HealthVision – AI Video Analysis for Patient Monitoring

APP DEVELOPMENT REPORT

Submitted to

SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES

In partial fulfilment of the award of the degree of

BACHELOR OF ENGINEERING

By

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SIMATS ENGINEERING

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SCIENCES, CHENNAI – 602105

BONAFIDE CERTIFICATE

Certified that this app development report "HealthVision-AI Video Analysis For Patient Monitoring"is the Bonafide work of I.ThanvithaReddy(192224126) who carried out the app development work under my supervision.

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION BY THE CANDIDATE

The undersigned declares that the "HealthVision-AI Video Analysis For Patient Monitoring" project submitted for the SPIC317-App Development course is our original work. We carried out this project under the guidance of _____from October (2025) to January (2026) and it has been completed.

I.ThanvithaReddy

Signature of the Candidate

INDEX

HealthVision – AI Video Analysis for Patient Monitoring

EXECUTIVE SUMMARY

AI Video Analysis for Patient Monitoring is a smart healthcare solution that uses artificial intelligence to continuously observe patients through video feeds. The system automatically detects critical events such as falls, abnormal movements, prolonged inactivity, or unsafe behavior without requiring wearable devices. It provides real-time alerts to caregivers and medical staff, enabling faster response and reducing risks.

The platform supports hospitals, ICUs, elderly care homes, and remote patient monitoring by improving safety, minimizing manual supervision, and enhancing clinical decision-making. With secure data processing and intelligent analytics, AI video monitoring ensures reliable, efficient, and proactive patient care.

INTRODUCTION

Problem Statement

Continuous patient monitoring is essential in healthcare facilities, particularly for high-risk, geriatric, and post-operative patients. Conventional monitoring techniques can be laborious, invasive, and prone to human error because they primarily rely on wearable sensors, manual supervision, or recurring nurse rounds. Significant occurrences like patient falls, strange movements, or extended periods of inactivity can go unreported, raising safety concerns and postponing medical attention.

Purpose

Providing an intelligent, non-intrusive, and real-time monitoring system is the main objective of AI Video Analysis for Patient Monitoring. The device improves patient safety while lessening the strain for medical personnel by automatically detecting patient activities, identifying potential dangers (including falls or dangerous movements), and promptly alerting carers through the use of artificial intelligence to analyse live video feeds.

Scope

AI Video Analysis for Patient Monitoring focuses on delivering:

- Real-time video-based patient monitoring using computer vision and deep learning models.
- Fall detection and abnormal behavior recognition without requiring wearable devices.
- Automated alerts and notifications for caregivers and medical staff.
- Continuous activity tracking to support clinical decision-making.

Future enhancements include advanced vital sign estimation through video, integration with hospital management systems, multi-camera support, privacy-preserving AI models, and AI-assisted health analytics for long-term patient care.

GPCU – Gap Analysis

Market Gap

Wearable sensors, manual observation, or simple CCTV surveillance are the mainstays of current patient monitoring systems. Many systems are obtrusive for patients, lack intelligent real-time analysis, or are unable to identify important events like falls, unusual movements, or extended periods of inactivity. Furthermore, the majority of systems lack automatic alarms or predictive insights, which causes carer workload to grow and medical answers to be delayed.

Identified Problems & Ingrify's Solutions

1.Delayed Detection of Patient Emergencies

Solution:AI-powered video analytics monitor live camera feeds in real time to detect falls, unsafe movements, or abnormal patient behavior and instantly alert caregivers.

2.Dependency on Wearable Devices

Solution:The system uses computer vision for non-contact monitoring, removing the need for wearable sensors and improving patient comfort, especially for elderly and critical-care patients.

3. Limited Situational Awareness for Caregivers

Solution: Advanced activity recognition provides continuous patient visibility, reducing manual supervision and enabling faster caregiver response.

4. Poor System Integration and Usability

Solution:A native Android app using Kotlin, XML, and MVVM ensures smooth performance, easy navigation, scalability, and seamless system integration.

APPLICATION DESCRIPTION

Application Overview

The **AI Video Analysis for Patient Monitoring** application enables healthcare providers to:

- Monitor patients in real time using live camera feeds
- Automatically detect falls, unsafe movements, and abnormal behaviors
- Receive instant alerts and notifications for critical events
- Track patient activity patterns to support timely medical decisions

The app uses:

- **Computer Vision & Deep Learning models** for real-time video analysis
- **AI-based behavior recognition** to identify risk scenarios
- **Backend services (Flask/Node.js)** for video processing, event handling, and alert generation
- **Native Android app (Kotlin + XML)** to display live status, alerts, and patient insights

A **simple, intuitive interface** ensures caregivers can quickly view patient status, respond to alerts, and monitor activity without complexity—making intelligent, non-intrusive patient monitoring accessible and efficient for modern healthcare environments.

