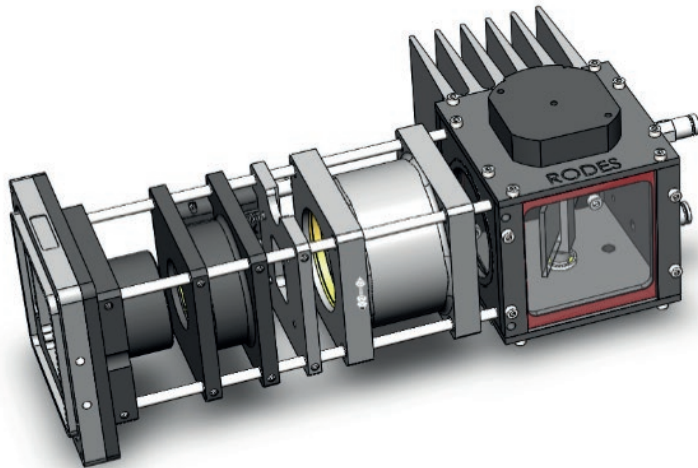


**Project no.:**  
**Provider:**  
**Realization period:**

VH20172020100  
Ministry of the Interior of the Czech Republic  
1<sup>st</sup> January 2017 – 31<sup>st</sup> December 2020

Project Title:

# Robust Detection System with a Hyperspectral Sensor (RODES)



The RODES project logically follows on from the issues solved in the HDES (Hyperspectral Detection System for Dangerous Substances) project. The HDES project resulted in a system that demonstrated the possibility of remote detection of dangerous substances on the basis of a custom designed microbolometric camera (supplied by the Liberec company APPLIC, s. r. o.) and a special optical system (supplied by the TOPTEC Re-

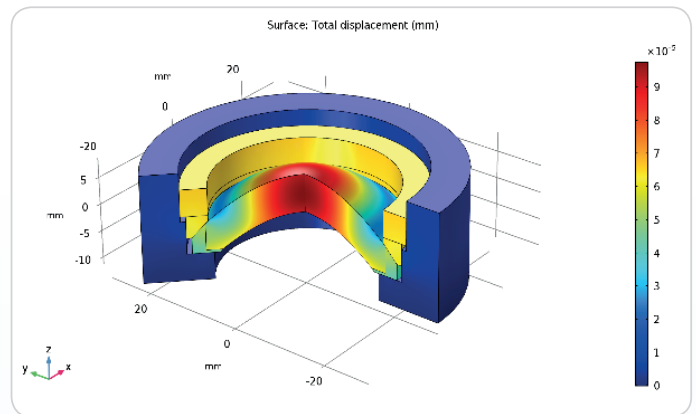
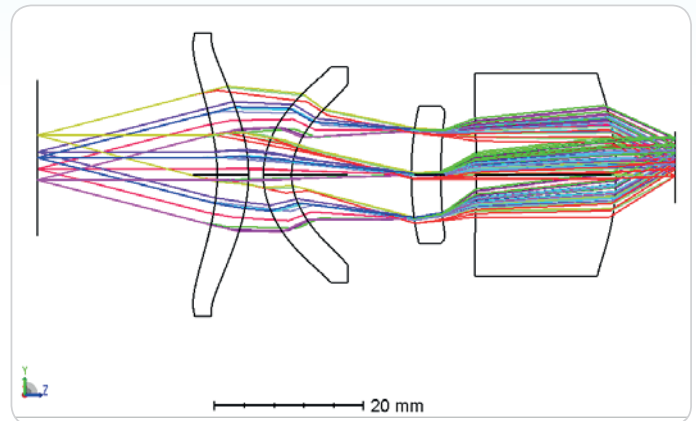
search Centre). The primary user of this system is the Integrated Rescue System, in particular the Fire Brigade. The overall robustness of the system is a decisive factor in its usability due to the high probability of deployment in harsh conditions. Therefore, the result of the project should be a robust and user-friendly system.

Research and development focuses on the following areas:

- Mechanical robustness – increased resistance to impact and rough handling. A possible solution lies in the combination of a rigid outer skeleton system and a flexible inner structure carrying the optical elements. The optical system will be redesigned to reduce its installation dimensions and weight. The goal is to reduce both size and weight to less than 50% compared to the HDES prototype.



- Environmental resistance – in particular, ensuring the system functions over a wide range of temperatures, resistance against sudden changes in temperature, and humidity resistance. The intended solution is to use a hermetic outer sheath, a thermal insulation layer, and additional heat conducting layers to produce a suitable compromise between temporal and spatial thermal stability on the one hand and system weight on the other.
- Robustness of the detection function – improving the stability and sensitivity of chemical detection in field conditions. It includes the development of a new sensing camera with increased stability and reduced noise, as well as improved algorithms for gathering and analysing hyperspectral data. The performance will also be improved by a new optical design with a higher image quality and system throughput (fewer elements, better anti-reflection layers).



**Results of the project:**

- A reduced-size optical system with a new type of optical components mounting using a cage-like mechanical structure. The newly designed system is smaller and lighter and it will serve the purpose of testing a modified method for hyperspectral data acquisition.
- A new version of the IRCA infrared camera – the IRCA-3, with modified electronics and completely redesigned firmware. The camera has reduced noise and increased stability of data link to the PC.