

Fire Emergency Command in Indoor and Outdoor Position Using Ibeacon Technology

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Abstract: - In cases of occurrence of fire accidents people need to call the fire department and give details of the incident and location. The methods used to solve the positioning in the indoor and the outdoor will help to provide the location of the trapped people and the firefighters. This provides solution for mapping and the location tracking. This technology is used for positioning in the indoor of complex building where several beacons are placed in every building. Each beacon has its own unique ID. The Application detects the beacon signals and use of the Tensor Flow Lite library is used as a mobile version platform which helps to capture photo frames and find the exact location of the fire accident location and thereby rescue the victims and achieves the safety of the firefighter.

Key Words: — *iBeacon, indoor positioning, Tensor flow Lite, fire detection, Android application.*

I. INTRODUCTION

A major threat to human life and properties is fire. In many years now, numerous number of accidents related to fire has happened all over. So, to overcome this fire situations various systems have been developed with advancements in Science and Technology. In the fire emergency, identification, tracking is the major focus to understand the emergency that has raised in case of fire accidents in buildings to locate the exact positions.

This technology of ibeacon helps us in resolving the fire related problems in the buildings with the advancements of new technologies, system works in Bluetooth range, every data will be uploaded to the server. An application with the firefighter will show the positions of the user inside the building along with the indoor and outdoor navigation maps. With this the firefighter will be able to locate the victims' exact location and rescue at the earliest, using mobile application platform. The application in turn helps us and recommends us the position of the victim trapped in fire who asks for help. This can be done with the help of the navigation maps provided to locate the victim.

Tensor flow lite is a library for creating models that would detect any kind of object in images or video frames, several pre-trained models containing set of various positive and negative images of fire incidents, for fast performance. Therefore, this helps us to track the firefighter location and identify the location where the firefighter is trapped.

II. LITERATURE SURVEY

Xuanya Liu, Qinglin Zhang, Xiaoyuan Xu [1] In this they state different characteristics of petrochemical plant which has both flammable and explosive materials also fire risk prediction method are used for fire hazard protection layer for petrochemical plant to follow the process. Also based on the fire risk prediction analysis, according to layer of prediction which layer is dangerous in plant and also helps in monitoring and eliminate fire accident and pre-warning. These were done using the advanced information technologies and they used CFD technique for petrochemical fire risk analysis, prediction and evaluation methods where used.

Markus Klann [2] In this they state the approach of using game like techniques to engage fire men in Paris Fire Brigade into a design process for wearable computing for emergency response. They have explained in domain and technology also they explain how to address them in framework design approach which has different prototyping steps. Also they have explained how designs in computer game is informed and validated by other techniques and how it can be used.

Petra Hafner, Thomas Moder, Karin Wisiol, Manfred Wieser [3] In this they have used PDR algorithm and filter approach which integrates finger printing based Wireless LAN positions and also to fetch current activity which is used for position estimation and also the map information which is used in indoor positioning environment.

In-HakJoo, Kwang-Soo Kim, and Min-SooKim [4] In this they have introduced a pilot project for fire service and they have developed several components related to fire service and an emergency system coordinated with Geographic Information system technology and also helps in information sharing between related people and mobile fire facility management system and provides real-time information for fire service. The system which is developed is efficiently used for fire to reduce and rescue.

Shixiong Xia, Yi Liu, Guan Yuan, Mingjun Zhu and Zhaojun Wang [5] In this it is focused on indoor fingerprint positioning based on Wifi and process of Wifi finger print technology, K-Mean clustering Deterministic position algorithm, AP selection strategy are being used for indoor finger print positioning.

Igor Bisio, Fabio Lavagetto, Mario Marchese, Andrea Sciarrone [6] In this they used RSS based localization algorithm extensively for indoor positioning and this proposes an algorithm called as RADAR which if nothing but an RF based system which is used to locate and track the location of users in the buildings by using the Really Simple Syndication service which is gathered by multiple receivers. The key idea of this is to implement some algebraic factorization equations which is implemented in traditional Parallel-Fixed Point to allow computing and storing information directly in training phase and to avoid computations during each of positioning process. Zhe He, Mark Petovello, Ling Pei, Daniel M. Olesen [7] In this they have discussed about the traditional and enhanced assisted-GPS/BDS algorithm by evaluating the real indoor data. The horizontal and vertical positioning performances are compared between BDS and GPS techniques which results in slight variation for test scenario. So the enhanced assisted receiver will provide mean positioning errors when GPS and BDS are combined.

