

**UiO** : **Institutt for teknologisystemer**  
Det matematisk-naturvitenskapelige fakultet

# **Welcome to UiO Department for Technology Systems (ITS)**

August 2020  
Stian Løvold  
Head of department



# Program

## Thursday 13 August

10:00 – 10:30 –	Presentation of ITS	Stian Løvold
10:30 – 11:00 –	Presentations in separate rooms	Sabrina Sartori/Paal Engelstad
11:00 – 11:30 –	Student information	Ida/Kaja
11:30	Questions	Ida/Kaja
11:45	Lunch outside	
12:30	Tour of the house	
13:00 →	Mentor-students take over	

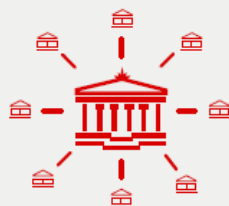
## Friday 14. August

10:00 – 12:00	Games and quiz outside	Emil
12:00 – 13:00	Lunch	

## Presentation of ITS

- UiO and Faculty of Mathematics and Natural Sciences
- The Kjeller Research Park
- Department of Technology Systems
  - Staff
  - Some research topics
- SARS-CoV2 and COVID-19 prevention measures
- Questions?

# UiO in brief



**8**  
faculties

Our breadth is our strength.  
New possibilities and solutions arise  
when knowledge from different subject  
areas and disciplines meet.



**28,007**  
students

Of these students, around 14,500 are  
at the bachelor's level, 6,400 are at the master's  
level and 7,000 are in professional programmes  
and integrated master's programmes.



**6,609**  
full-time equivalents

Three-quarters of our staff are  
in research and teaching positions,  
the rest are support or administrative  
personnel.

**2**  
museums



Study abroad  
award  
1<sup>st</sup> place



**2,000**  
events

2,000 events – debates, seminars  
and conferences – arranged by UiO  
are open and free to all.



UiO was ranked as the world's 67<sup>th</sup> best  
university, Europe's 24<sup>th</sup> best university  
and Norway's best university in 2016.  
*Shanghai Ranking of World Universities*



**5**

**Nobel Prize  
winners**

Fridtjof Nansen  
*Peace Prize,*  
1922  
Odd Hassel  
*Chemistry, 1969*

Ragnar Frisch  
*Economics, 1969*  
Ivar Giæver  
*Physics, 1973*  
Trygve Haavelmo  
*Economics, 1989*

## Det matematisk-naturvitenskapelige fakultet – Some numbers and highlights

- 6000 students (bachelor, master)
  - 50/50 natural sciences and technology courses
- 800 PhD-students
- 2000 employees
- Turnover 1,9 billion NOK
- 40% of funding from external resources (EU & NFR & Industry)
- 200 active projects partners in industry and public sector
- Extensive international activity
  - The Panorama strategy
  - The Guild network
  - .....



### Grant highlights

- 20 ERC-grants
- 4+4 Centre of excellences (SFF)
- 2+ (?) SFIs
- 1 SFU
- 2 Nordic Centre of Excellence
- 25% of free NFR-research grants (FRIPRO)
- 3 of 3 NFR lighthouse projects (ICT)

# Science and technology at UiO (MatNat)

Life sciences

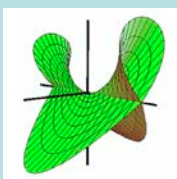
Earth and space sciences

Energy and material sciences

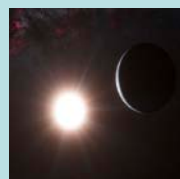
Digitalization and computational science



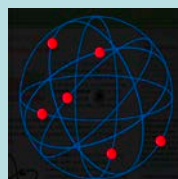
Informatics



Mathematics



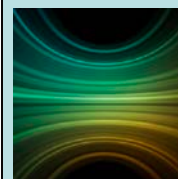
Astro-  
physics



Physics



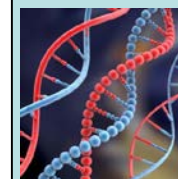
Geo-  
sciences



Chemistry



Pharmacy



Bio-  
sciences



Technology  
systems

Science Library

Natural History  
Museum

Norwegian Centre for  
Science Education

Centre for Molecular  
Medicine Norway



## An interdisciplinary research and education program



### Materials for Energy

New materials for more sustainable and efficient energy use



### Energy Systems

New energy systems to balance the multitude of energy sources and to optimize energy use



### Energy Transition and Sustainable Societies

New knowledge about societal, political and judicial aspects to accelerate the transition to a low-carbon society



### Carbon Capture, Usage and Storage

Improved technologies to reduce CO<sub>2</sub> emissions from fossil fuels and CO<sub>2</sub> as feedstock

