Master Student Meeting | UiO ITS Cybernetics | 29 October 2020

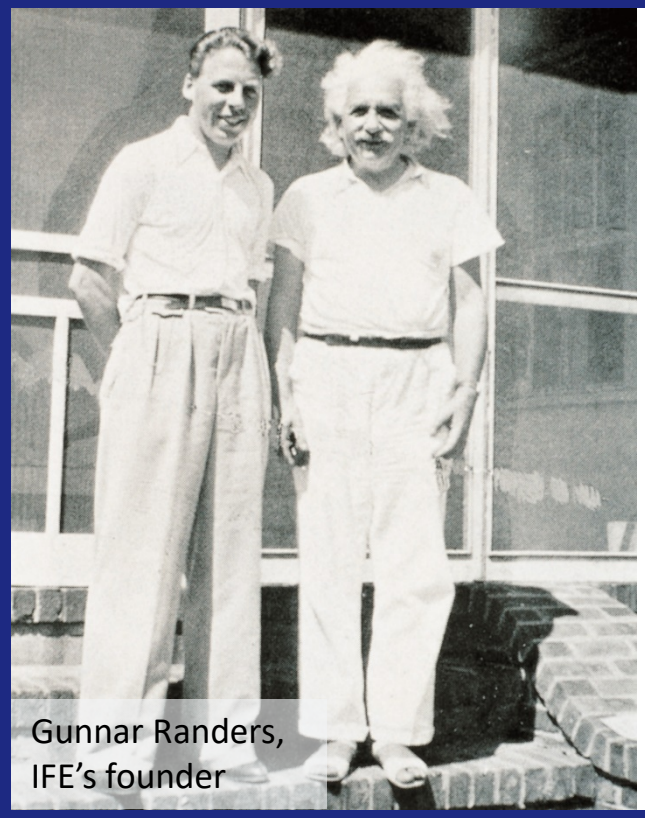
Possible
Master Student Projects at IFE

Øystein Ulleberg

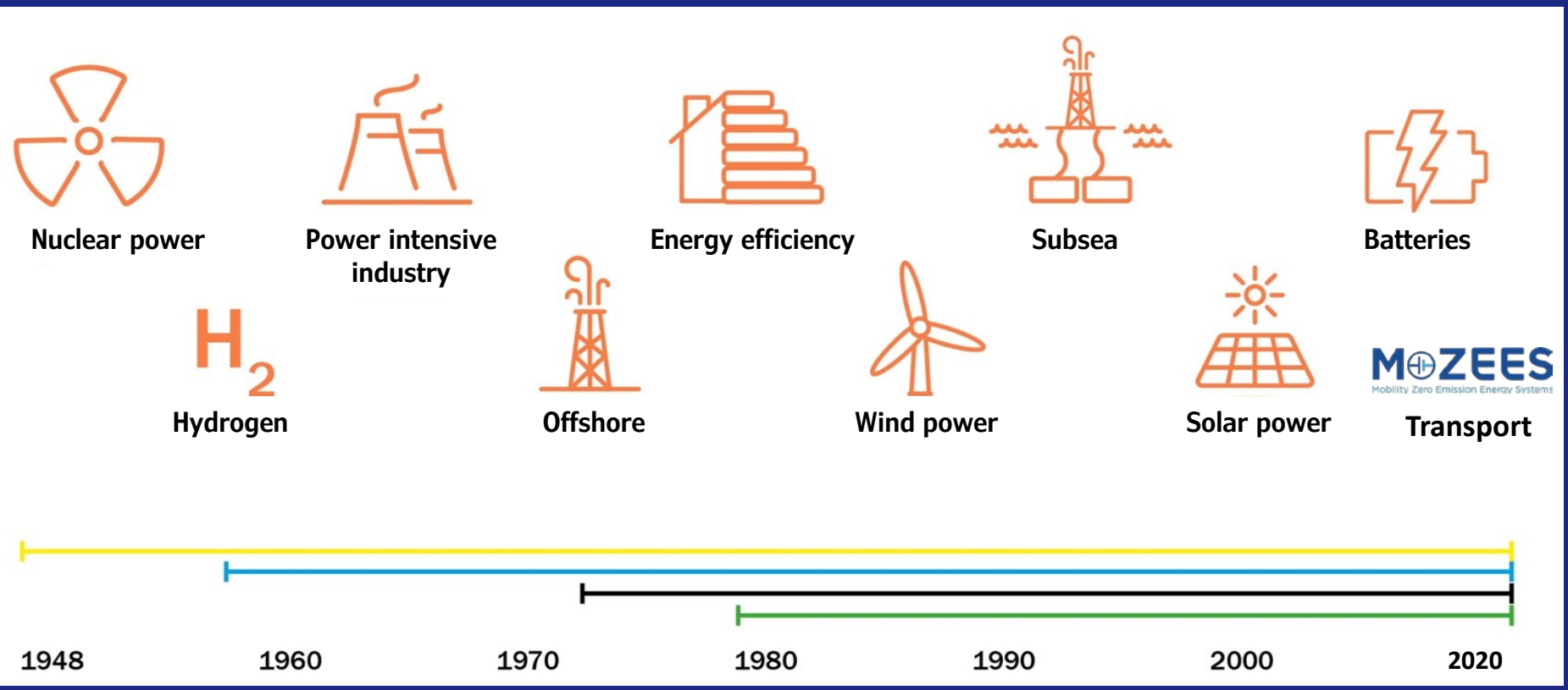
Principal Scientist IFE | Director MoZEES | Associate Professor UiO

