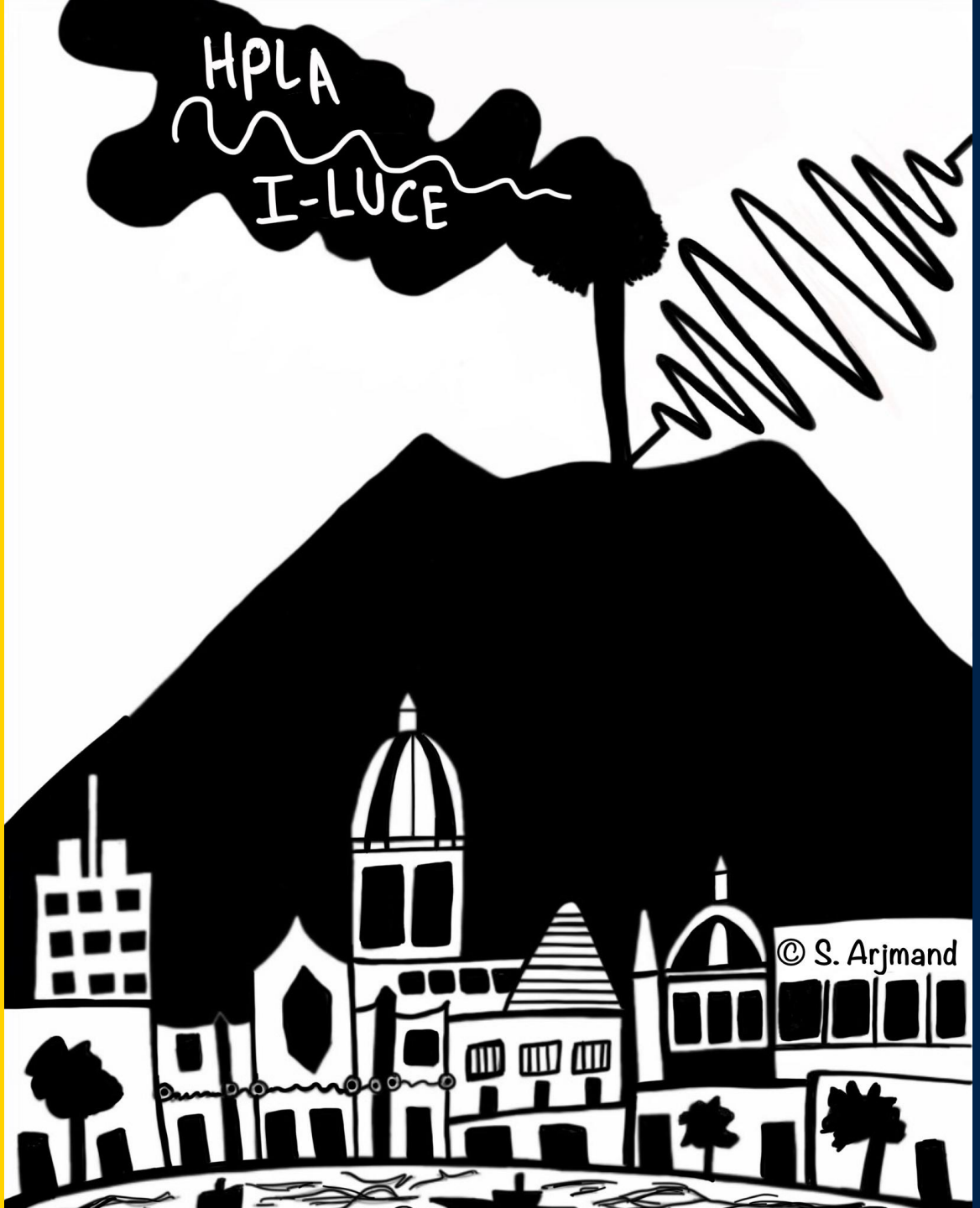