# Kjeller science park and Lillestrøm

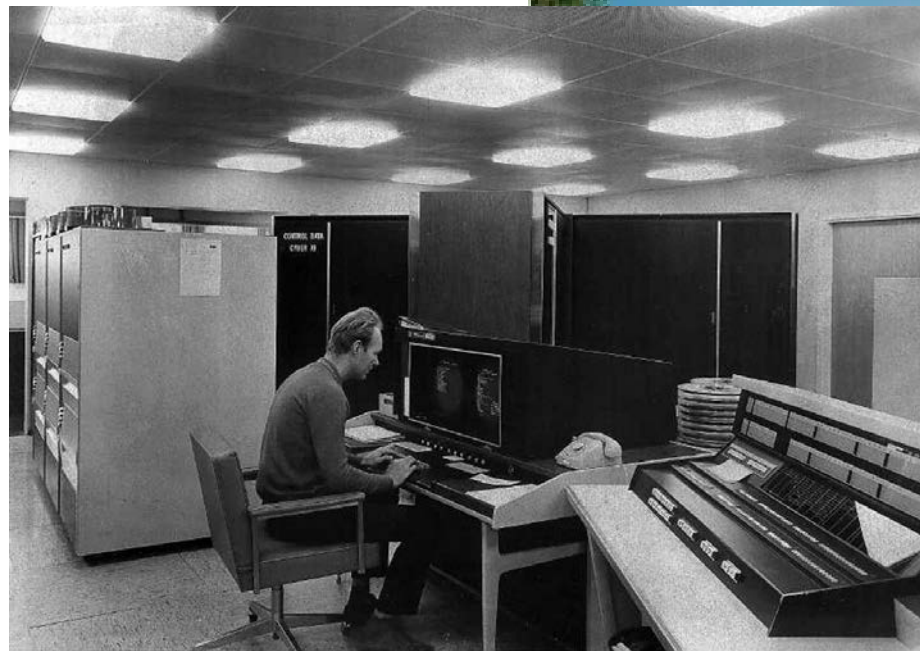
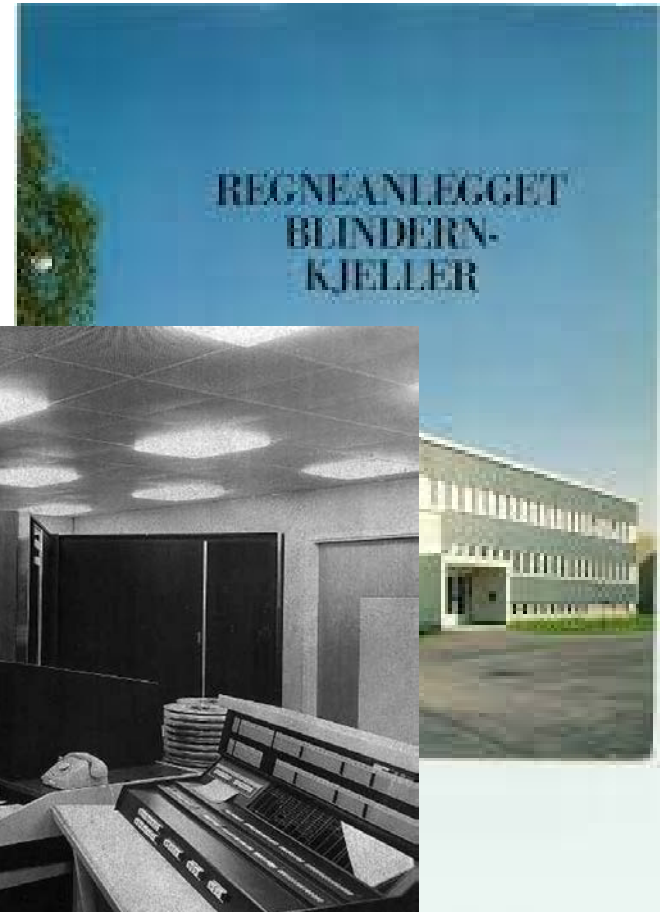




# Kjeller airport 1913

- Kjeller aircraft factory





Cyber-74: 132 kByte (60 bits) memory  
+ 4 disc stations with 118 MByte storage

# Kjeller and the Internet

1973:  
Internet til  
Europa via  
Norge

**BIRTH OF THE INTERNET**

THE ARCHITECTURE OF THE INTERNET AND THE DESIGN OF THE CORE INTERNETWORKING PROTOCOL TCP (WHICH LATER BECAME TCP/IP) WERE CONCEIVED BY VINTON G. CERF AND ROBERT E. KAHN DURING 1973 WHILE CERF WAS AT STANFORD'S DIGITAL SYSTEMS LABORATORY AND KAHN WAS AT ARPA (LATER DARPA). IN THE SUMMER OF 1976, CERF LEFT STANFORD TO MANAGE THE PROGRAM WITH KAHN AT ARPA.

