VitalResponder 2.0: Intelligent Management of Critical Events of Stress, Fatigue and Smoke Intoxication in Forest Firefighting

The VR system has been developed to enable on-duty first responders health monitoring and surveillance. We developed WiFi-based wireless mesh solutions, first based on smartphones and later on RPi. We characterised propagation and battery consumption, evaluate data carrying performance, and built a network coding based data gathering protocol.

**General Motivation and Objectives**

The system is composed of wearable monitoring platforms that are used by all members of the first responder team, which then communicate with an aggregator that may then show local parameters (team member location, vital variables etc.), generate alarms, etc.

The goal of IT’s task was to provide connectivity to support the data gathering from the sensors to a central collection unit to be installed on the fire truck.

**Challenge**

This is a challenge because cellular network support cannot be guaranteed in the targeted environments.

**Work Description and Achievements**

We analyzed the traffic generated by the sensing application (including all sensors), and concluded that it is nearly constant bit rate (CBR) with peak rate of 30kbps per node. Based on the insights, we created a traffic model that enables carrying out network performance evaluation without physically replicating the setup of each fireman.

We opted for using a multihop-enabled mobile ad-hoc network (MANET) built on top of 802.11 technology to support the expected worst case aggregate traffic at the early stage of the project. 802.11 technology is well-established. COTS devices are widely available at affordable prices and decent energy consumption, and integration into a portable system is feasible. As a first prototype, we developed AdHocDroid that enables creating an IP MANET of smartphones and measured the coverage range of smartphone links in forest environments to be around 70m. The AdHocDroid MANET has been evaluated and compared to other solutions that claim to build smart environments to be around 70m. The AdHocDroid MANET has been evaluated and compared to other solutions that claim to build smart environments to be around 70m. The AdHocDroid MANET has been evaluated and compared to other solutions that claim to build smart environments to be around 70m. The AdHocDroid MANET has been evaluated and compared to other solutions that claim to build smart environments to be around 70m.

**Technology re-assessment summary table**

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<td>Cellular network support</td>
<td>Limited</td>
<td>Due to variability in network coverage, cellular network support cannot be guaranteed.</td>
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<td>WiFi-based wireless mesh</td>
<td>Efficient</td>
<td>The WiFi-based wireless mesh solutions have been efficient in maintaining connectivity in forest environments.</td>
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<td>RPi-based wireless mesh</td>
<td>Robust</td>
<td>The RPi-based wireless mesh solutions showed robust performance in challenging environments.</td>
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**PROJECT WEBPAGE URL**

https://www.it.pt/Projects/2152