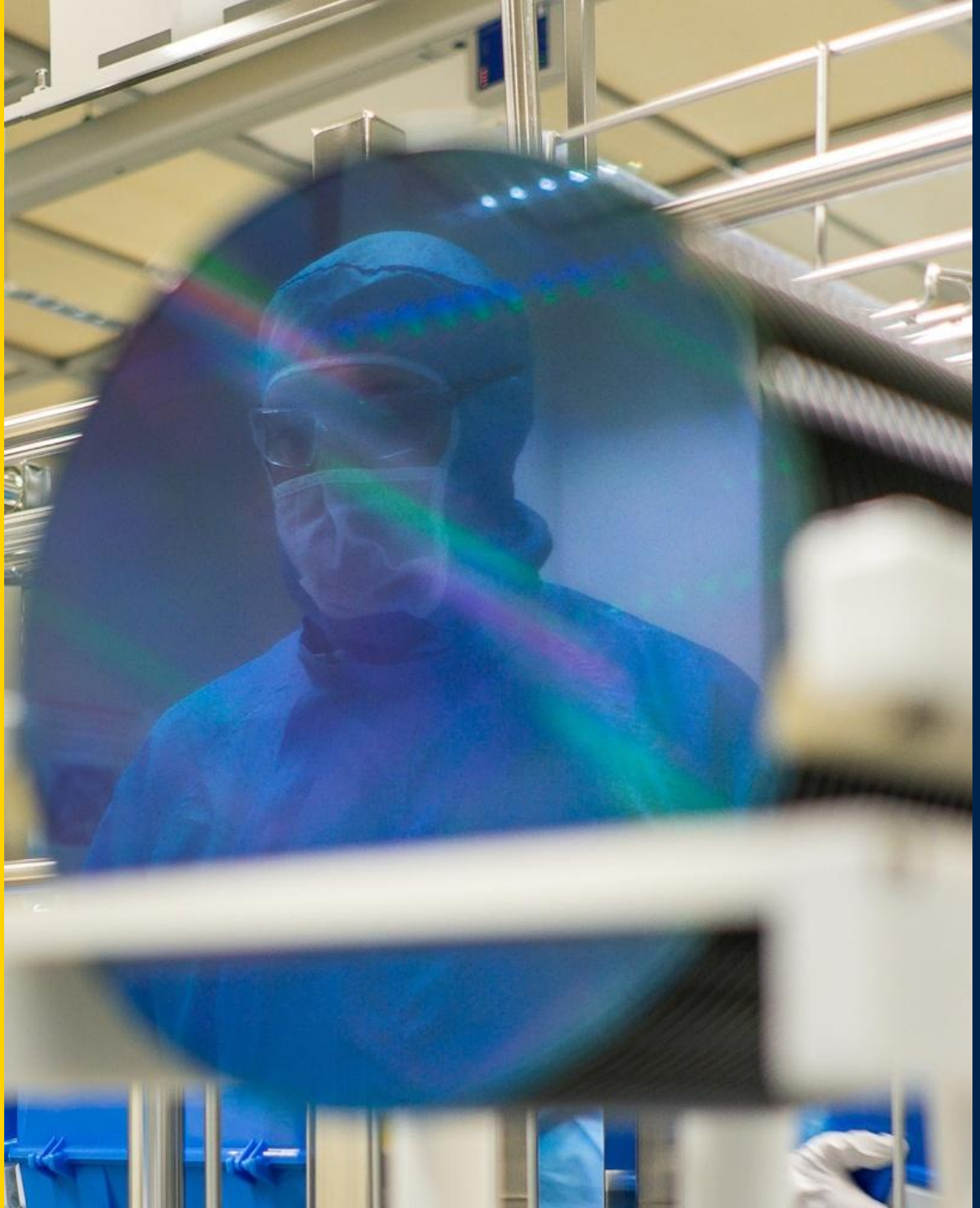