Institute for Energy Technology

IFE has led the field for 70 years and has played a key role in the development of Norway as an energy nation



Gunnar Randers, IFE's founder



MoZEES – A Research Center on Zero Emission Transport

Battery & Hydrogen
– Technology Value Chains

Illustration: NFR

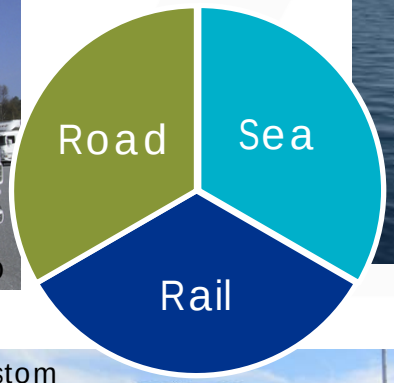
Materials → **Components** → **Systems**

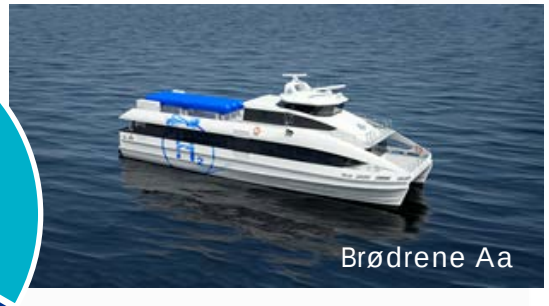
260 MNOK (2017-2024)

38 Partners

***Heavy Duty* Transport: Road, Rail, Sea**
– Areas for Innovation & New Business

ASKO




Brødrene Aa


Alstom

MOZEES
Mobility Zero Emission Energy Systems

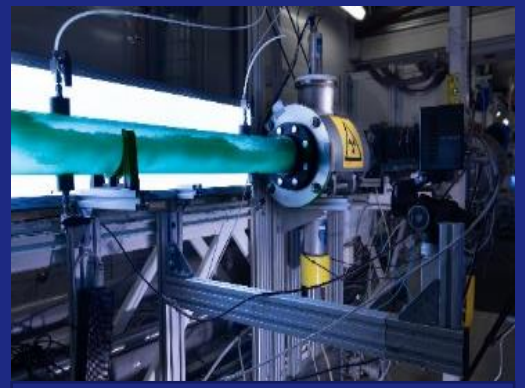
Advanced Infrastructure & Laboratories

Battery lab

Solar energy lab

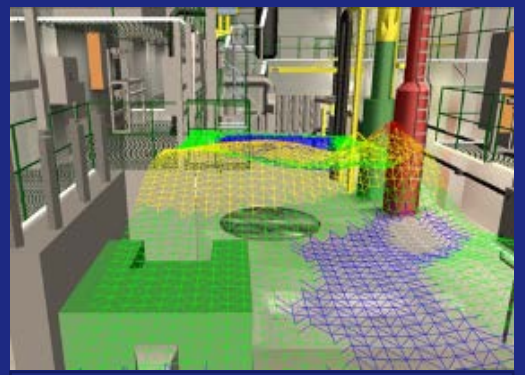
Hydrogen lab

Tracer tech lab



3-phase flow lab

Sensor lab



VR lab

Human behaviour lab

IFE Renewable Energy Research

- Solar PV Technology
  - PV materials
  - PV systems
- Offshore Wind Technology
- Battery Technology
- Hydrogen Technology
  - Water Electrolysis
  - Fuel Cell Systems
  - Hydrogen storage
- Energy System Analysis
  - RE Energy System Analysis
  - ZE Transport System Analysis

