

SoFiN Project

Software enabled
Fiber optic multisensing
Network



PROJECT INTRODUCTION

The goal of SoFiN project is the development of a flexible, modular, software-defined platform for fiber optical sensing that can be implemented in existing communication fiber networks.

The final system will be tested in near-to-operational environment for three different case studies, respectively focusing on the supervision of a telecommunication infrastructure, a water supply network and a powerline grid.



KEY OBJECTIVES

- Develop an adaptive, modular & highly integrated photonic multi-sensing platform
- Exploit new types of digital signal processing and cloud connection approaches
- Validation & demonstration under the context of end-user needs

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PROJECT WORK COMPLETED

TECHNICAL UPDATES

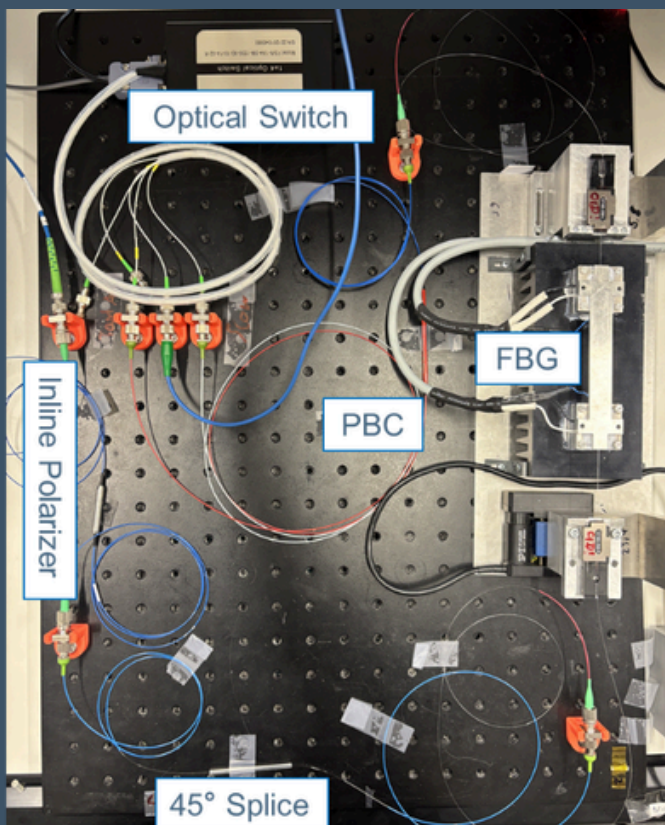
High performance laser development finalized

A novel ultra-low-noise single-wavelength laser was designed, built, and experimentally validated. NKT's proprietary laser technology was successfully integrated with a silicon-nitride dual-ring microresonator to generate a dark-soliton frequency comb.



Validation of novel approach for PM - π - FBG based multi-modal sensing

The testbed to validate the novel approach for the separation of temperature and strain based on the PM- π -FBG has been developed and initial results have been obtained.



