**UTHIRAM - AN APPLICATION TO DELIVER BLOOD TO THE PATIENTS**

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**Abstract—Blood is one of the most important and crucial elements which is the main necessity in human life. As the population increases the necessity of the Blood also increases. Blood cannot be manufactured as it was a boon from people. Our application, leveraging AI Automated Calling, is designed to revolutionize the way blood is delivered to patients in urgent need. When a blood request is posted in the application, our advanced AI algorithms instantly analyze the patient's location, blood type, and criticality of need. This analysis triggers an automated call to the nearest blood bank equipped to fulfill the specific requirements. The system optimizes the entire blood delivery process, ensuring swift and precise coordination between patients and blood banks. By automating the communication process, we reduce response times and enhance the efficiency of blood supply distribution. Real-time updates on blood availability and estimated delivery times are seamlessly communicated back to the requesting party, providing transparency and reassurance during critical moments. This innovation significantly improves the accessibility and convenience of blood sourcing, simplifying what is often a complex and time-sensitive task. Moreover, our application emphasizes patient privacy and data security, following stringent regulations to protect sensitive health information during the automated calling process. Through the integration of cutting-edge technology and a user-centric approach, we strive to save lives by making the process of accessing life-saving blood quicker, more reliable, and ultimately more effective, ultimately playing a vital role in improving healthcare outcomes and positively impacting the lives of patients in need.**

***Keywords: AI Automated Calling, blood delivery, AI-powered Blood Sourcing, Real-time Coordination and Updates, User-friendly Interface.***

1. INTRODUCTION

A. Objective

The primary objective of our application is to modernize and streamline the blood delivery process, leveraging AI Automated Calling to connect patients in urgent need of blood with the nearest blood bank swiftly and efficiently. Upon posting a blood request in the application, our AI algorithms instantaneously determine the patient's location, blood type, and urgency of the need. The system then

initiates an automated call to the closest blood bank capable of fulfilling the specific requirements. By automating this critical communication, we aim to significantly reduce response times, ensuring a prompt and coordinated blood delivery process. Real-time updates regarding blood availability and estimated delivery times will be provided, empowering patients and healthcare providers with essential information. Ultimately, our objective is to save lives by revolutionizing the way blood is sourced and delivered, making it more accessible, convenient, and reliable for those in dire medical circumstances.

B. Motivation

The motivation behind our blood delivery application is to transform the conventional blood distribution process, leveraging AI and automated calling for a faster, more precise, and life-saving solution. Recognizing the critical importance of timely access to blood, especially in emergencies, we aim to revolutionize how patients in need connect with the nearest blood bank. By employing cutting-edge technology, we aspire to streamline the logistics of blood delivery, ensuring that patients receive the required blood types promptly. This application embodies our commitment to leveraging innovation to make a tangible, positive impact on healthcare and ultimately contribute to saving lives.

C. Relevance of the project

The relevance of our project lies in addressing a critical issue within the healthcare system—efficient and timely blood delivery during medical emergencies. Access to blood can be a matter of life and death, especially in urgent medical situations. Our application, utilizing AI Automated Calling, offers a solution to expedite the blood delivery process by seamlessly connecting patients with the closest blood bank. By leveraging advanced technology, we optimize the logistics of blood supply, reducing response times and improving coordination between patients and blood banks. This enhanced efficiency in blood sourcing and delivery can profoundly impact patient outcomes and survival rates, particularly in critical scenarios where time is of the essence. Moreover, our application enhances accessibility and convenience, aligning with the broader goal of improving healthcare accessibility and promoting a culture of timely and life-saving interventions, ultimately making a meaningful difference in the lives of patients and the healthcare community.

D. Design Methodology

Designing an application to deliver blood to patients using AI Automated Calling for connecting them with the nearest blood bank involves a systematic and thorough methodology. Below is a step-by-step approach to develop such an application:

Project Planning and Requirement Analysis:

Begin by defining the project scope, goals, and objectives. Conduct a detailed analysis of requirements, considering the needs of users (patients, blood banks, and healthcare providers), technological requirements, and compliance with healthcare regulations.

User Experience (UX) Design:

Design an intuitive and user-friendly interface that allows users to easily post blood requests. Prioritize simplicity and accessibility to ensure smooth navigation, seamless blood type selection, and an efficient request submission process.