Laboratories

Battery Laboratory

Hydrogen Laboratory

Solar Laboratory

IFE Renewable Energy Research

- Solar PV Technology
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  - Hydrogen storage
- Energy System Analysis
  - RE Energy System Analysis
  - ZE Transport System Analysis

Hydrogen Systems Group


Øystein


Ragnhild


Fredrik


Piotr

Hydrogen Technology

- Renewable Power & Hydrogen Systems:
  Øystein Ulleberg
- Water Electrolysis Systems:
  Ragnhild Hancke
- Fuel Cell Systems:
  Fredrik Aarskog
  Piotr Bujlo

Hydrogen & Batteries

Possible Master Projects

- Water Electrolysis Systems
  - PV water electrolysis system modeling
  - PEMWE system testing (experimental)

Project 1

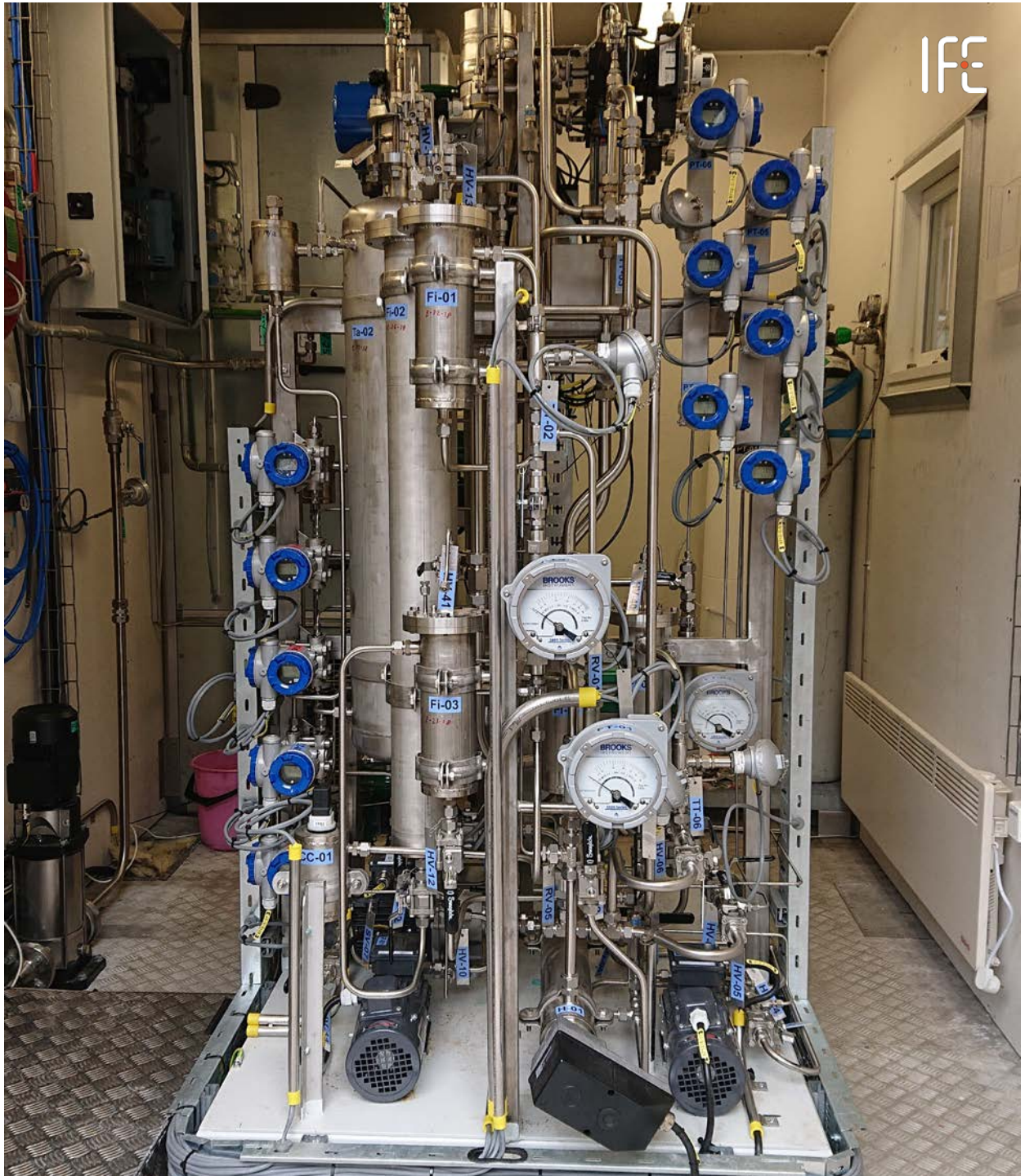
- Fuel Cell Systems
  - FC Maritime system modeling
  - FC Bus system modeling
  - PEMFC system testing (experimental)

