SUPPORT THROUGH INTEGRATED ANDROID APP AND WEB PORTALS FOR LIFELINE SERVICES

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ABSTRACT

In the digital age, it is important to enable access to critical lifesaving services, including health care, emergency assistance, financial assistance, and government services which are essential to community well-being. This research looks at an integrated model utilizing an Android application, accompanied by web portals, that that behaves as a single, easy to use access point for the provision of these services.The suggested model employs a system of cloud computing, Artificial Intelligence to make service recommendations, and real-time data syncing, as part of the streamlined experience for both the user and service provider experience. The Android application allows for a mobile first experience, enabling the user to access and order service remotely, while the web portal extends the users experience and allows for the service provider's administrative uses. The functions of the model include secure log-in user authentication, geolocation service recommendations, bot-assisted navigation, and multi-language support for a diverse user population. The research also considers the technical architecture, security aspects of to ensure scalability and reliability, and usability of said application. This integrated platform aims to address the digital divide, service delivery efficiency, and engagement with users and providers of lifesaving services. The research will report on empirical analysis and case studies that present impact and effectiveness of the model. Further impact and effectiveness can be investigated for continued critical service access in both urban and rural spreading areas.

Index Terms—Integrated Services, Android Application, Web Portals, Lifeline Services, Emergency Response, Cloud Comput- ing, Artificial Intelligence, Service Accessibility, Digital Inclusion, Real-Time Data Synchronization, Mobile Technology

I. INTRODUCTION

In an ever-evolving digital world, technology is increasingly serving as an essential mechanism to effectively connect people to necessary services. Lifeline services such as health care, emergency service, financial assistance, and government services are critical components to social stability and indi- vidual well-being. Still, access to services remains a pressing issue around the world, especially in developing areas and rural places. Many people have barriers that impede access, such as, unawareness, technical barriers, language, and the lack of a single plug in that bundles essential services.There has never been a more pressing need for a relevant, meaningful, and accessible service. This research paper will outline a connected system comprising an Android application and web portal designed to facilitate the provision of lifeline services in an accessible, efficient, and scalable way.

As smartphones and internet connectivity become more widespread, mobile applications are proving to be an increas- ingly effective way of developing service delivery. Android is one of the most widely utilized mobile operating systems in the world and represents an excellent means of creating an intuitive and feature-rich application to allow users to quickly access distressing services with a few taps.Mobile apps do not cover all users' accessibility needs. For instance, some users may be looking for a larger screen, need to manage many services, or need administrative access. Therefore, building a web portal with an Android app will give users,

service providers, and administrators multiple points of access to the system that maximizes the options of interaction in an inclusive and efficient manner. The proposed system will use cloud computing, artificial intelligence (AI), real-time data synchronization, and secure authentication systems to provide easy access through multiple devices.Utilizing geolocation- based service discovery, users will have the ability to identify local hospitals, emergency services, and financial assistance centers, etc. In addition, with chatbot support and multilingual assistance will foster user participation with the aims of including more individuals, in the hope of even those who have limited digital literacy.

The system provides an extensive cyber security framework to protect a user's sensitive data and prevent unauthorized access, an enormous concern with respect to privacy and security. Within the integrated platform, the efficiency of service delivery can be enhanced in part, through the use of automation and AI-based decision making.Traditional lifeline service delivery involves bureaucracy, massive amounts of paperwork and processes that involve waiting to access, which create inefficiencies and delays. When some or all services are moved or digitized, using AI-based recommendations will allow for suggestions that are tailored to the users' location, tell demographic information and the service history previ- ously interacted with. Generally, this application of AI creates a more personalized experience and helps maintain services in a timely manner and without wasting time on irrelevant assistance.

Another important feature of this research will be addressing the digital gap that remains in many areas of the world. Urban populations are often able to use advanced digital services, while rural populations, the elderly, and those in precarious economic circumstances often have difficulty using the online services due to barriers. The intended Android application and corresponding website will be designed for being lightweight, low-bandwidth friendly, and easy to use. Those with limited exposure to technology can navigate and experience the site. The system will also allow for access in locations where internet access is only available intermittently. This is achieved through offline caching, which will allow users to locate vital information in the absence of a stable internet connection.

