

TRIAGE fact sheet

Ultra-broadband infrared gas sensor for pollution detection

Acronym: TRIAGE

Summary

Air pollution is one of the largest risk factors for disease or premature death globally, yet current portable monitoring technology cannot provide adequate protection at a local community level.

TRIAGE aims to provide smart photonic sensing for environmental air pollution monitoring, by prototyping a portable, high-performance, sensing system, based on cutting-edge photonic technology for pervasive air quality sensing. By accessing the infrared atmospheric window between 2-10 μm , high specificity and sensitivity for molecular gases is achieved as each molecule has its characteristic infrared absorption spectrum in this 'fingerprint' region. As such, TRIAGE can detect minute traces of molecules in complex gas mixtures and will provide real time information and analysis.

- TRIAGE will develop a smart, compact and cost-effective air quality sampling sensor network for the hyperspectral detection of all relevant atmospheric pollution gases
- Resolution and selectivity will be two orders of magnitude better than current solutions and for lower cost
- Cloud-based deep-learning algorithms will enable automated short-term alerts and long-term trend analysis
- Extensive testing in urban settings with Swedish and Swiss environmental agencies and transport companies.

Objectives

The general TRIAGE approach is the following: a broad spectrum generated by a specifically designed supercontinuum (SC) laser (covering the wavelength region between 2-10 μm) will propagate through an environmental air sample with an optical path length of many metres in either a compact multi-pass cell or through free space e.g. between buildings using a retroreflector. In both cases, a compact Fourier Transform Spectrometer (FTS) will be used in combination with an IR detector for hyperspectral analysis. The measured hyperspectral data will then be conveyed wirelessly to a nearby access point for analysis in "the cloud", using sophisticated machine learning algorithms and neural networks.

Hardware

- 2-10 μm supercontinuum sources by NORBLIS and DTU
- Rugged low noise 2 μm pump laser by NKT Photonics
- High-performance multi-pass absorption cell by Senseair
- Infrared detector modules by VIGO System
- FT spectrometer by Radboud University
- The system will be integrated by CSEM

Data analysis

- Reference database by Radboud University
- Analysis and deep learning algorithms by CSEM

Demonstration

- Linköping University will be responsible for the tests of functionality and long-term demonstration of the TRIAGE system.
- Demo activities will be conducted in real world settings (urban environments and on transport networks)
- Several key players from the [TRIAGE-NET](#) will be involved, including national agencies relating to environmental air monitoring and instrumentation manufacturers

Partners

1	Technical University of Denmark (DTU)	Denmark	<i>[Coordinator]</i>
2	Vivid Components	UK	
3	NKT Photonics A/S	Denmark	
4	Radboud University	The Netherlands	
5	Senseair AB	Sweden	
6	CSEM	Switzerland	
7	NORBLIS IVS	Denmark	
8	Linköpings University	Sweden	
9	VIGO System S.A.	Poland	

Project details

Grant agreement ID	101015825
Start date	01-Jan-2021
End date	29-Feb-2024
Duration	38 months
Website	https://trriage-project.info
CORDIS page	https://cordis.europa.eu/project/id/101015825
Status	Execution
Project cost	5,853,624 €
EU contribution	4,994,301 €
Programme	H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP Leadership in enabling and industrial technologies Information and Communication Technologies (ICT)
Topic	ICT-37-2020 - Advancing photonics technologies and application driven photonics components and the innovation ecosystem
Type of action	Innovation Action

TRIAGE is an initiative of the Photonics Public Private Partnership.



This project has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation, under grant agreement No. 101015825.