THEIR WORK BECAME KNOWN IN SEPTEMBER 1973 AT A NETWORKING CONFERENCE IN ENGLAND. CERF AND KAHN'S SEMINAL PAPER WAS PUBLISHED IN MAY 1974.

CERF, YOGEN K. DALAL, AND CARL SUNSHINE WROTE THE FIRST FULL TCP SPECIFICATION IN DECEMBER 1974. WITH THE SUPPORT OF DARPA, EARLY IMPLEMENTATIONS OF TCP (AND IP LATER) WERE TESTED BY BOLT BERANEK AND NEWMAN (BBN), STANFORD, AND UNIVERSITY COLLEGE LONDON DURING 1975.

BBN BUILT THE FIRST INTERNET GATEWAY, NOW KNOWN AS A ROUTER, TO LINK NETWORKS TOGETHER. IN SUBSEQUENT YEARS, RESEARCHERS AT MIT AND USC-ISI, AMONG MANY OTHERS, PLAYED KEY ROLES IN THE DEVELOPMENT OF THE SET OF INTERNET PROTOCOLS.

**KEY STANFORD RESEARCH ASSOCIATES AND FOREIGN VISITORS**

VINTON CERF

DAO BELSNES	JAMES MATHIS
RONALD CRANE	BOB METCALFE
YOGEN DALAL	DARRYL RUBIN
JUDITH ESTRIN	JOHN SHOCH
RICHARD KARP	CARL SUNSHINE
GERARD LE LANN	KUNINOBU TANNO

DARPA

ROBERT KAHN

**COLLABORATING GROUPS**

**BOLT BERANEK AND NEWMAN**  
WILLIAM PLUMMER · GINNY STRAZISAR · RAY TOMLINSON

**MIT**  
NOEL CHIAPPA · DAVID CLARK · STEPHEN KENT · DAVID P. REED

**NDRE**  
YNGVAR LUNDH · PAAL SPILLING

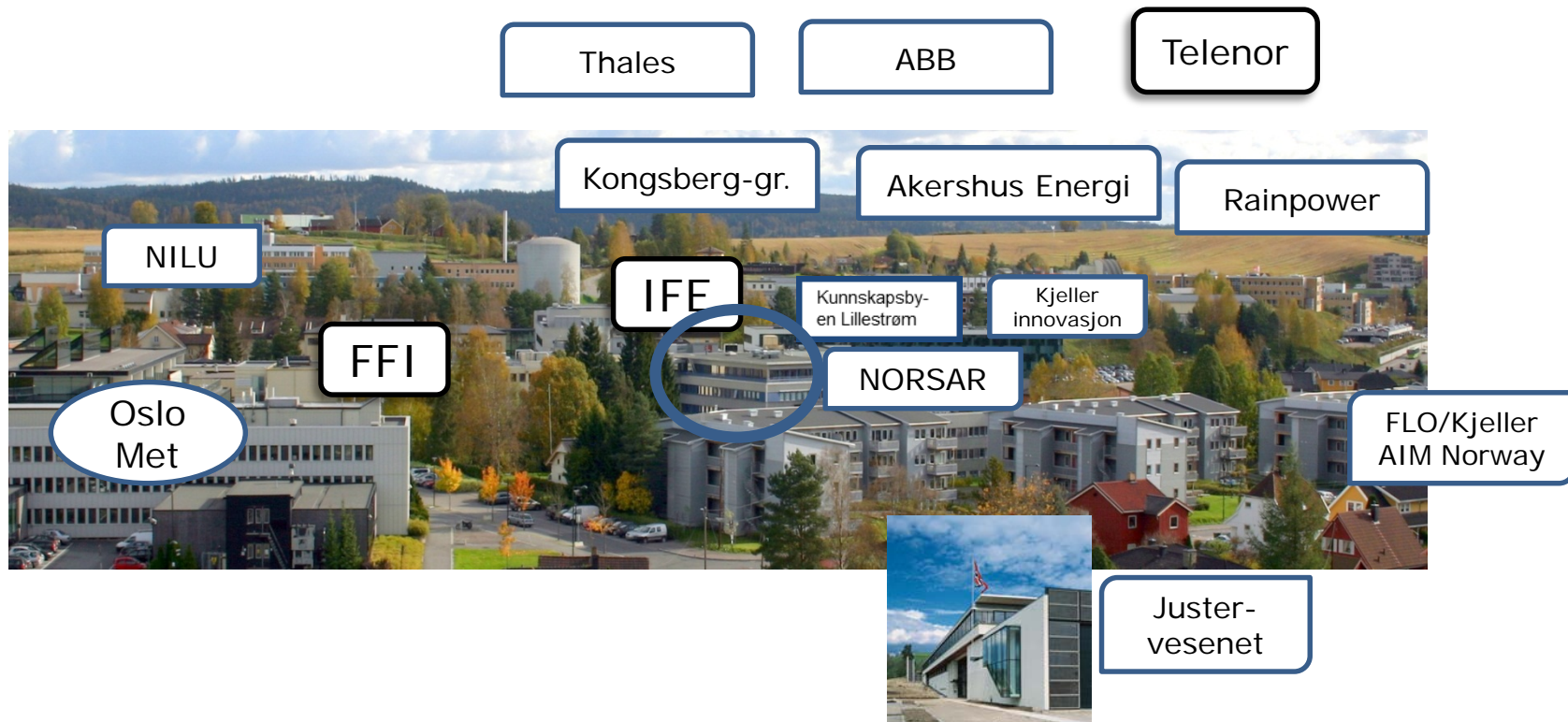
**UNIVERSITY COLLEGE LONDON**  
FRANK DEIGNAN · MARTINE GALLAND · PETER HIGGINSON  
ANDREW HINCHLEY · PETER KIRSTEIN · ADRIAN STOKES



1994:  
Opera  
Software

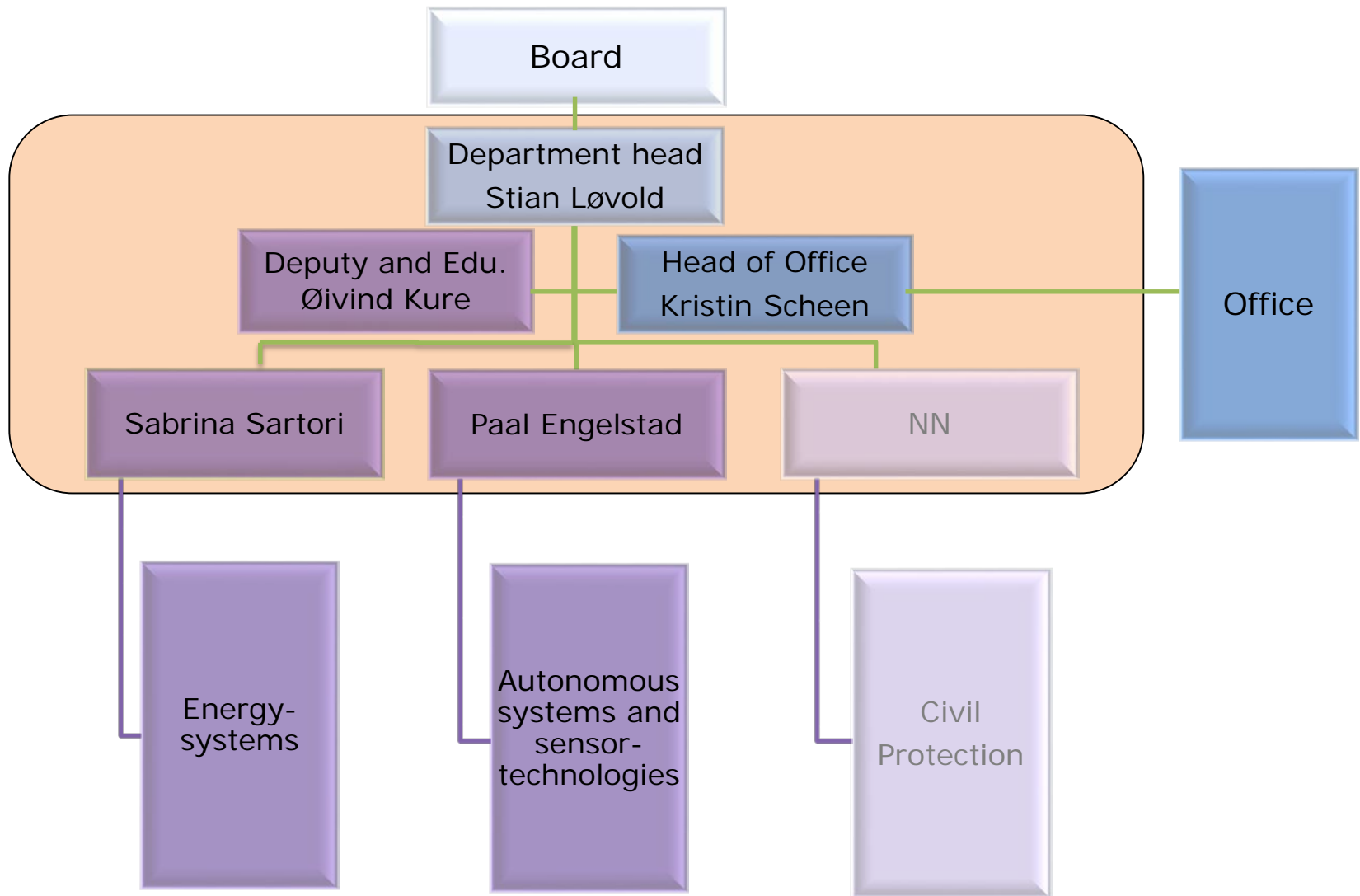


# Kjellermiljøet



# UiO : Institutt for teknologisystemer

Det matematisk-naturvitenskapelige fakultet





## ITS full-time scientific staff



Professor  
Paal Engelstad  
IKT



Professor  
Øivind Kure  
IKT



Professor  
Svein-Erik Hamran  
Radar



Professor  
Torbjørn Skauli  
Optics



Assoc. Professor  
Sabrina Sartori  
Energi-systemer



Assoc. Professor  
*Marianne Zeyringer*  
Energy Systems



Lektor  
Matylda Guzik  
Energi-systemer



Professor  
Josef Noll  
IKT



Professor  
Aasmund Sudbø  
Opto-elektronikk

## Administrativt ansatte



Stian Løvold  
Instituttleder



Kristin Scheen  
Kontorsjef



Arild  
Hemstad  
IT-leder



Kaja  
Mosserud-  
Haavardsholm  
Studieleder



Hellfrid Opsahl  
Newman  
Rådgiver



Tuhta Ismailova  
Seniorkonsulent



Mette Johnsrud  
Rådgiver



Ida Rydning  
Studiekonsulent



Marit Larsen  
Studiekonsulent

- and ca. 40 «adjuncts» / ca. six manyears (+ two «emeritus»)





## Centre for Research-based Innovation (SFI): Centre for Space Sensors and Systems (CENSSS)

CENSSS will address challenges and opportunities in the science, technology and business of "New-Space" satellite systems for Earth Observation, as well as of Space Exploration (to the Moon and Mars), by focusing on novel sensors and sensor systems,



UiO :

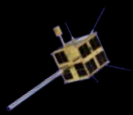


(Image credit ispace)