III. SYSTEM ARCHITECTURE

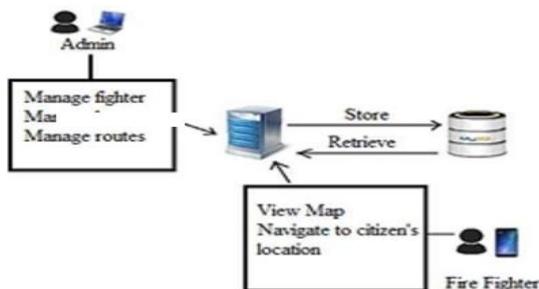


Fig.1. System Architecture Design

So the whole process in our system is:

- Once we start the webpage. It asks for login credentials.
- If person logged in is Admin using id and password, then he can manage fighters and also the beacons which are used.
- If person logged in is Firefighter using id and password, then he gets map of citizen's location.
- If person logged in is Citizen using the id and password, citizen can view the map and reach the nearby fire exit.

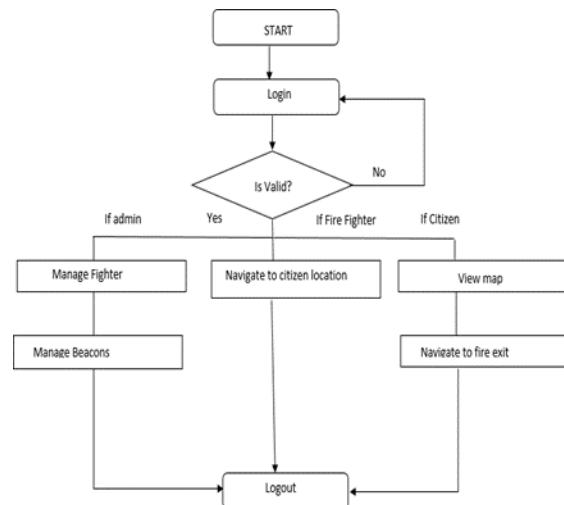


Fig.2. Control flow diagram

Here to identify and classify image or video frame with fire as fire is being detected or not, we use a here cascade image classifier. In this method, the system camera continuously monitors the surrounding and captures the image frames, when an image frame with fire is identified it sends a signal as fire is detected. Hence of the observed image frames the location is detected from the maps designed to track the location as to where the fire accident has occurred. This images having fire are treated as positive images, and the images with no fire are considered are negative images. These images are already stored and available in the training date model stored dataset.

IV. WORKING PROCEDURE

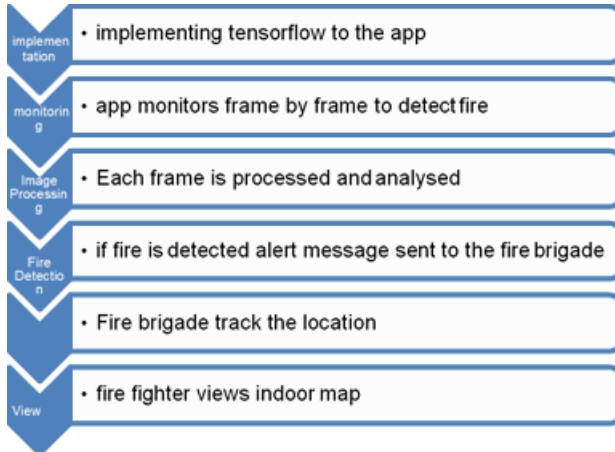


Fig.3. Working steps

In the proposed system, we try to overcome the drawbacks of existing system, where in existing system the work is completely done manually. So iBeacon technology is used for indoor positioning in the complex building. Several beacons are placed in every building. Each beacon has its own unique ID and this ID is transmitted continuously. Our Application detects the beacon signals. We made use of the TensorflowLite which is a mobile version of the platform. TensorflowLite is a technique designed to adapt standard Tensor flow models into for fast performance

