SELF RESCUE SYSTEM IN DISASTERS USING SMARTPHONES

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Abstract

Recent widespread earthquakes have caused widespread devastation of electrical power and cellular infrastructures, leaving millions of people without access to electricity and communication. As a result of the widespread earthquake tragedy, no electricity and The golden hours are lost due to ineffective and time-consuming rescue efforts and outdated equipment as well as a lack of a reliable communication system. It is reasonable to suppose that many catastrophe victims will have access to strong wireless devices like smartphones, which may be used to coordinate rescue efforts. In this study, we suggest the use of a smartphone-based self-rescue system called our system to aid in disaster relief and rescue efforts. Our system's central concept is that a group of cellphones belonging to survivors who are trapped or buried beneath the collapsed infrastructure establish a one-hop network and send out a distress signal in an energy-efficient way to surrounding rescue workers. We conduct a comprehensive simulation experiment to assess the suggested method and compare its results to those of the already established teamphone system. The simulation findings suggest that the suggested method may be a realistic way to speed up disaster rescue and relief activities by drastically decreasing the schedule vacancy of broadcasting distress signals and increasing the detection probability with little impact on network lifespan.

1. Introduction

In light of these considerations, the purpose of this study is to design a revolutionary disaster self-rescue system that makes use of the ubiquitous smartphone in the aftermath of a catastrophe. Here's a quick rundown of our main contribution:

To aid disaster relief efforts, we suggest a smartphone-based self-rescue system called our system. Our system's central concept is that a group of smartphones carried by survivors trapped or buried beneath the collapsed infrastructure creates a one-hop network and sends out distress signal in an energy-efficient way to surrounding rescue workers to aid in rescue efforts. In order to make meaningful performance comparisons, we review a previously established method, teamphone [6], and adapt it for use in the newly created simulation environment.

Through thorough simulation studies, we evaluate and assess our system and teamphone's performance in terms of network lifespan and scheduling void of broadcasting distress signal. The simulation results show that the proposed approach can significantly reduce the schedule vacancy of broadcasting distress signal and improve the discovery probability with very little sacrifice of network lifetime, suggesting a potentially viable approach to speed up rescue and relief operations in the event of a disaster.

The remaining pages of the document are laid out as follows. In Section II, we provide a summary and critical evaluation of the existing methods. In Section III, we present the suggested smartphone-based self-rescue system. Extensive analysis and findings from the simulations are presented in Section IV. The last section of the paper, Section V, serves as a wrap-up.

2. Related Work

In the recent decade, there has been a lot of research on the potential of smartphones to aid in disaster recovery network construction and disaster rescue and relief activities.

Using a wifi tethering approach based on smartphones, the [7] provides a system to allow the devices to autonomously locate their neighbours and communicate data about disaster-affected region via various network to wifi access points. To build the required network infrastructure using a mobile device, the authors of [8] suggest a unique architecture they name the energy conscious disaster recovery network employing wifi tethering. The core concept is to create an ad hoc network for data collecting in catastrophe situations by taking use of wifi tethering technology, which is widely accessible on wireless devices like smartphones and tablets. Using the ideas of wifi tethering, the [9] proposes a smartphone-based post-disaster management mechanism in disaster-affected areas, where smartphones in the affected areas may turn themselves into temporary wifi hotspots to provide Internet connectivity and important communication abilities to nearby wifi-enabled user devices. Using only users' mobile devices, sending out emergency messages from disconnected areas, and sharing information among people gathered in evacuation centres are all possible thanks to the concept of multihop device-to-device communication network systems proposed in the [3], which integrates with different wireless technologies. Hyper-redundant robot snakes with distinctive gaits are offered in [10] as a possible answer to the problem of catastrophe search and rescue. In [11], a technology is suggested to help rescue workers find potential victims by using unmanned aerial vehicles to hover over the disaster zone and detect wireless signals from cell phones, narrowing the search area down to just a few metres.

Smartphones belonging to trapped victims and other people in disaster affected areas can self-detect the occurrence of a disaster incident by monitoring the radio environment, and can then self-switch to a disaster mode to transmit emergency help messages with their location coordinates to other smartphones in the area (as described in [13]). Each smartphone initiates a rendezvous procedure to find nearby devices that are also functioning in catastrophe mode. In

[14], an application called soscast is suggested to spread SOS signals from survivors in a confined area using a network of cellphones. Rescuers may make educated guesses about the whereabouts of survivors by compiling SOS messages with crucial information like their name, state, and location.

Without any infrastructure, the smartphones of rescuers and victims may work together utilising the received signal strength indication of wifi signals and the GPS information of the rescuers' smartphones to estimate the whereabouts of the victims. In a post-disaster setting, the [16] suggests an emergency and recovery strategy that makes use of cellphones and Internet of Things (iot) devices to ensure that critical information may be effectively sent from disaster-affected regions to unaffected areas.

In [6], a technology named teamphone is presented to equip smartphones with the communication capabilities of disaster recovery by bridging the gap between several wireless networks. The communications system and the self-rescue mechanism make up teamphone. The messaging system allows rescue personnel to communicate by using cellular networking, ad hoc networking, and opportunistic networking. The imprisoned survivors' smartphones are grouped together and emergency messages are sent out in an energy-efficient manner via the self-rescue system. However, the self-rescue mechanism doesn't take into account the fact that the smartphones of the imprisoned survivors could all have varying amounts of remaining energy, and the one with the least amount of energy would die rapidly from constantly sending emergency signals. Since the network topology might vary due to the loss of individual smartphones, the timetable of sending out emergency alerts needs to be dynamically changed correspondingly.

