KIRAS Security Research

Federal Ministry
Transport, Innovation
and Technology

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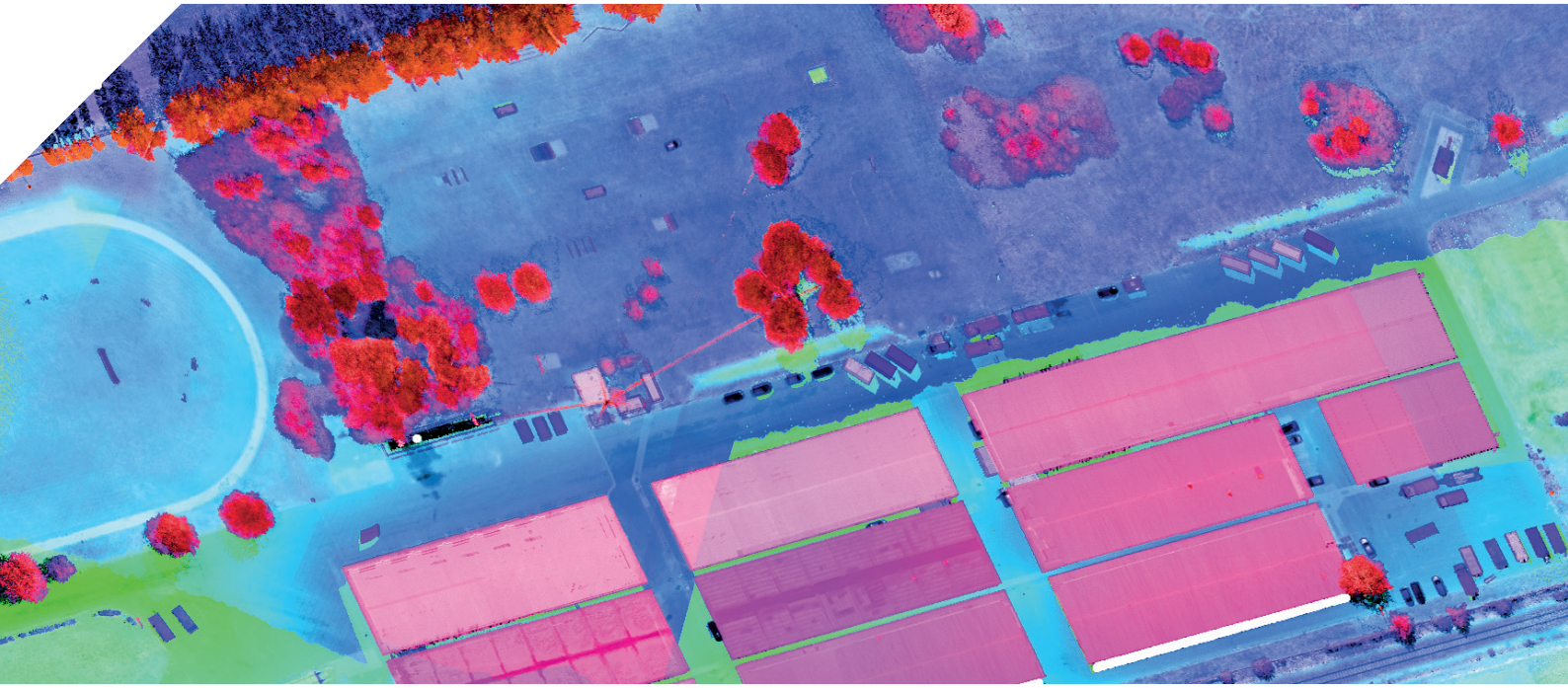
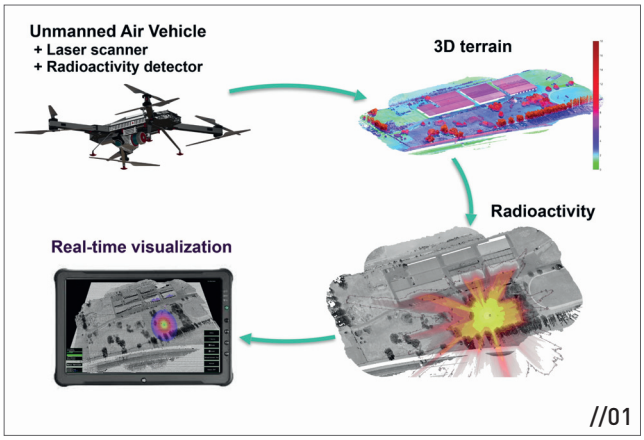


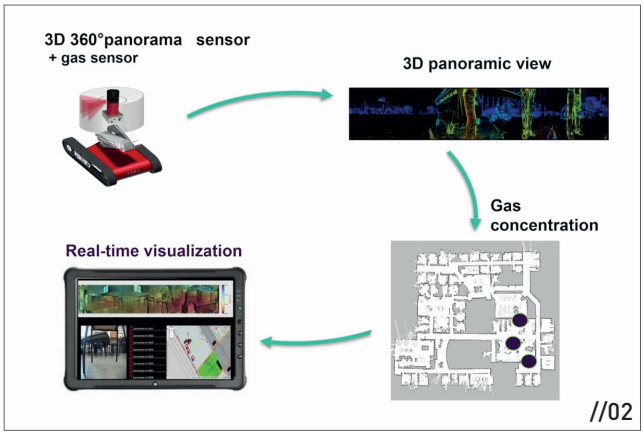
SECURESCUE - SECURITY BY INFORMATION

In disaster and crisis operations as well as operations involving unknown hazardous substances, emergency forces are often exposed to great and unpredictable dangers and risks - SecuRescue considerably improves the current level of information and thus the basis for operational planning.