COMPETITIVE ANALYSIS

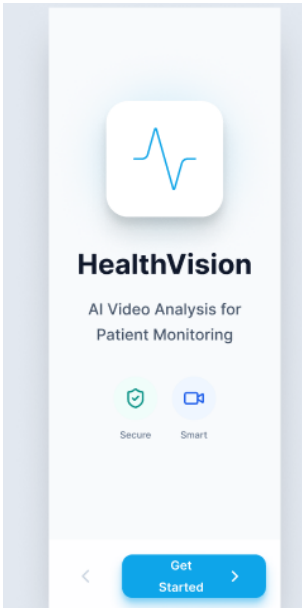
Competitor Name	Type	Focus	Offering	Limitation
CareWatch AI	Direct	Real-time patient monitoring	Video surveillance, fall detection, motion alerts, basic reporting	Limited predictive analytics; minimal behavior trend insights
MedEye Monitor	Direct	Hospital patient safety	Continuous observation, alert notifications	No advanced AI behavior analysis; limited integration with hospital systems
VitalVision	Direct	Elderly care & fall prevention	Motion tracking, emergency alerts, logging	Lacks scalable integration; limited data-driven insights
SafeHome AI	Direct	Home-based patient monitoring	Remote video monitoring, basic alerts	Minimal analytics; cannot predict high-risk behavior patterns.

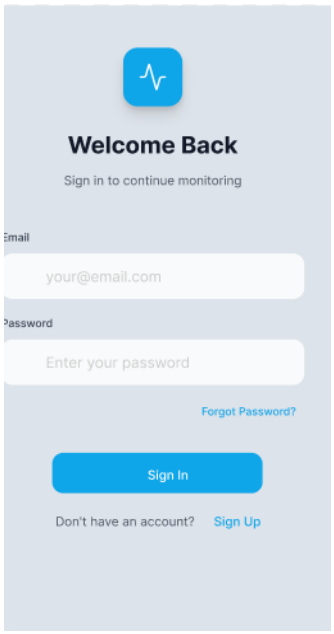
U – UNIQUENESS:

- Real-time, AI-powered video monitoring for continuous patient observation
- Non-contact fall and activity detection without wearable devices
- Instant alerts and insights for caregivers through intelligent video analysis

DESIGN AND ENGINEERING STANDARDS

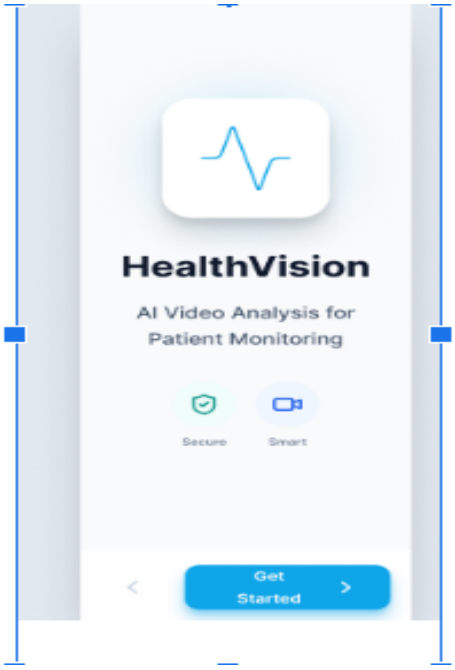
FIGMA DESIGN :