3. System analysis

Using a smartphone-based ifi tethering approach, the [7] provides a system to allow the devices to locate their neighbours autonomously and transfer data of disaster-affected region using various network to wifi access points. In order to build the required network infrastructure using a mobile device, the authors of [8] suggest a unique architecture they term energy conscious disaster recovery network employing wifi tethering. The core concept is to establish an ad hoc network for data collecting in catastrophe situations by taking use of wifi tethering technology, which is widely accessible on wireless devices like smartphones and tablets. The concept of wifi tethering is proposed in the [9] as a smartphone-based post-disaster management mechanism in disaster-affected areas, where smartphones can transform into temporary wifi hotspots to provide Internet connectivity and vital communication capabilities to nearby wifi-enabled user devices. Using only users' mobile devices, sending out emergency messages from disconnected areas, and sharing information among people gathered in evacuation centres are all possible thanks to the concept of multihop device-to-device communication network systems proposed in the [3], which integrates with different wireless technologies. In [10], the authors suggest using robot snakes, which have a hyper-redundant body and distinctive gaits, for search and rescue applications during a crisis. In [11], the use of unmanned aerial vehicles (uavs) as part of a disaster rescue system is suggested; these uavs would circle the disaster zone, sniffing out wireless signals from nearby mobile devices to help the search team zero in on a smaller region, maybe only a few square metres in size.

Smartphones belonging to trapped victims and other people in disaster affected areas can self-detect the occurrence of a disaster incident by monitoring the radio environment, and can self-switch to a disaster mode to transmit emergency help messages with their location coordinates to other smartphones in the vicinity, as presented in [13]. Each smartphone initiates a rendezvous procedure to find nearby devices that are also functioning in catastrophe mode. As described in [14], an app called soscast is offered as a means for stranded individuals to send out SOS signals through smartphone-to-smartphone communication. Rescuers may make educated guesses about the whereabouts of survivors by compiling SOS messages with crucial information like their name, state, and location. Without any infrastructure, the smartphones of rescuers and victims may work together utilising the received signal strength indication of wifi signals and the GPS information of the rescuers' smartphones to estimate the whereabouts of the victims. In a post-disaster setting, the [16] suggests an emergency and recovery strategy that makes use of cellphones and Internet of Things (iot) devices to ensure that critical information may be effectively sent from disaster-affected regions to unaffected areas.

Disadvantages

- Slower hardware prevents the system from zeroing in on the epicentre of a crisis in a timely manner.
- There is no way to use the victims' own smartphones to help locate them inside the system.

4. Proposed System

In order to aid rescue and relief efforts, the system suggests a smartphone-based self-rescue system called our system. Our system works by having a group of smartphones belonging to people who are trapped or buried beneath the collapsed infrastructure build a one-hop network and send out a distress signal in an energy-efficient way to surrounding rescue workers. For the purpose of experimental research, the system creates a unique simulator framework and applies the specified method. To provide a fair performance evaluation, we review a previously established method, teamphone [6], and adapt it for use inside the newly created simulation environment.

5. Implementation

Disaster Source:

Disaster Source: A data source will upload a file to a routing server, and from there, the data file will be sent to an end user based on the least distance between the two nodes. The router will respond to the data provider after it has received data.

A Router Server

The Routing server in this section consists of n nodes (A, B, C, D, E, and F) and offers a data service. When a data file is sent from the Source, the Routing Server will find the nearest suitable node and forward it on to the appropriate recipient. If an intruder is detected in a router, the Routing Server will reroute traffic via a closer node. Distance between nodes may be set, and data about nodes and attackers can be seen, all inside a routing server. Choose the node you wish to assign a distance to, type in the new distance, and hit submit; the information will be saved in a routing server.

GPS

Some operations, including seeing the trajectory of a route or the target of an assault, are available in this module. When we choose to see the trajectory of a journey, we are presented with a list of metadata, including the name of the city along the route, as well as the time and date. An attacker's GPS tags provide information about them, including their identity (name, city, Mac address, time, and date), as well as the location of their assault.

Shelter(Hospital,Cottage,Apartment)

The number of users, n, who are actively engaged with this module is currently unknown (A, B, C and D). The data file originates from the Source and is sent to the destination user through the Routing Server. Without altering the File Contents, the final user will get the file. Certain data files may be restricted to users inside of the router.

Attacker

The attacker is the one responsible for re-directing the trajectory node. The attacker will target a specific node and inject a bogus key into it. Information about the attacker, including their location, IP address, and the time and date of the assault, will be recorded in the Global Positioning System and the Routing Server when the attack has been successful.

Advantages

Since Fast our system Techniques suggest employing gsps, the system is more efficient.

Due to its complete reliance on a wifi network, our system: Smartphone-Based Self Rescue System is blazingly quick.

6. Conclusion

To aid in disaster relief efforts, this study proposes a smartphone-based individual rescue system. Our system works by having a group of smartphones belonging to people who are trapped or buried beneath the collapsed infrastructure build a one-hop network and send out a distress signal in an energy-efficient way to surrounding rescue workers. The new method was tested via comprehensive simulation studies, and the results were compared to those of the already-existing teamphone technique.

Based on simulation findings, it seems that the suggested method has the potential to shorten the time it takes to find survivors after a natural catastrophe.

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