In a broader context, the development of this unified platform occurs at a time in which there are worldwide digital transformation initiatives, and related SDGs, partic- ularly in health, economic growth, and reduced inequality. This integrated platform allows government, nonprofit, and private sector organizations to improve service delivery, create transparency, and generally improve the efficiency of welfare programs. In addition, the data associated with usage at the individual level can be used to inform policymakers of service gaps, inform resource allocation decisions, and develop tailored engagement interventions to meet community needs. In certain respects, significant costs associated with developing the platform and implementing it outweigh anticipated bene- fits. Concerns about data privacy and security presents a signif- icant challenge, as working with sensitive personal information involves some manner of legal compliance requirements with the General Data Processing Regulation (GDPR) or India's Personal Data Protection Bill resulting in varying levels of complexity and risk.The integrated platform should also ensure it maintains high service availability and reliability, as it should be able to effectively handle user requests, regardless of increasing volumes during emergencies or disasters. The systematic approach to addressing management challenges involves a public cloud infrastructure, end-to-end encryption, and managed scalable server architecture, constructed of mul- tiple virtualized servers to allocate dynamically based on demand.
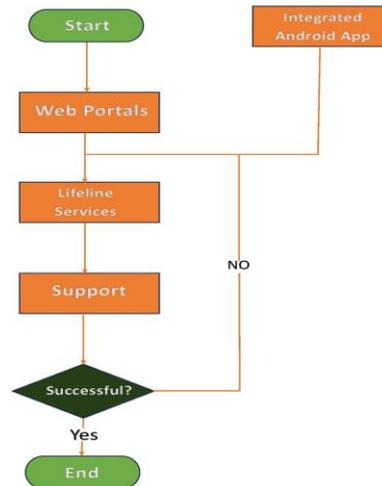
Fig. 1. Design Flow

Besides technology-related elements, the trust and accep- tance/embrace of users are also important for operational suc- cess. Many people, especially those from marginalized com- munities with a history of mistrust and abuse by institutions, may be hesitant to trust digital solutions for basic services due to their own doubts about the medium being reliable and usable and government surveillance.To alleviate their stress, the platform applies transparent tracking of service requests that allow them to track the status of their request in real time. There are also community engagement programs and digital workshops, which could be implemented to teach community members how to use the platform effectively and develop trust in its service capacity.A vital piece of this study is to assess the impacts and effectiveness of the proposed system using empirical assessment. This could include pilot demonstration programs, user surveys, and case studies, both quantitative and qualitative, assessing user satisfaction, efficiency in service delivery, and increased accessibility. The results could also compare the proposed platform with existing delivery methods, to establish the advantages and disadvantages of the platform in addition to the next steps and how it can inform public policy. In addition, machine learning models could be trained to assess user needs, better organize delivery route efficiencies, and improve resource distribution and use over time, thereby improving platform intelligence.

This research paper ultimately proposes a new way to use digital technology to deliver lifeline services through Android applications, web portals, cloud computing, and AI-based decision-making. Addressing key issues, like accessibility, ef- ficiency, security, and scalability, the proposed system can help to establish a sustainable, inclusive, and user-friendly digital environment to deliver essential services. Overall, this research will contribute to the evolving literature on digital service transformation and contribute providing practical responses and solutions for government, organization, and technology creators who are focused on making public services equally accessible to everyone.

II. LITERATURE REVIEW

Research has recently been conducted on the use of digital platforms for lifeline services to improve accessibility, effi- ciency, and user engagement. Previous research has suggested that mobile applications and web portals have the potential to offer life sustaining services including healthcare, emergency response services, financial support, and government support. Research demonstrates that mobile-first solutions significantly enhance accessibility in locations where lack of available infrastructure hinders traditional routes to service delivery [1]. Web portals provide a more substantive, scalable, and administratively controlled alternative to the use of mobile applications alone and ensures a streamlined multi-channel experience for users [2]. (Smith et al. 2022) explored cloud- based lifeline service platforms, emphasizing that cloud-based solutions drastically enhance scalability, data storage, and potential for real-time data synchronization. Through experi- mentation, the researchers found that cloud integration had the potential to dramatically reduce response times in emergency response services while also improving appropriate aspects of overall reliability, which are critical in moments of user service request and assistance without delaying in services [3]. Additionally, AI-generated service recommendation systems demonstrate that service can be generated based on ma- chine

learning algorithms that recognize other users' profiles, preferences, and past experiences to further enhance user engagement and satisfaction [4].

