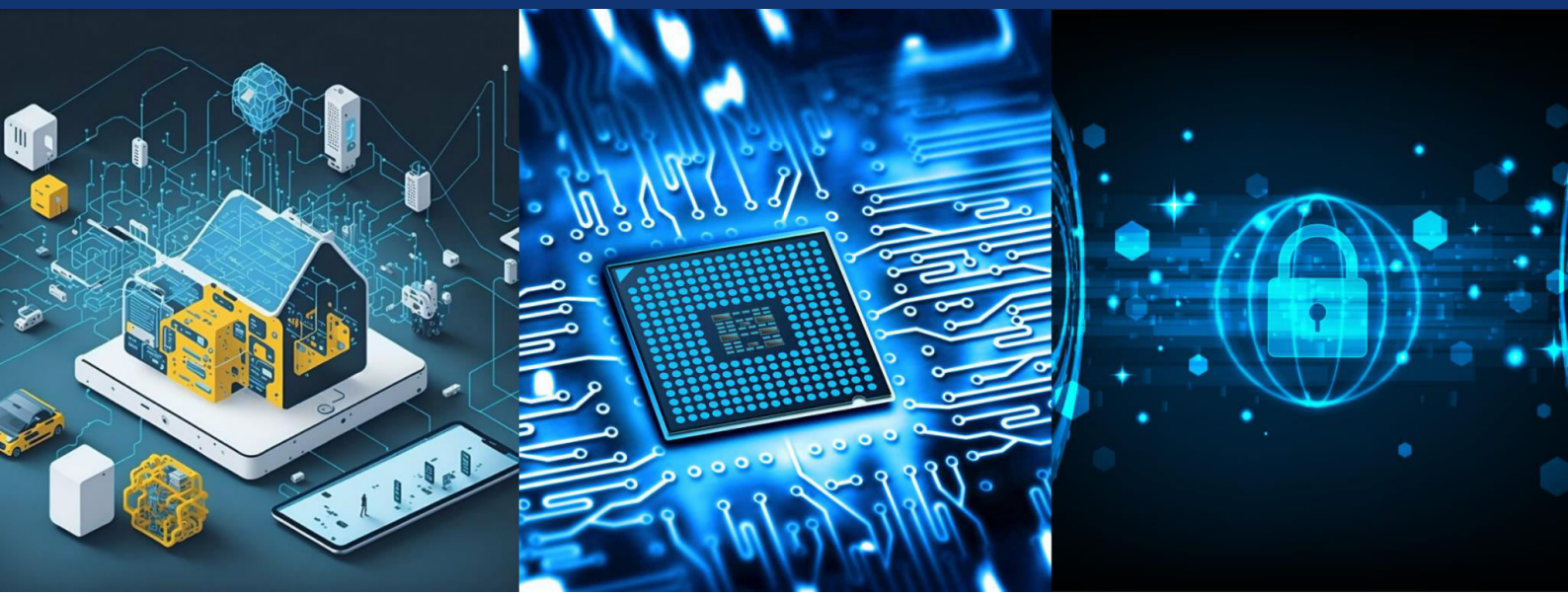
IJIRCCE

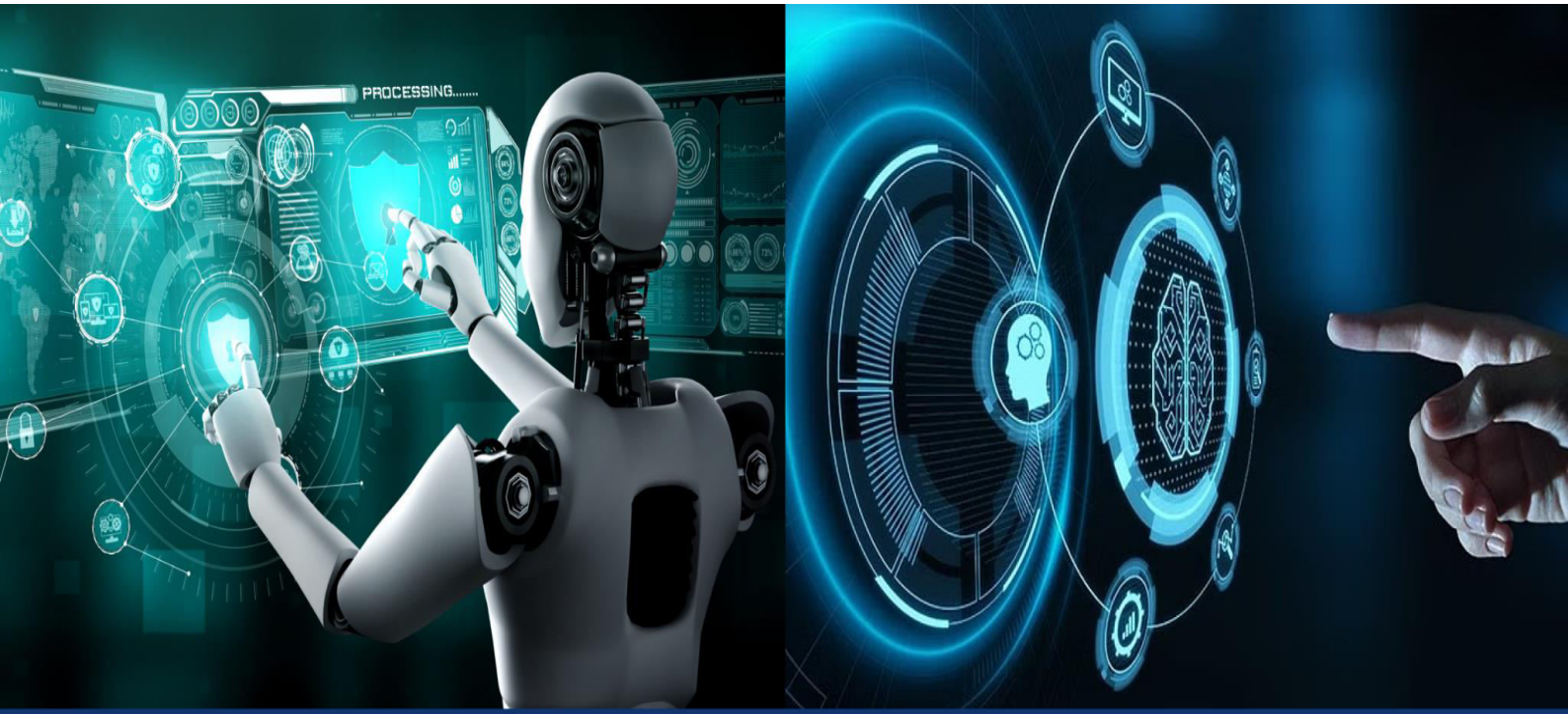
ISSN(O): 2320-9801

ISSN(P): 2320-9798



International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.771

Volume 13, Issue 4, April 2025

© 2025 IJIRCCE | Volume 13, Issue 4, April 2025| DOI: 10.15680/IJIRCCE.2025.1304100

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Smart Care – Ambulance Booking System using Deep Learning

Mr.G.Raju, P. Shiva Shankar, B. SathPranay, G. Shravya, Y. Sathwika Reddy

Asst. Professor, Department of CSE, School of Engineering, Malla Reddy University, Hyderabad, Telangana, India

Department of CSE, School of Engineering, Malla Reddy University, Hyderabad, Telangana, India

ABSTRACT: Smart Care is an ambulance booking system designed to improve emergency medical response by allowing users to book ambulances, track their real-time location, and receive hospital details based on their emergency needs. The system ensures fast and efficient ambulance dispatch by connecting users with the nearest available ambulances and hospitals. The platform uses Deep Learning (DL) for ambulance identification and route optimization. It incorporates Geographic Information Systems (GIS) and real-time traffic data to determine the fastest routes while avoiding congestion. A Convolutional Neural Network (CNN) is implemented to classify ambulance images and recognize number plates using number series patterns, ensuring accurate ambulance verification .Google Maps API is integrated for real-time tracking and navigation, allowing users and ambulance providers to monitor movements. The system is designed to handle multiple requests efficiently, ensuring reliability and scalability.