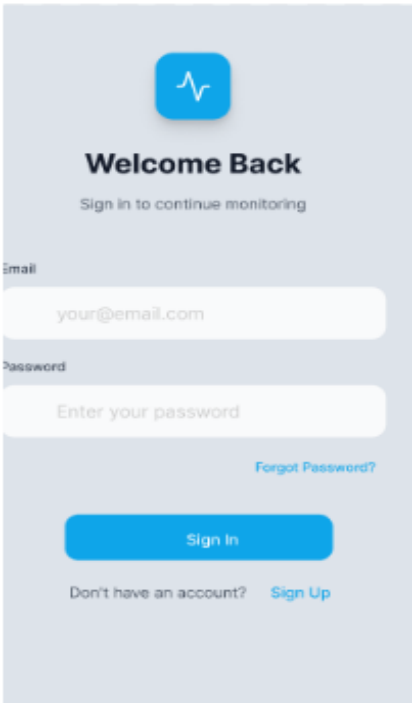


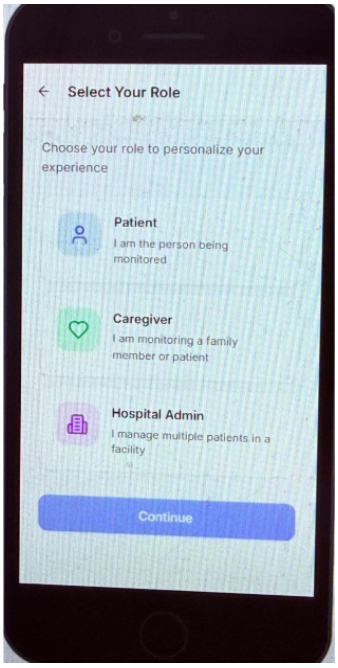


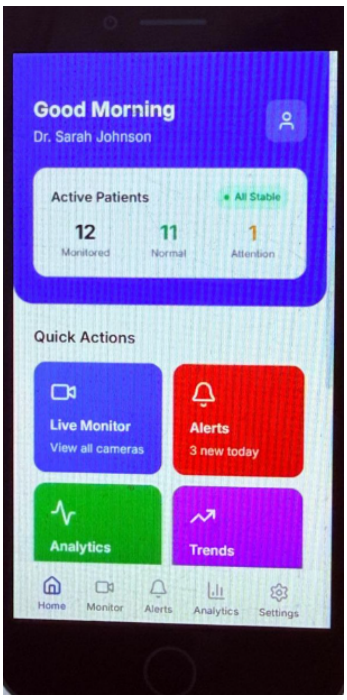
To guarantee a secure, dependable, and superior patient monitoring system, AI Video Analysis for Patient Monitoring complies with globally accepted software engineering, healthcare, and data security standards. The solution ensures accurate monitoring, secure video processing, and reliable warnings for healthcare providers by adhering to established criteria for medical data protection, real-time system reliability, and ethical AI usage.

UI Design


HealthVision
AI Video Analysis for Patient Monitoring
Secure
Smart
Get Started


Welcome Back
Sign in to continue monitoring
Email
your@email.com
Password
Enter your password
Forgot Password?
Sign In
Don't have an account? Sign Up


Select Your Role
Choose your role to personalize your experience
Patient
I am the person being monitored
Caregiver
I am monitoring a family member or patient
Hospital Admin
I manage multiple patients in a facility
Continue


Good Morning
Dr. Sarah Johnson
Active Patients
All Stable
12
Monitored
11
Normal
1
Attention
Quick Actions
Live Monitor
View all cameras
Alerts
3 new today
Analytics
Trends
Home
Monitor
Alerts
Analytics
Settings

DATABASE ENTITIES

- Patients – Stores patient personal details, medical ID, room number, and assigned doctor information.
- Cameras – Contains details of installed cameras such as camera ID, location, and patient room mapping.
- VideoFeeds – Stores live and recorded video references linked to patients and camera sources.
- MonitoringLogs – Records detected events like falls, unusual movements, inactivity, and alerts generated by the AI system.
- Alerts – Stores alert details including alert type, time, patient ID, and notification status for medical staff.
- Staff – Holds doctor and nurse details such as staff ID, role, department, and contact information.
- AI_Analysis – Stores results from AI processing such as risk level, activity status, and detected anomalies.

