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A Novel Smart Ambulance System

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ABSTRACT: In today's world, where medical emergencies can occur at any time, the need for an efficient and reliable ambulance service is crucial. The traditional way of calling an ambulance through emergency services can be slow and inefficient, leading to potential delays in receiving medical attention. This is where the need for a smart ambulance system comes in. A smart ambulance system allows people to quickly and easily book an ambulance online through a web application. This platform can provide information on the availability of ambulances and other important details such as the patient's condition and location. By using a smart ambulance system, patients and their families can ensure timely access to medical care, reducing the risk of complications and potentially saving lives. Moreover, the platform can also help streamline the entire process of ambulance services, making it easier for hospitals and emergency services to manage their resources and respond to emergencies promptly.

KEYWORDS: Algorithm, Smart Ambulance, Shortest Path, Google Map, Machine Learning

I. INTRODUCTION

In today's era, there are many cities in India which are working on transforming themselves into Smart Cities. If the city is going to be called as Smart City, then it should have all possible advancements in the sector of smart technology. Emergency medical response in India is lagging behind other countries. This is partially because of lack of technology implementation at ground zero. To address the issue, we are introducing smart ambulance system. Smart ambulances use cutting-edge technologies to enhance emergency services, reduce response times, and deliver medical assistance with the least amount of delay. Web application were created by authors to help patients find the nearest ambulance. The web app displays neighboring hospitals when the ambulance arrives at the patient's location, allowing the user to choose the closest hospital based on their location. Finally, the ambulance's app determines the quickest path to the hospital with the help of Google Maps API. This system also contains a disease prediction model with the help of symptoms of the patient. The doctor/nurse present in the ambulance can take the patient's symptoms and predict the patient's condition with the help of a machine learning model, thus being able to contact the hospital beforehand about the arrangements for the patient.

II. RELATED WORK

Smart Ambulance is the Future of Emergency Healthcare and although this concept will take some time in realization, the expected potential outcome of this idea is very advantageous for patients. In [1], the idea about Real-Time Connectivity with Fast Internet Connection is proposed. These smart ambulances have a user-friendly interface that provides easy accessibility to the paramedics. In [2], a novel smart ambulance system was proposed which utilized real-time information about hospital loading and road traffic conditions. Emergency departments with initial checkup of patients such as heartbeat rate, blood pressure measure, glucose level, and body temperature were proposed. In [3], multi-language support was proposed to broaden the use of the system. We plan to take all this work of respective authors into consideration in future and develop a smart and responsible diagnostic model.

III. METHODOLOGY

The idea was to create a web-based application that helps the user to book ambulance which shows the shortest path to the hospital from the patient's location. The frontend of the application was created with the help of

HTML (Hyper Text Markup Language), CSS (Cascading Style Sheet) and JavaScript (JS). HTML is the standard markup language used for creating the structure and content of web pages. CSS is a style sheet language used for describing the presentation and visual appearance of a web page. It defines how HTML elements should be displayed on the screen, specifying properties like colors, fonts, layouts, and animations. JavaScript is used to add interactivity, handle events, and dynamically update the content and behavior of the web page.

The Backend of the application was created with the help of Django Framework. Django's built-in features, libraries, and tools enable faster development. It follows a pragmatic and efficient approach, allowing you to focus on the unique aspects of your project without having to reinvent the wheel. The Database was created with the help of SQLite. SQLite is a widely used relational database management system (RDBMS) that implements a self-contained, serverless, and zero-configuration SQL database engine.

Around 60 Hospitals of Pune City were added into our Database. To fetch location from the user's current location to the desired location, Google Map's API was used. Google Maps API is a web service that provides developers with a set of tools to embed maps, directions, and location-based data into their applications.

Machine Learning Algorithms like Decision Tree, Random Forest and Naïve Bayes were added. The idea was to predict the patient's condition as soon as he is brought into the ambulance so that the hospital immediately make the following arrangements. The symptoms of the patient were used to predict the patient's condition.

