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Fire Evacuation and Safety Navigation System

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Abstract – *Nowadays, technology is changing and so is the development of internet of thing. Structure of buildings are getting more developed and complicated as well. In sudden disasters it is very difficult to escape and to find out solution out of it. So with help of internet of things various sources of safety systems can be controlled. Fire evacuation is the most important aspect and it is very difficult to escape from the fire. So, whenever fire will occur system will guide user to exit safely so this helps in avoiding congestion as well as leads to the usage of other sub-optimal paths which are often left unused thereby improving the survival rate of evacuees.*

Key Words: IOT, Fire Evacuation, Artificial Intelligence, Fire Detection

1.INTRODUCTION

As technology is changing the structure of buildings are becoming complicated day by day, so there are more chances of occurring sudden disasters and it is very difficult to find out the path from these types of buildings, and fire detection has become very big issue as it can cause several damage including various losses. Fire evacuation system has been used in this which will guide user until exit with shortest path. We propose smart escape and user specific evacuation system with Smartphone's for emergency purpose like fire.

The mobile phones will interact with sensors and ant colony algorithm will be used for finding shortest path. Voice map assistant will be used to guide users through voice, it will guide the user where to move whenever the path will update. As fire will keep increasing, wherever the fire will occur that path will be blocked and another short and safe path will get generate and user can easily escape through the shortest path.

1.1 Literature Survey

Building structures are way more complicated and whenever fire occurs it keeps increasing rapidly, not only in the buildings and work stations, whenever fire occurs in home places it is very difficult to help them to escape.

In the fire evacuation process, school of computing came up with approach of fire detection using wireless sensor networks in 2018, in this real time and robust routing technology is used for emergency purpose and the main purpose of this system is to deliver the data in real time and with high probability, it maintains delay from each node to the nearest sink and keeps tracking the status of nodes and it allows the traffic to avoid those nodes which are in danger. In 2018 indoor positioning algorithm is used for evacuation using improved RSSI model which is used for receiving signal strength and to measure the distance between device and beacon. This consist of one input node ,i hidden nodes and one output node, but no positions were considered including indoor corners and other electromagnetic regions. In 2018 mobile based intelligent modeling for home place in fire is used for prevention and safety for home peoples using advanced communication protocol and it is an approach for sensor deployment. In this sensor collects the data and send it to processing unit using the zigbee protocol, but zigbee mainly include short range and lack of total solution.

1.2 Proposed System

In this paper, user will be equipped with their Smartphone's and smoke sensors will be used to detect the fire and Wi-Fi technique will be used to tract the current location of the user with the help of wireless access points. And voice map assistant will be used to guide the user using voice for safe exit and it will inform user where to move, either left or right. On sudden accidents sensor value goes beyond the threshold and it helps detecting the fire easily and the centralized server will be having the location details of building which will be useful to navigate the safe path.

2. System Components

System Components consists of three different layers:

1. User: This will consist of login and registration part of the user in their mobile phones.
2. System: In this system will get the current location of that user and whenever the fire will occur sensor will detect the fire quickly and using ant colony optimization algorithm shortest path will be shown to user.
3. Prediction System: It will predict the path which will be based on ant colony algorithm and in case if any path is blocked then this system will predict the path.

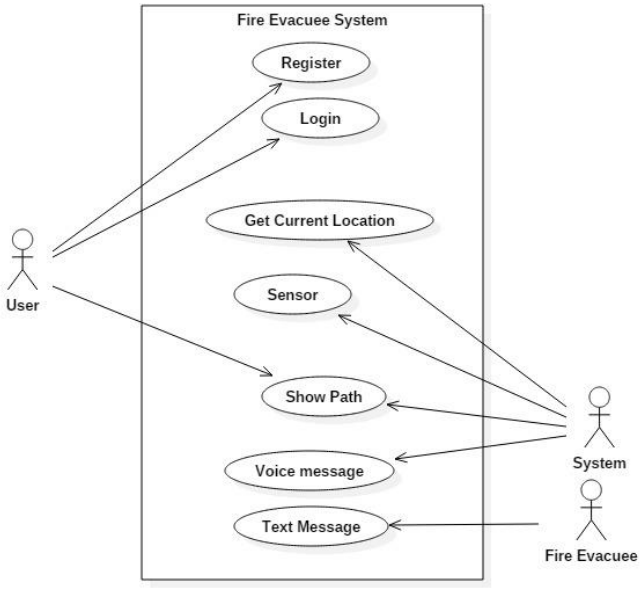

Fig 1. Diagram of Fire evacuation and safety path system

In this paper, ant colony optimization algorithm is used for finding shortest path and in each iteration a new solution gets constructed and this algorithm is based on the metaheuristic approach that can be used to find out solutions for optimization problems.