KEYWORDS: Ambulance Booking, Emergency Response, Deep Learning, GIS, Route Optimization, CNN, Real-Time Tracking, Google Maps API.

I. INTRODUCTION

In today's fast-paced world, timely medical assistance is crucial in saving lives. However, delays in locating ambulances, inefficient route planning, and lack of real-time tracking often lead to critical situations where patients do not receive emergency care on time. Traditional ambulance booking systems rely on manual dispatching, which can be slow and uncoordinated, resulting in increased response times and uncertainty in hospital preparedness.

SmartCare is designed to address these challenges by providing a streamlined and automated ambulance booking system that connects users, ambulance providers, and hospitals in real time. The platform enables users to quickly book an ambulance, track its live location, and receive hospital suggestions based on their proximity and emergency requirements. It also facilitates ambulance drivers in efficiently navigating to the patient's location using optimized routes while providing hospitals with real-time information about incoming patients, allowing them to be better prepared.

To enhance accuracy and efficiency, Smart Care integrates verification, reducing the chances of fraudulent or unauthorized services. The system also utilizes geographic information systems and real-time traffic data through Google Maps API to optimize routes, helping ambulances avoid congestion and reach the destination in the shortest possible time.

The platform is developed with a web-based interface, ensuring accessibility for users, ambulance providers, and hospitals. The backend is powered by Python and MySQL for efficient data handling and secure management of user and ambulance records. The development environment includes Jupyter Notebook for model training and Visual Studio Code for implementation and integration of services.

By combining deep learning, real-time data processing, and location-based services, Smart Care aims to improve the efficiency and reliability of emergency medical services. The system minimizes manual workload, reduces response time, and enhances coordination between ambulances and hospitals, ultimately leading to better emergency healthcare outcomes.

© 2025 IJIRCCE | Volume 13, Issue 4, April 2025| DOI: 10.15680/IJIRCCE.2025.1304100

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

II. LITERATURE SURVEY

Ambulance booking and emergency response systems have been widely studied in recent years due to the increasing need for real-time, technology-driven healthcare solutions. Several studies have explored the challenges in traditional ambulance dispatching, the role of Artificial Intelligence (AI) and Deep Learning (DL) in emergency response, and the integration of Geographic Information Systems (GIS) for optimized route planning.

Traditional ambulance booking methods involve manual dispatching, leading to delays in response time, poor coordination, and lack of real-time tracking. Studies have shown that manual coordination often results in miscommunication between hospitals, ambulance providers, and patients, ultimately affecting emergency response efficiency. The reliance on call-based dispatch systems also increases the risk of human error in booking and tracking ambulances.

Recent advancements in Deep Learning (DL) and AI-driven automation have significantly improved ambulance management systems. Convolutional Neural Networks (CNNs) have been widely used for image classification and pattern recognition, including ambulance identification and number plate recognition. These AI models enhance ambulance verification, ensuring that only authorized ambulances are available for booking, thus reducing fraud and improving trust in the system.

Geographic Information Systems (GIS) and real-time location tracking technologies have transformed emergency response by providing accurate ambulance locations and determining optimal routes. The integration of Google Maps API allows for real-time traffic analysis, helping ambulances avoid congestion and reach patients and hospitals faster. Route optimization using AI-based decision-making further reduces delays in emergency medical services.
Several studies highlight the importance of real-time coordination between ambulances and hospitals for effective emergency response. Many existing systems lack the ability to notify hospitals about incoming patients, leading to delays in medical preparedness. By implementing automated notifications and hospital dashboards, Smart Care ensures that hospitals receive real-time patient details, allowing for faster admissions and immediate medical attention.

While existing ambulance booking systems have made progress in real-time tracking and AI integration, many still lack automated dispatching, predictive demand analytics, and seamless multi-stakeholder coordination. Smart Care fills this gap by implementing CNN for ambulance classification and number plate detection, integrating Google Maps API for real- time tracking and optimized navigation, providing automated hospital notifications for better preparedness, reducing manual workload, and ensuring a seamless user experience.

