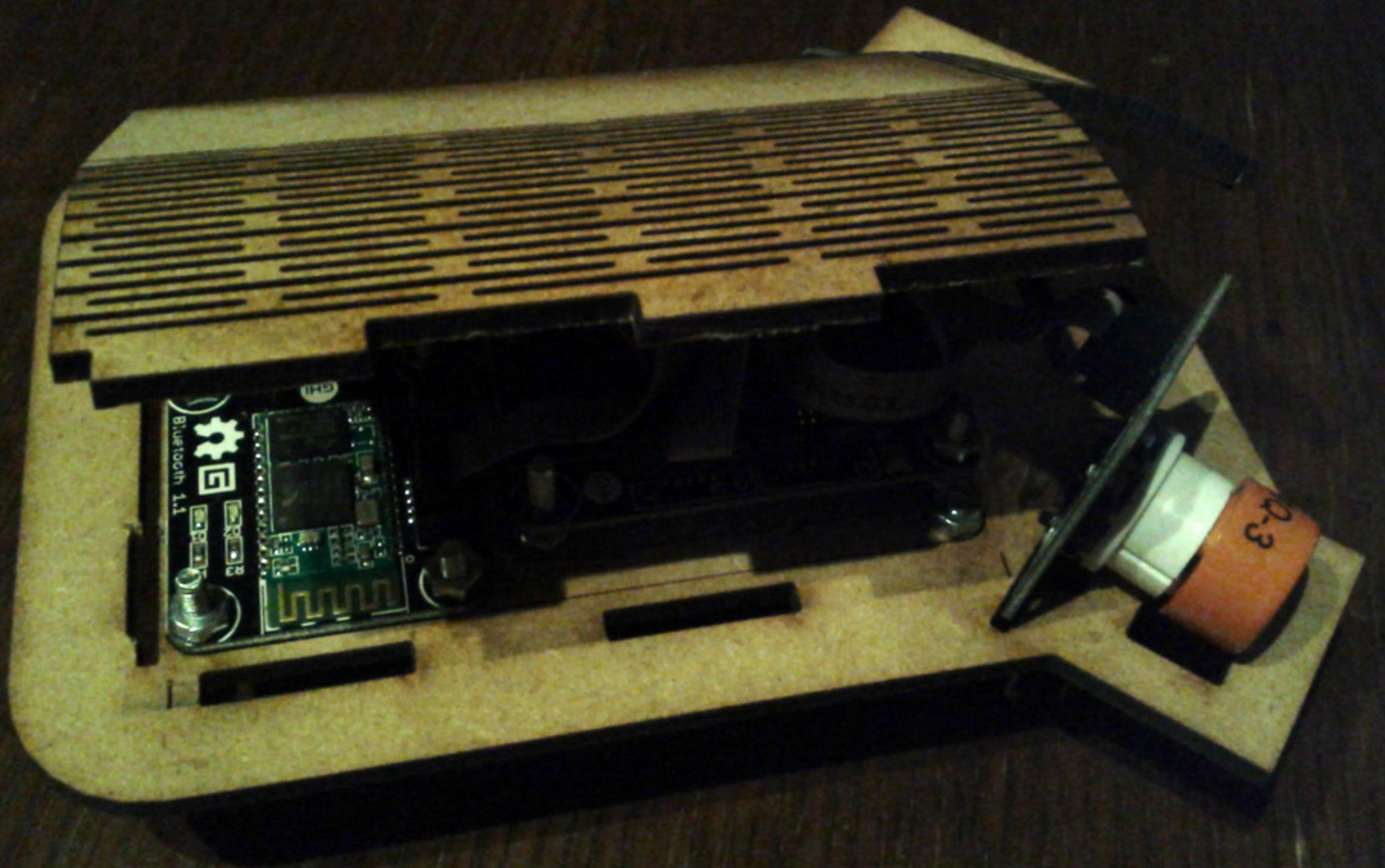


Cuno's Open Source Hardware for Microsoft Gadgeteer

@tamberg



<http://www.flickr.com/photos/tamberg/8660880803>

What

Cuno: My boss at **Oberon microsystems**, author of Getting Started with the Internet of Things

