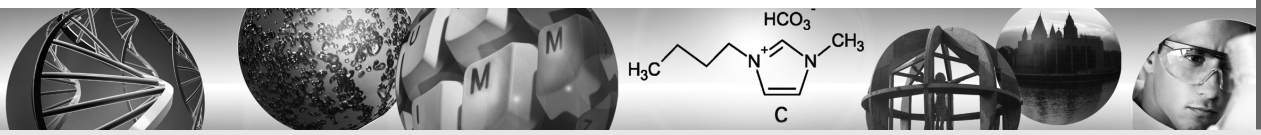

Protecting People and Critical Infrastructure in a Multi-Organizational Approach to Hazard Response

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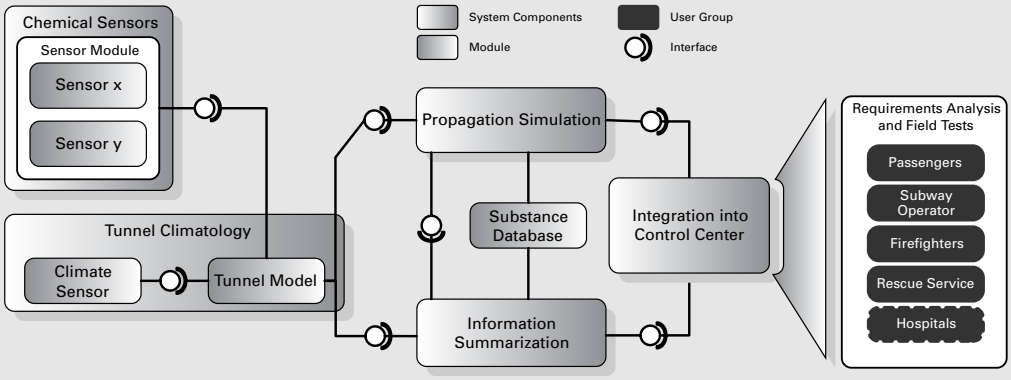
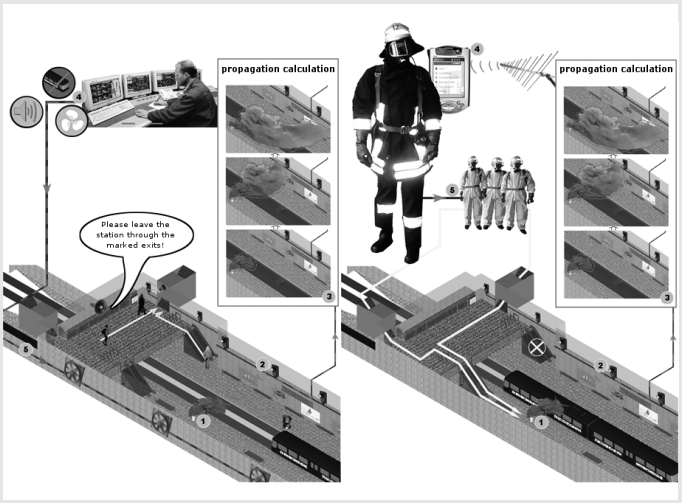
Introduction

Subways can at times be very crowded places – especially during rush hours – which makes them a potential target for terrorist attacks. For this reason, the release of harmful chemical substances in subway trains was chosen as test case for the OrGaMIR project.



Project description and objectives

The project will be weighing in on different aspects of novel information delivery methods. The goal is to expedite evacuations and other rescue operations. The objectives are threefold. First, an initial chemical contamination by hazardous substances in subway systems shall be detected by way of chemical analysis. Secondly, computational models shall predict spatial propagation patterns. Thirdly, concise and pertinent information shall be distributed to all organizations participating in the rescue effort. These aspects are naturally interconnected. The knowledge of propagation patterns of a hazardous substance is decisive in deriving specific instructions for passengers, rescue forces, and operators enabling them to make potentially life-saving decisions more reliably. Also, improved crisis management procedures will rely on and help enhancing the cooperation between firefighters, emergency aid workers, and subway operators.

