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EMERGENCY NAVIGATION WITH A NEW SEND ALGORITHM

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ABSTRACT— During emergency, it is necessary to navigate people to nearby exit and to keep them away from disaster. To avoid this, early and automatic detection of disaster is needed and response to be made, to save the life of people. They rely on environment of monitoring and data transmission. Wireless sensor network to support continuously sense and communicate. Many techniques are added with WSN to make emergency exit work, but it neglects to consider the hazard level and congestion. Thus, we enhance with SEND situation aware emergency navigation algorithm, to take hazard level and congestion at exit into account and direct mobile user to nearby emergency exit. They guarantee a successful navigation.

Key words--Emergency; situation sense;

Existing System:

All of the existing studies do not take the impact of different hazard levels of emergencies and different capabilities of exits into account. They mainly treat emergencies equally and lead internal users to a nearby exit without considering the exit's evacuation capabilities. In addition, most if not all existing methods are designed for 2D settings, and thus cannot be directly applied to 3D scenarios. Existing navigation approaches may fail to keep people farther away from emergencies of high hazard levels and would probably encounter congestion's at exits with lower evacuation capabilities.

Proposed System:

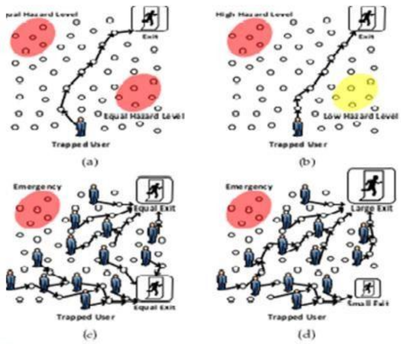
This paper present SEND, a situation- aware emergency navigation algorithm, which takes the hazard levels of emergencies and the evacuation capabilities of exits into account and provides the mobile users the safest navigation paths accordingly.

I. INTRODUCTION:

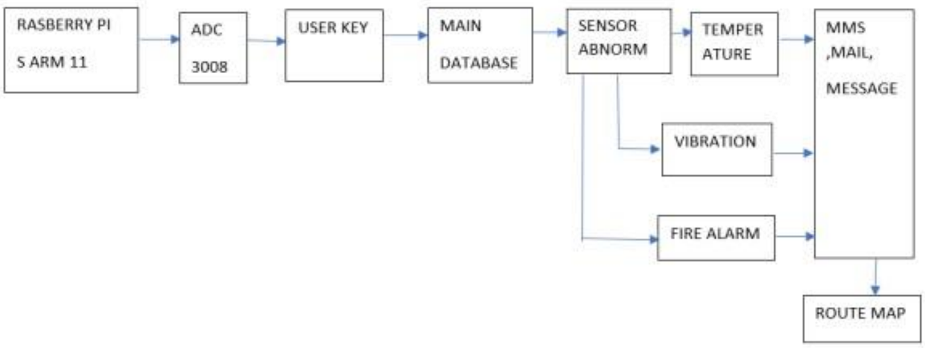
This paper considers WSN assisted emergency navigation making use of sensor network. With mobile user they make their devices communicated with sensors, track the user and provide necessary information to safe and secure exit. Emergencies occur at various situations the hazard and their level vary. Congestion occurs at the exit, as many people are directed to the same exit. The above two problems are considered equal in all the circumstances. But this can't safeguard the people life and many accidents occur. Thus, this paper provides with a SEND (Situation Aware Emergency Exit) this direct people to their nearby emergency exit by considering the hazard levels and many factors at the exit

Motivated by the fact that the natural gradients of some physical quantities always follow a natural diffusion law, we thus propose to model the hazard levels of emergencies and the evacuation capabilities of exits as hazard potentials with positive and negative values, respectively. By guiding users following the descend gradient of the hazard potential field, our method can thereby achieve guaranteed success of navigation and provide optimal safety to users. The potential fields and navigation paths by SEND. To the best of our knowledge, SEND is the first situation- aware emergency navigation scheme, considering the impacts of both the hazard levels of emergencies and the evacuation capabilities of exits. It is fully distributed and does not require any location information.

II. ARCHITECTURAL MODEL:



III.BLOCK DIAGRAM:



IV.MODULES:

- Road Map Based Navigation Approach (RMN)
- A Situation-Aware Emergency Navigation Approach (SEND)
- SOS: A Safe, Ordered, and Speedy Emergency Navigation Approach.

