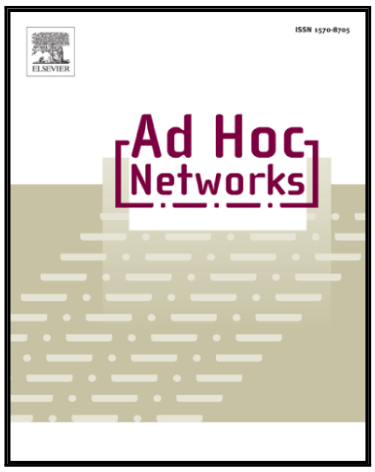

No-Collision Grid Based broadcast scheme and Ant Colony System with Victim Lifetime Window for navigating robot in first aid applications

Sarah Allali, Mahfoud Benchaïba, Fares Ouzzani, Hamid Menouar

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No-Collision Grid Based broadcast scheme and Ant Colony System with Victim Lifetime Window for navigating robot in first aid applications

Sarah Allali, Mahfoud Benchaïba

Computer Science Department, LSI, USTHB, Algeria

Fares Ouzzani

Faculty of Mathematics, USTHB, Algeria

Hamid Menouar

Qatar Mobility Innovations Center Doha, Qatar

Abstract

The system that we propose in this paper aims to help robots to rescue immobilized victims by providing first aid (e.g.: oxygen masks). Such first aid can increase the chances of saved lives, by maintaining the status of victims until the arrive of rescue team for the take over. The proposed system takes advantage from a grid-based architecture for sites monitoring that has been presented in a previous work. It is composed of a mobile robot and a wireless sensor network (WSN). The robot has the mission of rescuing victims, and the WSN has three main missions: (1) detecting the existence of victims or any anomaly in the area, (2) disseminating reliably information and alerts and finally (3) providing the robot with efficient route guidance. To disseminate information with low cost (i.e avoids collisions caused mainly by the hidden node problem), we propose a distributed algorithm that insures the no collisions in the broadcast scheme using a grid, we called it No-Collision Grid Based (NCCB). Using NCGB allows to create all possible paths from any cell to the victim. This helps in guiding the robot through the safest and shortest route in a distributed manner. In order to increase the number of rescued victims, we used Ant Colony System with Victim Lifetime Window (ACS-VLM) to schedule the sequence of victims to