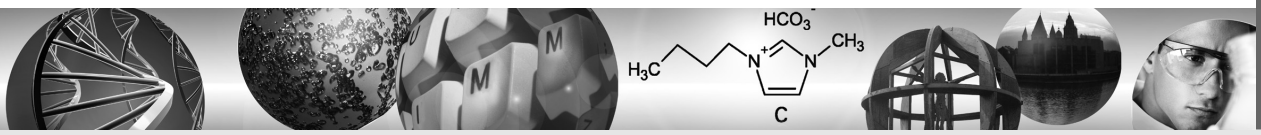


Innovations and applications

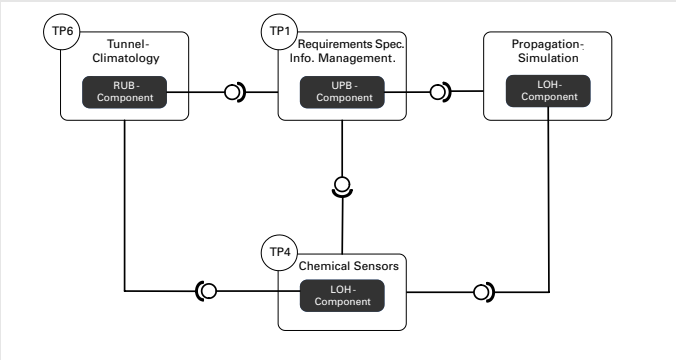
The "OrGaMIR system" is based on an innovative approach to provide an information delivery tool, which in case of emergency will direct passengers to uncontaminated exits using methods like loudspeaker announcements or optical signals. Further, climatic aspects of tunnel architectures are examined and how any shortcomings can be eliminated by new safety features, thus guiding the remodeling of existing as well as the construction of new subway stations.

Institut für Mikrotechnik Mainz GmbH

Protecting People and Critical Infrastructure in a Multi-Organizational Approach to Hazard Response

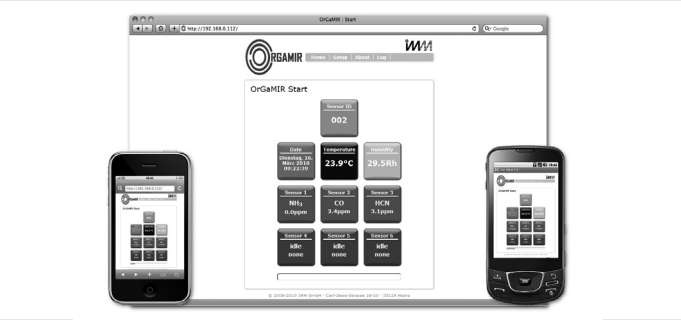


Requirements



The sub-project being worked on at IMM seeks to develop, and integrate into a forecasting system, a modular analysis platform that will detect CBRNE (Chemical, biological, radiological, nuclear or explosive) substances by convoluting measured data from various sensors into an easily handled, concise set of information that can be used to visualize the propagation of hazardous materials inside subway and train stations. The universal applicability of this concept will provide new insights into optimal designs of interfaces between micro- and information systems, or between multiple microsystems. Such results will give renewed impetus to the development of marketable microstructure-based analysis systems.

System



With CBRNE hazardous materials being as numerous as they are, it is unfeasible to detect every single of such substance individually. Instead, IMM is developing a system that will detect hydrolysis products resulting from the release of one or more hazardous substances with a certain probability. After creating a database of hazardous substances, IMM was able to build a modular platform containing up to six gas sensors. It can accommodate and read out, e.g., commercially available sensors with analog signals from 0-10 V, transmitters with signals form 0-20 mA, sensors with serial interfaces, or digital two-wire sensors (I_C). The sensors will be read out permanently and the determined concentrations of hydrolysis products, if any, will be compared with their stored Acute Exposure Guidelines Levels (AEGL) value. If the AEGL value is exceeded, an event will be triggered requesting the OrGaMIR system to query all installed sensor platforms. Data obtained in this detection procedure as well as aspects based on investigations of the tunnel climatology will allow creating a predictive model for future usage.

Communication between individual sensor platforms and the OrGaMIR system takes place via Ethernet. The Web Service-based data interface continually writes all measured values into an XML structure. This way, sensor units can also be used outside the OrGaMIR system. In addition, each sensor platform features an integrated web server, enabling the current gas concentration to be monitored with a web browser from a remote computer, PDA, or smart phone. Finally, the web server acts as a configuration interface for setting up sensor configurations, AEGL thresholds as well as choices for the computational model.

In order to keep installation costs for chemical sensors at a minimum, a PoE (Power over Ethernet) module is integrated into every sensor platform, combining power supply and communication in a single cable per platform.

Partners

- Universität Paderborn
  Computeranwendung und Integration in Konstruktion und Planung
- Indanet Informations- und Datennetze GmbH
- Ingenieurbüro Lohmeyer GmbH und Co
- Institut für Mikrotechnik Mainz GmbH
- Friedrich-Schiller Universität Jena
- Ruhr-Universität Bochum, Geographisches Institut
- Ed. Züblin AG

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