REAL-TIME INFORMATION FOR FIRST RESPONDERS

SecueRescue tackles the needs to improve visibility of risks in disaster areas, to allow fast and efficient localization of dangerous zones and to increase safety for action forces and victims.
As an essential component, **3D terrain data** of a high-quality laser scanner or images of a novel **3D 360 ° panorama camera** (TUCO-3D) are fused with data from hazard sensors (gas, radioactivity, ...).
The laser scanner system is used in combination with a gamma probe from an unmanned aerial vehicle (UAV). The TUCO-3D panorama camera and a gas sensor are mounted on a mobile robot.
In potential hazardous situations, such as fire, escape of hazardous substances or release of radioactivity, the unmanned aerial vehicle (outdoor) or the robot (indoor), are able to explore the terrain **semiautonomously and without endangering human life**, in order to generate an interactive map and a visualization on a tablet in a very short time frame.





//01 Outdoor scenario
//02 Indoor scenario

CENTER FOR
DIGITAL SAFETY & SECURITY

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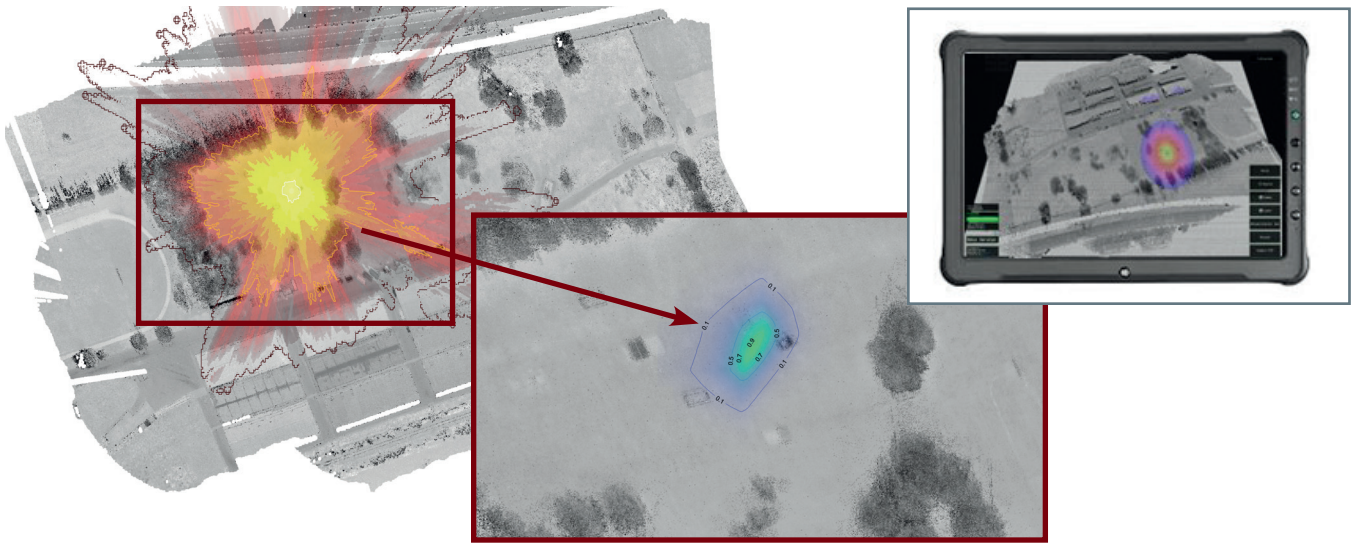

UAV BASED SMART DETECTION & LOCALIZATION OF RADIOACTIVE AREAS

EXPLORATION OF UNKNOWN TERRAIN

- **Accurate 3D terrain maps**:
  Live data stream between the UAV in the air and the mobile base station.
  3D terrain maps are generated by laser measurements in real time.
- **Dynamic floor model**:
  New laser points consistently improve the 3D terrain model
- **No vision problems** due to vegetation:
  Revealing hidden paths, impassable roads
  and terrain imperfections

SMART DETECTION OF RADIOACTIVE SOURCES

3D LiDAR and CBRNE sensors create a consistent view

- the **fusion** of all available measuring instruments and values (LiDAR, radioactivity) into one
- **comprehensive set of information**, which reveals the exact location of radioactive sources and summarizes key parameters
- The current results and measurements are clearly shown in a **zoom and rotatable map**, e.g. shown on a tablet

BENEFITS OF REAL-TIME SITUATION AWARENESS

- **Localization** of individual radioactive sources within one minute
- Radioaktivitätsmessungen werden mit 3D Geländekarten kombiniert, um Verstrahlung zu modellieren
- **Reliable floor model:**
  High quality 20k laser pts/s -> 30 pts/m²
- Scan of large areas (500x500m)
- **Fast results**: complete scan after 400s
- Accuracy of localization ~ 1 m

Austrian security research programme KIRAS of the Federal Ministry for Transport, Innovation and Technology (bmvit)

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