HPLA 2025: STMicroelectronics

November 18th, 2025

Fabrizio La Rosa – SRA/System Lab
STMicroelectronics – Catania



STMicroelectronics: Company overview

We are creators and makers of technology

One of the world's largest semiconductor companies

50,000 employees
of which **9,000+** in R&D

$13.3 billion revenues
in 2024

Over **80** sales & marketing offices serving over **200,000** customers across the globe

14 main manufacturing sites

Signatory of the United Nations Global Compact (UNGC)
Member of the Responsible Business Alliance (RBA)

As of December 31, 2024

Where you find us

Making **driving** safer, greener, and more connected

Enabling the evolution of **industry** towards smarter, safer, and more efficient factories & workplaces

Making **homes & cities** smarter, for better living, higher security, and to get more from available resources

Making everyday **things** smarter, connected, and more aware of their surroundings

Our products and solutions enable customer innovation

Dedicated automotive ICs

Analog, industrial & power conversion ICs

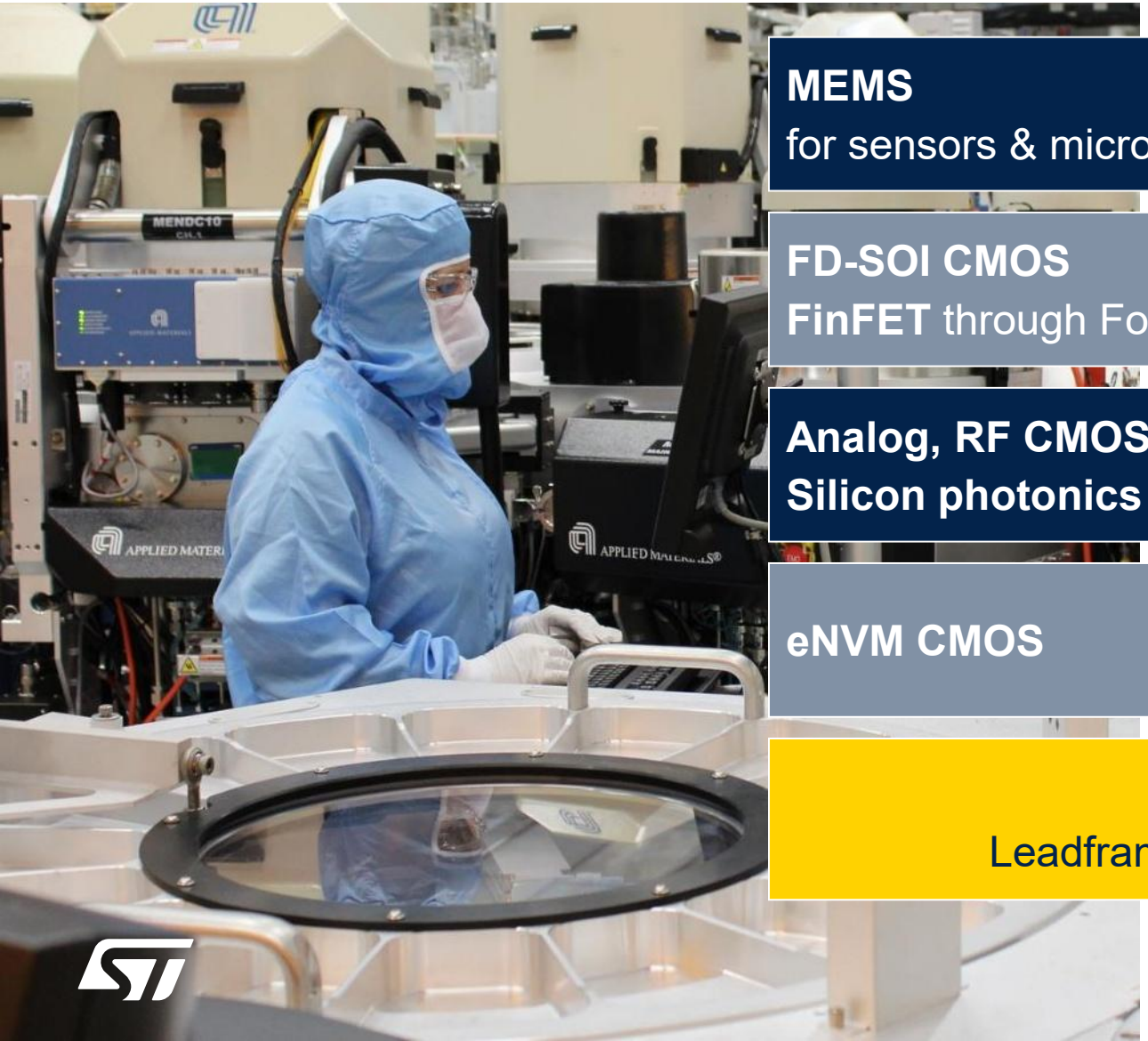
GP MCU & MPU, Wireless solutions, secure MCU, EEPROM

Discrete & power transistors

MEMS & optical sensing solutions

ASICs based on ST proprietary technologies

Differentiated technologies are our foundation



MEMS
for sensors & micro-actuators

Smart Power: BCD
(Bipolar - CMOS - Power DMOS)

FD-SOI CMOS
FinFET through Foundry

Discrete, Power MOSFET, IGBT
Silicon Carbide, Gallium Nitride

Analog, RF CMOS & BiCMOS,
Silicon photonics

Vertical Intelligent Power

eNVM CMOS

Optical sensing solutions

Packaging technologies
Leadframe – Laminate – Sensor module – wafer level

We are drivers of your innovation

Advanced R&D centers around the world for close collaboration with operations, customers, and partners

- **~9,300** people working in R&D and product design
- **~21,000** active and pending patents worldwide
- **~16%** of revenues invested in R&D in 2024
- **~200** active R&D partnerships
- **13** fab labs to drive open innovation
- **~80** startups engaged in our programs

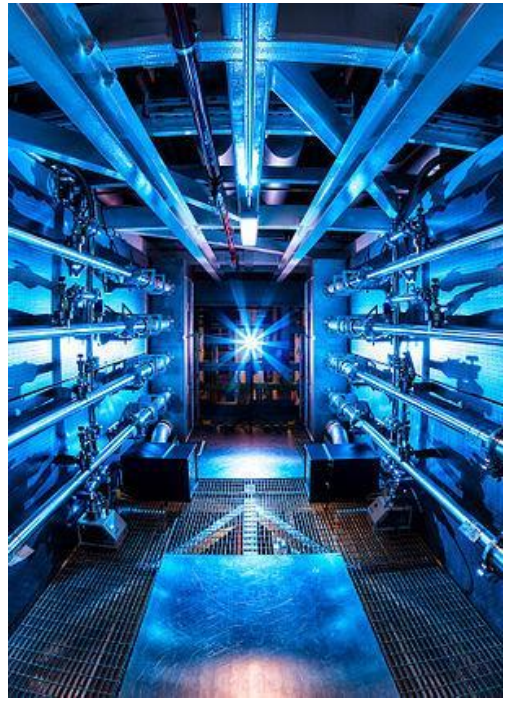
New challenges for engineering in innovation scenarios