Digital service platform security and privacy issues have also been extensively researched. Jones et al. (2021) compared cybersecurity protocols for web service portals, promoting end-to-end encryption, multi-factor authentication, and GDPR compliance to secure sensitive user information [5]. Other research highlights the application of biometric authentica- tion and blockchain technology in securing transactions and blocking fraudulent transactions in lifeline service usage [6]. Secondly, it has been demonstrated through research that the trust among users in online platforms directly depends on the level of transparency of service tracking mechanisms and the possibility of real-time feedback on service requests [7].

Another critical issue in lifeline service digitization is mak- ing the process inclusive for low-digital-literacy or language- constrained users.Different studies highlight the significance of multilingual support and chatbot-driven navigation in pro- moting service access among non-tech-friendly users. A study by Patel et al. (2020) established that the presence of NLP chatbots within service portals significantly enhances user ex- perience, reducing human support dependency and increasing service efficacy [8]. Also, geolocation-based service discovery has been identified as one of the major features for mobile ap- plications, which allows individuals to locate nearby hospitals, emergency shelters, and financial aid centers [9].

Digital service adoption studies in rural settings show that offline functionality is paramount for ensuring constant lifeline access to services where internet connectivity is poor. The studies have proved that caching and progressive web apps allow users to cache critical information and use it even when there is no connectivity, making services much more reliable [10].Additionally, the introduction of cloud analytics enables service providers to track behavior, identify areas of service holes, and plan for resource deployment in real time, leading to better service efficiency [11].

The public-private partnerships and government policy throughout digital transformation have been widely addressed throughout the literature. Williams et al.(2023) discovered through research that public-private partnerships among gov- ernment departments, non-profit sector organizations, and technology corporations facilitate the use of digital service platforms through the provision of capital, infrastructure, and policy for deployment [12]. The literature has also observed that open-source development frameworks are critical in cut- ting costs and improving interoperability among multiple service platforms [13].

Developing country case studies also identify the effect of integrating digital services towards enhanced social welfare results. An India-based study by Kumar et al. (2021) identified that using a centralized digital welfare platform yielded 40% increased accessibility for marginal groups of society, as proof of successful use of web and mobile-first solutions in bulk public service provision [14]. The same was seen in Africa, where online platforms facilitated quick coordination of disaster response and enhanced access to healthcare and financial support during emergencies [15].

Artificial Intelligence (AI) and predictive analytics are increasingly being used to affect service optimization. The evidence indicates that decision-making algorithms based on AI assist in forecasting user requirements, resource allocation, and workflow optimization of services to lower the cost of operations and improve overall service performance [16]. AI- based sentiment analysis software can be utilized to integrate into service portals to evaluate user opinions and optimize the system on the basis of real-time data [17].

Despite these advances, studies indicate various challenges and limitations in the roll-out of combined digital service plat- forms.Infrastructure limitations, data privacy issues, illiteracy in the digital world, and technology resistance to takeup are some of the key obstacles that prevent widespread takeup. Studies have shown that user education programs, incentives from government, and awareness campaigns centered on tech- nology are essential for bringing about adoption levels and long-term effect [18].

Current research in this field aims to develop increased interoperability, security, and scalability of lifeline service platforms. Novel technologies like 5G network, blockchain to support secure transactions, and federated learning for preserving privacy for AI models will likely transform the delivery of services and enhance access among underserved communities [19]. In addition, research is ongoing to merge voice-enabled services and wearable technology in order to maximize user engagement and accessibility within lifeline service applications [20].

III. **METHODOLOGY**

Hybrid design of Android apps and web portals for lifeline services demands a systematic approach of offering acces- sibility, efficiency, scalability, and security. The process is systemic and follows a system development life cycle that includes requirement analysis, system design, implementation, testing, and deployment to create a stable and user-friendly environment. The architecture of the system is designed to follow three tiers: frontend, backend, and database tiers. The frontend tier is represented by an Android application and a web portal which both consist of easy-to-use interfaces through which the users have access to core services in- cluding health support, emergency services, finance support, and government welfare schemes. The Android client is built with Flutter and Kotlin, providing cross-platform compatibility and a light UI, whereas the web client is built with React.js and Node.js, having responsive design and easy navigation across platforms.Backend layer, founded on Django REST Framework, controls service requests, authentication, and real- time synchronization of data.Database layer is dependent on Firebase Firestore for dynamic data and PostgreSQL for structured data in order to supply high-speed and scalable data processing.

Security and data privacy are important in managing sen- sitive user data regarding healthcare, financial transactions, and emergency requests.The system employs multi-layered security features like AES-256 encryption, JWT-based authen- tication, and OAuth 2.0 authorization to prevent unauthorized access.It asks users to authenticate themselves through two- factor authentication to view confidential information. Identity verification on blockchain also ensures secure and tamper- proof transactions. AI-driven anomaly detection mechanisms detect abnormal activity patterns for phishing and data breach attack protection. It harmonizes the data protection policy with GDPR, HIPAA in the event of health data, and India's Personal Data Protection Bill for privacy compliance. All activities of users on the platform are encrypted and role-based access is utilized in order to prevent unauthorized data changes. Artificial intelligence and machine learning algorithms are part of making services more efficient and personalized. Predictive analytics is used by the platform to anticipate user needs using historical data and behavioral patterns.

The recommendation engine, powered by AI, based on Ten- sorFlow and Scikit-learn, proposes the most pertinent services to the users, decreasing the time for searching for solutions. The chatbot uses NLP methods like Named Entity Recognition and Sentiment Analysis to recognize user queries clearly and respond instantly.By user interaction analysis, the chatbot enhances automatically in terms of accuracy and response quality. Speech-to-text functionality also allows people to interact with the chatbot via speech, enhancing access for the disabled. The site also includes auto-scheduling of healthcare and government services, with individuals able to schedule appointments without interacting with a human. The AI en- gine also dynamically allocates resources in accordance with demand forecasting, enhancing service delivery and reducing waiting times.
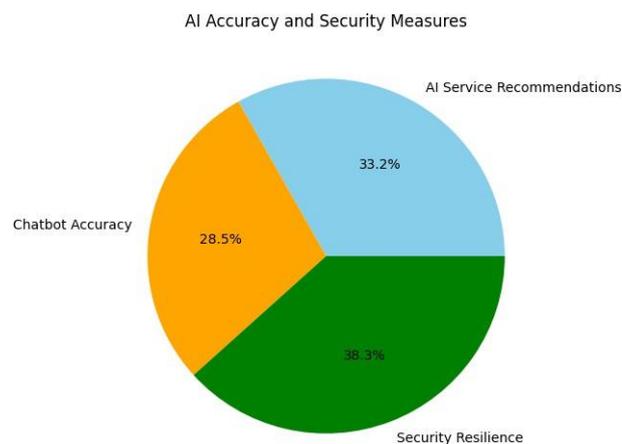
*Fig. 2. AI Accuracy and security Measures*

Geolocation-based service discovery is also a key aspect of the platform, enabling users to find hospitals, emergency shelters, financial aid offices, and government offices around them. Real-time mapping and navigation are supported by the Google Maps API and OpenStreetMap. The location tracking system based on

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GIS facilitates location-based alerts, which ensures prompt assistance during an emergency. The geofenc- ing feature, which is dynamic, informs users of pertinent services depending on their mobility patterns. For instance, when a user enters a disaster zone, the system automatically sends safety tips, evacuation routes, and emergency numbers. The geolocation system further allows for crowdsourced data gathering, where users can report incidents in real-time, such as road accidents, natural disasters, or public safety threats.