PROJECT WORK COMPLETED

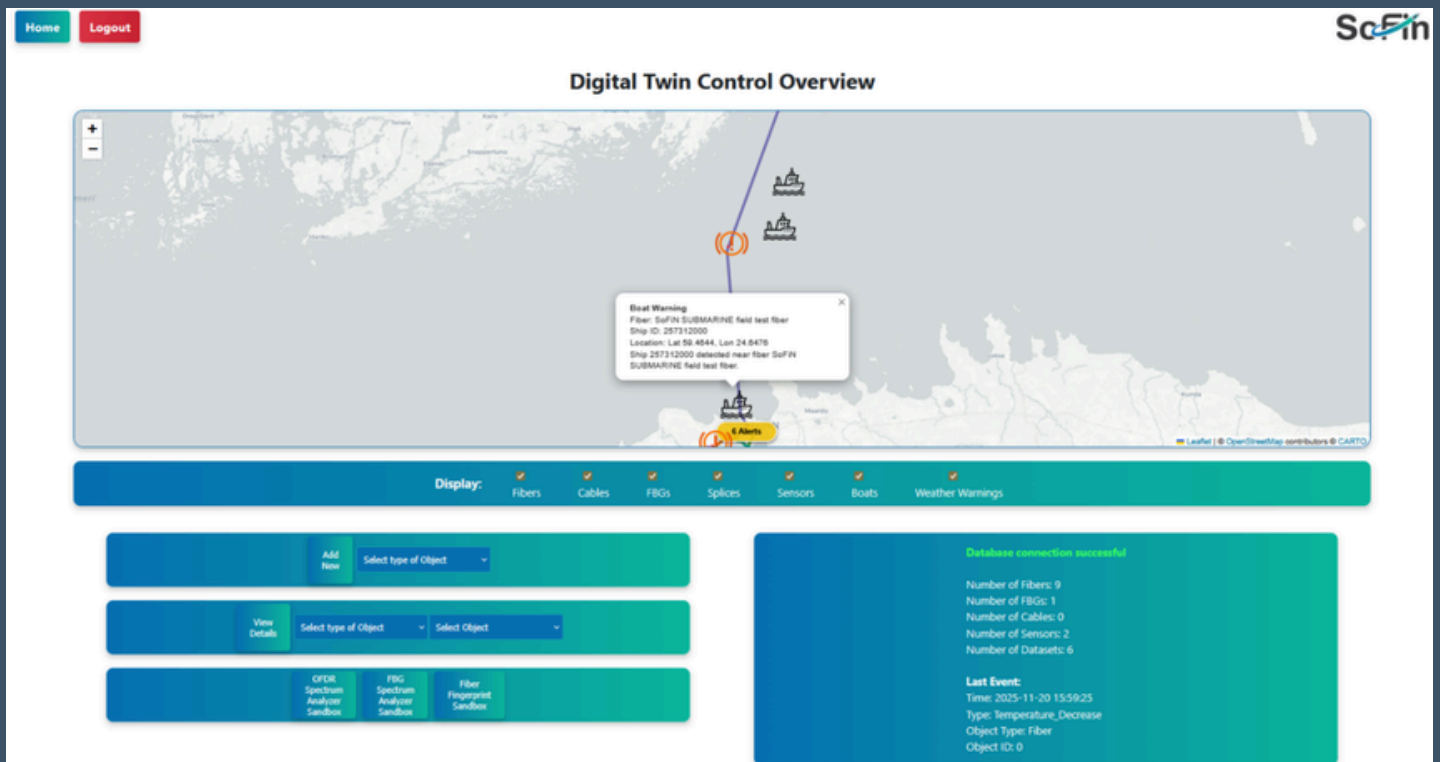
TECHNICAL UPDATES

Digital Twin Technology

SoFiN developed a modular Digital Twin framework for fiber sensors, enabling real-time monitoring, anomaly detection, simulations, automated alerts, and predictive fault diagnosis while supporting long-term network optimization through historical data analysis.

Cloud Platform

To complement the sensing infrastructure, the SoFiN cloud platform was developed to collect, store, and visualize interrogator data through an intuitive user interface, while providing REST APIs for seamless connectivity, integration, and data-driven applications.



PROJECT WORK COMPLETED

TECHNICAL UPDATES FROM LAST 6 MONTHS

Interrogator Finalized and Ready for Use Case Validation

The SOFIN project successfully developed and demonstrated a highly configurable interrogator for combined time- and frequency-domain sensing based on coherent correlation OTDR. The system combines a high-performance laser, a highly integrated photonic transceiver chip, and FPGA-based signal processing to enable advanced sensing capabilities.