Heterogeneous Integration

Photonics

Quantum Technologies

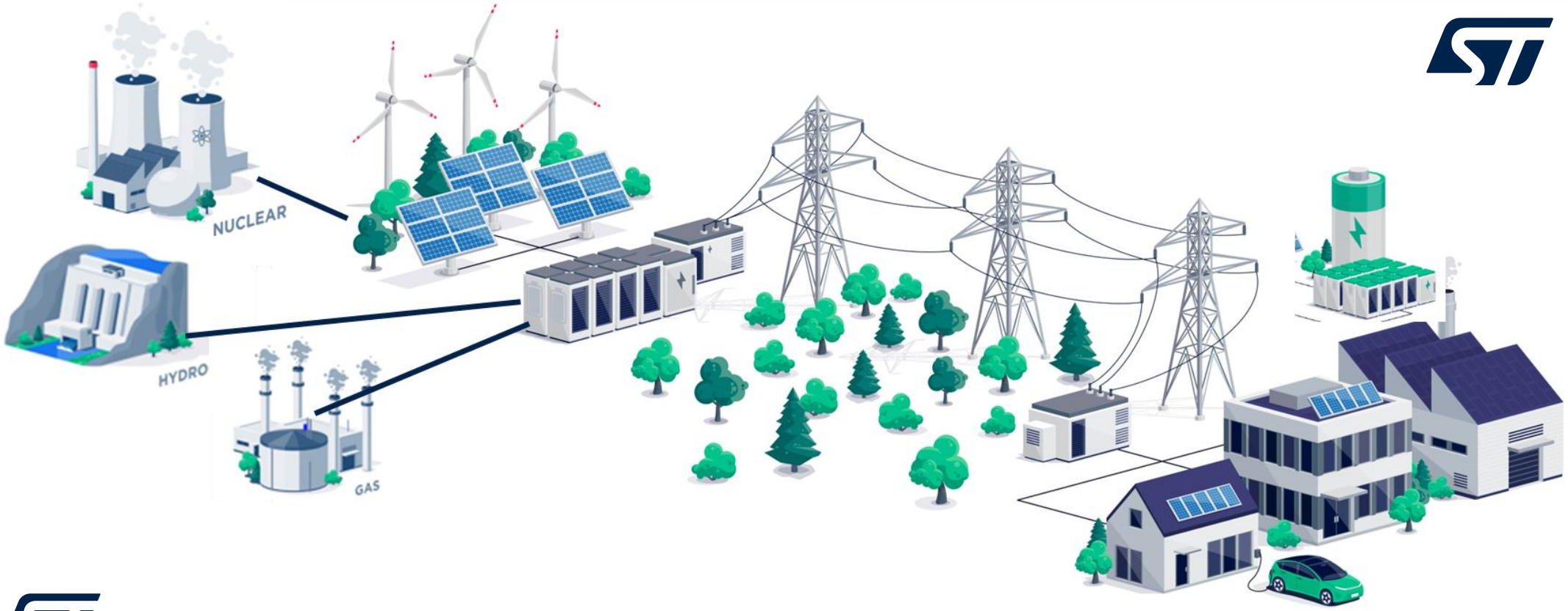
Nuclear Energies



Why are we interested in Nuclear Fusion?

The End-to-End “Energy” Chain

Energy Generation	Energy Transmission	Energy Storage and Utilization
Medium Voltage (1kV – 30kV) – High Voltage Systems (30kV ~ 150kV)		Low Voltage Systems ~1000 Vdc



A new Energy Deal

- By end of 2100, demand for energy is expected to tripled due to:
  - population growth & increased urbanization;
  - expanding access to electricity in developing countries;
  - electrification of vehicles (including cars, planes and drones)
- Significant increase (3x) in energy cost, due to geopolitical tensions, requiring world leaders to propose alternative solutions
- Public opinion on nuclear energy improved
  - new mini-reactors with compact design making them very safe.
- Renewable energy sources are not yet fully scalable due to their intermittent nature
- The renewal, modernization, and proliferation of nuclear technologies are underway:
  - fusions, SMR, AMR, Gen3/4 , plant lifetime >60Y, new local usages