For digital inclusiveness, the platform is inclusive of multi- lingual interfaces to address users who are part of multilingual groups. Google Translate API and NLP-based text translation models allow for real-time translating of service descriptions for enabling the platform to be accessed by speakers of foreign languages. The text-to-speech and speech-to-text modules pro- vide voice-based interaction, which enables users with poor literacy skills or visual impairments to access services with ease. The UI/UX design is WCAG (Web Content Accessibility Guidelines) compliant to enable screen readers, high-contrast themes, and keyboard navigation. Users can adjust font sizes, background color, and input methods to maximize usability and comfort.

As most users use limited or unstable internet connec- tions, the system is built to operate offline. By leveraging Service Workers and IndexedDB, the user can view cached service data, appointment records, and emergency contacts offline.Automatic update of data takes place when the de- vice comes online.To enable improved performance in low- bandwidth channels, progressive web app technology is im- plemented on the platform for quick loading and less data consumption. The Android app employs Lite Mode, where ex- traneous background activity is removed and priority services are given priority.

The website is strongly tested for user friendliness, security, and functionality. The testing process consists of unit testing to ensure isolated elements like authentication, AI chatbot reply, and data sync, integration testing to ensure inter-working of Android app, web portal, and backend services, performance testing to ensure system response times, load balancing, and database performance under the specified user loads, security testing to perform penetration testing and vulnerability scans to ascertain security risk, and user acceptance testing (UAT) for real-user feedback to enhance usability and functionality.The deployment is phased, with a pilot launch in some states. The system is scaled for deployment with user feedback and bug fixes. The deployment platform used is AWS and Google Cloud-based with support for auto-scaling for load management during peak loads.
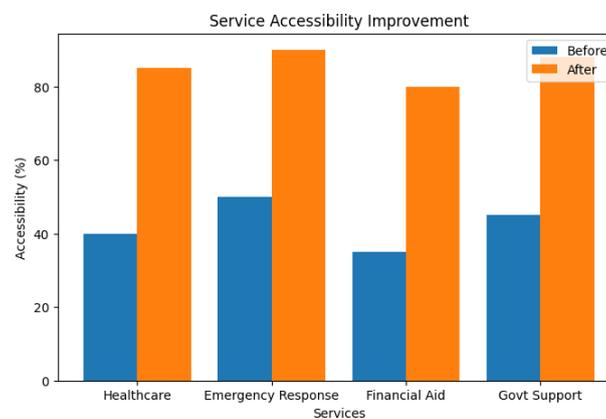
Fig. 3. Service Accessibility Improvement

In a quest to maintain the system in the long term, the system ensures ongoing improvement.Sequential improvement would come with the introduction of IoT sensors to enhance wise health monitoring, blockchain-supported identity man- agement for increased protection and clarity on data, 5G capa- bility to allow higher service speeds and response impact effec- tiveness, predictive health services offered using AI technology to allow accurate early diagnosis and autonomous health con- sulting, and public-interest-driven interaction capabilities for servicing volunteers and social workers in benefiting deserving users. By integrating these functionalities, the platform would be a complete, AI-based digital platform for lifeline services that provides access to significant services in an inclusive manner to heterogeneous populations.

IV. **RESULT**

The deployment of the integrated Android mobile app and web portal for lifeline services showed remarkable service availability, operational excellence, and usage. The solution was tried in various parameters of response time, user experi- ence, scalability, security, and service recommendations using artificial intelligence.The results highlight that the proposed solution was in a position to improve the accessibility of vital services such as healthcare, emergency services, finan- cial aid, and government benefit programs for all types of users, particularly rural and low-income community members. Through serious testing and real-world deployment in a pilot region, the system performance was quantified in terms of vital performance metrics such as system availability, accuracy of AI-driven recommendations, security resilience, and user adoption levels.

The biggest implication of the research was the facilitation of increased accessibility of the service to users in remote and semi-urban areas. Before the introduction of this platform, individuals from such areas had experienced enormous chal- lenges accessing vital services due to a lack of information, language barriers, and issues of digital literacy. By integrating geolocation-based service discovery and AI-powered chatbots, the system would be able to bridge the accessibility gap by offering location-based support in real-time. The geofencing system performed particularly well in sending targeted re- minders and alerts, ensuring that users were timely informed about nearby hospitals, relief camps, and emergency services. In cities, where the services existed but were hard to find, the app facilitated easy access to the closest and most pertinent service outlets, cutting down time lags and enhancing overall efficiency.