IV. EXPERIMENTAL RESULTS

The results of machine learning model used to predict the disease were based on three machine learning models-

1. Decision Tree
2. Random Forest
3. Naïve Bayes

Naive Bayes is computationally efficient because it has a simple and straightforward algorithm. It requires minimal computation during training and prediction, making it faster compared to Decision Trees, especially when dealing with large datasets. Naive Bayes is known to be robust to irrelevant features or symptoms in the dataset. It can effectively ignore irrelevant features during classification, making it more efficient in situations where there are many irrelevant or noisy features. Decision Trees, on the other hand, can be sensitive to irrelevant features, leading to overfitting and decreased efficiency. The model proves to be 92% accurate in the case of Decision Tree algorithm while 99% accurate in the case of Naïve Bayes algorithm.

Figures show the results of our web platform and its functionality. Fig (a) shows the Home Page of the application, Fig (b) shows the ambulance booking page while Fig (c) shows the shortest path on the map from the current location to destination location with the help of Google Maps. Fig(d), Fig(e) and Fig(f) show the model about patient's symptoms and its predicted disease.

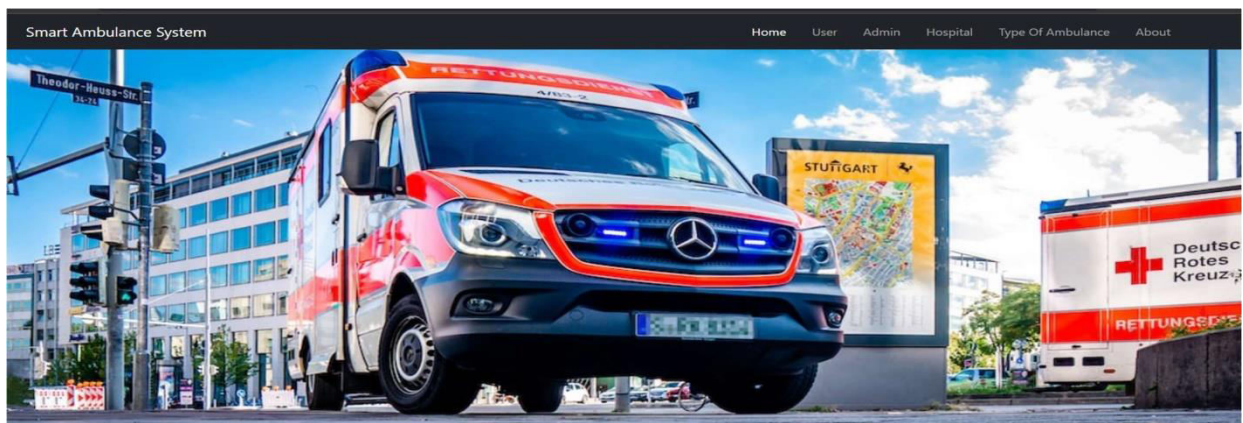


Fig (a) Home Page

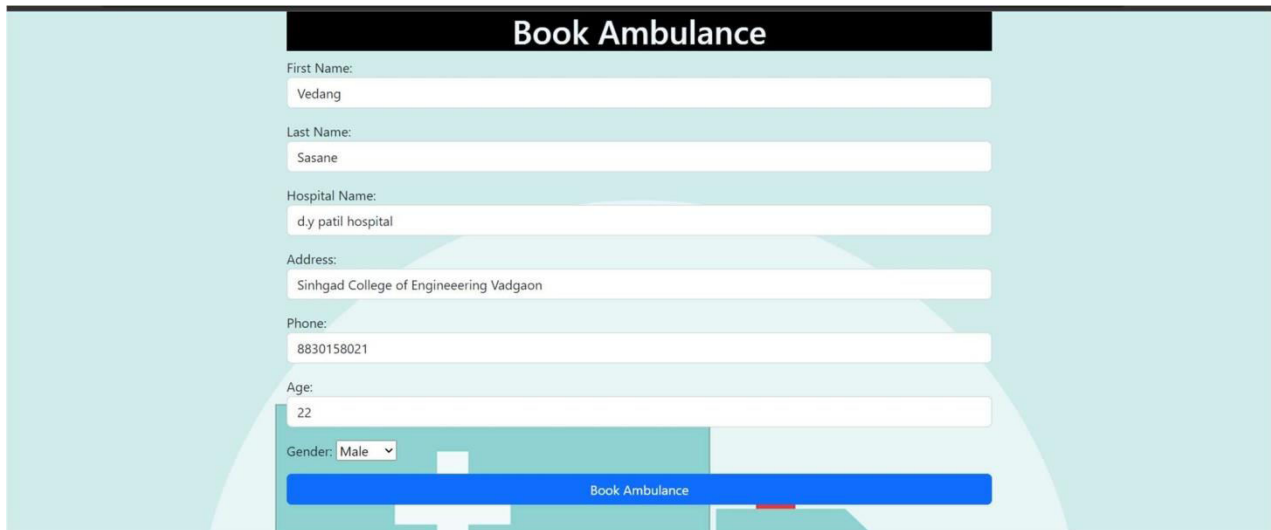


Fig (b) Ambulance Booking Page

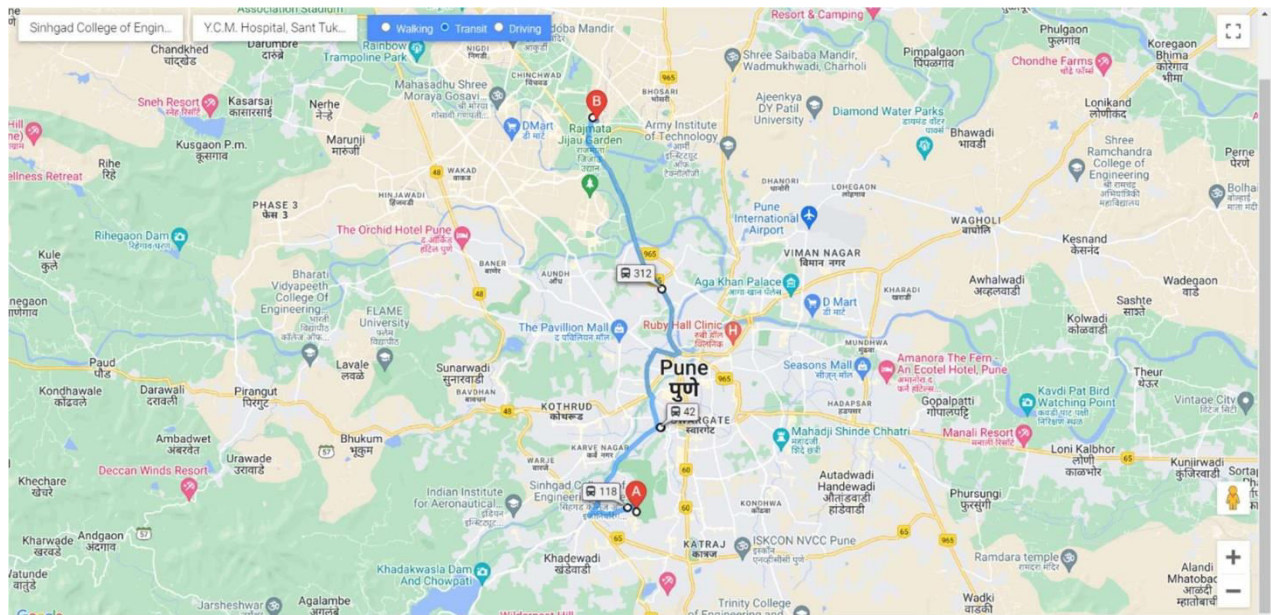


Fig (c) Shortest Path on Google Maps API



FILL THE DETAILS

PERSONAL DETAILS

Vedang Ajay Sasane

22

Male

22

70

Fig (d)

SYMPTOMS

itching

spotting_ urination

fatigue

muscle_wasting

Enter a symptom

SUBMIT

Fig (e)

Predicted disease: Allergy

[Generate report](#)

⋮

Fig (f)



V. CONCLUSION

The Smart Ambulance System is an innovative solution that has the potential to improve patient outcomes and save lives. By leveraging technology such as real-time monitoring, machine learning-based diagnosis and a navigation system, the system can provide doctors with the necessary information and tools to make informed decisions and provide appropriate treatment to patients in a timely manner. Additionally, by developing a web application for patients and collaborating with emergency services, the system can provide patients with a seamless and coordinated healthcare experience from the moment they request an ambulance to the moment they receive treatment at the hospital. Overall, the Smart Ambulance System has the potential to transform the way emergency medical services are delivered, by combining cutting-edge technology with best-in-class healthcare practices. The system is scalable, adaptable, and can be customized to meet the unique needs and requirements of different healthcare organizations and patient populations. With the continued growth and development of technology, the potential for innovation in the healthcare sector is limitless, and the Smart Ambulance System represents just one of many exciting possibilities for the future of healthcare.

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