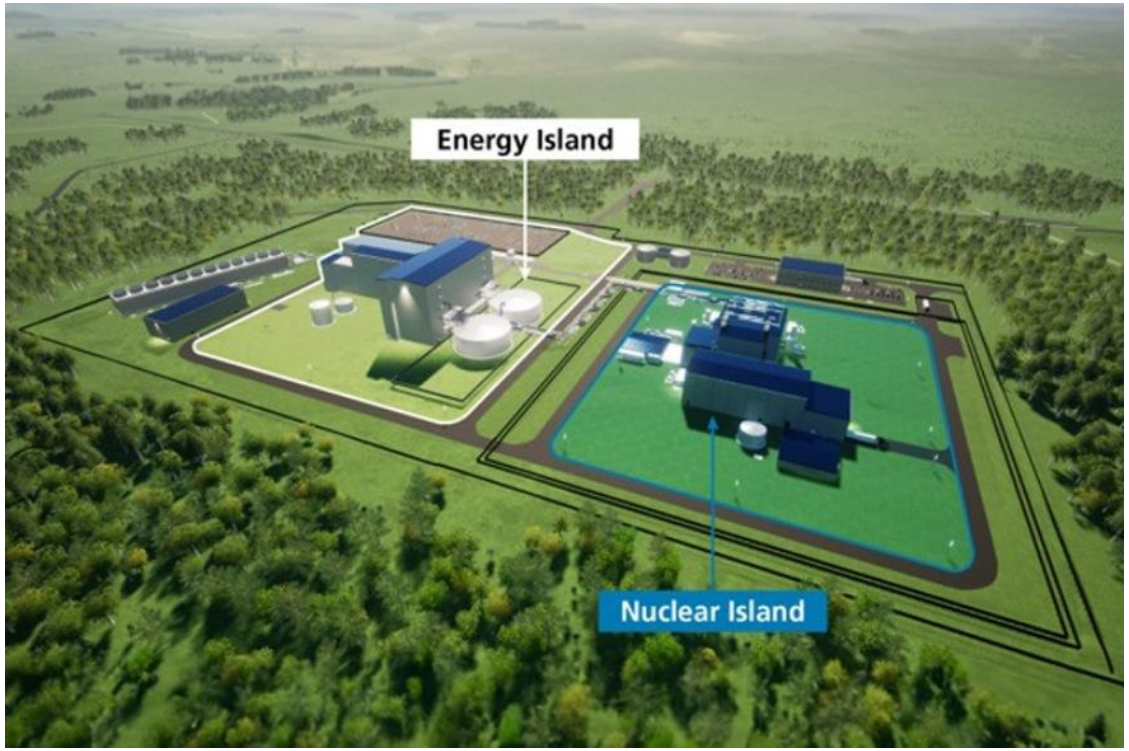
An insight into a nuclear power plant

Key functions to perform in Nuclear environments

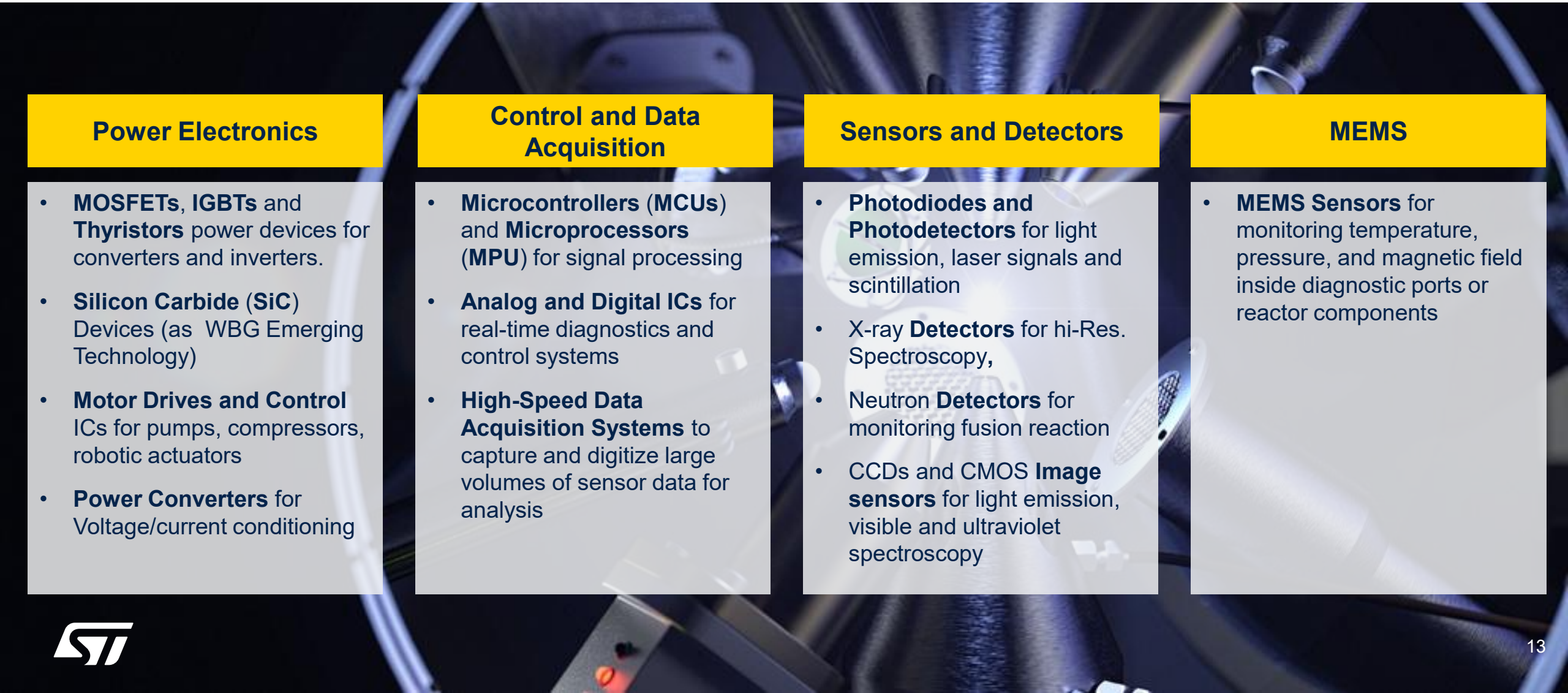
- **Measure, Actuate, Control & Monitor, Diagnose**
- **Communicate** (Data and Video)
- **Identify and localize** (total asset visibility)
- **Protect, track and guide**

