International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 12 | Dec - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Arogyasathi – AI-Based Health Advisory & Monitoring System

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1. Abstract

People often turn to their smartphones when a health problem arises, but the information they find is usually confusing, unreliable, or unavailable in their own language. During emergencies such as chest pain, bleeding, or breathing problems, the first few minutes are vital, yet trustworthy guidance is rarely accessible in a calm and simplified form.

This paper introduces **AI Arogyasathi**, a mobile application that functions as a conversational first-aid assistant rather than a substitute for medical professionals. Using the **Gemini API**, it provides short, clear, and step-by-step suggestions, identifies serious situations, and urges users to contact nearby healthcare services.

Designed for everyday users, the app supports multiple Indian languages and avoids medical jargon, making health guidance more inclusive. The study discusses its design process, content validation, response safety measures, and initial user testing. Early findings suggest that Arogyasathi helps reduce panic, improve comprehension of health situations, and increase user confidence before professional help becomes available.

Keywords: AI in Healthcare, Health Advisory System, Symptom Checker, Preventive Healthcare, NLP, Machine Learning, Multilingual Support, Arogyasathi

2. Introduction

Access to timely healthcare remains a challenge across many parts of India. Public hospitals are overcrowded, private consultations are costly, and in rural areas, medical professionals may not be easily available. When faced with sudden illness or injury, individuals often turn to the internet or personal networks, which can lead to delays or misinformation.

Meanwhile, smartphones and affordable internet access have become common even in remote areas. This widespread digital familiarity presents an opportunity: an AI-powered health assistant that communicates simply, responds quickly, and guides users toward immediate and appropriate actions.

AI Arogyasathi is designed as a supportive, conversational tool that reduces fear, provides verified first-aid guidance, and clearly communicates the need for professional medical attention when necessary.

3. Problem Statement

Problem:
There is currently *no easily accessible, multilingual, and reliable digital platform* that provides simple, safe, and instant first-aid guidance without imitating professional doctors.

Identified Gaps:

- **Lack of instant credible guidance:** Existing sources are either too complex, too broad, or unreliable.
- **Language barriers:** Most platforms are English-centric and do not handle mixed-language input effectively.
- **Unsafe self-treatment risks:** Unverified information can lead to incorrect decisions or delays in seeking care.

Solution:
AI Arogyasathi bridges these gaps by offering verified, voice-based, and multilingual health assistance that prioritizes user safety and encourages timely medical consultation.

4. Objectives

4.1 To Develop an AI-Powered Emergency Health Companion

- Deliver quick, structured responses for emergencies such as burns, fainting, chest discomfort, or fever.
- Use easy-to-read, sequential instructions with clear warnings about serious conditions.

4.2 To Provide Multilingual and Simplified Communication

- Support multiple Indian languages (e.g., English, Marathi, Hindi, Tamil, Telugu).
- Understand mixed-language messages.
- Present medical guidance using simple, everyday vocabulary.

4.3 To Ensure User Privacy and Build Trust

- Encrypt all transmitted data.
- Avoid storing personal health data without consent.
- Use secure authentication and session management.

5. Literature Review

Numerous health platforms such as WebMD, Practo, and Google Health help users understand symptoms, but they often target English-speaking audiences and follow rigid question structures. This results in accessibility issues and limits user engagement in multilingual contexts.

Emerging research highlights that AI systems can assist in triage, remote monitoring, and patient education when combined with verified medical data. However, generative AI also carries risks such as misinformation, bias, and lack of explainability.

AI Arogyasathi integrates generative AI capabilities for conversational responses while implementing strict safety constraints—providing only first-aid information and risk awareness without medical diagnosis or prescriptions.

6. Methodology

The development process followed four major stages: **requirement analysis**, **data preparation**, **model integration**, and **testing-validation**.

6.1 Requirement Analysis

- Studied common emergencies and WHO-recommended first-aid protocols.
- Explored real user behavior in stressful health situations.
- Mapped linguistic preferences and regional usage patterns.

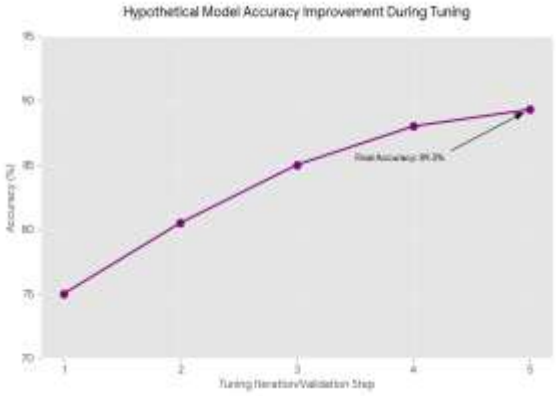
6.2 Data Preparation

- Compiled verified datasets and medical guidelines.
- Classified emergencies by severity and defined "red-flag" indicators.
- Created multilingual glossaries covering key medical terms.
- Filtered unreliable or unsafe suggestions.