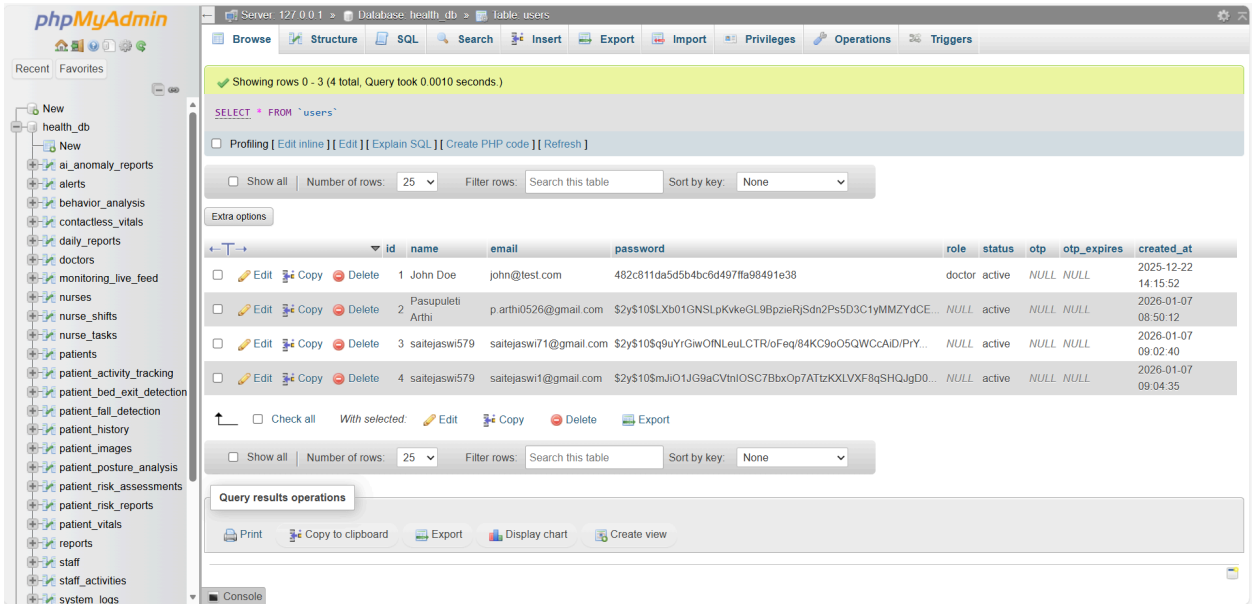


Fig .1. Users Database

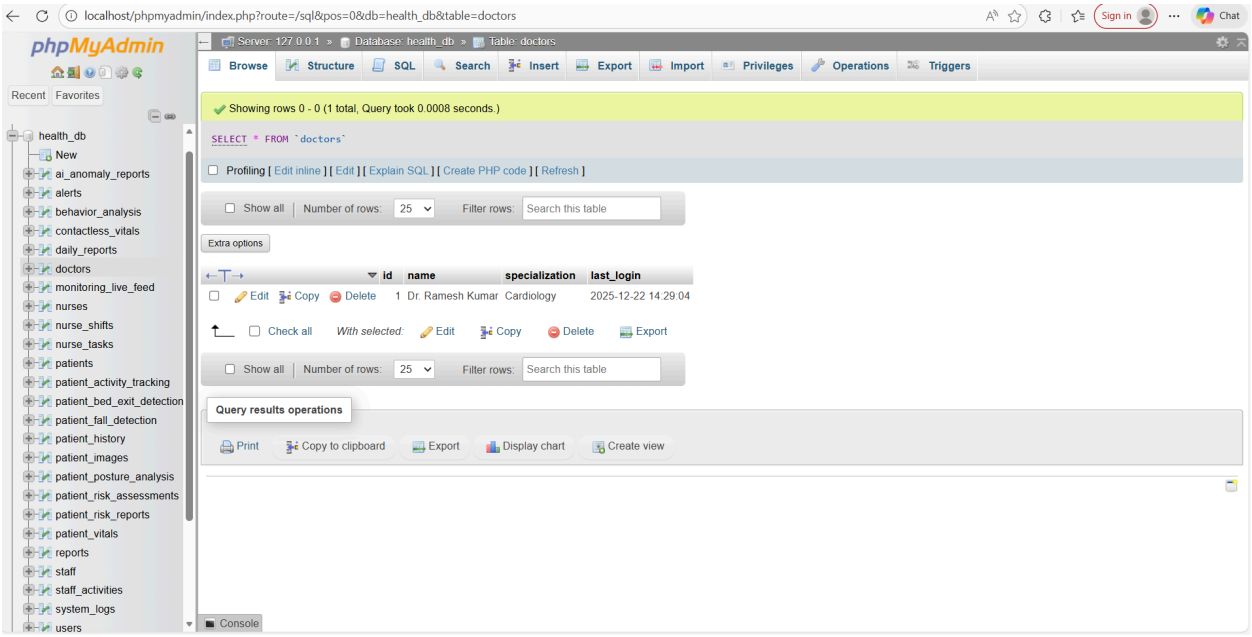


Fig. 2.Doctors Database

Standards Compliance:

- **ISO/IEC 25010 (AI Software Quality Model)** –

  Ensures the AI video analysis system meets critical quality attributes such as **accuracy, reliability, performance efficiency, usability, and maintainability**, enabling continuous and dependable patient monitoring in real-time healthcare environments.

- **ISO/IEC 27001 (Information Security Management)** –

  Provides a structured framework to protect sensitive patient video data and AI-generated insights through **access control, encryption, and risk management**, ensuring data confidentiality, integrity, and regulatory compliance.