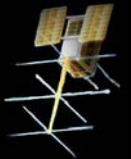




# Mikrosatellitter

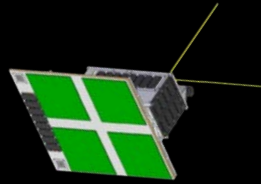


AIS



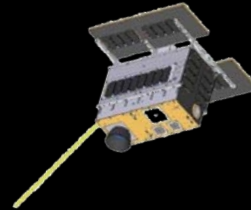
VHF  
Satcom  
& AIS

NorSat-2



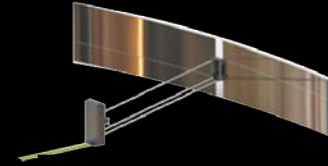
NRD  
& AIS

NorSat-3

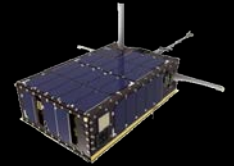


EO  
& AIS

NorSat-4



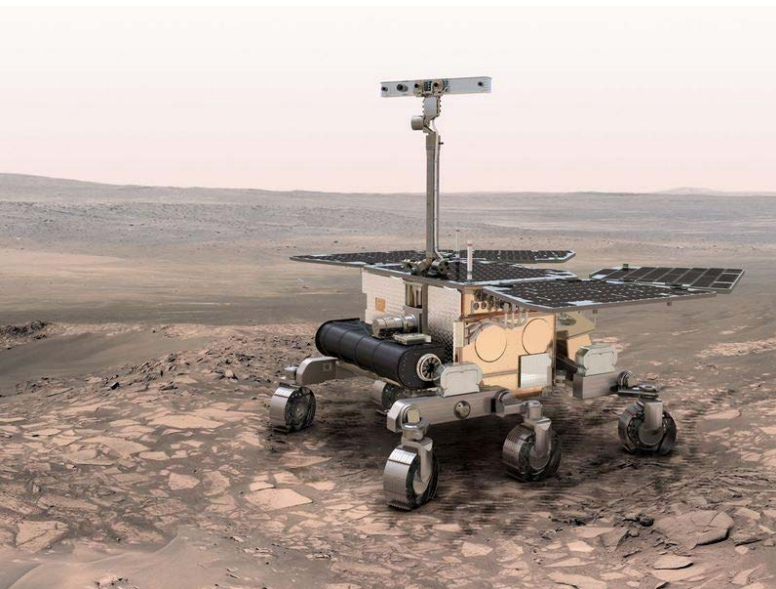
$\mu$ SAR  
& AIS

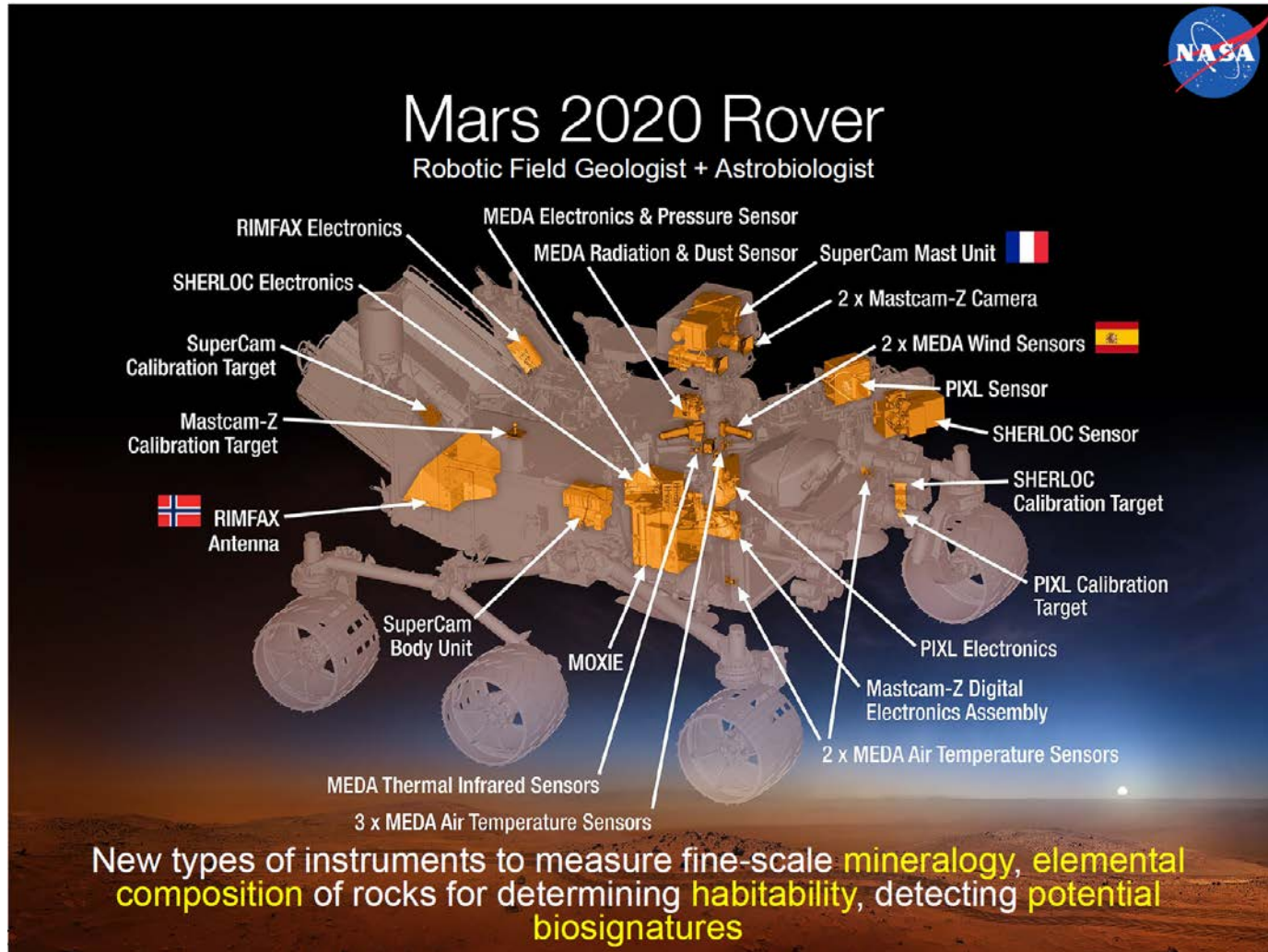


MicroTacSat

## Case Studies Exploration

- WISDOM on ESA ExoMars
- Phase B prototype: FFI
- Flight Model: France
- RIMFAX on NASA Mars 2020
- All design: FFI
- Antenna: Comrod/FFI
- Electronics: Norspace
- FPGA: BitVis







## Dronebasert autonom overvåking av solcelleparker

- Helhetlig tilnærming til kostnads-effektiv overvåking av solparker
  - fra stordata-analyse for kommersielle solcelleparker...
  - ...til planlegging av optimalt flymønster for droner
- Pågående innovasjonsprosjekt
- 4 PhD-studenter, 4 år
- Bidrag fra begge seksjoner hos ITS og tett koblet til
  - Solenergi på IFE (Marstein, Selj)
  - Autonomiprojekter på FFI

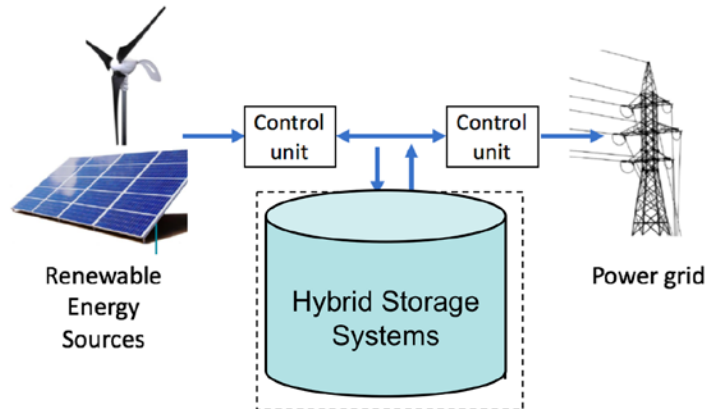


# Energy storage systems for the integration of renewable energy sources into the power grid

1 PhD

**Main supervisor:** Sabrina Sartori

**Co-supervisors:** Truls Norby, Øystein Ulleberg (IFE)



Collaboration with:

 Helmholtz-Zentrum  
Geesthacht

Centre for Materials and Coastal Research



Tianjin Baogang Research  
Institute of Rare Earths Co., Ltd,

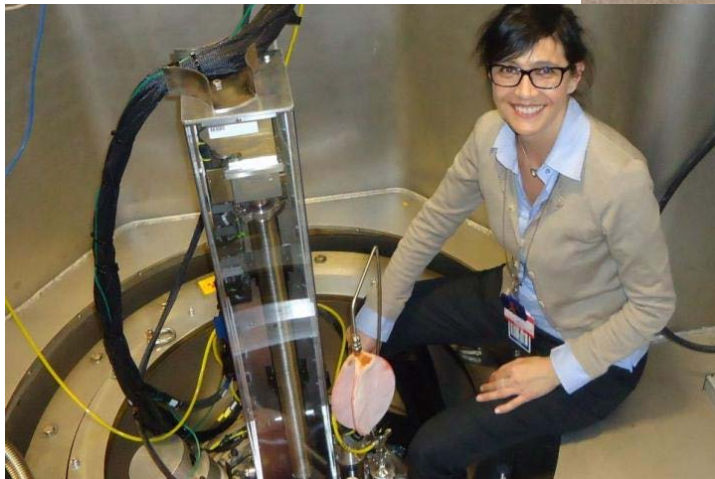
Stockholm  
University

Hybrid energy storage system for gathering real data on how different components are interacting with each other, and comparing them with simulations



## AtLAST

- Design of a new 50m dia radio telescope in Chile, powered by Renewable energy



Sabrina Sartori during experiments to study hydrogen storage materials at the Spallation Neutron Source, Oak Ridge Laboratory. Photo: Sabrina Sartori/UiO

Claudia Cicone and the antennas of the Atacama Large Millimeter/sub-millimeter Array (ALMA). Their diameter is 12 metre, while AtLAST is designed to be four times bigger. Photo: Claudia Cicone/UiO

## AutonoWeather



- “Enabling autonomous driving in winter conditions through optimized road weather interpretation and forecast”
  - 3-årig prosjekt finansiert av forskningsrådet
  - Partnere:
    - Kontaktperson ITS/AUTOSENS: Svein-Erik Hamran (Radar sensor)
    - IFE: Harald P-J Thunem
    - NORCE (Leder prosjektet)
    - TracSense AS (SME)
- 
- Assosiert PhD-prosjekt ved ITS
    - KD-stilling, jobbe med maskinlæring assosiert med samme problemstilling
    - Kontaktperson: Paal Engelstad

## ELOGOW



- “Electrification of Oil and Gas installations by Offshore Wind”
  - KPN-prosjekt finansiert av forskningsrådet
  - I prosjektet samarbeider IFE og ITS nå med å rekruttere en felles PhD-student som skal jobbe med maskinlæring for å bedre forecasting av el-produksjon, optimal kontroll og drift av slike anlegg, gjøre analyse og simuleringer m.m
- 
- Kontaktperson ITS/AUTOSENS: Paal Engelstad
  - IFE: Roy Stenbro

# □ Digital Development

- fostered through “Internet light for all”
- free access to information for all

## □ Net neutrality

- access to information, compressed text and pictures through Internet light for all

## □ Catalyst for Sustainable Development Goals (SDGs)

### □ Pilots for Digital Inclusion through Internet light for all

- Focus in Tanzania on health
- Focus in DRC on education/work





# Connect the unconnected in Africa



- Antenna in 6 m height
- Reaches Tigo tower > 20 km away



# Infection control supervisor

- **You must take a mandatory e-learning course** on infection prevention (15 min.)

- **Keep distance**, ie. at least one meter to others **at all times, everywhere**

- **Wash your hands** when you arrive, when you leave and while you are in the building

- **Do not cough or sneeze into the air**, or on others, or in your hands. Use a paper handkerchief, a regular handkerchief or the arm hook.

- **If you have symptoms of COVID-19 or are in quarantine, do not stay at ITS.**

- **In case of symptoms, confirmed infection, desire for testing, or after contact with an infected**, employees and students are asked to contact the health service

- Oslo Municipality has corona tel. 21 80 21 82

- UiO by SiO Health has a test station at Blindern, call first 22 85 33 00

- Lillestrøm corona telephone 66 93 20 40

- **By confirmed cases of infection among employees and students, employees** are asked to notify the Mat-Nat faculty on telephone 920 50 857 (at 08-20) asap.

- Our common rooms; lecture rooms, studies, meeting rooms, kitchen, lounges, etc., are furnished in order to keep > 1 meter distance between people.

- Stays in studies are registered (for two weeks) for possible infection tracking. Notepads are supplied.

- Common rooms and common areas are cleaned once a day.

- Disinfection equipment will be available in - or near all common rooms.

- Everyone is encouraged to wash surfaces that will be touched, preferably both before and after, in all common rooms or - areas.

- We have a reasonably good ventilation system, with replacement of the air in the floors 1-4 about 2 times an hour, and at about the same rate in the basement floor (auditorium).

- The gym is closed to students, until further notice. Maximum two employees simultaneously.

# Questions ?

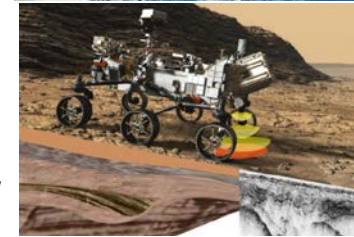


## Center for Space Sensors and Systems - CENSSS

- Two major business innovation areas:
  - A National New-Space (small, low-cost satellites) capability and
  - Space Exploration (“to the Moon and Mars”).
- Work Packages
  1. New-Space Sensors,
  2. New-Space Demonstrator,
  3. New-Space Services,
  4. RIMFAX Science Operation Center
  5. Mapping Instruments for planetary INSURU



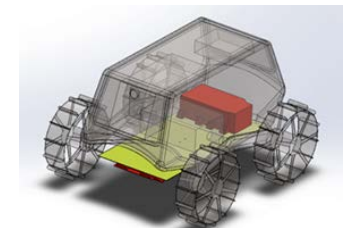
AISSat image credit FFI



Artist illustration show  
RIMFAX image the  
subsurface of Mars.  
(Background image credit NASA)



IDEAS terrestrial precision gamma ray spectrometer.



(Image credit ispace)



## Andre prosjekter

I avslutningsfasen:

- IoTSec (NFR) (Security in the internet-of-things applied to smartgrids)
- Scott (EU)(Secure connected trustable things)
- Digi (NFR/Norad) (Non-discriminating access for Digital inclusion)
- Mixstrex (NFR/BIA) (M&S with mixed reality for crises management training)

I startfasen:

- ATLast (EU prosjekt med ITA)
- HERA (a Polish-Norwegian collaboration)
- SPATUS (UiO:Energi TRG:  
«Spatial-Temporal Uncertainty in Energy Systems”, med MI)
- RIMFAX (FFI) .....
- .....







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1 hr ·

Ingeniør Pål Grønstad Solheim har 3D-printet 200 visir på vår lab, Makerspace. Disse skal overrekkes helsesektoren, og er endel av en felles dugnad for å skaffe nok nødvendig utstyr til sykehusene i forbindelse med Korona-pandemien. - Det er meningsfylt å kunne være til nytte for helsepersonell. Det er de som tar støyten i disse vanskelige tidene, sier Solheim.



11

## Master programs - status

- *Renewable energy systems* – starting 2019
- *Cybernetics and autonomous systems* – program option in M-program on Robotics and intelligent systems @ IFI
- *Information security* – participant in M-program @ IFI