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Private University Estd. in Karnataka State by Act No. 41 of 2013
Itgalpura, Rajankunte, Yelahanka, Bengaluru - 560064

A Real-Time AI Command Center for Emergency Dispatch: Triage, Resource Allocation, and Simulation

A PROJECT REPORT

Submitted by

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BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

PRESIDENCY UNIVERSITY

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BONAFIDE CERTIFICATE

Certified that this report "A Real-Time AI Command Center for Emergency Dispatch: Triage, Resource Allocation, and Simulation" is a bonafide work of "ZOYA ALAM (20211CSE0242), FAIZAN AHMED (20221CSE0021),PAVITRA PRABHUSWAMI HIREMATH (20221CSE0541) ", who have successfully carried out the project work and submitted the report for partial fulfilment of the requirements for the award of the degree of BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE ENGINEERING, during 2025-26.

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DECLARATION

We the students of final year B.Tech in COMPUTER SCIENCE ENGINEERING, at Presidency University, Bengaluru, named ZOYA ALAM , FAIZAN AHMED ,PAVITRA P H, hereby declare that the project work titled **"A Real-Time AI Command Center for Emergency Dispatch: Triage, Resource Allocation, and Simulation"** has been independently carried out by us and submitted in partial fulfillment for the award of the degree of B.Tech in COMPUTER SCIENCE ENGINEERING during the academic year of 2025-26. Further, the matter embodied in the project has not been submitted previously by anybody for the award of any Degree or Diploma to any other institution.

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Abstract

Emergency Medical Services (EMS) play a crucial role in pre-hospital healthcare, where rapid response can be the difference between life and death. Traditional EMS dispatch systems often rely on manual processes, telephone-based reporting, and static decision-making, which can cause significant delays in response times and inefficient allocation of medical resources. These challenges are particularly acute in urban environments, where factors such as traffic congestion, limited ambulance availability, and overcrowded hospitals exacerbate the difficulty of timely and effective emergency care. Delays in dispatch and transport not only increase patient mortality and morbidity but also reduce the overall efficiency of healthcare systems.

This project presents an **AI-Driven Emergency Dispatch Command Center** designed to modernize EMS operations through real-time, data-driven decision-making. The system integrates **Natural Language Processing (NLP)**, **Recommender Systems**, and **Route Optimization** algorithms to automate and optimize emergency response workflows. Using a large language model (LLM)-based NLP engine, the system accurately interprets caller reports, classifying emergencies by severity, type, and required medical expertise. A **constraint-based recommender module** then identifies the most suitable available responders, considering proximity, skillset, and current workload. In parallel, a hospital allocation module leverages real-time hospital data, including bed availability, specialization, and critical care capacity, to suggest the most appropriate treatment facility.

The platform is implemented as a **Next.js application**, featuring a real-time dashboard for fleet monitoring, incident tracking, and system alerts. Case studies simulating complex emergencies, including multi-vehicle collisions and cardiac arrest scenarios during peak traffic hours, demonstrate that the AI-driven system can **reduce response times by up to 30%** and **improve hospital allocation accuracy by 25%** compared to conventional dispatch methods. Additionally, the system enables predictive insights for resource planning, improves communication between dispatchers and responders, and can scale to accommodate large urban areas or multi-city networks. Overall, this project represents a **scalable, next-generation EMS framework** that combines AI, optimization algorithms, and real-time analytics to enhance emergency response efficiency, patient outcomes, and healthcare system resilience.