

Publications and Teaching

In the SmartRescue project we have published 16 peer-reviewed international conference papers, 1 book chapter and 5 scientific journal papers.

In teaching, the SmartRescue project has been used as a case for student projects, Master's theses and PhD projects. The topics covered span a wide range of challenges, including simulating fire based on Bayesian networks, publish-subscribe systems for real-time emergency management, hazard visualization, evacuation planning, as well as fire detection and prediction using machine learning techniques such as Naïve Bayes Classifier and Decision Trees .

Workshops and Dissemination

The SmartRescue Project has been involved in various workshops and dissemination events, such as:

- SmartRescue Workshop, Grimstad, June 2012
- Forskningsdagene, Grimstad, 22 September 2012
- Evaluation Workshop for Mandal Terrorist Attack Drill, 23 October 2013, Kristiansand,
- CIEM Workshop, Kristiansand, 27 November 2013
- ISCRAM Summer School, University of Tilburg, the Netherlands, 13-22 August 2014
- CIEM Workshop, Kristiansand, 4 November 2014
- Digitalkonferansen Change IT, Kristiansand, 18 March 2015
- Kristiansandskonferansen, Kristiansand, 21 April 2015

Future Plan



As a proof-of-concept solution, the SmartRescue system has demonstrated promising functionality for supporting first responders in fire scenarios, and laid down a solid foundation for novel applications. We have also explored and developed business scenarios for SmartRescue, supported by master thesis work in Industrial Economics at UiA.

Further work includes extending SmartRescue with a platform for ad-hoc networking and methods for quick adaptation to new environments.

The goal is to reduce dependence on critical infrastructure. We welcome partnerships for further exploitation of SmartRescue, either research-wise or with respect to commercialization.

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CIEM CENTRE FOR INTEGRATED
EMERGENCY MANAGEMENT



**SmartRescue Project
(2012 – 2015)**

 UNIVERSITETET I AGDER


AUST-AGDER
UTVIKLINGS- OG
KOMPETANSEFOND

What is the SmartRescue Project?

Mobile wireless devices such as smartphones have become a widespread and typical asset. At the same time, such devices are equipped with ever more advanced sensor technology, including accelerometer, digital compass, gyroscope, GPS, microphone, and camera. This has enabled an entirely new class of mobile device based applications that connects low-level sensor input with high-level events.



SmartRescue App

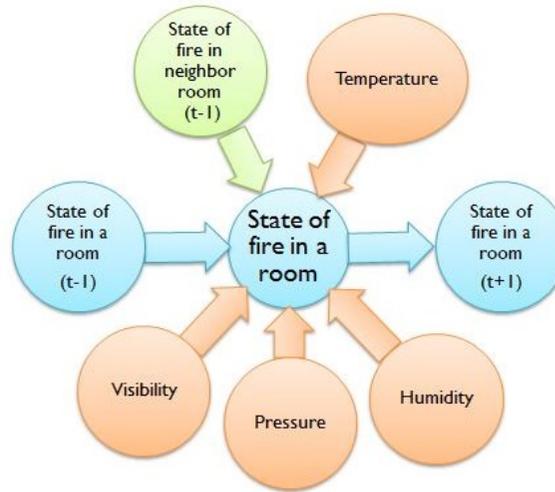
The SmartRescue project at University of Agder, Norway, have explored how this kind of communication technology can be used in acute crisis situations, where individuals need to be alerted about immediate threats, and be supported with plans for evacuating the affected area in the safest possible way. Our focus has been on the first phase of an acute and severe emergency situation in which human life and health are endangered, and where individuals for the moment are partially left to themselves, for example, because the traditional response apparatus is suppressed, delayed or paralyzed by the crisis.

Scenario

Our focus has been on building fire, forecasting the extent, impact and development of the fire.

SmartRescue App Technologies

- Android app based
- Smartphone based sensing
- Data sharing through Publish-Subscribe Notification System
- Artificial intelligence techniques (Bayesian Network, K-Nearest neighbor algorithm) for threat assessment and forecasting
- Ant-based algorithms for evacuation planning



Bayesian Network Model for fire assesment and prediction implemented in the SmartRescue app

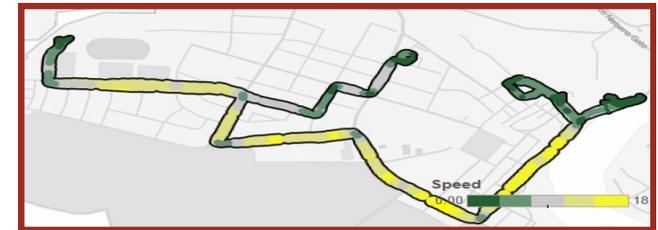
SmartRescue App Features

The app user can share sensor information through a publish-subscribe system, meaning that in a crisis situation, users can filter the sensor information they wish to know, such as peers' locations or temperature surrounding them. It has simple activity recognition that detects someone's movement, and senses the environment surrounding the users, for instance, if they are inside in office light, in a dark area, or outdoor.

By exploiting the sensor readings from the devices (temperature, humidity, pressure) in a fire hazard scenario, the user app can assess and predict the fire development based on a color-coding scheme. Besides, the SmartRescue app has an indoor localization feature that can track people within a building during a fire, such as victims trapped in a room. Although the app is prototyped for building fire, its applicability can be extended into other fire scenarios such as a ship or tunnel fire.

Cooperation with Local Authorities

Smartphone sensor data collection in the Mandal Drill
24 September 2013



Mandal Terrorist Attack Drill (Above) and Geovisualization of a Responder tracked from Smartphone (below)

Serious Game for Testing SmartRescue App

1. Testing the fire development feature in ISCRAM Summer School, University of Tilburg, the Netherlands, 18 August 2014
2. Testing indoor localization, fire assessment and prediction features of SmartRescue App in University of Agder Grimstad, 20 November 2014