- From ultrahard-to-softer radiation perimeters
  - Nuclear island (extreme radiation, temp., lifetime)
  - Turbine island
  - Industrial Plant (including cooling tower)
  - Front end (low radiation level) & recycling (severe radiation level)

- Mixed Nuclear Constraints
  - Radiation (gamma, neutrons …): medium <1Mrad to extreme >10Mrad
  - Humidity, Vibration, Temperature
  - RAMS : Reliability - Availability - Maintainability - Safety - Security
  - Lifecycle (obsolescence) & Qualification (authority acceptance)



Main technologies convergence



Power Electronics

- **MOSFETs**, **IGBTs** and **Thyristors** power devices for converters and inverters.
- **Silicon Carbide** (**SiC**) Devices (as WBG Emerging Technology)
- **Motor Drives and Control** ICs for pumps, compressors, robotic actuators
- **Power Converters** for Voltage/current conditioning

Control and Data Acquisition

- **Microcontrollers** (**MCUs**) and **Microprocessors** (**MPU**) for signal processing
- **Analog and Digital ICs** for real-time diagnostics and control systems
- **High-Speed Data Acquisition Systems** to capture and digitize large volumes of sensor data for analysis

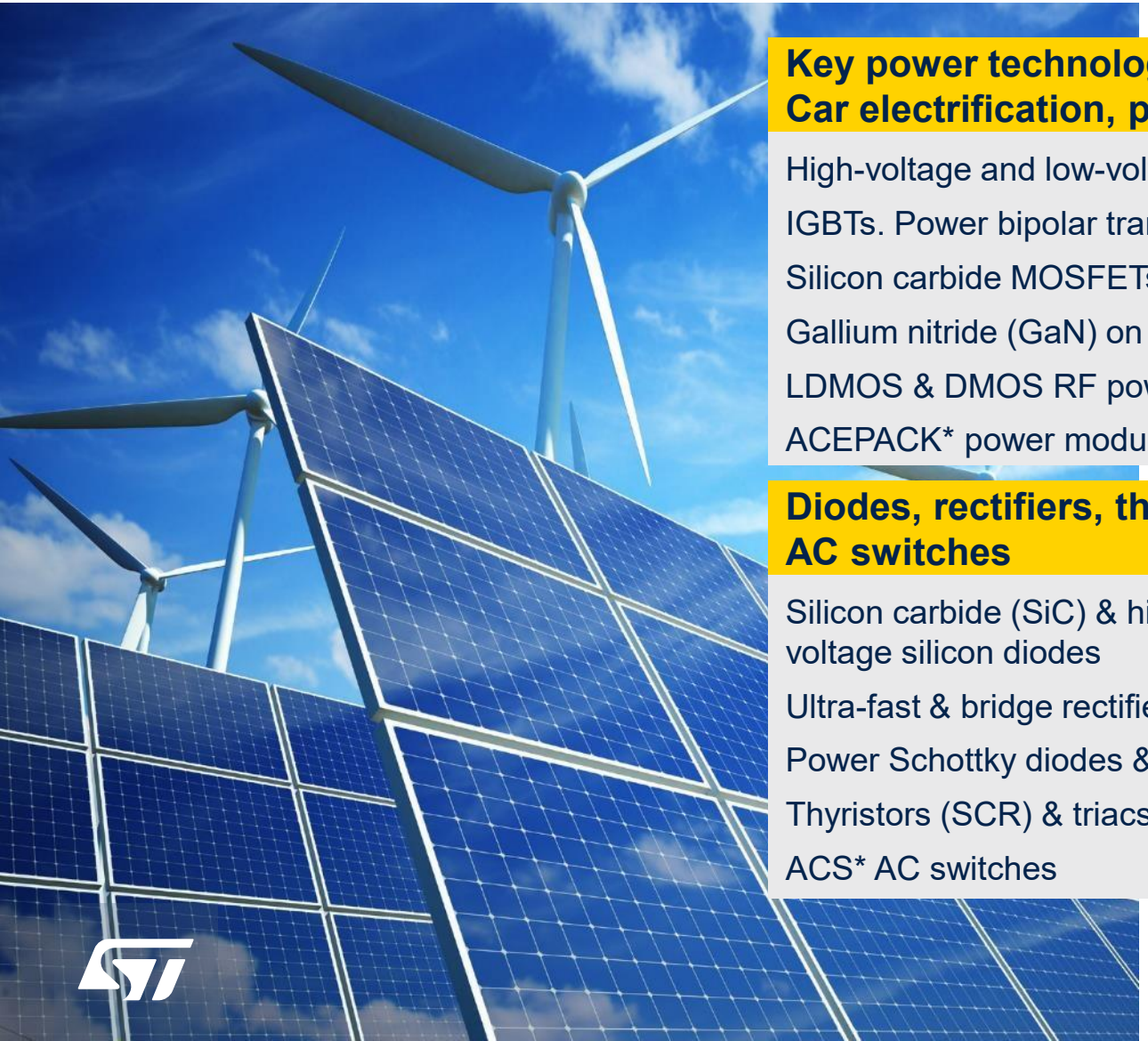
Sensors and Detectors

- **Photodiodes and Photodetectors** for light emission, laser signals and scintillation
- X-ray **Detectors** for hi-Res. Spectroscopy**,**
- Neutron **Detectors** for monitoring fusion reaction
- CCDs and CMOS **Image sensors** for light emission, visible and ultraviolet spectroscopy

