

Emergency Mobile Navigation in Hazardous Environment using Wireless Sensor Network

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Abstract

Aims: In this era, wireless sensor network are used everywhere. One of the major applications is used in the WSN domain of navigation. Using the cyber physical system, if any emergency comes the wireless sensor will detect the hazard and it will direct the way out. To provide and guide short and safe path to the user who are in danger, emergency navigation is used. It will help to avoid congestion and to use other sub optimal path. Navigation algorithm along with wireless sensor network is used to make people route safely avoiding the dangerous areas. **Result:-**By this paper, different navigation safe path have come across complete activity of the above said strategies. **Conclusion:** - It is useful to guard people from unpredictable dangerous area and to set a safe path.

I. INTRODUCTION:

With the Advantages of WSN technology, huge scale deployment of these networks is getting added and further. These days the WSN are used into emergency navigation system [1], when emergency occurs like geologic disasters wildfire hazards and gas leakages and navigating people to safe exits while keeping them away from emergencies. The wireless sensor networks provide the necessary information to the users so user can escape safely using the sensor's navigation for that road map navigation approach is introduced. RMN approach [2] contain sensor navigation which will use to connect road map and provide a safe path. Road map based navigation[3], forms road map by connecting the center point around which routes revolves. In this mobile scenario people are equipped with communicating devices like mobile that can talk to the sensors. SEND is a situation aware emergency navigation, this process have a main pattern to considering the effect of both danger levels of emergencies and discharge capabilities of exits. Crowd sensing is an way to collecting a lot of samples of a phenomena of draw your attention by distributing the across a sample amount of individuals. Navigation application was interaction between sensor and user that will guide user in a safe path through shortest path. people inside the building are expected to be at once navigated to suitable exits. Particularly, the emergency navigation paths are expected to be more distant away from hazards areas and all the people should be lead to exits with more evacuation ability to perform. In terms of safety the emergency navigation problem is more basically to find the optimum emergency navigation paths.

II. RELATED WORKS

Many researches have been done for a situation aware emergency navigation algorithm with sensor networks still there are many fields where to improve navigation path are needed on the existing solution to develop a new and better solution for emergency mobile navigation in hazardous environment using wireless sensor network.

A. Emergency navigation system:

The proper navigation path can be done by using the following ways:

- 1) The proper navigation path is not defined
- 2) To calculate the congestion that is not taken into account to avoid the hazardous.
- 3) Measure the safety of a path is equal to Measure the hazard of a path is not possible all the time.
- 4) Trust calculation time be high in navigation path
- 5) 2D and 3D representation there is no proper and clear graphical and visualization in navigation map .

a) Other Related Works

To determine the life of sensor network energy consumption is very important because usually sensor nodes are driven by battery. Sensor network of energy optimization is more difficult because it involved not only reduction of energy devouring but also extend the life of the network as much possible. Every aspect of design and operation is optimized can be done by energy awareness.

Navigation has been important issue in robotics fields [4], and computational geometry [5]. Self-organized network consisting more sensor nodes will preferred to be conducted in a shared manner. Emergency navigation helps to direct the trapped users to safe places and Connection process is done by wi-fi medium. Cyber physical interaction is established by user's position estimation between users and sensor, path planning based on location details can be stored in centralized control system, mapping and navigation to destination.

Centralized system stores the map details to determine shortest path. Sensor nodes compute the hop count to find the shortest path according to the maps, thus the user can escape from the danger area. Sensor node have three emergency process are Network Formation, Destination Navigation, Emergency Navigation.

B. Background

The works that are proposed in the previous sections are having several shortfalls. This section will give a brief background about the new approach proposed in this paper.

1) *Idea Behind:* Emergency navigation system is used to help people who are stuck in any kind of danger in any building or in an apartment and to show them the shortest and safest way to get rid of that danger. To improve this technology many new advancements are done, all over the world, in which IoT is playing a major role. In emergency navigation many technologies are used, such as, Indoor Positioning System (IPS) [6], Bluetooth [6], Global Positioning System (GPS), Radio Frequency Identification (RFID) [7]

C. Proposed System

In this era the users are equipped with smart phones which can connect to their users as well as the sensors. If any emergency situation arises, the sensor networks send the information that are needed to the users to guide them and to move them from the hazardous area. The WSN provides them the necessary safety guide to the users. The proposed system, SEND, provides the users a better way to avoid the hazardous area or to make them possible to reach safe places while having the minimum congestion. Using the human navigation is not as suitable as sensor navigation, because, human navigation as fast as sensor navigation and at the first chance it could not have detected the safest route. SEND searches all the sub-optimal paths and suggest the most appropriate path for the evacuation process.

D. Process of admin

To navigate properly at the time of emergency, the admin should have the whole knowledge about the area by preprocessing the environment as it needs to add the block details and the exit-path to the central system so that it can guide correctly when needed.