Road map based navigation approach (RMN):

RMN first builds the road map by connecting the medial axis (a path with equal distance to the hazards) of the network, with a tail route connecting the exits, and then guides users along the road map with preset directions on the road segments. To incorporate the impact of different hazard levels of emergencies, the medial axis may be built as the weighted medial axis. However, it is still difficult to incorporate the impact of different capabilities of the exits at the same time. For one thing, the evacuation capability of an exit represents the safety level instead of the hazard level, but a unified treatment is far from ready-made.

When there are more than one safe exit, which is very common in reality, existing methods simply guide people to the nearest one for the sake of timeliness, Such strategy would probably guide a majority of people to the same exit, which potentially causes extreme congestion's at the exit and significantly prolongs the emergency navigation time while leaving other exits of low usages.

Asituation-aware emergency navigation approach (send):

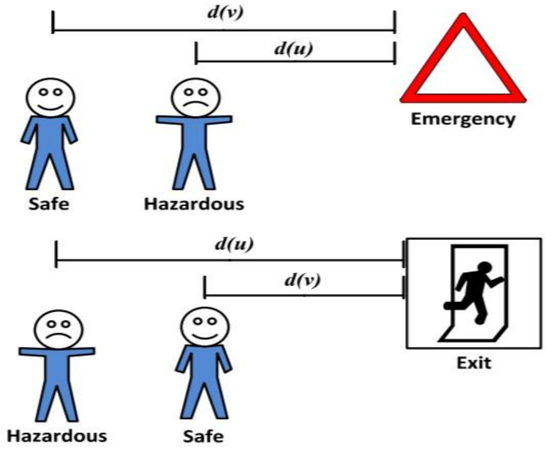
First, we aim to design a localized protocol with the capability to be implemented in large scale sensor networks. Cubic extrapolation fits our requirements by using only local and incomplete information to reduce the redundancy of the iteration. Second, the memory of each sensor in the network is limited due to the hardware constrains of the sensors. Cubic extrapolation uses only a constant number of the past time series to estimate multi- step forward values of the hazard potential. The implementation process mainly consists of three steps: initialization, hazard potential field establishment and path construction. The information of the sensor, including sensor ID, convergence threshold, role detection threshold, safe exit information, etc, is in the charge of the configuration management component. The communication module receives queries from trapped users and sends the path information back to them. It also takes charge of notifying its neighbor sensors the hazard potential status.

SOS: A Safe, Ordered, and Speedy Emergency Navigation Approach:

Our enhance proposed SOS, a safe, ordered, and speedy emergency navigation algorithm in WSNs. To minimize users' evacuation time, we have converted the emergency evacuation problem to a traditional network flow problem and used push- relabel algorithm to solve it. Our results of large-scale simulations have shown that SOS is better than existing approaches in terms of average evacuation time, last evacuation time, and network overhead

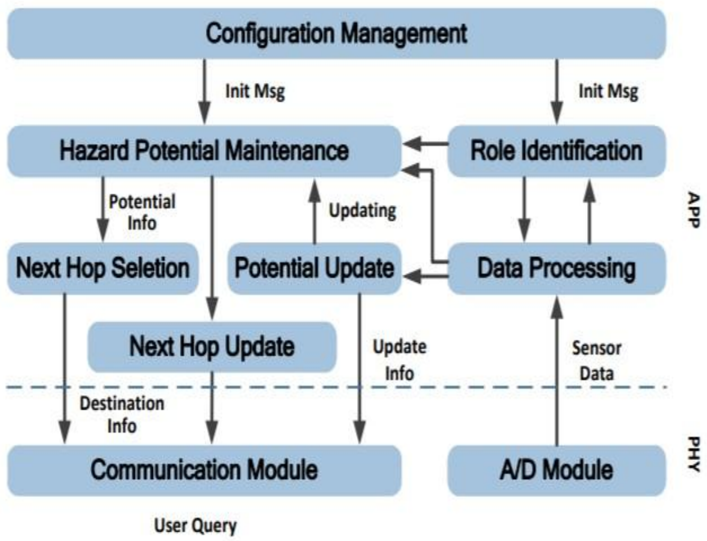
V. NETWORK MODEL:

There occur multiple hazards and contain multiple exists with the different evacuation capabilities. People inside this area must be directed to their nearby exist and make them away from the hazard



VI. IMPLEMENTATION:

Due to emergency dynamics, the hazard areas and the hazard levels of emergencies may vary from time. For example, the fire area and the hazard level of fire emergency events may increase as time goes by or decrease due to human intervention. We assume hazard speed is less than peoples moving speed. Thus, SEND is able to complete the hazard potential field construction process hazard spreads from one node to another. In this method users are relatively uniformly distributed in the field.