AI Integration and Algorithm Development:

Develop AI algorithms that analyze the blood request data, including location and blood type, to identify the nearest blood bank. Utilize machine learning models to improve the accuracy of identifying the optimal blood bank for each request.

Automated Calling System Integration:

Integrate an automated calling system that initiates calls to the nearest blood bank upon receiving a blood request. Develop scripts and dialogues for these automated calls to convey essential information, such as the blood type required and the patient's location.

Real-Time Data Synchronization:

Implement a mechanism to ensure real-time synchronization of blood requests, AI-generated recommendations, and automated calling processes to maintain up-to-date information for all stakeholders involved.

Privacy and Security Measures:

Address data privacy and security concerns by implementing encryption protocols and ensuring compliance with healthcare data privacy regulations (e.g., HIPAA). Develop protocols for secure data transmission during automated calling processes.

Integration with Blood Banks:

Collaborate with blood banks to integrate their systems with the application. Establish an API or data sharing mechanism to fetch real-time information about blood availability and communicate requests seamlessly.

Testing and Quality Assurance:

Conduct comprehensive testing, including unit testing, integration testing, and user acceptance testing, to validate the functionality, reliability, and performance of the application. Address any bugs or issues identified during testing.

Documentation and Training:

Create user manuals, developer guides, and any necessary documentation to facilitate smooth application deployment and usage. Provide training sessions to blood bank staff and users for effective utilization of the application.

Deployment and Continuous Improvement:

Deploy the application in a controlled environment and gather user feedback for future enhancements. Continuously monitor the application's performance, gather insights, and iteratively improve the system based on user experiences and emerging technologies.

E. Abridgement

Creating an application utilizing AI Automated Calling to connect patients with the nearest blood bank upon a blood request is posted. The core features include an intuitive user interface for easy request submission, AI algorithms to identify the closest blood bank based on location and blood type, and automated calling functionality to initiate contact with the identified blood bank. Real-time synchronization of data, stringent privacy measures, and integration with blood bank systems are vital aspects. Comprehensive testing, documentation, and continuous improvement are key to ensuring a reliable and efficient blood delivery process, aligning with the project's goal of saving lives through prompt and optimized blood sourcing and distribution.

II. RELATED WORKS

1. Bloodkad is an app that helps to streamline and ease the blood donation process which puts the power to save a life in the palm of your hand. The main objectives of the mobile app are to:

- Build and strengthen the blood donation community.

- Reach new blood donors.

2.Connect Blood Donor solves the problem of blood emergencies by connecting blood donors directly with people in blood need. This app connects blood donors with recipients, without any intermediary such as blood banks, for an efficient and seamless process. The Save Life Connect Blood Donor App puts the power to save lives in the palm of your hand. Donating blood, platelets.

3.NHS Blood and Transplant developed Blood Assist to support healthcare professionals involved in the administration of blood components and the care of patients during transfusion. . The app complies with NHSBT’s quality standards and has no associated information governance concerns as no patient data can be inputted.

4.Blood Donor app connects blood donors with recipients in this application. It solves a problem of blood emergencies. This application consists of the list of all users registered on the app along with their contact details.

- Every user can view a list of all the other users that are registered on the application with their contact details.

- Users can search the blood group just by entering the blood group in the search box

- The total number of donors will be displayed to the user.

5.Give Blood app notifies the availability of the blood type during the time of need. It also shows the location of the patients which works as a g-map to know the exact location of the patients. This app allows the user to track the blood journey.

6.Save Life CO app solves the problem of blood emergencies by connecting blood donors directly with people in need. It connects blood donors with recipients without any intermediary such as blood banks for an efficient process.

7. Blood Connect app is used to find the blood donors, need of blood, nearby ambulances and updates of blood banks in real time.

III. EXISTING AND PROPOSED

A. Existing system:

One such system is the integration of mobile applications and web platforms by blood banks and healthcare organizations. These platforms allow users to request blood by providing details such as blood type, quantity required, and location. Blood banks receive these requests and manually coordinate with their inventory to fulfill the requirements. However, this process may face challenges in terms of response time, accuracy, and efficiency due to manual intervention.