MEMS

- **MEMS Sensors** for monitoring temperature, pressure, and magnetic field inside diagnostic ports or reactor components

Discrete & power transistors



Key power technologies & packages for: Car electrification, power management, motor control

- High-voltage and low-voltage silicon power MOSFETs (STripFET*, Planar & MDmesh*)
- IGBTs. Power bipolar transistors
- Silicon carbide MOSFETs
- Gallium nitride (GaN) on silicon power and RF transistors
- LDMOS & DMOS RF power transistors
- ACEPACK* power modules. SLLIMM* intelligent power modules

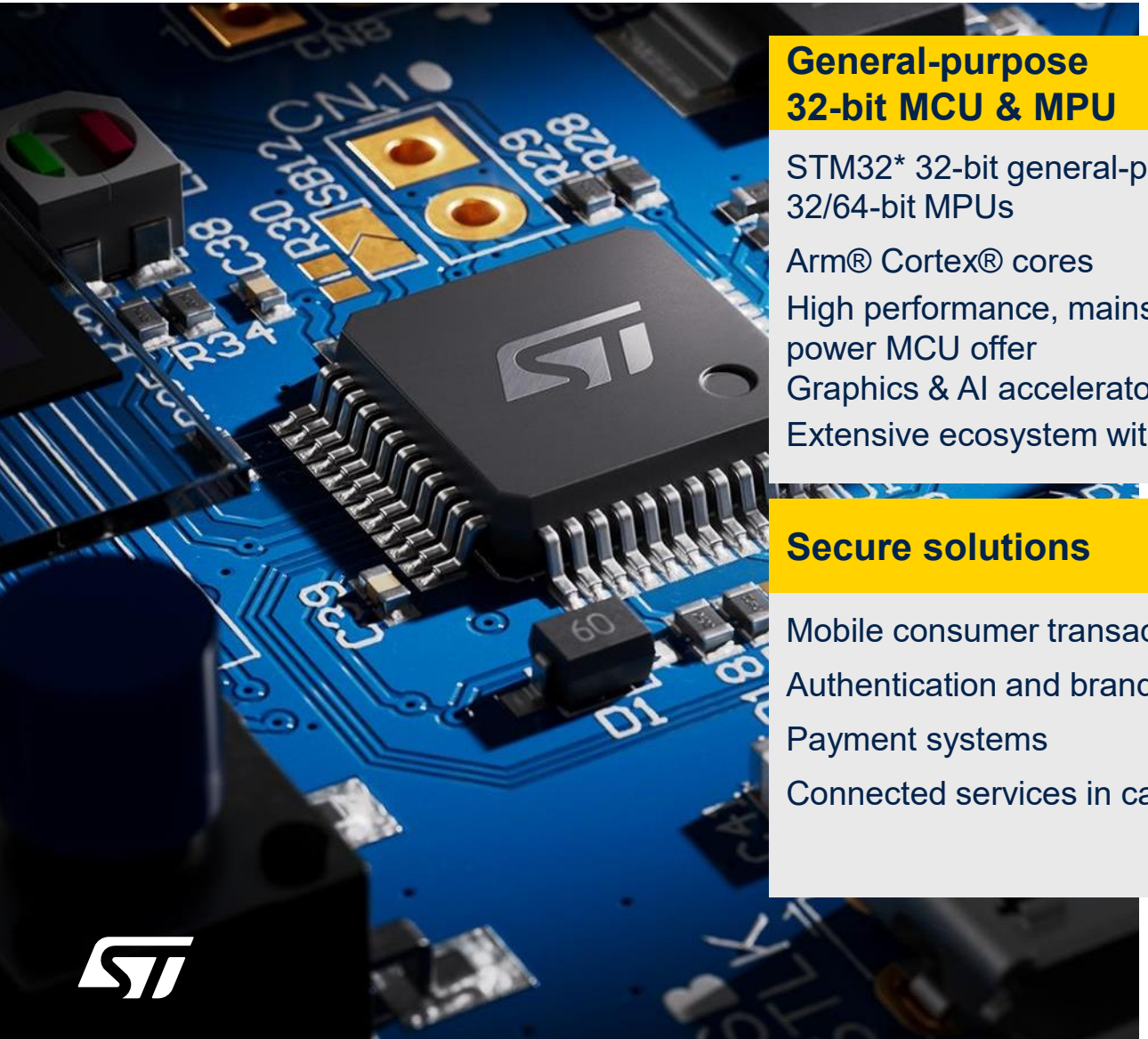
Diodes, rectifiers, thyristors (SCR), AC switches

- Silicon carbide (SiC) & high-voltage and low-voltage silicon diodes
- Ultra-fast & bridge rectifiers
- Power Schottky diodes & field-effect rectifiers
- Thyristors (SCR) & triacs
- ACS* AC switches