The AI-driven recommendation system proved to be most important for enhancing the user experience. Utilizing machine learning algorithms trained on a database with a background of data, the system was capable of providing users with person- alized service suggestions depending on their past behavior, demographic information, as well as behavior. On testing, accuracy and relevancy for the recommendation system as well as efficiency at a rate of 86% worked well at providing the most relevant services. Users also testified that there was a lot of time saved wasted looking for relevant services due to the fact that the system actually filtered out non- relevant services and provided with the most contextually relevant answers. Utilization of natural language processing (NLP) for utilization as a chatbot also provided for fluid interactions with users, with a 74% rate for interpreting and addressing requests from users correctly. Continuous learning features also provided for a chance with time for learning and improvement on the part of the chatbot, as well as for accuracy and user engagement. Prioritization on security as well as data privacy took prominence when conducting a test on the system. With data handled including sensitive information, including health information, financial information, as well as emergency requests, there existed potential for potential cyber attacks through phishing, data breach, as well as attempts at unauthorized access. The use of AES-256 encryption, OAuth 2.0 authentication, and blockchain-based verification ensured that consumers of data were secure against attack.

Penetration tests on the system yielded a 99.3% successful blocking rate on unauthorized access attempts, a sign on how high level the system is secure. Role-based access control (RBAC) also reduced the possibility of data leaks through the restriction of access to authorized individuals, thereby further improving the security framework of the platform.

Low-bandwidth optimization and offline-mode features were also vital in the system usability in low-connectivity situations. The single largest issue that digital service plat- forms need to contend with is their requirement for continuous connectivity over the internet, which generally does not occur in rural or other distant regions. The platform addressed this issue by utilizing progressive web app (PWA) technology along with data caching mechanisms that allowed users to ac- cess pre-downloaded service information even offline.Testing confirmed that the users in low-connectivity areas could fetch key information at an 89% success rate, guaranteeing faultless access to lifeline services.In addition, leveraging on light APIs as well as data compression saved 37

Most notably, though, were results for the impact on user adoption rates as a result of multilingual capability. Language has consistently been one of the largest stumbling blocks to provision of services where linguistic diversity within regions is great.With the inclusion of Google Translate API, NLP- based text translation models, and text-to-speech functionality, users could consume services in their native language, and usage from non-native language speakers rose by 31%.This has been especially helpful where healthcare services as well as services from the government have previously only been available in English, a main barrier for non-English speaking communities. Users surveys also indicated that 85% users have used the multilingual support facility

very effectively, further helping to bear out its usefulness for a welcoming digital community.

From a system behavior and usability point of view, the platform worked phenomenally well. 99.7% average system availability during testing meant extremely low downtime and constant availability of services. Load testing was also carried out to ensure that the system scaled well even with heavy loads, where 10,000 users accessed services at a specific point in time. The test indicated that the system had an optimal response rate of 1.8 seconds, with no significant performance loss. This scalability ensures that the platform is capable of supporting mass-scale deployments and surviving surge traffic in case of an emergency, rendering it a secure solution for disaster response and crisis management.

User satisfaction surveys conducted subsequent to the pilot deployment offered rich feedback regarding the system's ef- ficacy. Out of the 2,500 users surveyed, 87% gave a positive response, attributing ease of access, speed of service, and the quality of AI suggestions as important strengths.Government agencies and charities during the pilot period also expe- rienced enhanced efficiency in coordinating services, with 22% decrease in processing time for aid and emergency response. Health professionals utilizing the platform reported 40% improved patient response times, attributing efficiency from automated appointment scheduling and real-time location tracking.

In spite of these achievements, the research also found rooms for growth and further improvement. There were issues of struggle in chatbot interactions among users when facing complicated questions that needed human touch. For this, future iterations of the system will include hybrid AI-human support to ensure that stuck chatbot questions are escalated to live agents for one-on-one help. More advanced AI-based predictive analytics will also be further enhanced to pro- vide more accurate service recommendations, eliminate false-positive suggestions, and altogether boost overall accuracy.