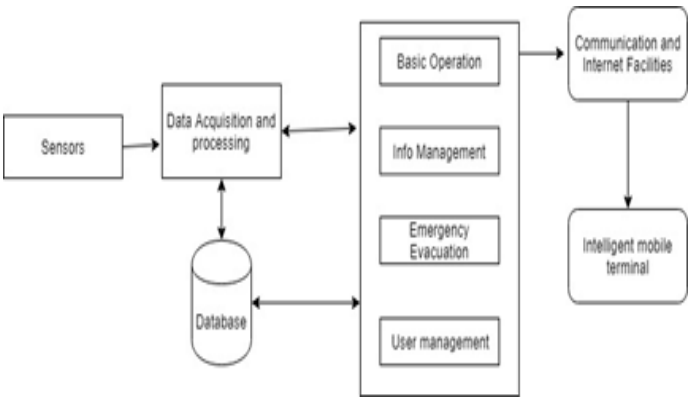

Fig 2. Internal Structure of Evacuation System

When fire occurs wireless sensor will detect the fire and direct the user to areas which are near them using shortest path method, whenever the fire will in any of the path then that path will get block and another shortest path will be guided to the user. Sometimes due to complex building structures it is very difficult to find out the path due to route co ordination problem.

Wireless sensor networks are the key role of fire evacuation system which helps to deal with navigation and mapping.

3. CONCLUSIONS

In this fire evacuation and safety navigation system main purpose is to guide the user for safe exit. Using an artificial intelligence algorithm to build an shortest and safe path so the peoples can easily escape. voice map assistant will be useful to inform the user where to move when the path will change. Using fire evacuation process economic as well as humans losses will reduce.

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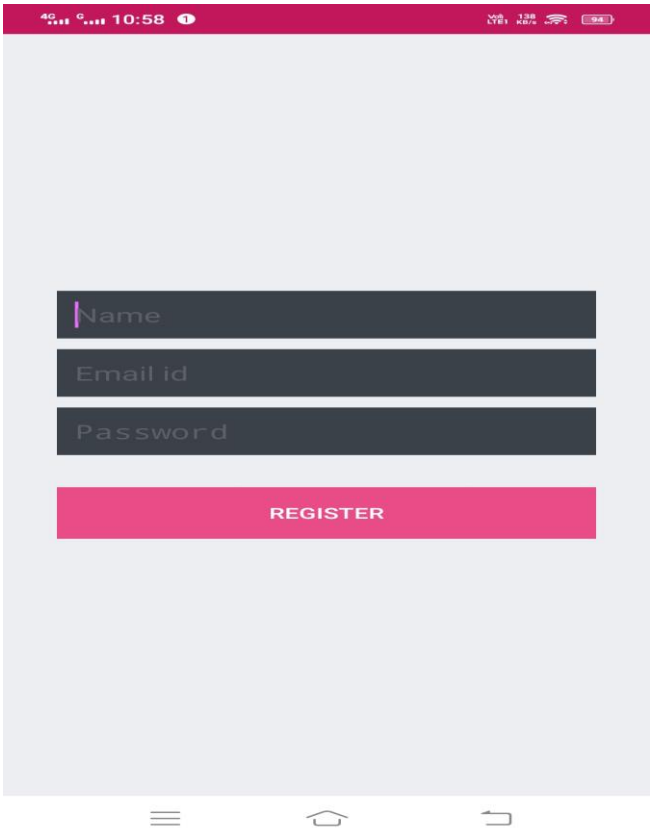
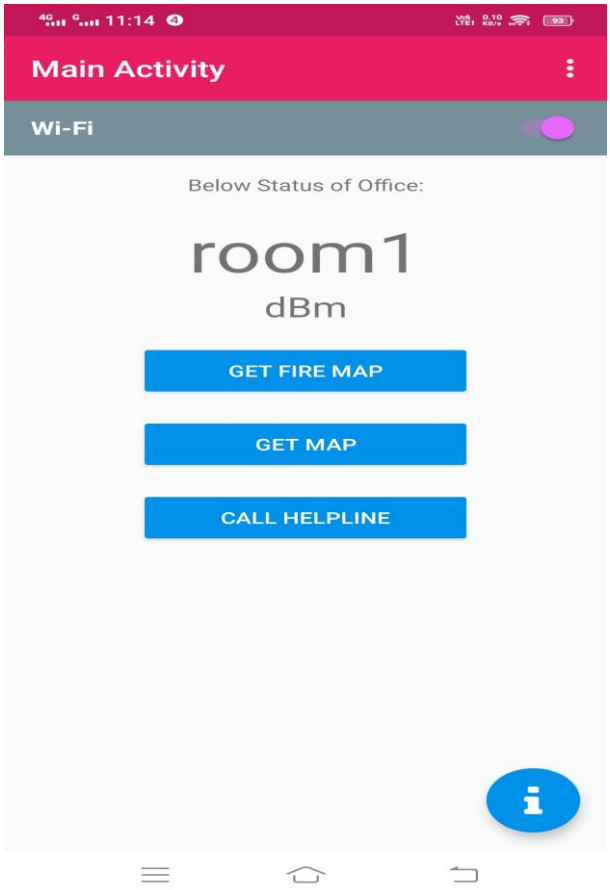
RESULTS

Registration:



Current Location of User and Maps:



Fire Map of user's current location:

Changed Map after increasing Fire: