

# MEF 2023

2023-11-30, 13:00 – 17:00

# Agenda

- 13:00 - 13:15: Arrival and coffee/tea
- 13:15 - 13:30: Introduction to participants
- 13:30 - 13:45: Update from the board
- 13:45 - 14:15: Planned changes to "Main Profiles" the last 2 years of the Masters at NTNU
- 14:30 – 15:15: Presentation from each of the participants: One slide on "What project/master/Ph.D research is <insert organization/professor> interested in?"
- 15:30 - 16:15: Discuss what could be the top 5 strategic research topics
- 16:30 - 17:00: How can industry help make NTNU best in the world on the top 5 strategic research topics?
- 17:30 – 20:00: Middag på Una (<https://unapizzeria.no/no/meny>)

13:15 - 13:30: Introduction  
to participants

13:30 – 13:45: Update from  
the board

# Who 2023

- Professors in integrated circuits
- Industry that makes integrated circuits

# Why Microelectronicsforum NTNU

- Award best master in microelectronics at NTNU
- Idea development and a discussion forum for professors and industry, with focus on project and bachelor/master assignments
- Increase recruitment to microelectronics (both get more students to select microelectronics during their studies, and to increase the number of students that starts at NTNU)
- Increase gender diversity within microelectronics
- Popularize what microelectronics is used for

## Board (2022 – 2023)

- Chair: Carsten Wulff (Nordic Semiconductor)
- Secretary: Per Gunnar Kjeldsberg (NTNU)
- Board member: Marius Ubostad (Texas Instruments)
- Board member: Øystein Gjermundes (Arm)

# Recommendations to Industry

- Don't ask NTNU for too specialized skills
- Try to avoid Master/Bachelor/Project proposals that require confidentiality



# MEF 2022

Meeting Notes <https://www.ntnu.no/wiki/display/ntnumef/2022-12-01+--+MEF+2022>

Highlighted actions	
Guest lecture topic requests	<a href="https://www.ntnu.no/wiki/display/ntnumef/Guest+Lectures">https://www.ntnu.no/wiki/display/ntnumef/Guest+Lectures</a>
Wheel of the year	<a href="https://www.ntnu.no/wiki/display/ntnumef/Wheel+of+the+year">https://www.ntnu.no/wiki/display/ntnumef/Wheel+of+the+year</a>
“Build on the shoulder of giants”	Topic for this MEF

<https://www.ntnu.no/wiki/display/ntnumef/NTNU+Mikroelektronikkforum+Home>

# <https://www.ntnu.no/ies/mikroelektronikkforum>

## Mikroelektronikkprisen

Årlig siden rundt årtusenskiftet har «Bladet Elektronikk og Mikroelektronikkforums pris for beste masteroppgave innen mikroelektronikkonstruksjon ved Institutt for elektroniske systemer, NTNU» blitt delt ut til en verdig vinner. Prisen består av et diplom og en sjekk på 15.000 kroner. I tillegg får vinneren mulighet til å skrive en artikkel om arbeidet sitt i fagbladet [Elektronikk](#). Nedenfor listes vinnerne de ulike år, inkludert lenker til omtaler, artikler og masteroppgaver der dette er tilgjengelig. Listen er beklageligvis ikke komplett fra de første årene. Nederst på siden er statuttene til prisen beskrevet.

Gratulerer til alle vinnere og takk til norske mikroelektronikkbedrifter for støtte til prisen opp gjennom årene. Hvem blir neste vinner?



Fra prisutdeling februar 2022.

Foto: Julie Schult

Master's thesis

Martin Ericsson

### Fish-farm Integrated Sensor Cluster: Environmental and Biological Surveillance in Fish-farming Aquaculture with Emphasis on Sensor Fusion

Master's thesis in Electronic Systems Design  
Supervisor: John R. Potter  
Co-supervisor: Arild Søråunet  
May 2022



## Prisvinnere

År	Prisvinner	Oppgavens tittel / Artikkel / Omtale av prisen
2022	Martin Ericsson	<a href="#">Fish-farm Integrated Sensor Cluster: Environmental and Biological Surveillance in Fish-farming Aquaculture with Emphasis on Sensor Fusion</a>
2021	Fredrik Esp Feyling	<a href="#">Design Considerations for a Low-Power Control-Bounded A/D Converter</a> / Et nytt perspektiv på analog-til-digital omforming / Mikroelektronikkprisen 2021 til masteroppgave om nytt konsept for AD-omforming
2020	Andres Mondragon Clavijo	<a href="#">Distributed acoustic acquisition with low-cost embedded systems</a> / Et første skritt mot lavkost distribuert akustisk datafangst / Mikroelektronikkprisen 2020 - Masteroppgave om akustisk målesystem
2019	Fredrik	<a href="#">Real-time synchronization of data streams in low-power ECG and PPG sensors /</a>

# Key Financial Figures 2023

	2023 (budsjett)	2023 (regnskap)	2024 (budsjettforslag)
På konto 1/1-2023	24 898	24 898	65 648
Kontingenter	67 500	67 500	67 500
Mikroelektronikkprisen	- 20 000	- 15 000	-20 000
E&T-dagen	- 1 000	- 750	-1 000
Diverse	0	0	0
Publisering	-40 000	- 11 000 <sup>1</sup>	-45 000
Resultat	6 500	40 750	1 500
På konto	31 398	65 648	67 148

1: Foreløpig anslag

# Proposal for board (2023 – 2024)

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Other suggestions?

# Volunteer to evaluate best master 2023

- 2020: Nordic
- 2021: TI
- 2022: Microchip
- 2023: Ideas

13:45 - 14:15: Planned changes  
to "Main Profiles" the last 2  
years of the Masters at NTNU

14:15 – 14:30: Break

14:30 - 15:15: What  
project/master/Ph.D research is  
<insert organization/professor>  
interested in?



# Format

- PostIT where we write down keywords for research topics while others present
- All PostITs go up on a whiteboard before break

# Carsten Wulff

*I'd love to simplify analog integrated circuit design*

**Students (Ph.D/Master/Project):** Ranging algorithms and channel sounding, analog integrated sensors, analog to digital converters, radio communication integrated circuits and mixed-signal circuits.

**Research focus:** How may we orchestrate the symphony of an analog artisan's mind, harnessing the ethereal artistry of automagical alchemy, to generate state-of-the-art analog integrated circuits?



*Educator, programmer and analog designer*

[Google Scholar](#)

<https://analogicus.com/markdown-cv>

<https://www.youtube.com/@analogicus>

<https://github.com/wulffern>

Associate Professor @ NTNU (20%)

[TFE4188 – Advanced Integrated Circuits](#)

[carstenw@ntnu.no](mailto:carstenw@ntnu.no)

IC Scientist @ Nordic Semiconductor (100%)

[carsten.wulff@nordicsemi.no](mailto:carsten.wulff@nordicsemi.no)

## Project/master/Ph.D research areas

Low power analog circuits (OSC, PLL, VREG, ADC, DAC, LNA, PA, MIX, DC/DC, TEMP)

High efficiency dynamic compute (CPUs, RISC-V)

Low power AI/ML at edge

Physical security countermeasures for ICs



Employees: ~ 1500

Revenue (BUSD): 0.4 (2020), 0.6 (2021), 0.8 (2022), 0.6? (2023)

***Low power wireless microcontrollers,  
and supporting ICs***

nRF5x: Bluetooth LE, 802.5.14

nRF7x: WiFi

nRF9x: LTE, NB-IoT, NR+

nPMxx: Power Management IC

nRF21: Range Extenders



15:15 – 15:30: Break

Board sorts and taxonomizes the PostITs

15:30 - 16:15: Discuss what  
could be the top 5 strategic  
research topics

# Format

- First vote on top 5 topics
- Discuss, and advocate for topics that did not make the top 5 list
- New vote on top 5

16:15 – 16:30: Break



16:30 – 17:00: How can industry  
help make NTNU best in the world  
on the top 5 strategic research  
topics?

CACHES  
NETWORK  
ON  
CHIP  
(ARM)

COMPUTE  
- CPU  
- GPU  
- ML  
(ARM)

High Efficiency  
COMPUTE  
(RISC-V)

Micro FPGA

Energy efficient  
dynamic systems

RISC-V

~~||||~~

Low power  
AI/ML at edge

Semi

Low power

AI

ML - RCA,  
Yield analyse

→ compression  
→ AI - milde behandeling

ML pi  
kant noden

Sony

- CNN/AON
- object detection / recognition

LOW-POWER

ML

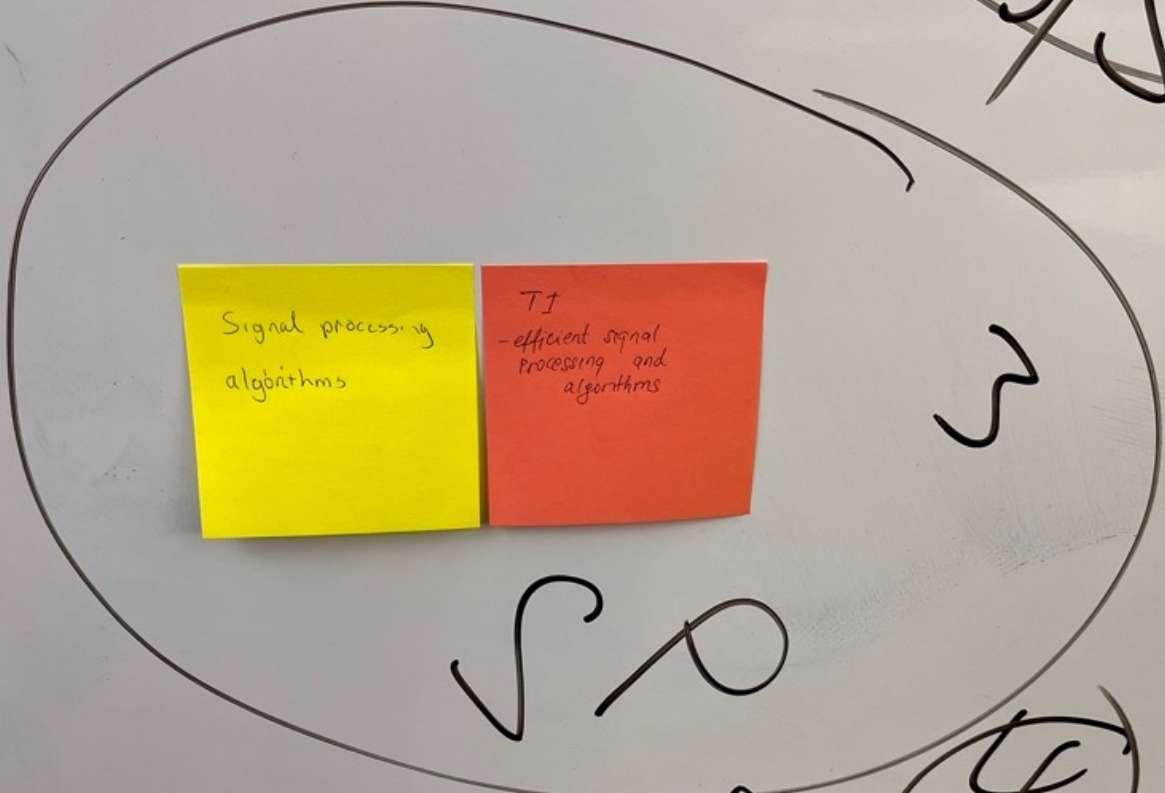
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Signal processing  
algorithms

TJ  
- efficient signal  
processing and  
algorithms

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# LP

ADC

Low Power  
ANALOG

- Smart
- Verksamhet
- Low Power
- Kraftfullhet

Forskning på  
den ~~alla~~  
ultra low-voltage  
/ low power  
kombinationer av  
minne har  
användbara

Low power  
Designs

low-effekt  
analog & digital

LOW  
POWER  
(HIGH PERFORMANCE)  
(ARM)

SENSOR  
UTLESNING

# SEC

5

SECURITY  
(SAFETY)  
(AMM)