The literature highlights the need for an AI-driven, real-time ambulance booking system that integrates Deep Learning, GIS, and cloud-based automation to reduce response time, optimize ambulance dispatching, and enhance emergency medical coordination. SmartCare builds upon existing research by introducing advanced AI techniques, real-time tracking, and automated hospital integration, offering a more efficient, technology-driven emergency response system.

III. PROBLEM STATEMENT

In emergency situations, delays in ambulance arrival and the lack of real-time coordination among patients, ambulances, and hospitals can lead to life-threatening consequences. This research focuses on developing a web-based system that enhances emergency medical response by integrating real-time tracking, intelligent ambulance dispatching, and hospital coordination.

The system allows users to book ambulances efficiently and access information about nearby hospitals based on their emergency needs. Ambulance drivers receive user requests and navigate to their locations using optimized routes, ensuring minimal response time. Hospitals are provided with real-time updates on patient status and estimated ambulance arrival times, allowing them to prepare necessary medical resources in advance. By leveraging deep learning for ambulance identification, geographic information systems (GIS) for route optimization, and real-time traffic data, the proposed system aims to improve the overall efficiency and reliability of emergency medical services.

© 2025 IJIRCCE | Volume 13, Issue 4, April 2025| DOI: 10.15680/IJIRCCE.2025.1304100

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IV. OBJECTIVES

A. Reduce Emergency Response Time:
Traditional ambulance booking is slow due to manual dispatching and lack of real-time tracking. SmartCare ensures quick ambulance booking, reducing delays and improving emergency response.
B. Optimize Ambulance Route Using Deep Learning & GIS : Traffic congestion and poor route selection can delay ambulance arrivals. Smart Care integrates Google Maps API and real-time traffic data to determine the fastest and most efficient route.
C. Real-Time Ambulance Tracking & Live Updates: Patients and hospitals often lack visibility of the ambulance's location. Smart Care provides real-time tracking, enabling users to monitor ambulance movement and receive live updates.
D. Accurate Ambulance Identification Using CNN: Misidentification of ambulances can cause delays. Smart Care uses Convolutional Neural Networks (CNNs) to classify ambulance images and recognize number plates using number series patterns.
E. Seamless User Experience Through a Web-Based Platform:
Manual ambulance booking can be slow and inefficient. SmartCare provides a user-friendly web platform for quick and hassle-free ambulance booking.

V. PROPOSED SYSTEMS

In emergency situations, delays in ambulance arrival and the lack of real-time coordination among patients, ambulances, and hospitals can result in life-threatening consequences. This project aims to develop a web-based system that enhances emergency medical response by ensuring efficient ambulance dispatch, real-time tracking, and seamless hospital coordination. The system enables users to book ambulances and access information about nearby hospitals efficiently. Ambulance drivers receive user requests and navigate to their locations using optimized routes, reducing response time. Additionally, hospitals receive real-time updates on patient status and estimated ambulance arrival times, allowing them to prepare necessary medical resources in advance. By integrating advanced technologies such as Geographic Information Systems (GIS) for route optimization and real-time traffic data analysis, this system ensures a faster, more reliable, and coordinated emergency response.

VI. METHODOLOGY

VI.I. Materials Used

The development of Smart Care requires various software and technologies to ensure an efficient and scalable system. The primary materials include
programming languages such as Python for backend development and TensorFlow for deep learning model implementation. MySQL is used for database management, while Google Maps API provides real-time location tracking and navigation. The frontend is built using HTML, CSS, JavaScript, and React.js, ensuring a user- friendly interface. The system is deployed on a cloud-based infrastructure to support multiple concurrent requests efficiently.

VI.II. Data Collection & Preprocessing

To train the CNN model for ambulance classification and
number plate detection, a dataset consisting of ambulance images and number plate samples is collected from various sources. The images undergo preprocessing techniques such as resizing, normalization, and augmentation to improve model performance. The data is then split into training and validation sets, ensuring the model generalizes well for real-world scenarios. Labelling and annotation of ambulance images are conducted to enhance accuracy in classification

VI.III. Model Development

A Convolutional Neural Network (CNN) is designed and trained for ambulance classification and number plate recognition. The model consists of multiple convolutional layers for feature extraction, followed by fully connected layers for classification. The TensorFlow framework is used to implement and optimize the model, ensuring high accuracy.

