

TECHNOLOGY FOR LOCATING INJURED PEOPLE IN AREAS WITHOUT MOBILE PHONE COVERAGE

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ABSTRACT

The technology developed by researchers at the University of Alicante allows the use of a smartphone to locate people injured in remote environments where there is no mobile phone coverage (GSM/UMTS). The smartphone emits a Wi-Fi signal that acts as a distress beacon and can reach a distance of several kilometers.



The system allows to locate exactly the injured and can be implemented on any Android smartphone model.

This technology is especially suitable for situations where there is no possibility of establishing communication using mobile phone networks and where speed in the rescue is essential to save lives. Two areas have been identified where the system can be vital: rescue of people in high mountain and sea rescue (man on the water).

**INTRODUCTION**

The current technologies for requesting assistance in recreational activities in nature are based on three technologies (mobile phone service, VHF stations and satellite systems), although the most widespread in use is the mobile phone service contacting with the emergency number 112.

The developed system employs as a distress signal device a smartphone.

There are commercial applications (Apps) that are installed on smartphones and offer multiple functionalities for emergencies. Normally they can send distress signals in the event of an accident, both orally and through the App, informing the emergency

services of the injured state.

These Apps are very useful since the majority of users take their smartphones when they are going to carry out activities in the nature. However, these signals depend on the availability of mobile phone coverage.

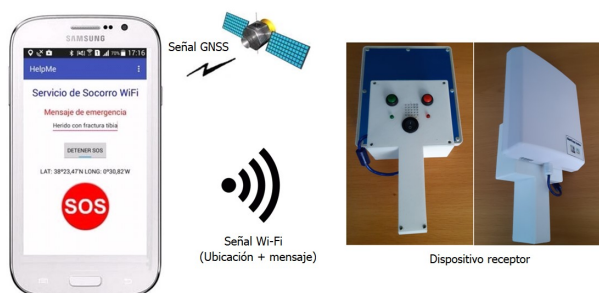
Although mobile phone coverage is widely extended, there are places where it is not available because it is located far from the communications infrastructure. It is in these areas where the technology developed has great potential.

TECHNICAL DESCRIPTION

In geographical areas where there is no coverage of the mobile phone service, the citizen does not have the possibility to establish any contact to request help with his smartphone.

However, it is possible, with the technology developed, to give any smartphone the ability to generate a distress signal. This signal informs the GNSS (GPS / Glonass / Galileo) location and is detectable several kilometers away.

The technology developed consists of two fundamental elements, the software (App) incorporated in the emitting smartphone and a receiving device designed to receive and interpret the signal.



The **smartphone** must be equipped with a GNSS receiver and a Wi-Fi interface, elements found in almost all smartphones on the market. In addition, it must have installed an App, specifically designed by the researchers of the University, that emits the distress signal detectable by the receiving device. The developed App can be used by any smartphone that owns the Android operating system. Also, the App could be developed for other operating systems.

The **receiving device** used by rescue teams or mountain refuges, allows the signal to be detected several kilometers away, depending on the terrain orographic conditions and the physical characteristics of its antenna. The device has a small antenna and it connects to the rescuer's smartphone where the received signals are displayed.



When an incident occurs, the injured person only has to activate the App of the smartphone that will emit the signal periodically indicating the coordinates of his position.

Rescue teams equipped with the portable receiving device will perform their search operations with the advantage that they do not need to have visual contact with the injured person. At the moment they can detect a single signal, that will indicate the exact position of the injured, even if it is several kilometers away.

ADVANTAGES AND INNOVATIVE ASPECTS

TECHNOLOGY ADVANTAGES

The main advantages of the technology are:

- Users do not need to purchase a specific device to emit a distress signal. Any smartphone that incorporates the App can emit the signal.
- The receiving devices of rescue teams have a low cost.

- The weight of the receiving devices is also very low. Can be carried in a backpack.
- No mobile phone coverage is required.
- The signal can be emitted for hours or even days. It can be disabled the rest of services on the smartphone to save battery, increasing the duration of the signal.
- The signal can be configured, incorporating relevant data such as the GPS coordinates of the accident, the identification of the person or a small message about the type of accident.
- The signal can be detected from long distances, depending on the orography of the place from which it is emitted. In recent mountain tests the signal was detected about 3 kilometers away.
- It allows an injured to continue transmitting a distress signal even if he/she has lost consciousness or loses mobile phone contact with the rescue teams.
- In situations of bad weather conditions (blizzard, fog) or night time, it is possible to locate the wounded with great precision, without having to make eye contact.

INNOVATIVE ASPECTS OF TECHNOLOGY

The main innovation of the technology is that it allows to use a standard device that we usually carry with us and provide it with specific functionality for emergencies.

The system facilitates the work of rescue teams, saving time and costs in rescue operations, and focusing on tracking in more specific areas.

In short, in extreme cases, it increases the chances of survival of the injured.

CURRENT STATE OF DEVELOPMENT

The technology has been tested in high mountain simulating real cases with rescue teams. The tests performed have been very satisfactory, locating the injured in different locations, in a very short time. Those responsible for the rescue teams have been interested in being able to pilot tests in real conditions with hikers.

MARKET APPLICATIONS

This technology brings added value fundamentally in the following circumstances:

- When there is no mobile phone coverage.
- When the speed in accessing the injured is vital to save his life.
- When there is difficulty in locating the injured because of adverse weather conditions or poor visibility.

An area of specific application have been detected where this technology would be vital to save lives: **high mountain rescue**.

Frequently it happens that hikers who practice mountain sports suffer an accident or get lost. These people are usually equipped with a smartphone but there may be no mobile phone coverage.

In these cases the operative is to start their search when they are missing and a search is made based on the visual contact or sound signals. When there are extreme weather conditions, the chances of survival fall considerably and it is very difficult to locate people even if the rescue teams are close to the injured.

The technology developed allows to optimize the searching and reduce the tracking time. In situations with bad weather conditions (blizzard, fog) or even at night, it allows to locate a hiker with great precision.

COLLABORATION SOUGHT

Companies interested in acquiring this technology for commercial exploitation through licensing agreement are required.

INTELLECTUAL PROPERTY RIGHTS

This technology is protected as intellectual property by registration in the repository of the University of Alicante (RUA), within the register of computer programs and databases:

- *Title of registration: "SYSTEM FOR BROADCASTING GEOLOCATION INFORMATION IN EMERGENCY SITUATIONS VIA WI-FI INTERFACES OF SMARTPHONES".*
- *Date of creation: 1/09/2016*
- *Date of publication in the RUA: 24/03/2017*

The technology has been awarded in the European Satellite Navigation Competition ESNC 2016.

MARKET APPLICATION (5)

Agri-food and Fisheries
Computer Science, Language and Communication
Engineering, Robotics and Automation
Transport and Automotive
Tourism