E. Network Process

A connection is created within the user and sensor that also covers the neighbour nodes each sensor are also connected with the mobile nodes of the user.

F. Navigating Destination

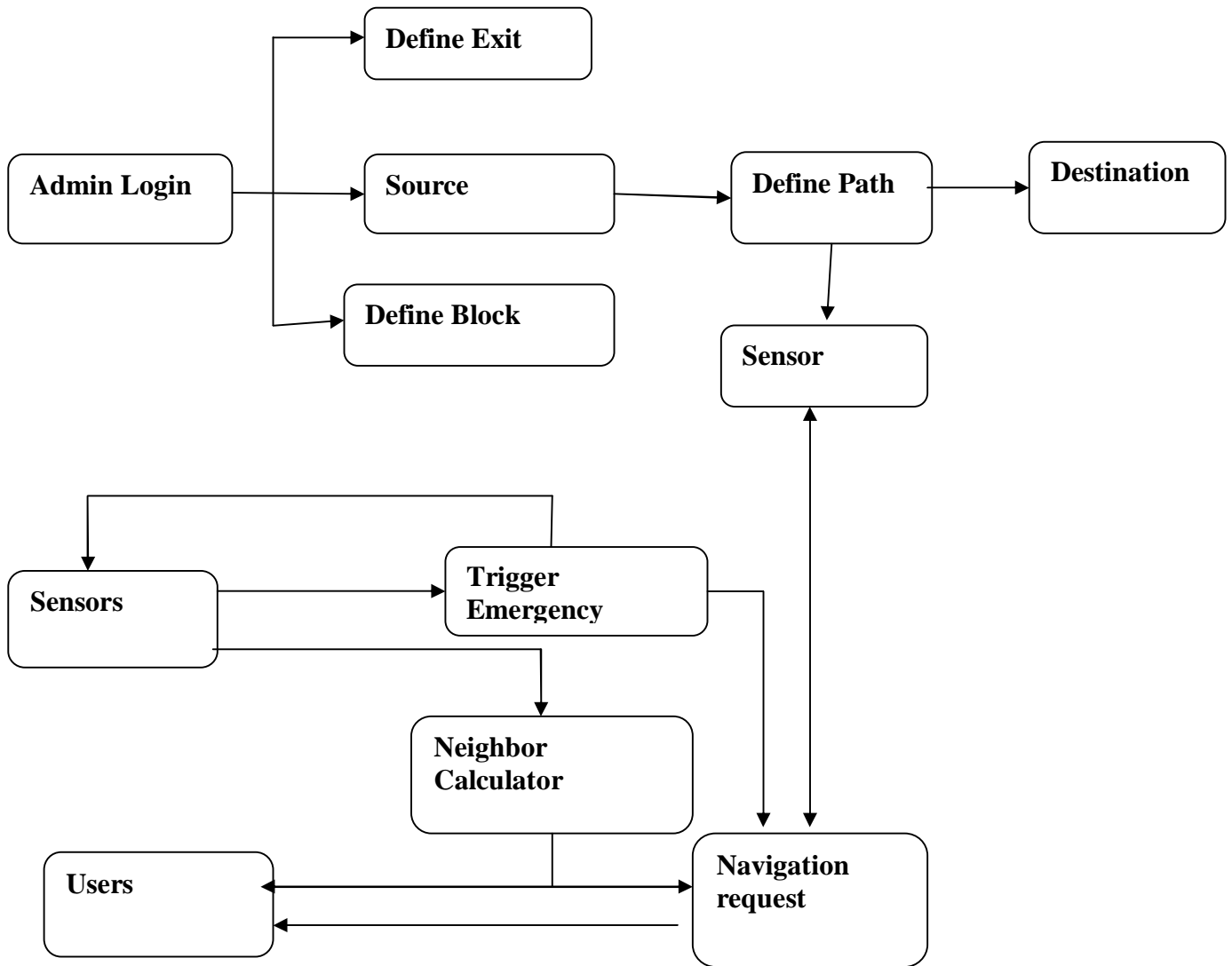
At the time of emergency the user request the sensor to show him/her the particular path for escaping. The centralized server then checks the source of the user and determines the suitable path and shows it to the user using the maps.