VII .EXPERIMENTAL RESULTS:

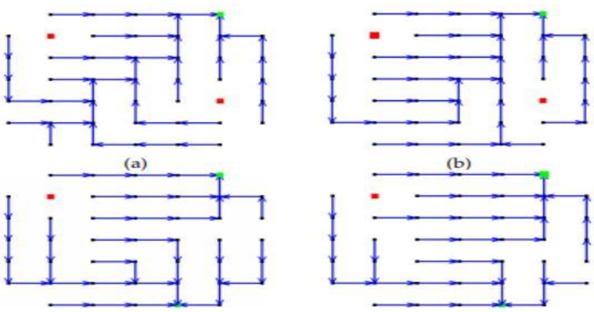
The experimental results of the proposed algorithm on a testbed with TICC2530 chips. The chip has 256KB In-System- Programmable Flash and 8KB SRAM. The operating system of the sensors is Tiny OS.

2D experiments:

The proposed algorithm on a testbed of 45 sensor nodes and deploy them on a roof of a building as a miniature prototype. The 45 sensors are deployed into grids with 1-meter space between a pair of nodes. Four experiments to examine our algorithm in the 2D field. In the first experiment, two sensors are emergencies with Potential= 1andonesensorisanexitwith Potential = -1. In the second one, we change the settings of the two sensors of emergencies with the top-left node's Potential = 1 and the bottom-right node's Potential = 0.5. The rest of the sensor nodes have Potential= 0, which means they are unaware of surrounding situations. When these settings are done, the network conducts the iteration process. Once the iteration process stops, each sensor node sets its neighbor node with the minimum Potential among all neighbors as its Parent. Eventually, each node has a Parent node except for the nodes with hazardous readings and the nodes at positions of exits. As a result, nodes in the sensor network form path graphs.

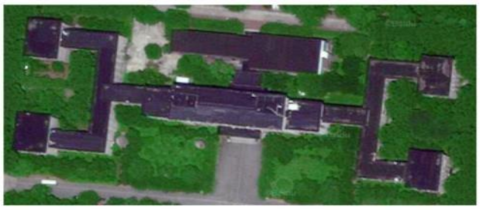
Byte #	Name	Description
0	*ID*	the unique ID of a sensor
1-2	*Reading*	the raw sensor reading
3	*Threshold*	determining whether a sensor is hazardous
4-7	*Criteria*	the criteria determining the hazard level
8	*Role*	the role of a sensor in a network
9-10	*Potential*	the hazardous potential
11	*Parent*	the *ID* of the parent sensor
12-18	*Neighbors*	the neighbors' *IDs* of a sensor
19-22	*Series*	the preceding *Potential*
23	*Converge*	the convergence threshold
24-40	*NPotential*	the *Potential* of neighbors

Fig. 5. Experiment testbed with sensors deployed in 2D space.

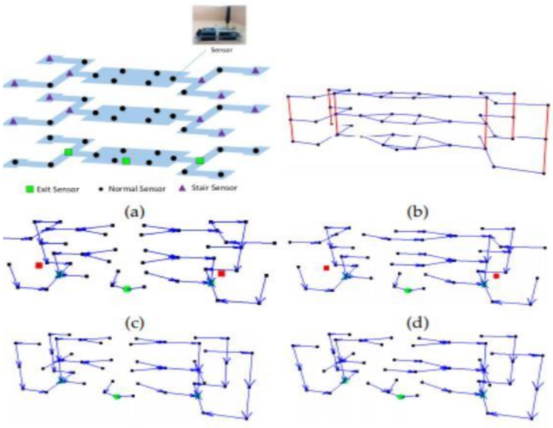


3D experiments:

For the first group of experiments, we test the impact of different hazard levels of emergencies on our algorithm. In the first experiment, two sensors are set as emergencies with Potential = 1, and the sensors at positions of exits are set the same evacuation capabilities with Potential
= −1. In the second one, we change the hazard level of the right emergency to be less hazardous with Potential = 0.5. After conducting our algorithm, the path graphs established with different settings. The established navigation paths are inclined to avoid the sensors with higher hazard level. The objective of the second group of experiments in 3D scenarios is to test the impact of evacuation capabilities of exits on our algorithm. In the third experiment, we set three exits the same evacuation capabilities with Potential = −1 and no sensors sense emergencies. In the fourth one, we set the three exit sensors different evacuation capabilities.