Project 2

- Hydrogen Safety
  - Maritime LH2 system analysis
  - Safe LH2 system design (experimental)
- Battery Systems
  - Battery lifetime modeling

Project 3

- Integrated RE & Transport Systems
  - E-mobility systems modeling
  - ZE Truck system modeling



Project 1: PV Water Electrolysis Systems

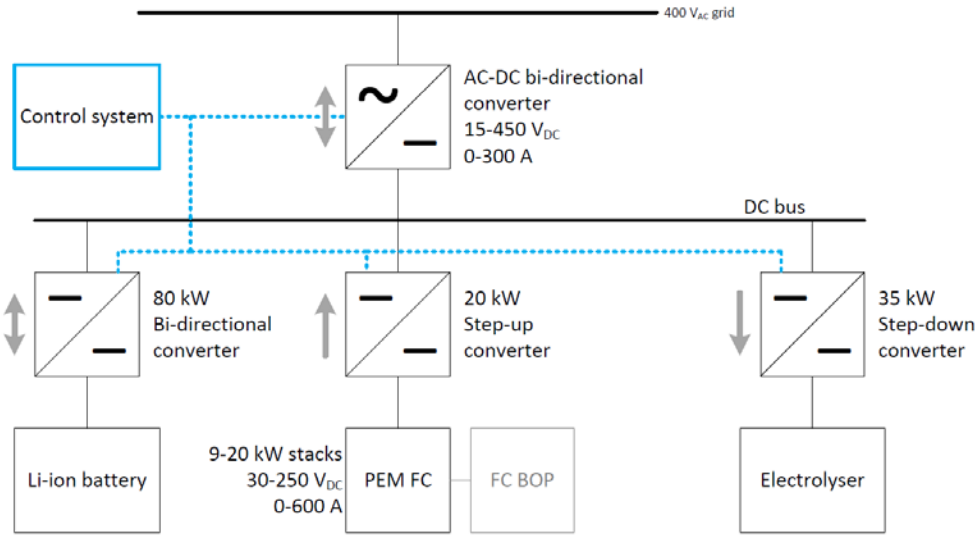
- Design and operation of PV-based water electrolysis system
- Modeling of dynamic operation: Electrical system & Balance of Plant (BoP)

Water Electrolysis System Laboratory

- High pressure (≤ 200 bar) PEMWE test rig, including *several key safety systems*
- Prototype high-pressure stack

Advanced Power Electronics

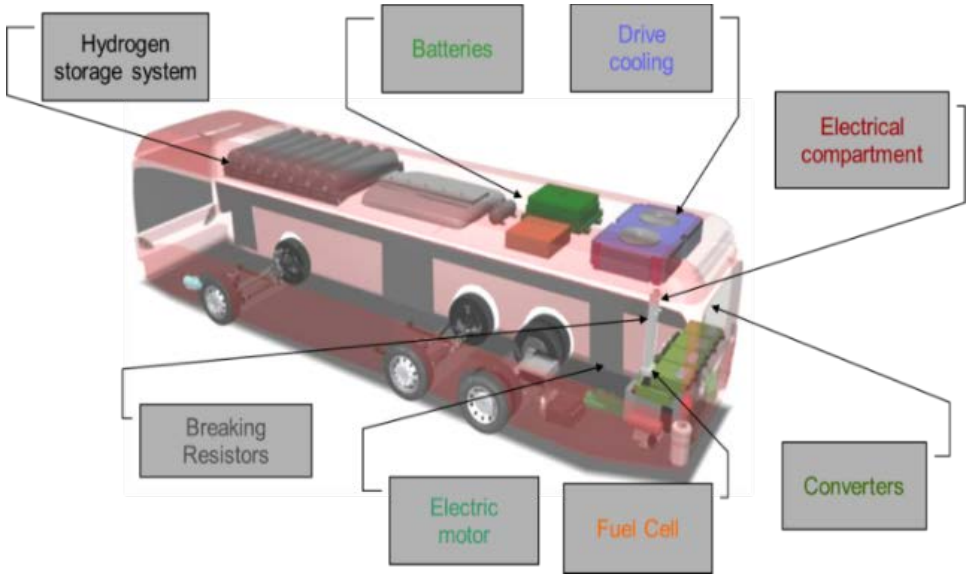
- Power electronics for emulating intermittent power sources and hybridization with batteries