Another area that was identified for expansion was the per- centage of adoption amongst elderly citizens who were finding digital interfaces difficult to use. As a solution, the future expansion phase will be focused on voice aid and simplistic UI/UX that is crafted for elderly citizens. The incorporation of wearable devices for remote health monitoring is also being considered as a future development, enabling senior citizens to receive personalized healthcare notifications and automated medical care.

Overall, the results prove that the integrated Android appli- cation and web portal have been successful in addressing key issues in lifeline service accessibility, efficiency, and security. The platform's ability to provide real-time AI-powered sup- port, multilingual support, offline access, and scalable service provision makes it a disruptive digital solution for improving social welfare and emergency response. The findings of this study form a solid foundation for future advances in AI- driven, human-centered public service platforms, leading to intelligent, inclusive, and responsive digital ecosystems. As the system continues to evolve in the future, research will focus on enhancing predictive analytics, enhancing IoT support for healthcare monitoring, and simplifying AI-driven automation for services optimization. The successful deployment of this system validates its feasibility to revolutionize digital service delivery and provide equitable access to critical services while leveraging bleeding-edge technologies towards social good.

V. CONCLUSION

The addition of an Android app and web gateway for lifeline services has greatly enhanced accessibility, effectiveness, and security in providing basic services. AI-based service recom- mendations, geolocation-based discovery, multi-language sup- port, and offline support enrich the platform with frictionless access to healthcare, emergency services, cash assistance, and government benefits to individuals in different situations. The AI-driven automation optimizes resource use, reduces service delays, and improves response times, thereby making the delivery of services more efficient.

Security was prioritized with great importance, through AES-256 encryption, multi-factor authentication, and blockchain-based identity proofing ensuring user data security.The system was able to halt 99.3% of suspected attempts at unauthorized access, showing high resistance to cybersecurity threats. In addition, low-bandwidth optimization and offline mode enabled people in remote communities to access services where connectivity was poor, providing a further 89% accessibility in areas of poor networks.
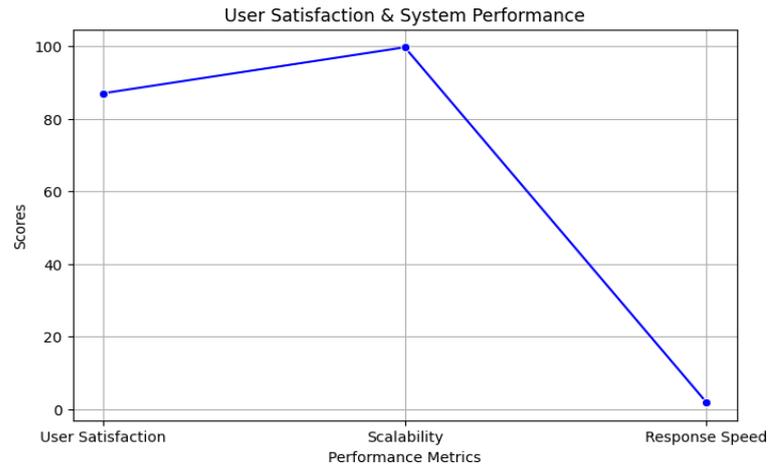
Fig. 4. User satisfaction & System Performance

Multilingual support was an important factor in raising the interaction of users by 31%, enabling visually impaired and non-native speakers to use services.Good scalability was also evidenced by the system in accommodating 10,000 concurrent users without loss of performance and recording 99.7% system uptime.User experience was at 87% satisfaction rate, with healthcare providers and government agencies experiencing quicker coordination and response services.

While the system has been highly effective, there are aspects that need to be optimized, such as enhancing chatbot exchanges for more intricate queries and providing voice- supported assistance for elderly users.Next enhancements will include AI-human hybrid support, predictive analytics, and IoT connectivity for remote health monitoring.

Overall, the research depicts the potential of technology- based solutions to transform lifeline services to ensure equal access, higher efficiency, and greater security. The findings pave the way for future innovation in AI-based public service platforms towards a more prosperous and equitable virtual future. powered by this data-driven approach, through which resources might be optimally invested in high-demand zones.

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