- **ISO/IEC 29147 (Vulnerability Disclosure)** –

  Supports responsible reporting, assessment, and resolution of security vulnerabilities in AI models and video processing pipelines, helping maintain system security, transparency, and long-term trust in patient monitoring solutions.

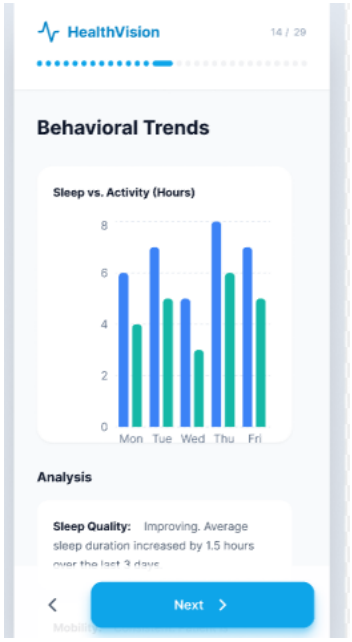
TESTING & VALIDATION

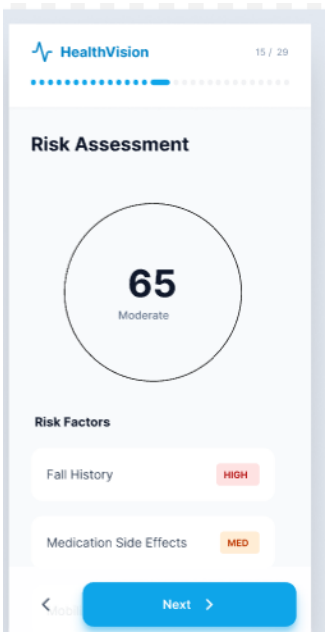
- Unit Testing:Validates individual features such as video capture, patient detection, movement tracking, fall detection, alert generation, and data storage.
- UI / Instrumentation Testing:Ensures smooth dashboard navigation, clear video display, accurate alert visualization, responsive layouts, and easy staff interaction.
- Integration Testing:Verifies correct interaction between video cameras, AI analysis engine, alert system, patient database, and staff notification modules.
- Performance Testing:Monitors real-time video processing speed, system response time, memory usage, network bandwidth, and stable operation while monitoring multiple patients simultaneously.

VALIDATION OUTCOMES

- Accurate Patient Monitoring – Patient movements, posture, and activities are correctly captured and reflected in monitoring dashboards.
- Reliable Event Detection – Falls, inactivity, and abnormal behavior are detected accurately by the AI system.
- Secure Video Data Protection – All video feeds and patient data remain encrypted and protected from unauthorized access.
- Fast and Clear Alerts – Emergency and warning alerts are generated instantly and delivered reliably to medical staff.
- Smooth System Performance – Live video, AI analysis, and dashboard updates run smoothly without delays.

RESULTS/ OUTPUT





- Patient Activity Visualization – Charts showing patient movement, activity levels, rest time, and behavior trends.
- Alert & Event Summaries – Records of detected falls, unusual movements, inactivity periods, and emergency alerts.
- Reports & Exports – Downloadable patient monitoring reports in PDF or CSV format for doctors and hospital records.
- AI Health Insights – AI-driven analysis providing risk levels, activity patterns, and recommendations for patient care.

CONCLUSION

For ongoing patient monitoring in medical settings, the AI Video Analysis for Patient Monitoring system offers a safe, dependable, and clever solution. The solution improves patient safety while lessening the workload for medical personnel by utilising real-time video analytics, automatic activity recognition, and prompt alarm creation. The dangers

of manual monitoring are reduced when occurrences like falls, strange movements, or extended periods of inactivity are accurately detected. It is a dependable solution for contemporary healthcare institutions, promoting proactive treatment, quicker clinical response, and better patient outcomes because to its user-friendly dashboards, ethical AI design, and scalable architecture.

REFERENCES

- ISO/IEC 27001 – Information Security Management Systems
- ISO/IEC 29100 – Privacy Framework for handling patient video and health data
- ISO/IEC 25010 – Software Quality Model for system reliability and performance
- HIPAA Guidelines – Patient data privacy and healthcare information protection
- HL7 & FHIR Standards – Medical data exchange and interoperability
- WHO Digital Health Guidelines – Use of digital technologies in healthcare
- IEEE Computer Vision Standards – AI-based image and video analysis
- Android Developers Documentation – Mobile UI, camera integration, and secure data handling

ANNEXTURE

1. Github link - https://github.com/thanvithareddy/HealthVision_Backend.git
2. Linkedin Profile Link - www.linkedin.com/in/shreya-aditi-s-698905326
3. Published APP Link -
4. Poster Link-