ON-CHIP  
KRYPTERING

IC  
MARKNAD

Physical security  
countermeasures  
for ICs

IDEAS

- on chip encryption
- on-board video processing

Energy-effektiv  
cybersikkerhet

leakage based  
power analysis  
attack  
resilient  
building blocks

Sikkerhet /  
sidekanal beskyttelse

SINGLE CHIP  
SPORBARHET

X

Trädlose nätverk

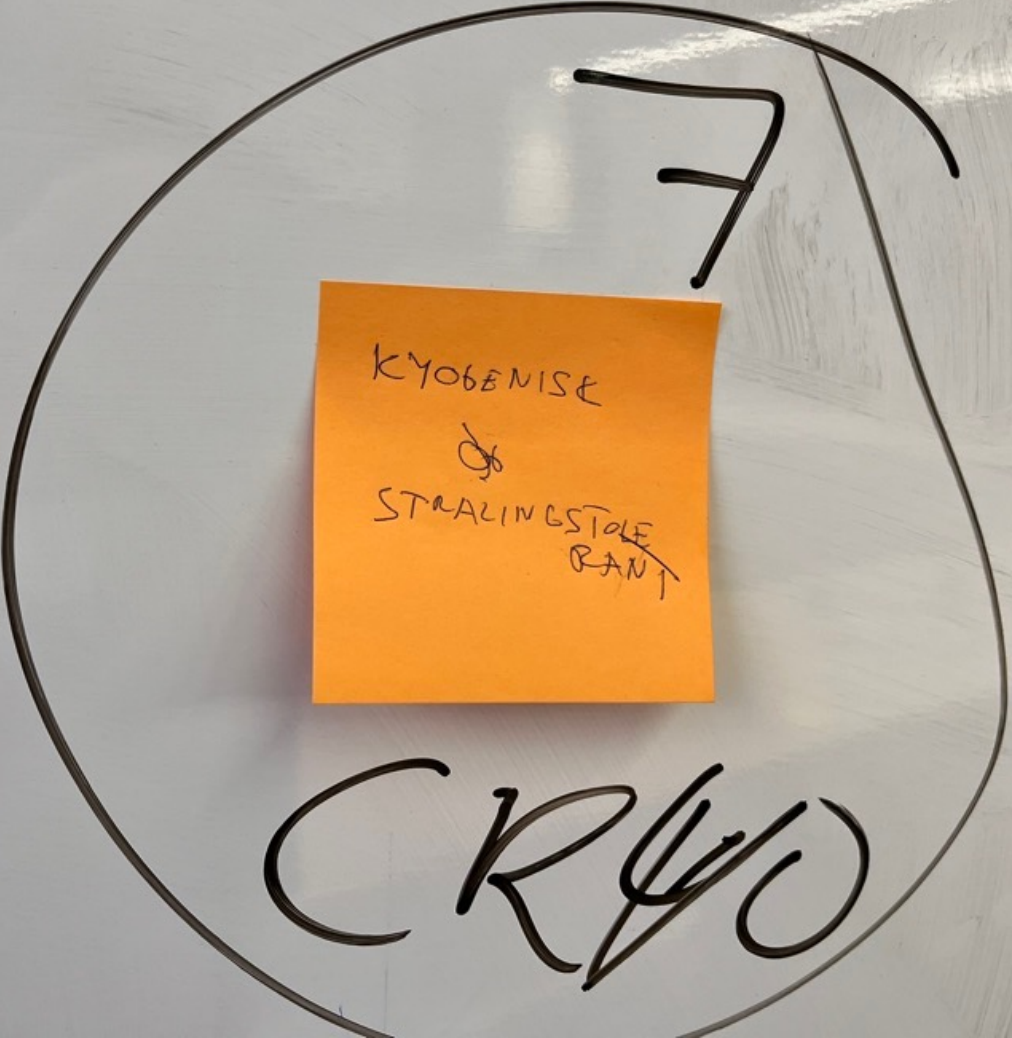
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WIRLS

p  
134



Handwritten scribbles in the top left corner, including a large 'A' and some illegible marks.



Handwritten number '7' inside the circle, positioned above the orange sticky note.

Handwritten text on an orange sticky note:  
KYOBENISE  
✕  
STRALINGSTOLE  
RANT

Handwritten word "CRYO" inside the circle at the bottom.



Sys Eng

System  
nivå modellering

VERIFIKASJON  
AV STORE  
MIXED SIGNAL  
SYSTEMER

VERIFIKASJON  
OF MIXED SIGNAL  
CIRCUITS

Mixed-signal  
metodikk og  
selv-sjekkning

Mixed signal

SYSTEMS  
ENGINEERING

Robust complex  
designs verification

DESIGN &  
VERIFIKASJON  
METODIKK



~~MS~~

# Format

- 5 minute for individual reflection
- 25 minute discussion