Transient voltage suppressors (TVS) EMI filtering & protection ICs

- ESD protection
- EOS & lightning surge protection
- Current limiters
- IPAD* integrated EMI and ESD protection devices
- Integrated passive devices

General-purpose MCU & MPU, secure solutions & NFC



General-purpose 32-bit MCU & MPU

STM32* 32-bit general-purpose MCUs and 32/64-bit MPUs

Arm® Cortex® cores

High performance, mainstream, ultralow power MCU offer

Graphics & AI accelerators

Extensive ecosystem with edge AI

Wireless 32-bit MCU

Bluetooth® Low Energy ICs

Zigbee, Thread, Matter

Wi-Fi modules

Sub-1 GHz & Sigfox-compatible devices

LoRaWAN® technology

STM32 DNA, extended ecosystem for RF

Secure solutions

Mobile consumer transactions

Authentication and brand protection

Payment systems

Connected services in cars

NFC & Memory

NFC / RFID Tags

Dynamic NFC tags

NFC / RFID Readers

High-performance & high-endurance EEPROMs

Analog, industrial & power conversion ICs

Power management

- AC/DC & DC/DC
- MOSFET, IGBT, SiC, GaN gate drivers
- Analog / digital controllers
- Linear voltage regulators
- Intelligent power switches
- Galvanic isolation
- Digital power
- Smart power GaN
- Battery management | eFuses

Analog products

- Operational amplifiers, comparators, LDOs
- Current sensing amplifiers
- Filtering & conditioning
- Interfaces & transceivers
- Reset & supervisors
- Powerline communication
- IO-Link
- Rad-hard

Motion control

- Brushed DC motor drivers
- Brushless DC motor drivers
- Stepper motor drivers

Application specific ICs

- PMIC, pre-amps for data storage & servers
- Wireless charging, touch controller, display PMIC for personal devices
- Medical ICs

MEMS & optical sensing solutions

Motion sensors

- Accelerometers & gyroscopes
- Inertial modules & smart sensors
- Vibrometers, inclinometers
- Magnetometers
- T-Plus: Motion MEMS with embedded temperature sensor

Environmental & biosensors

- Biosensors (motion + bio-signals)
- Barometers, pressure sensors
- Temperature sensors
- Electrostatic sensors
- MEMS microphones

Micro actuators

- Actuators for printheads
- Piezoelectric actuators
- Electrostatic actuators
- Electromagnetic actuators
- Thermal actuators

Optical sensing solutions

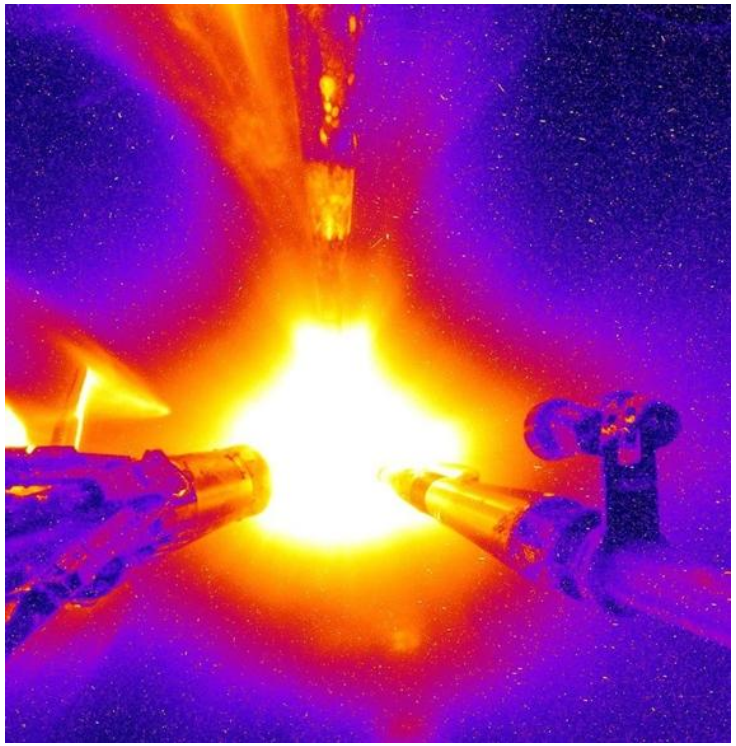
- FlightSense* ToF proximity & multi-zone ranging modules
- 3D FlightSense ToF sensors
- BrightSense* global shutter CMOS sensors
- Ambient light sensors
- Micro-optics
- Custom optical solutions

Take aways

Take aways

As nuclear fusion technology advances toward practical energy generation, it presents significant opportunities for semiconductor companies as:

- **Growth in clean energy sector:** strategic positioning in the energy transition.
- **Technological innovation:** developing materials and packaging resistant to extreme conditions.
- **Demand for advanced components:** supplying sensors, microcontrollers and power devices.
- **Research collaborations:** strengthening know-how and visibility in the high-tech sector.



Our technology starts with You

Find out more at www.st.com