PROJECT WORK COMPLETED

TECHNICAL UPDATES FROM LAST 6 MONTHS

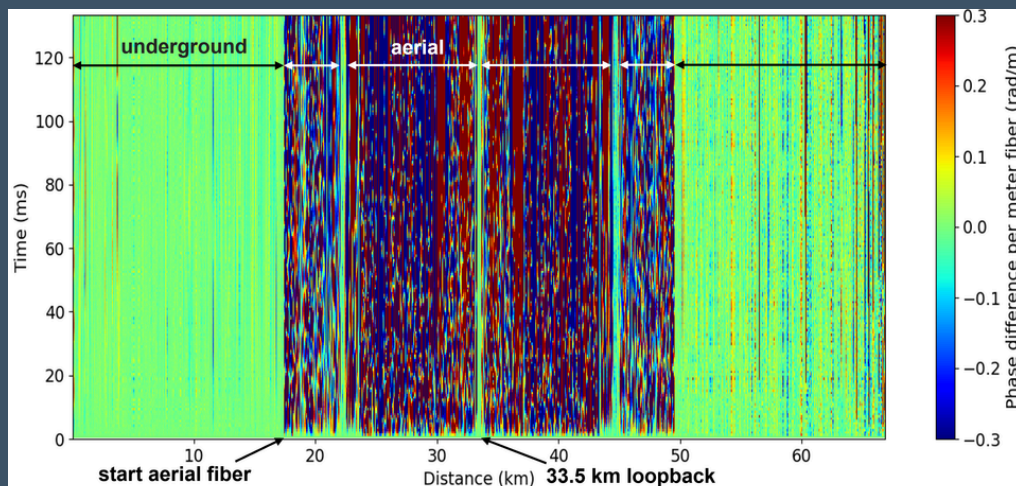
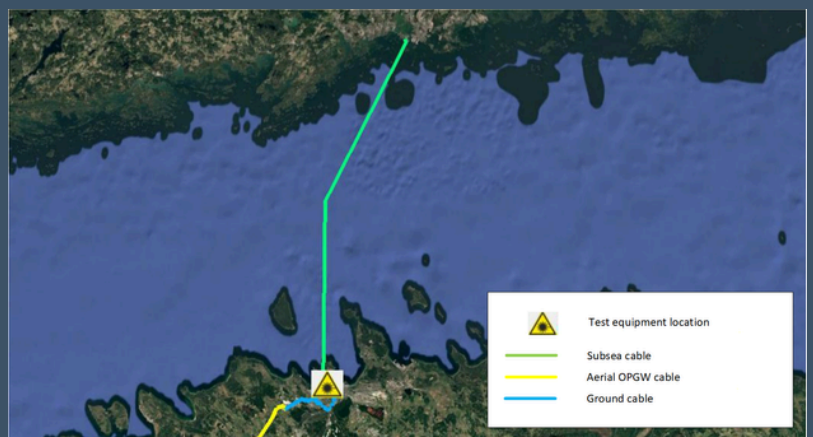
Telecommunications Infrastructure Monitoring Successfully Validated in Real Network Environment

A major milestone of the SoFiN project was achieved through the successful validation of the telecommunications infrastructure monitoring use case during field trials conducted within the Tele2 network. The completed SoFiN interrogator was deployed in operational telecom infrastructure to demonstrate how existing fiber networks can be transformed into intelligent sensing systems for critical infrastructure monitoring. The trials covered three different cable environments – subsea, underground, and aerial deployments – representing realistic operational conditions.

Underground and aerial cables deployments



Subsea cable deployment



Interrogation Results of Underground and Aerial Cables Sections

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Updates From Events Attended

CLEO 2025

The conference paper describing part of the ML work developed within SoFiN and titled “Method for Conversion of Optical Phase to Temperature for Coherent φ -OTDR” was presented by Francesco Da Ros from DTU at CLEO Conference US 2025.



ECOC 2025

An exciting week at the 51st European Conference on Optical Communication, ECOC 2025, 28th Sep. – 02 Oct., with a strong participation of the SoFiN Project. Important work developed as part of the project was presented as three papers:

1. 4405 FBG Array Sensor Interrogation using Coherent Correlation OTDR with Hybrid Wavelength Tuning
2. Quantum Noise Limited Temperature-Change Estimation for Φ -OTDR Employing Coherent Detection
3. How to Model Temperature Perturbations in φ -OTDR?



DISSEMINATION & COMMUNICATION

Updates From Events Attended

OFC 2026



SOFiN was strongly represented at OFC 2026. Lukas Bernhardt from FAU presented recent developments of the SoFiN project in a keynote presentation titled “Laser Diode Based Demodulation for Spatially Resolved Fiber Fault Detection.”

In addition, ADTRAN actively contributed to the panel discussion “Optical Sensing as a Service on Transceiver and Fiber Systems,” where Florian Azendorf participated as both panelist and presenter. In his talk, “How to Integrate Sensing and Communication?”, he highlighted key application areas such as subsea cable and power line monitoring, while addressing technical challenges related to system integration, hybrid sensing approaches, and signal processing. The panel also explored future developments, standardization efforts, and considerations around data privacy and the responsible use of sensing technologies.



DISSEMINATION & COMMUNICATION

BROCHURE & PRESS RELEASE

SoFiN Brochure Released

The first SoFiN brochure was successfully created and disseminated through social media channels and the official SoFiN website, serving as a key communication tool for the project. It provides a comprehensive overview of SoFiN's vision, core objectives, and innovative technological developments. It also presents SoFiN technology breakthroughs, including high-performance lasers, integrated sensing platforms, and AI-driven data analytics.



