

Acoustical sensors and a range-gated imaging system in a self-routing network for advanced threat analysis

S. Hengy, M. Laurenzis, A. Schneider

French-German Research Institute of Saint-Louis
5 Rue du General Cassagnou
68301 Saint Louis CEDEX, France
Sebastien.Hengy@isl.eu
Martin.Laurenzis@isl.eu
Armin.Schneider@isl.eu

Abstract: We present a wireless sensor network which is used in an acoustic-optical system for sniper detection. The network consists of mobile nodes, carried by soldiers or mounted on vehicles as well as fixed nodes which are used to forward data to a base station. The mobile nodes are equipped with a microphone array, a GPS receiver and an electronic compass. In case of a sniper attack, each mobile node is capable of estimating the distance and direction of the threat. In addition, preprocessed audio-data from each mobile node will be sent via the wireless network to a base station, where the data will be processed to further enhance the accuracy of the threat localization. Identification and verification of the threat will be attained by a range-gated active imaging system which is automatically orientated towards a calculated GPS coordinate of the threat. In order to properly design the wireless network, we carried out simulations using the freely available network simulator ns-3. This simulator allows including real hardware into a simulation. It is therefore possible to use real mobile nodes to generate real network traffic while the fixed nodes can be simulated. The wireless network can thus be easily investigated by modifying parameters like node location, number of nodes, bandwidth etc. without expensive field experiments and without realizing real hardware in advance. In addition, several experiments have been carried out with real nodes in a rural area.