'ig. 7. Experiment field of a 3D building (top view).



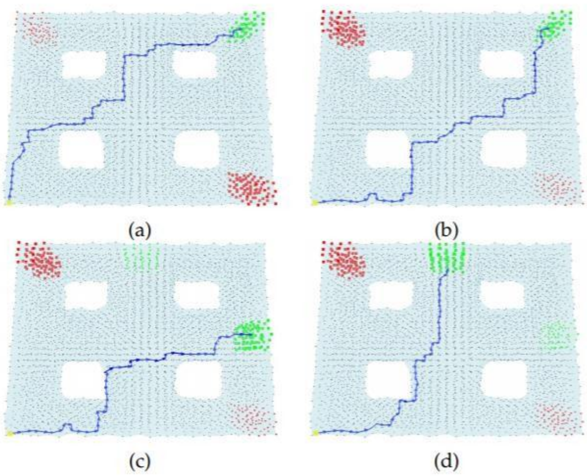
VII. SIMULATION RESULTS:

Paper conduct extensive simulations by a simulator in both 2D and 3D scenarios, to test the performance of our algorithm when the network size scales up. First test the impact of dynamic emergencies and exits by tuning the hazard levels of emergencies and the capabilities of exits.

The Impact of Emergencies and Exits: Top-right and the bottom-left green riangles are exit nodes, marked as Exit 1 and Exit 2; the top-left and the bottom right red squares are emergency nodes, marked as Hazard 1 and Hazard 2. We first evaluate the impact of varying capabilities of the exits by randomly selecting 2,000 nodes. Second, we evaluate the impact of different hazard levels of emergencies by varying the hazard potential ratio between Hazard 1 and Hazard 2. To demonstrate proposed approach in 3D sensor networks, network in a 3D genus-4 cube space. we first test our algorithm with two hazardous regions and only one exit region. The bottom-right area has higher hazard potential (1) than the top-left area (0.5), the bottom-right area has lower hazard potential (0.5) than the top-left area. The results show that the selected path is farther away from the area with higher hazard potential.

VIII. CONCLUSION

This paper contains emergency navigation by considering a more general and practical problem, where emergencies of different hazard levels and exits with different evacuation capabilities may coexist. We then propose a fully distributed algorithm to provide users the safest navigation paths, as well as an accelerated version that can significantly boost up the speed of the navigation. Both experiments and extensive simulations in 2D and 3D scenarios validate the effectiveness of SEND. We are currently devoting to conducting a small-scale system prototype under more complex scenario



IX.REFERENCES:

[1] X. Xu, X. Li, and M. Song, “Efficient aggregation scheduling in multihop wireless sensor networks with SINR constraints,” IEEE Transactions on Mobile Computing, vol. 12, no. 12, pp. 2518–2528, 2013.

[2] L. He, Z. Yang, J. Pan, L. Cai, J. Xu, and Y. Gu, “Evaluating service disciplines for on-demand mobile data collection in sensor networks,” IEEE Transactions on Mobile Computing, vol. 13, no. 4, pp. 797–810, 2014.

[3] S. Bondorf and J. B. Schmitt, “Boosting sensor network calculus by thoroughly bounding cross-traffic,” in Proceedings of 34th IEEE INFOCOM, 2015, pp. 235–243.

[4] Y. Liu, X. Mao, Y. He, K. Liu, W. Gong, and J. Wang, “CitySee: not only a wireless sensor network,” IEEE Network, vol. 27, no. 5, pp. 42–47, 2013.

[5] Y. Liu, Y. He, M. Li, J. Wang, K. Liu, and X. Li, “Does wireless sensor network scale? a measurement study on GreenOrbs,” IEEE Transactions on Parallel and Distributed Computing, vol. 24, no. 10, pp. 1983–1993, 2013