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Mobile Navigation Algorithm in Emergency Hazardous Process using WSN

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Abstract: Aims: wireless sensor network are used everywhere. Which will use to provide and guide short and safe path to the user who are in danger emergency navigation is used and it is useful to guard people from unpredictable dangerous area and to set a safe path . if fire accident happen in mall or some buildings wireless sensor will detect the danger and it will help people to avoid congestion and to use other sub optimal path .so that the people will be escape safely from hazards. wsn technology networks are deployed in huge scale process sensor networks are getting added.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 are used to make people route safely avoiding the dangerous areas.

I. INTRODUCTION

With the Advantages of WSN technology, huge scale deployment of these networks are 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 excepted 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

In some single occurrence of firefighters might have only a fraction of seconds to reach safety. People must notice the gateway as soon as feasible and might can't able to retreat through the same path they used to enter the building owing to a collapsed ceiling or floor. Different exits might be obtainable but won't be clearly perceptible. When a firefighter radios a danger call, the deliver team must find that person. Even when circumstances aren't at once life-threatening, of great value time can be wasted by searching the same room twice or failing to search another. The occurrence commander also needs to know elements of the building layout, team members, location, and the parts of the building that have already been searched.

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B. 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.Navigationhas 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.

C. 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 an: d 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 navigationmanytechnologiesareused,suchas,IndoorPositioningSystem(IPS)[6],Bluetooth[6],Global Positioning System(GPS), Radio Frequency Identification(RFID)[7].

III. PROPOSED SYSTEM

In this Mobile Environment, the users are equipped with Privacy-Preserving Data Aggregation PDAs or smart phones that can talk with the Sensors easily. When emergency occurs, the WSN provides necessary information to users, So that guided to move out of a hazardous area through interaction with sensors.

Wireless network sensor combined with a navigation algorithm could help safely guide for the people to get safe exit with avoiding hazardous area.

We propose a plain navigation algorithm for emergency situation. SEND leverages the idea of level set method to track the evolution of the exit and the boundary of the hazardous area, so that people nearby the hazardous area achieve a mild congestion at the cost of a slight detour, while people distant from the danger avoid unnecessary detours.

Firstly, the navigation of human beings seeks for a safe-critical path, other than packet loss or energy efficiency which is the first priority as in packet routing. Secondly, human navigation consumes much more time than traditional packet routing process, due to the limited movement speed of people.

And which are critical for a fast evacuation, as they mainly focus on finding the shortest/safest path for each person, while other sub-optimal (yet safe) paths are left unused throughout most of the evacuation process.

Also we focused on two set of path navigation if user in hazardous place navigation path detail will be displayed on user android application. Once emergency triggered from sensor we will intimate to the near by fire station. So that we need to configure the near by fire station information in our application

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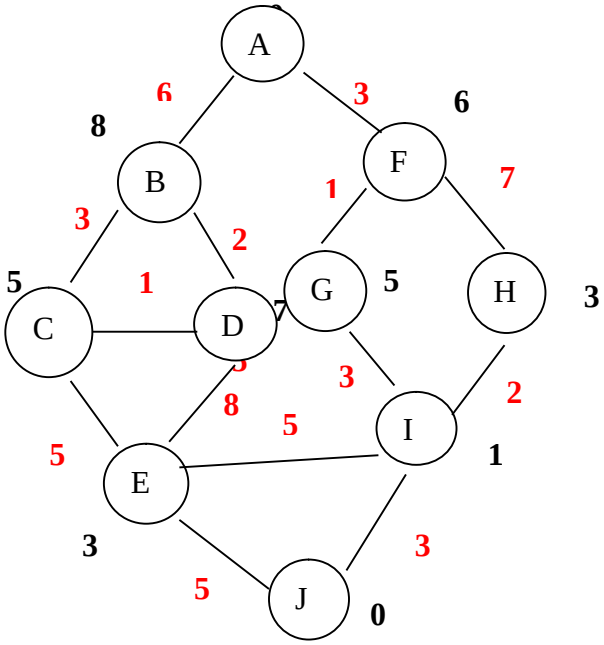
A. Algorithm



A* Search is one of the best and popular technique used in path-finding and graph traversals. Many web-based maps use this algorithm to find the shortest path very efficiently.