SoFiN Second Press Release Published



The telecommunication infrastructure monitoring case study was actively disseminated through press releases in multiple medias:

Economy Today
CBN
In Business News

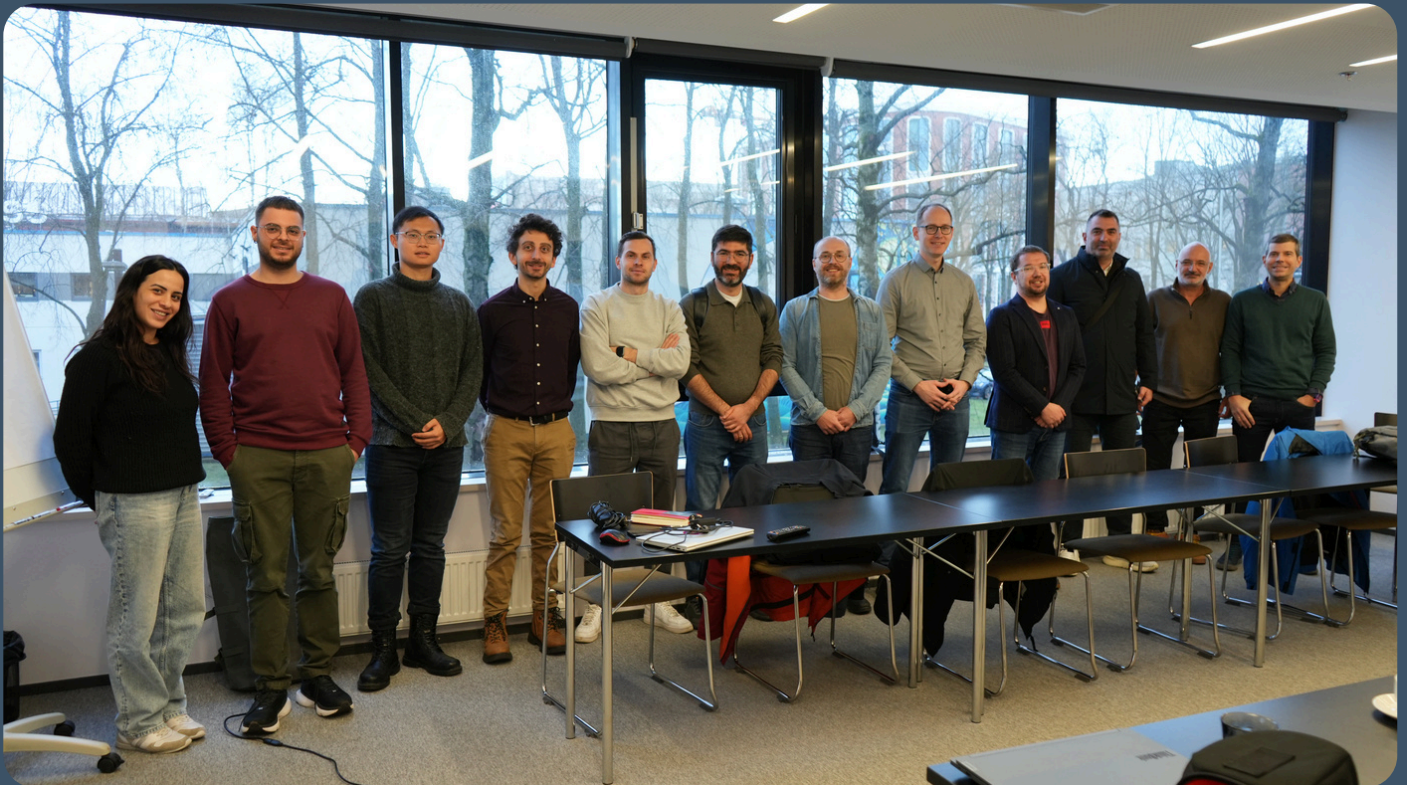
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Project Meeting

M37 Consortium Meeting

In December 2025, the SoFiN consortium met in Tallinn, Estonia, hosted by TELE2. As the project enters its final phase towards completion in 2026, partners reviewed progress on system integration, work packages, and ongoing laboratory and field demonstrations.

The meeting marked an important step towards final validation and upcoming demonstrations, highlighting the strong collaboration among all consortium partners.