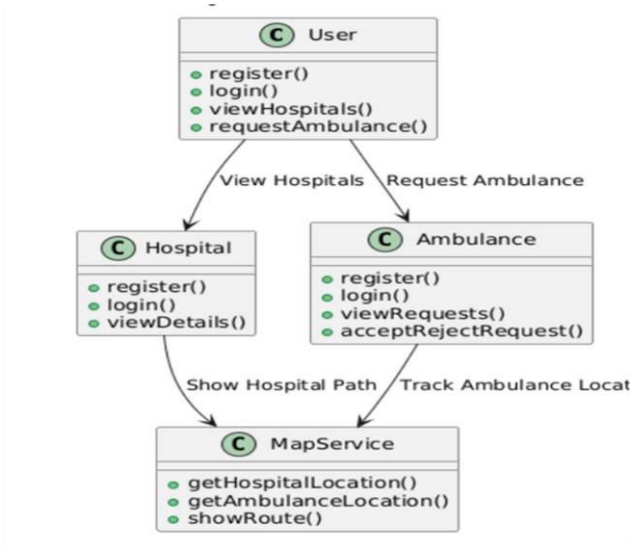
© 2025 IJIRCCE | Volume 13, Issue 4, April 2025| DOI: 10.15680/IJIRCCE.2025.1304100

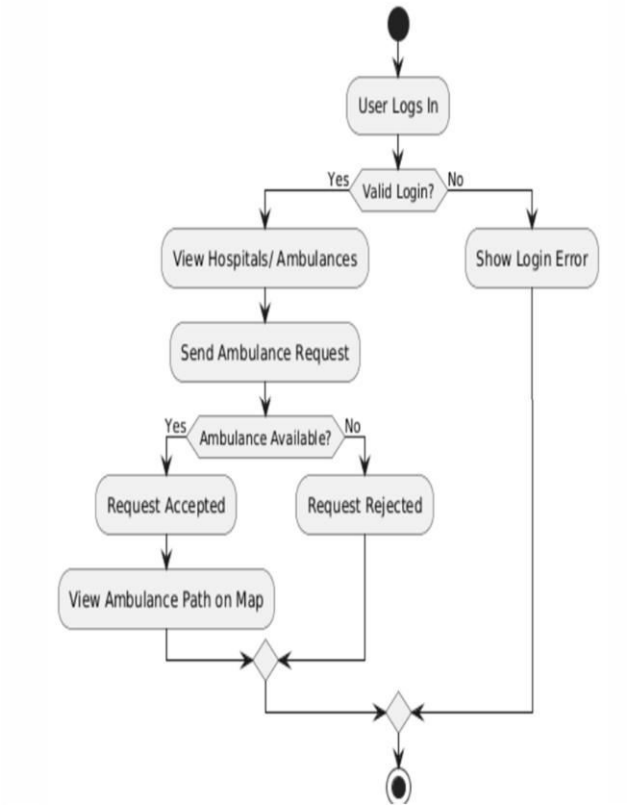
www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Hyper parameter tuning techniques such as learning rate adjustments and dropout regularization are applied to enhance model performance. The trained model is evaluated using metrics like accuracy, precision, recall, and F1-score before deployment





VI.IV. Tools and Instruments Used

The development and implementation of SmartCare require several tools and frameworks. Visual Studio Code is used as the primary integrated development environment (IDE) for writing and testing code. Jupyter Notebook is utilized for deep learning model training and experimentation and also MY SQL. MySQL Workbench helps manage the database,

© 2025 IJIRCCE | Volume 13, Issue 4, April 2025| DOI: 10.15680/IJIRCCE.2025.1304100

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

ensuring structured storage of user, ambulance, and hospital data. Postman is used for MySQL Workbench helps manage the database, ensuring structured storage of user, ambulance, and hospital data. Postman is used for API testing, validating the integration of Google Maps API with real-time tracking and route optimization.

VI.V. Deployment and Integration

The SmartCare system is deployed on a cloud-based server to ensure scalability and accessibility. The frontend and backend are integrated using RESTFUL APIs, allowing seamless communication between system components. The CNN model is deployed as a microservice, enabling real-time ambulance classification and verification.