Consider a graph with multiple nodes. We want to reach the target node from the starting node as quickly as possible. What is A* Search Algorithm does is that at each step it picks the node according to a value 'f' which is equal to sum of 'g' and 'h'. At each step it select the node having the lowest 'f', and process it.

f(n)=g(n)+h(n)

where n is the previous node on the path,

g(n) is the cost of the path from the start node to n,

h(n) is the Heuristic that estimates the cost of the cheapest path from n to the target node.

A* uses f(n)=g(n)+h(n) to find the shortest path.

Let us start with A

Lets calculate

G is our new start node

G has only 1 node

Lets calculate F(I)

F(I) = 7 + 1 = 8 (3+1+3=7)

Now we will choose I as our new start node

Path : A-F-G-I-

Now I is our new start node

I have 3 nodes E,H and J

Lets calculate F(E),F(H) and F(J)

F(E) = 12 + 3 = 15 (3+1+3+5 = 12)

(H) = 9 + 3 = 12 (3+1+3+2 = 10)

F(J) = 10 + 0 = 10 (3+1+3+3 = 10)

Jas our new start node

But we stop here as J was our

Target Node.

Path : A-F-G-I-J-

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So we have found the shortest path from A to J which is :
Path : A-F-G-I-J

B. Admin

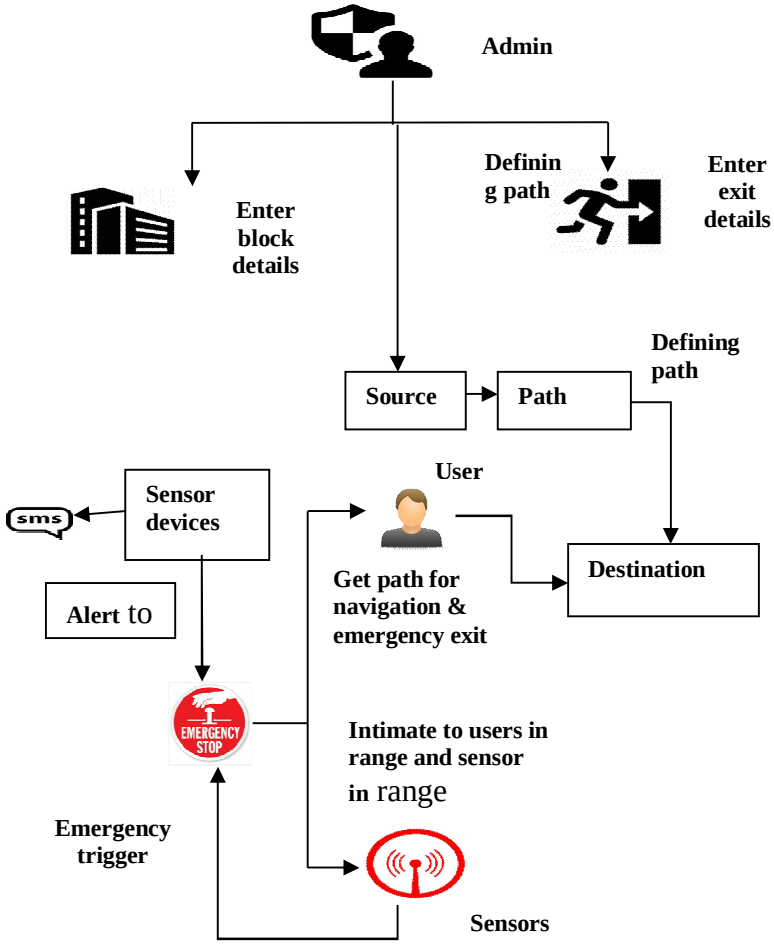
To navigate properly at the time of emergency,the admin should have the whole knowledge about the area by preprocessing the environment as it needs to add the block details and the exit-path to the central system so that it can guide correctly when needed. ,one may feel more danger threat when getting closer to emergencies and would fell safe when getting closer to exits.

1) *Network of Source:* 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.
2) *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 show it to the user using the maps.