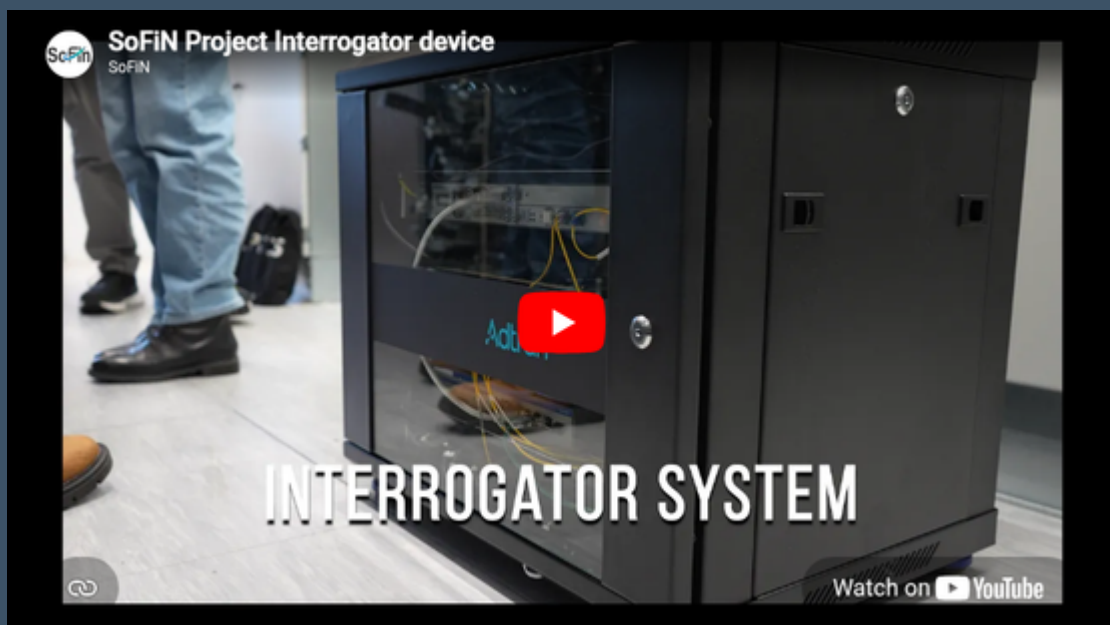
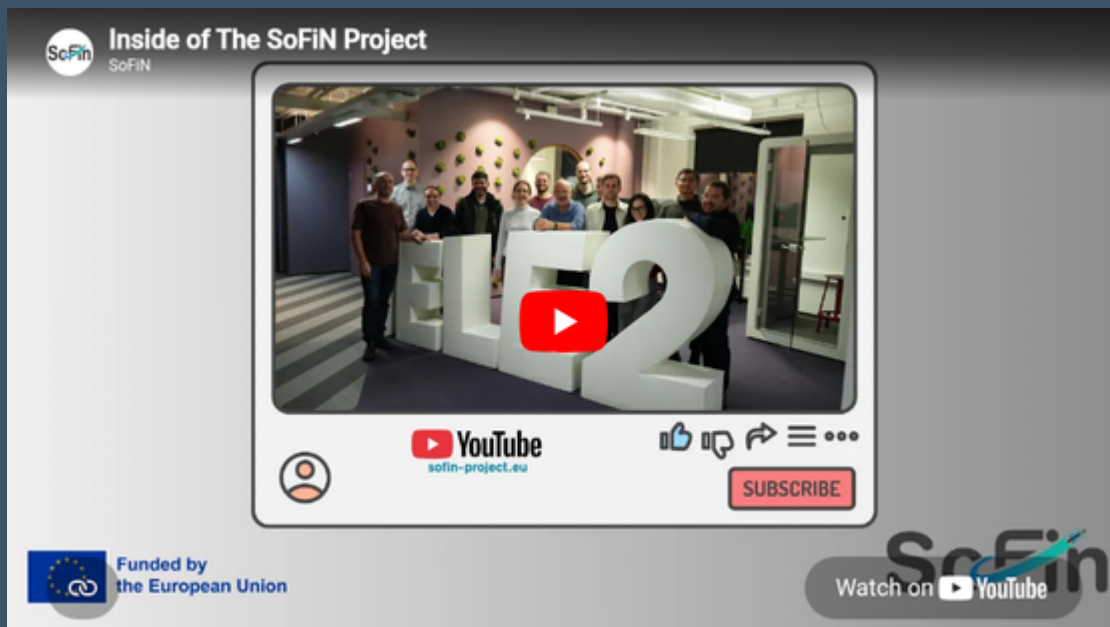


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PROJECT VIDEO RELEASED

SoFiN CM meeting and Telecom Demo videos

During the consortium meeting in Tallinn, Estonia, two videos were produced and recorded at Tele2 facilities, reinforcing the link between communication activities and real-world deployment of the project outcomes. The first video presents an overview of the project, including its objectives, approach, and key achievements, with input from project partners. The second video focuses on the telecommunication infrastructure monitoring use case, showcasing the implemented solution and its practical demonstration.



»»» PROJECT NEWSLETTER

The newsletter aims at presenting a quick overview of project updates, news, work performed and events attended, every 6 months throughout the project duration. Anyone interested in the SoFiN project may conveniently subscribe via the project website to receive an automated notification once a newsletter is released.

»»» CONTACT DETAILS

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