Gadgeteer: MS Research **conventions** to build independently extensible modular hardware

Mountaineer boards: Cuno's **open source hardware** mainboards for MS Gadgeteer

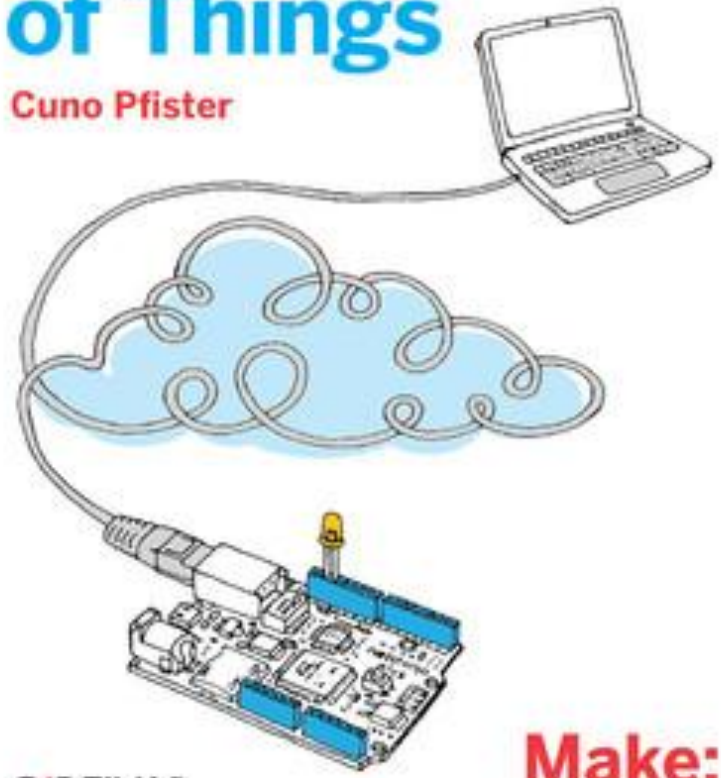


Make: PROJECTS

CONNECTING
SENSORS
AND MICRO-
CONTROLLERS
TO THE CLOUD

Getting Started with the Internet of Things

Cuno Pfister



O'REILLY

Make:
makezine.com

<http://gsiot.info/>

**Application
Layer**

User Applications & Libraries

**ClassLibrary
Layer**

Libraries

.NET

WPF

Comms

...