C. Emergency Alert Process

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.

D. System Architecture



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IV. CONCLUSION

Most existing routing protocols consider the energy efficiency and lifetime of the networks as the foremost design factor 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. It is useful to guard people from unpredictable dangerous area and to set a safe path.

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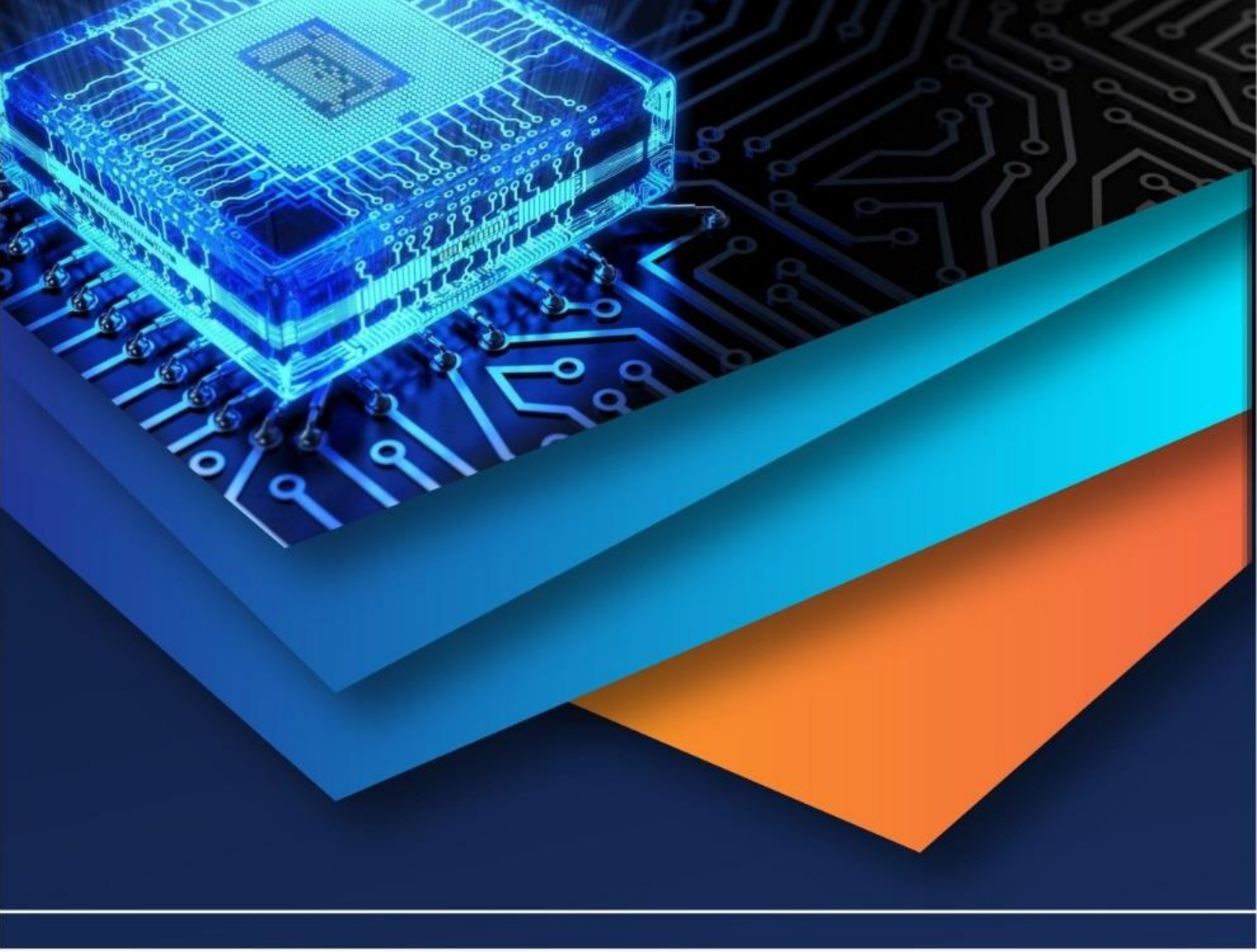

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