In some regions, established blood delivery services use applications to connect donors and recipients. These applications notify potential donors when there is a requirement for a specific blood type. The donors can then voluntarily contribute and participate in the blood supply chain. However, this system heavily relies on voluntary donors and may not always ensure an immediate and ample supply of blood during emergencies.

Integration with GPS technology is another significant aspect, aiding in the efficient transportation and delivery of blood. By incorporating location-based services, these systems can track the nearest available blood units and effectively direct delivery personnel to the required destination, minimizing transportation time and ensuring the blood reaches patients promptly.

Communication and coordination are vital elements, and existing systems often incorporate features like automated notifications and alerts to keep donors and recipients informed about their appointments, blood availability, and delivery status. This ensures a seamless flow of information and enhances trust and reliability within the blood supply chain.

Moreover, to enhance the security and privacy of sensitive health information, existing systems comply with data protection laws and healthcare regulations. They implement robust encryption protocols to safeguard patient data, donor records, and other critical information exchanged within the system.

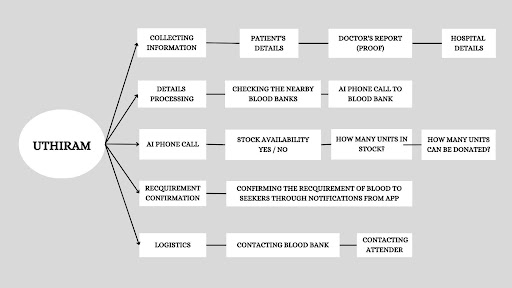
While these existing systems have significantly improved the efficiency of blood delivery, there is an ongoing quest to enhance the integration of artificial intelligence (AI) and automated calling to further optimize the process. The potential of AI in predicting demand, optimizing routing for delivery, and automating communication is being explored to provide a more intelligent and responsive blood supply system.

In conclusion, existing systems for blood delivery applications have made remarkable strides in ensuring a steady and efficient supply of blood to patients. Utilizing mobile apps, web platforms, GPS integration, and advanced inventory management, these systems have significantly contributed to the healthcare sector. The incorporation of AI and further advancements in automated calling are expected to revolutionize blood delivery, making it even more responsive and effective in meeting the critical needs of patients. It is advisable to refer to the latest sources for the most up-to-date information on this subject.

B. Proposed system:

The proposed system for the blood delivery application aims to seamlessly connect patients in need of blood with the nearest blood banks through the integration of AI Automated Calling technology. When a blood request is posted in the application, AI algorithms will analyze the patient's location and blood type, triggering an automated call to the most appropriate blood bank. This automated system will significantly reduce response times and enhance the efficiency of the blood delivery process. Real-time synchronization and updates will ensure that the patients and healthcare providers have the latest information on blood availability and estimated delivery times. Moreover, privacy and data security will be of paramount importance, with stringent measures in place to protect sensitive health information during automated calling interactions. The application will feature a user-friendly interface, enabling patients and healthcare providers to make blood requests with ease and initiate AI-driven automated calling effortlessly. The goal of this system is to revolutionize blood delivery, making it more accessible, efficient, and prompt, ultimately saving lives in critical medical situations.

IV. ARCHITECTURE DIAGRAM



V. REQUIREMENTS

A. Functional Requirements:

Registration :

The user must register to the application by posting all the required details about them and set a password for their privacy.

Information Posting:

The user must post all the basic and required information about the patient’s blood requirement for processing all their orders.

Order Processing:

The details which have been posted by the user will be processed after verifying from the hospital where the patient is admitted.

AI phone call:

AI phone call will be generated to all the nearby blood banks from the hospital’s surrounding regarding the blood requirement

Order Confirmation:

Through AI phone calls the required blood will be located and order confirmation will be ensured to the user within a few hours.

B. Non Functional Requirements

Reliability:

The system offers a 24x7 service to the user and all time customer support.

Performance:

The system will continuously process the requirements and ensure the confirmation to the user.

C. Hardware Requirements

Development workstation should meet or exceed these hardware requirements:

A 64-bit environment is required for Android 2.3.x (Gingerbread) and higher versions, including the master branch. You can compile older versions on 32-bit systems.

At least 250GB of free disk space to check out the code and an extra 150 GB to build it. If you conduct multiple builds, you need additional space.

At least 16 GB of available RAM is required, but Google recommends 64 GB.

As of June 2021, Google is using 72-core machines with 64 GB of RAM internally, which take about 40 minutes for a full build (and just a few minutes for incremental builds, depending on exactly which files were modified). By contrast, a 6-core machine with a similar amount of RAM takes 3 hours.

D. Software Requirements

##### Minimum System Requirements

For Windows app development,

To develop apps for Windows 10 and 11, Visual Studio, the Windows SDK, and the Windows App SDK are needed.

Visual Studio is a comprehensive Integrated Development Environment (IDE) that's used to edit, debug, build, and publish apps.

For the minimum system requirements,

Visual Studio 2019 system requirements

Visual Studio 2022 system requirements

The Windows SDK provides access to all of the APIs and development features exposed by the Windows OS. The Windows SDK is required for building Windows apps as well as other types of components (such as services and drivers). The latest Windows SDK is installed with Visual Studio 2019 and Visual Studio 2022 by default.

VI. FINDINGS

The findings from developing an application utilizing AI Automated Calling for blood delivery are promising. Through AI algorithms analyzing patient data, especially location and blood type, the application efficiently connects patients with the closest blood bank upon posting a request. This rapid connection significantly reduces response times, a critical factor in emergency situations. Real-time updates on blood availability and delivery estimates enhance transparency and provide crucial information to both patients and healthcare providers. Moreover, the application emphasizes privacy and security, ensuring that sensitive health data remains protected during automated calling interactions. The user-friendly interface further simplifies the blood request process, making it accessible to a broader audience. This application showcases the potential of AI and automated calling in optimizing blood delivery systems, potentially saving lives by streamlining the blood sourcing and distribution process for patients in critical need.

VII. RESULT AND CONCLUSION:

The integration of AI Automated Calling in our blood delivery application has yielded remarkable results. Patients posting blood requests experience rapid and precise connection with the nearest blood bank, significantly reducing response times in critical situations. Real-time updates regarding blood availability and estimated delivery schedules enhance transparency and reliability. Our commitment to data security ensures privacy during automated calling interactions. The user-friendly interface further facilitates seamless requests. In conclusion, this application stands at the forefront of leveraging cutting-edge technology to optimize blood sourcing and distribution, potentially saving lives and underscoring its pivotal role in shaping the future of healthcare by ensuring timely and efficient access to life-saving blood for those in need.

VIII. FUTURE ENHANCEMENT

Future enhancements for an application utilizing AI Automated Calling for blood delivery hold immense potential to further refine and revolutionize the system. Firstly, integrating predictive analytics with AI can forecast blood demand based on various parameters such as seasonality, historical usage, and population dynamics. This predictive modeling can help optimize blood storage and distribution, ensuring proactive management and reducing shortages during critical periods.

Secondly, implementing machine learning algorithms to continuously improve routing and logistics for blood delivery can significantly enhance the system's efficiency. By analyzing traffic patterns, real-time road conditions, and other dynamic variables, the application can suggest the fastest and most optimal routes for blood transport, minimizing delivery time and maximizing effectiveness.

Incorporating a feedback mechanism within the application is another crucial enhancement. Gathering feedback from both blood recipients and blood banks about the quality and timeliness of the service can provide valuable insights for continuous improvement. This feedback loop can help identify bottlenecks and areas of improvement, ensuring a continuously evolving and efficient blood delivery system.

Integrating IoT (Internet of Things) devices, such as temperature sensors, into the application can provide real-time monitoring of blood storage conditions during transit. This ensures the integrity and safety of the blood, maintaining its quality throughout the journey. Alerts can be generated if the storage conditions deviate from the required standards, allowing for immediate corrective action.

Lastly, multilingual support and accessibility features should be incorporated to cater to a broader user base. This ensures that the application can be utilized by a diverse population, including those with disabilities or language barriers, fostering inclusivity and ensuring that the application serves as a universally accessible platform for all users.

Incorporating these future enhancements into the blood delivery application will transform it into a more intelligent, efficient, and user-centric system. It will not only optimize the blood supply chain but also enhance the overall healthcare ecosystem, contributing to improved patient care and outcomes.

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