Tensor Flow Object Detection is a library for creating models that would detect any type of object in images or video frames. It provides several pertained models for this purpose. This system works in Bluetooth range; this position will be updated to the local server. An App with the fire fighter will show the positions of the users inside the building along with indoor and outdoor navigation maps for tracking. With this information firefighter easily locate the victim's exact location and will be able to rescue at earliest. Thus, by using these application victims as well firefighters can be safe. For identification of image frames haar cascade is used.

Steps to detect fire in the given image:

Load the Model File:

- In this step the trained model is load from the.lite file.
- Convert Bitmap to Byte Buffer:

- The image captured from the camera will be in the form of bitmap. It is converted Byte Buffer object by extracting each pixels of the given bitmap image.
- Compare with the model:
- The image is now compared with the model loaded from.lite file.
- Print the result:
- After comparing each pixels whether the image contains the fire or not is printed.

Here the.lite file refers to the file in which set of training models are stored in the dataset. The algorithm of Haar cascade used, helps to detect objects in other images. Here positive images include incidents of fire and images with conditions of fire and negative images are non-fire images, this is done with the help of the cascade function implemented in the algorithm.

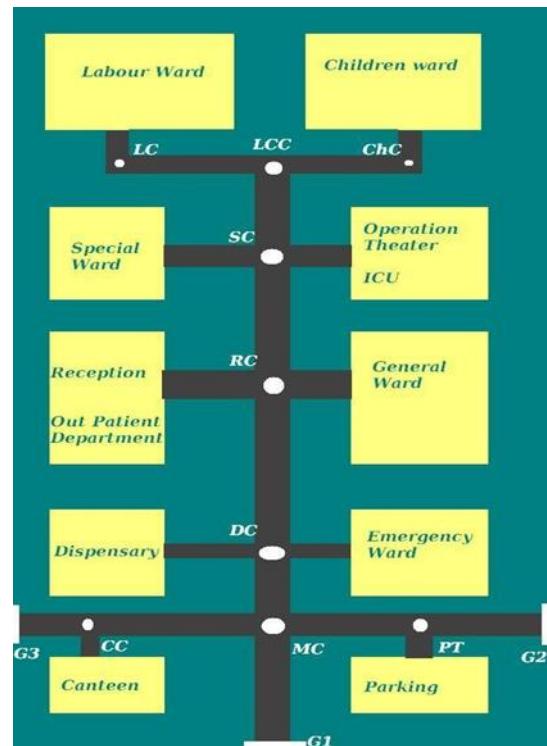


Fig.4. Indoor Navigation Map

Using the Indoor map of the complex building the Fire-Fighters will be able to rescue citizens who are trapped in the fire.

Advantages:

- Easy indoor positioning
- Fast victim rescue
- Fire fighter safety achieved

V. RESULTS AND DISCUSSION

The main aim of our project is to rescue victims who are trapped in fire in less amount of time. Our system overcomes existing systems drawbacks by providing,

- Fire detection.
- Indoor positioning in complex buildings.
- Tracking people and firefighters trapped in fire.
- Reduce the rescue time.
- Identifying accurate number of victims.

Our system detects fire when fire accidents occurs and alarms the fire emergency command station by updating the location of fire accident through the server. With the unique beacon Id, mapping solutions tracking has become easier.

VI. CONCLUSION

In the proposed system we have tried to overcome the drawbacks of existing system, where in existing system the work is completely done manually. Thus, iBeacon technology is used for indoor positioning. In the complex building several beacons are placed in every building. Each beacon has its own unique Id and this Id is transmitted continuously.

Our Application detects the beacon signal and identifies the ID, this system works in Bluetooth range, this position will be updated to the local server. An application with the fire fighter will show the positions of the users inside the building with this information firefighter easily locate the victim's exact location and will be able to rescue at earliest. Thus, by using this application victim as well firefighters can be safe.

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