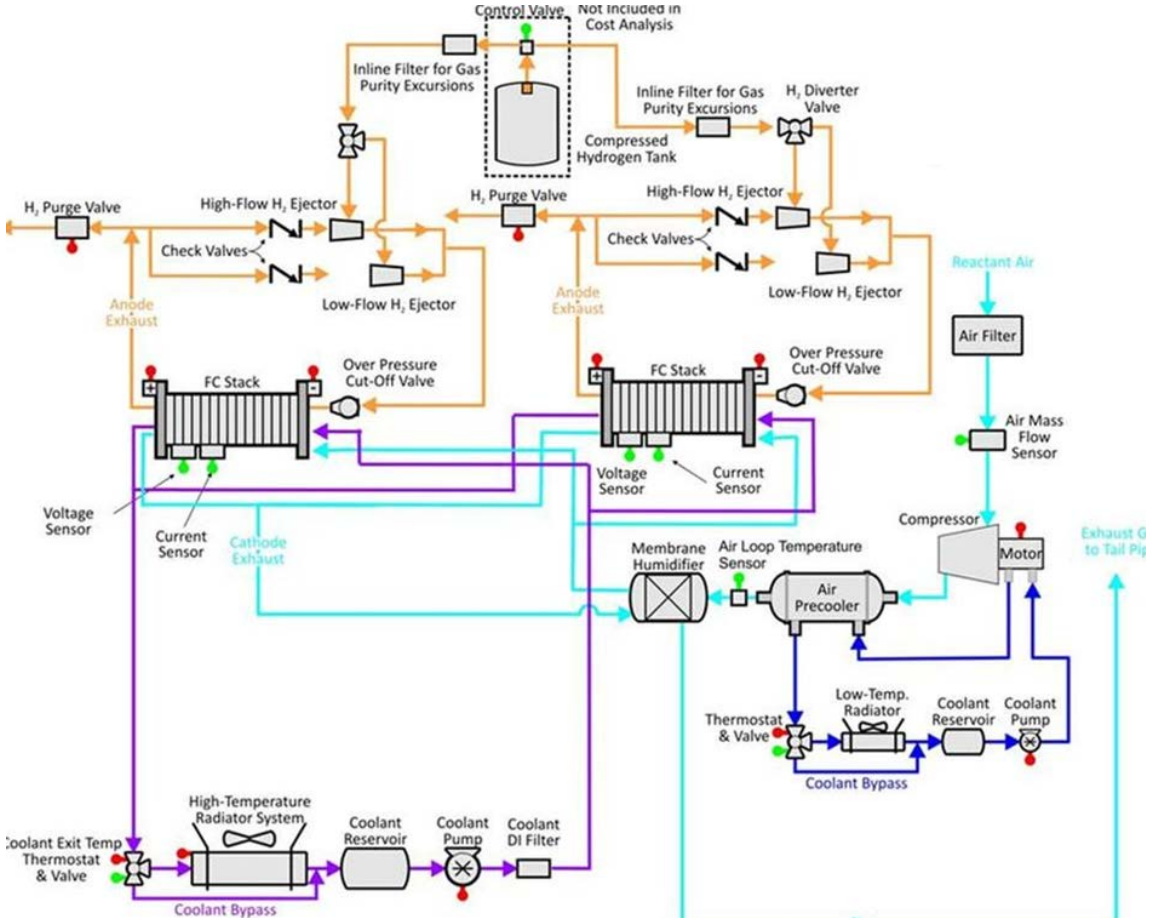


NORWEGIAN FUEL CELL AND HYDROGEN CENTRE
FUEL CELL & ELECTROLYSER SYSTEMS

Project 2: Fuel Cell Systems for Buses

- Design and operation of fuel cell power and heating systems
- Modeling of dynamic operation: Fuel cell, electrical drives & auxiliary systems





Project 3: Battery Lifetime

- Estimation of Li-ion battery performance using machine learning and neural networks
- Possible applications: Battery electric buses or Battery electric ferries

Contact

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