G. Emergency Navigation

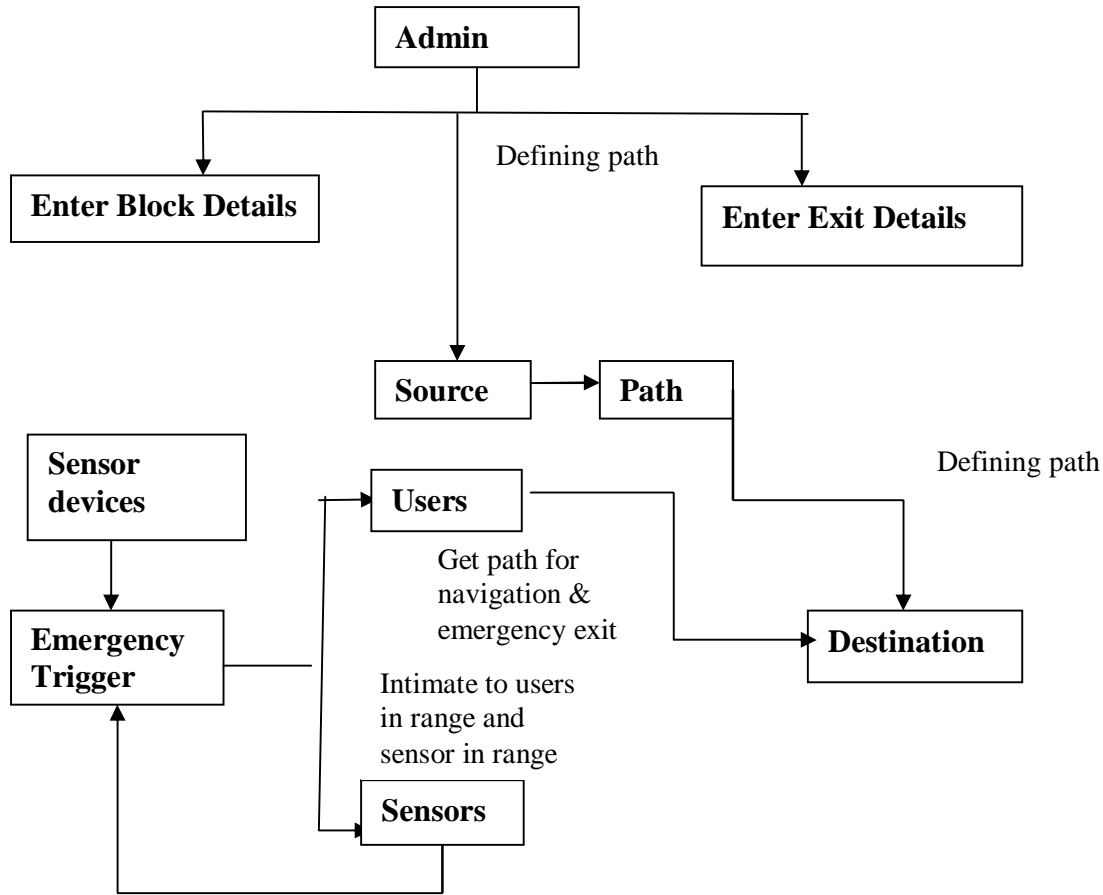
The wireless sensor networks continuously checks the environmental condition and if it senses any kind of abnormality it immediately informs the user that are connected with the sensor. An emergency situation is alarmed and soon the navigation maps are shown to the users in their handheld devices to navigate them to the safe places.

H. Flow Diagram

Data Flow



I. System Architecture:



III. CONCLUSION

For assisting people who are stucked in a hazardous or dangerous area to reach to a safe and secured area by avoiding excessive congestion, SEND is proposed .

A. Conflict Of Interest

Author declares no conflict of interest.

IV. ACKNOWLEDGEMENT

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REFERENCES

- [1] L.Wang, Y.He,Y.Liu, W.Liu,J.Wang,and N.Jing,"It is not just a matter of time: Oscillation-free emergency navigation with sensor networks ," in Proceedings of IEEE 33rd Real –Time Syst.Symp., 2012,pp.339-348.
- [2] J. Wang, Z. Li, Y. Liu, Z. Yang, Mo Li, "Sensor network navigation without locations", IEEE Transactions on Parallel and Distributed systems, Volume 24,no.7,pp.1436-1446, 2013.
- [3] M, Li, Y.Liu,J.Wang, and Z.Yang," Sensor network navigation without locations",in Proceedings of 28th IEEE INFOCOM,2009,pp.2419-2427
- [4] S.Bhattacharya,N.Atay,G.Alankus,C.Lu,O.B.Bayazit,andG.C.Roman,"Roadmap query for sensor network assisted navigation in dynamic environments,"in Distributed Computing in Sensor System. Springer,2006,pp. 17-3
- [5] M.De Berg,O.Cheong,M.Van Kreveld, and M. Overmars, Computational Geometry:Algorithms and Application.3rd ed. Springer,200
- [6] https://en.Wikipedia.org/wiki/indoor_positioning_system
- [7] Taylor & Francis, Kevin Curran, Eoghan Furey, Tom Lunney, Jose Santos, Derek Woods and Aiden Mc Caughey ,” An Evaluation of Indoor Location Determination Technologies. Journal of Location Based Services”,Vol.5,No.2,pp.61-78,June 2011.