CLR

Execution
Engine

Type
System

Garbage
Collector

Interop

**Runtime
Component
Layer**

PAL

Timers

RAM

I/O

HAL

Drivers

or

OS

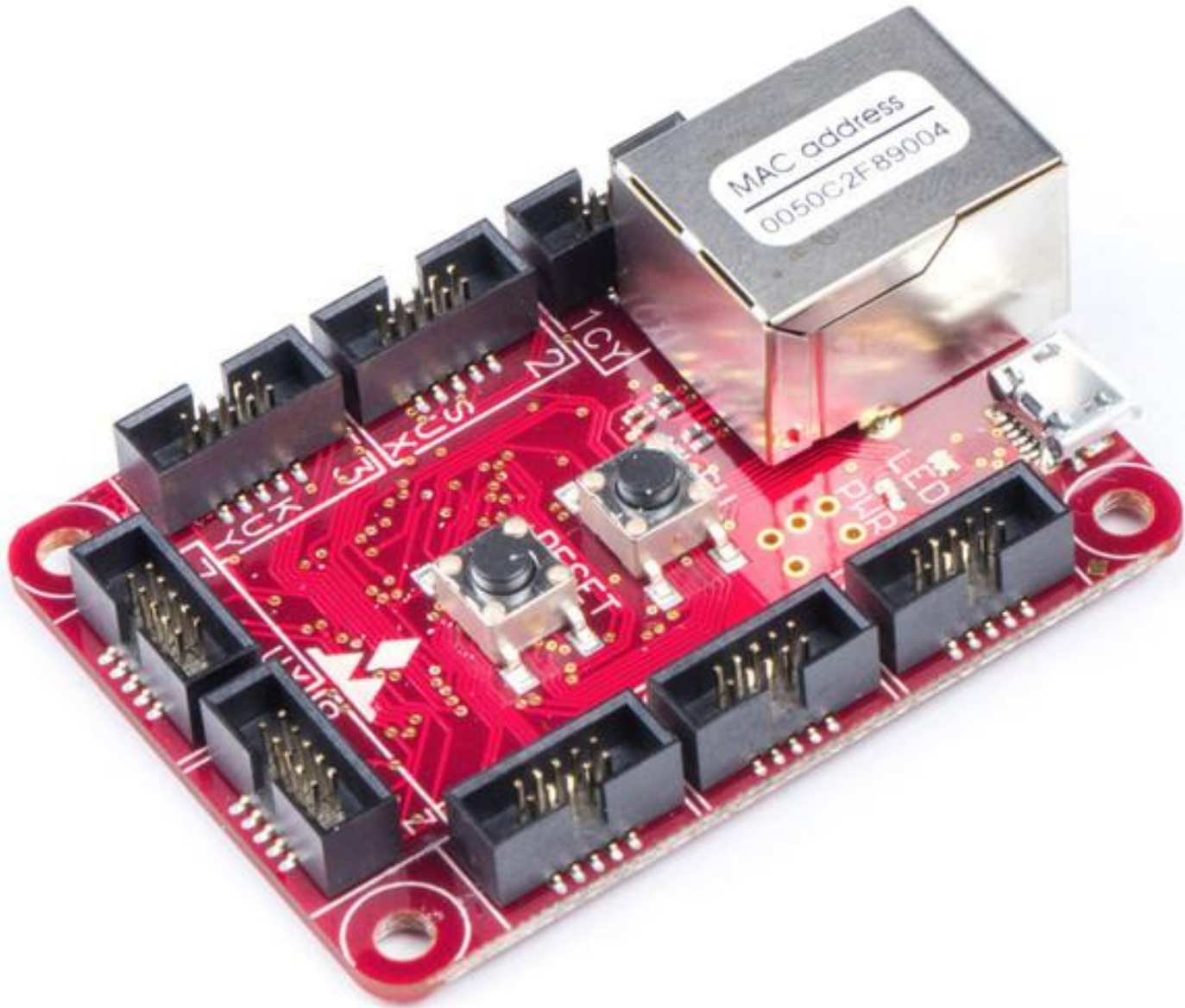
Facilities

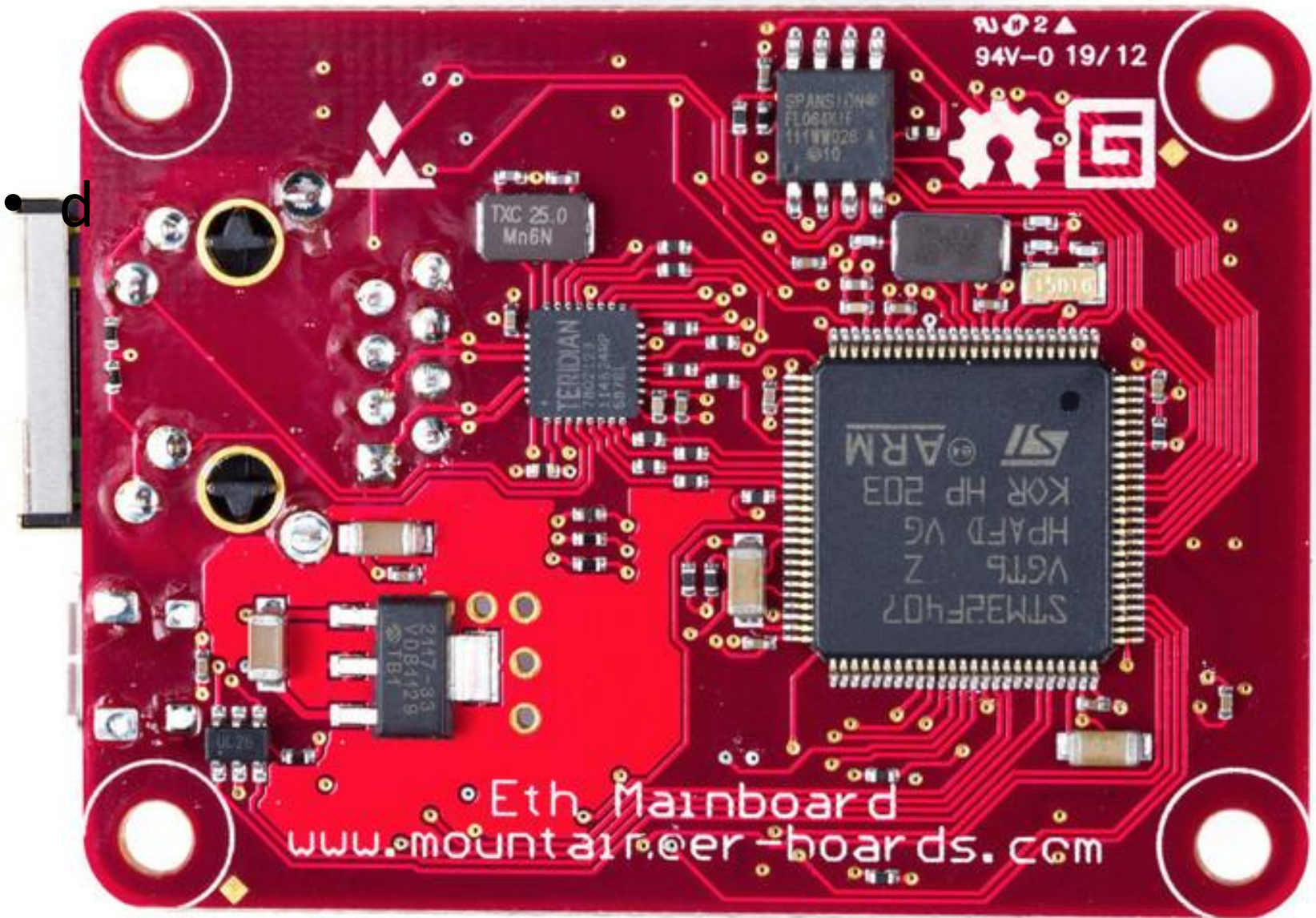
**Hardware
Layer**

Processor and Peripherals



<http://research.microsoft.com/en-us/projects/gadgeteer/>





94V-0 19/12

TXC 25.0
Mn6N

TERIDIAN
7802 L3
3.145 2A0P
S078L

SPANSION
FLASH
111W026 A
©10

ARM
STM32F407
VGT6 Z
HPAFD V6
KOR HP 203

Eth. Mainboard
www.mountaineer-boards.com

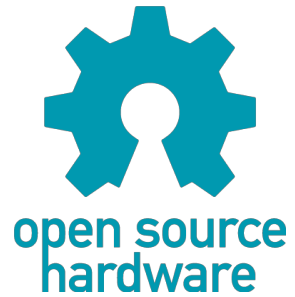
Why

Cuno: "needed own reference design anyway;
OSHW simplified collaboration; nice marketing"

Beat (Oberon's Woz): "**Technical challenge**"

Stefan (CSA Engineering): "Cuno; **demonstrating ARM/STM32 knowledge**; prototyping platform; available personal resources at the time"

How



Together with CSA Engineering in Solothurn

Collaboration **by handshake**, no contracts

2010: NETMF port for expensive ARM dev board

2011: NETMF **firmware** published as **Apache 2**

2012: **Board** schematics and layouts, **CC BY-SA**

Results

First ARM **Cortex M port** of NETMF; 3 others failed trying; now used by GHI, Secret Labs (Netduino), others; Cuno and Beat became part of core NETMF developer team

Small **Web shop** for CH, EU; **GHI** as US-producer, **licensee**

Projects by Oberon, CSA, others, **based on OSHW** design

Italian company **InnovActive** became 3rd member of Mountaineer group (equally committed to quality)

Learned

Cuno: "**Chip industry not easy** to approach, ST is a positive exception; **OSHW nice**, still a mystery"

Beat: "Biggest pain was **bad documentation**, had to study C source examples for many hours"

Stefan: "Integrating lwIP stack was hard; we're a service company, **had to learn to sell products**"