The system is tested for real-world performance by simulating multiple emergency scenarios and evaluating response times. Continuous monitoring and updates are applied to enhance system reliability and efficiency. During integration, the ambulance tracking system is tested to ensure accurate real-time updates using Google Maps API. The MySQL database is optimized for efficient query processing, ensuring quick response times for ambulance requests. The system undergoes multiple rounds of testing, including functional, performance, and user acceptance testing, to validate real-world effectiveness.

VII. RESULTS AND DISCUSSION

Fig1: The Above page shows the register page of patients can Register page of patients where the patients Register and login with their credentials.

Fig2: This Page Shows the Request of Patients for Booking Ambulance.

© 2025 IJIRCCE | Volume 13, Issue 4, April 2025| DOI: 10.15680/IJIRCCE.2025.1304100

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

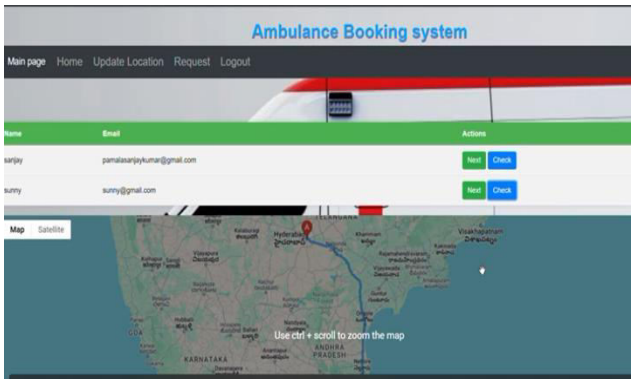
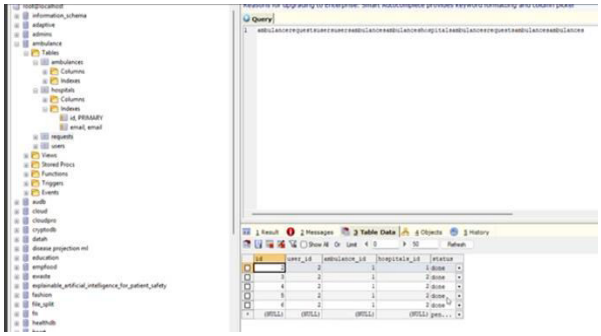


Fig3: This page shows the Ambulance location and also distance between the patient and driver.

Fig4: The Ambulance Driver Accept patients Request.



Fi5: This above page show SQL Database Ambulance booking system of patients and drivers availabity.

REFERENCES

[1] Kumar, A., et al. (2020). "Challenges in Emergency Medical Response Systems," International Journal of Medical Informatics.
[2] Gupta, P., et al. (2021). "IoT-Based Ambulance Dispatch System," Journal of Embedded Systems
[3] Chen, Y., et al. (2022). "Machine Learning for Ambulance Arrival Time Prediction," IEEE Transactions on Smart Healthcare.
[4] Singh, R., et al. (2023). "Reinforcement Learning for Emergency Dispatch," Journal of AI Research.
[6]. P Chavan Pragati, R Thosar Mrunal, M Panchal Sudha and D Bandel Pooja, "Ambulance Service", IJARIIE - International Journal of Advance Research and Innovative Ideas in Education, 2019.

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

[7]. Muhd Zafeeruddin Bin, Mohd Sakriya and Joshua Samual, "Ambulance Emergency Response Application", International Journal of Information System and Engineering, April 2016.
[8]. Devender Maureen S. Van, William Bradley Glisson, Ryan Benton and George Grispos, Understanding De - Identification of Healthcare Big Data, Americas.
[9]. S.J. Barbeau, M.A. Labrador, P.L. Winters, R. Pérez and N.L. Georggi, "= Location API 2.0 for J2ME–A new standard location for Java-enabled mobile phones", Computer Communications.
[10]. Al-Shareeda, S, Celik, Y. Bilgili, B.,Al-Dubai, A. & Canberk, B. (2025). "Accurate AI-Driven Emergency Vehicle Location Tracking in Healthcare ITS Digital Twin."

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi crossref

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details