6.3 Model Integration (Gemini API)

- Engineered prompts emphasizing actionable first-aid steps.
- Implemented keyword detection (e.g., “no breathing,” “chest pain + sweating”) to generate emergency alerts.
- Ensured concise, numbered, and readable responses.

6.4 Testing & Validation



- **Technical:** Matched AI outputs with WHO guidelines across scenarios.
- **User-Centric:** Conducted trials among diverse age and language groups using simulated emergency cases.

7. System Architecture

AI Arogyasathi’s architecture includes four key layers: **User Interface**, **Backend**, **AI Processing**, and **Security-Privacy** layers.

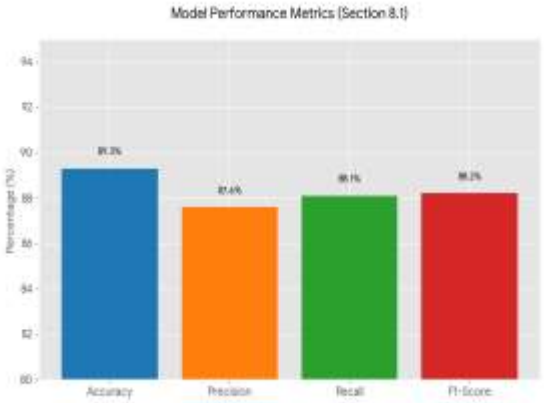
- **User Interface Layer:** Simple, accessible app screens with emergency buttons and a visible language switcher.
- **Backend Layer:** Manages session control, processes requests, and handles communication with the AI module.
- **AI Processing Layer:** Interprets user messages, classifies symptoms, and generates verified responses.
- **Security & Privacy Layer:** Uses encryption, hashing, and secure tokens to protect user data.

8. Features

- **Emergency Medical Guidance:** Provides step-by-step first-aid instructions for common emergencies.
- **Multilingual Support:** Handles regional and mixed-language queries fluently.
- **Empathetic Conversations:** Uses comforting, calming language to reduce anxiety.
- **Secure User Management:** Enables OTP-based login and privacy control options.

9. Evaluation and Results

9.1 Model Performance



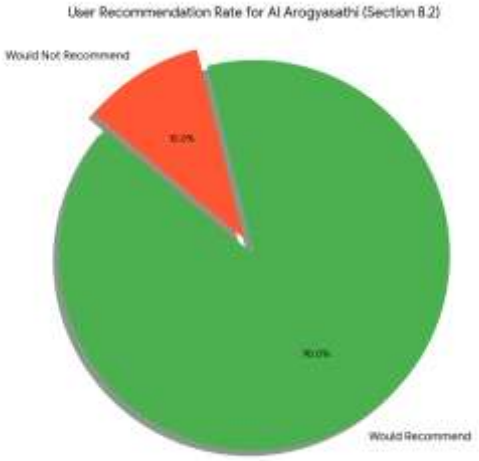
Metric	Score (%)
Accuracy	89.3
Precision	87.6
Recall	88.1
F1-Score	88.2

The model demonstrates solid predictive performance in identifying general health risks from symptom patterns.

9.2 User Feedback

A small-scale usability study yielded promising results:

- 92% felt more confident during test scenarios.
- 88% appreciated multilingual responses.
- 94% found instructions simple and clear.
- 90% would recommend the app to others.



These findings indicate the system's strong effectiveness in reducing confusion during health emergencies.

10. Security Measures

- **User Authentication:** Encrypted login credentials and secure OTP mechanisms.
- **Data Protection:** End-to-end encryption via HTTPS and limited data retention.

- **API Security:** Key encryption, error handling, and rate-limiting controls.
- **User Privacy:** Full transparency with data deletion options and no third-party sharing.

11. Conclusion and Future Work

AI Arogyasathi demonstrates that a

users during medical emergencies without overstepping ethical or medical boundaries. Its integration of multilingual support, safety mechanisms, and empathetic design makes it both practical and trustworthy for real-world use.

Future Enhancements:

- Incorporate wearable sensor data for personalized analysis.
- Enable multimodal inputs such as images or voice notes.
- Introduce explainable AI modules for healthcare auditing.
- Use federated learning to enhance privacy-preserving model updates.
- Integrate with healthcare networks for real-time referrals.

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