More

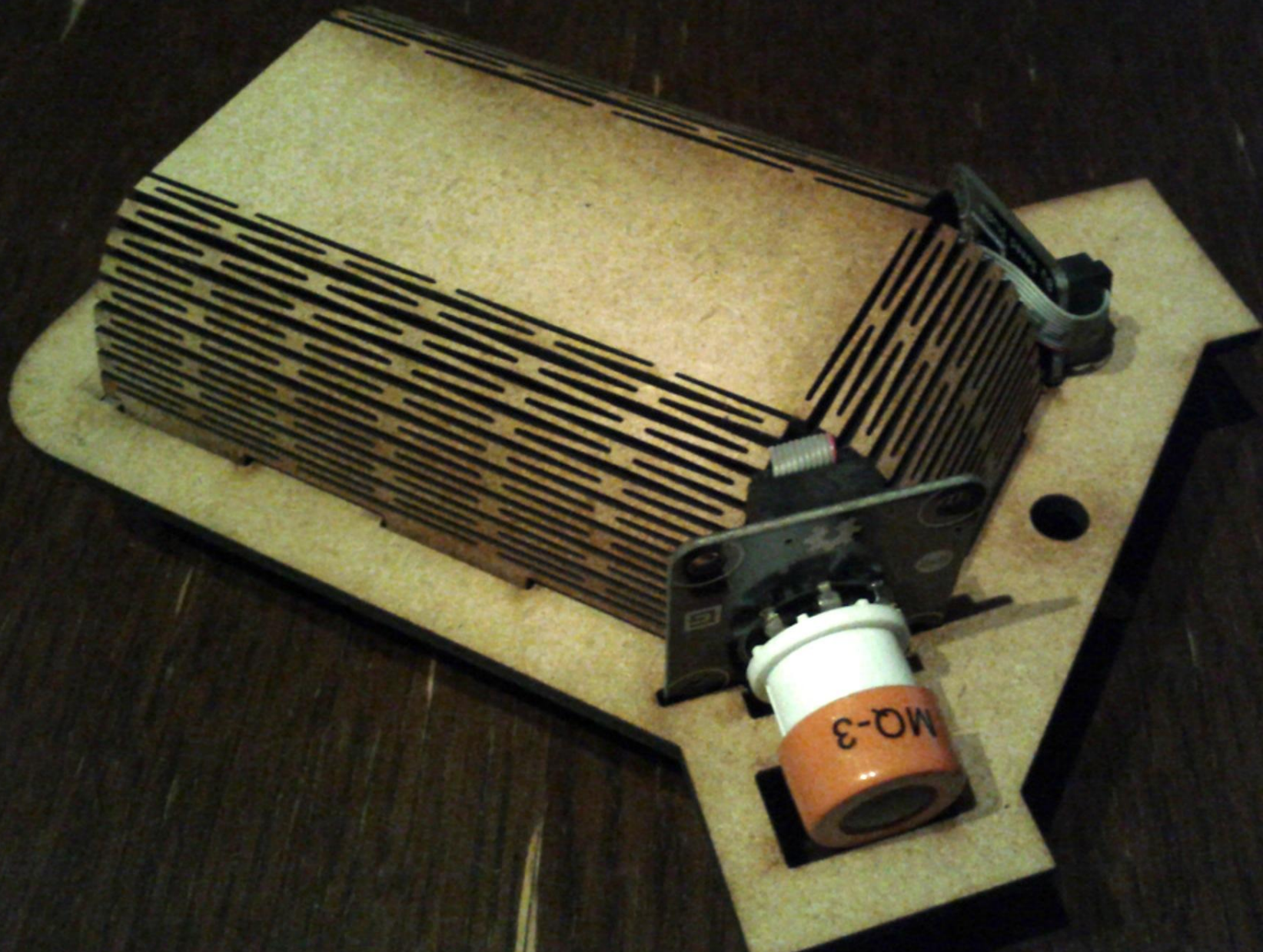
<http://mountaineer.org/>

<http://netmf.codeplex.com/>

<http://gadgeteer.codeplex.com/>

<http://goo.gl/7QcEH> (NETMF for STM32 details)

tamberg@yaler.net



<http://www.flickr.com/photos/tamberg/8660880951>