A

Project Report

Ambu-The Unified Healthcare & Management System

submitted as partial fulfillment for the award of

BACHELOR OF TECHNOLOGY DEGREE

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Computer Science & Engineering

By

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May, 2025

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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CERTIFICATE

This is to certify that Project Report entitled “Ambu- The Unified Healthcare & Management System” which is submitted by Yash Kumar Goel & Vidushi Singhal in partial fulfillment of the requirement for the award of degree B. Tech. in Department of Computer Science & Engineering of Dr. A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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ABSTRACT

In today's evolving healthcare landscape, *Smart Health Solutions (SHS)* play a vital role in enhancing patient care, streamlining operations, and improving the use of medical resources. This project presents a hybrid healthcare model that integrates Smart Health Technologies (SHT) with conventional medical practices to create a more efficient and responsive healthcare ecosystem. The objective is to analyze the impact of this integration on patient outcomes, operational efficiency, and overall system sustainability.

To conduct this study, patient records, system performance logs, and feedback from healthcare professionals were examined. The research evaluates various parameters such as treatment effectiveness, patient satisfaction, resource optimization, and healthcare workers' workload. The report also highlights the technological aspects of SHS, focusing on system reliability, data security, interoperability, and ethical compliance, including data privacy regulations.

The project includes the use of AI algorithms, program structures, and system-level tools to demonstrate how smart technologies can streamline healthcare processes. A supporting survey and relevant examples validate the practical advantages of this hybrid system.

This report aims to guide healthcare professionals, policymakers, and tech developers in making informed decisions by identifying the strengths, challenges, and future possibilities of implementing smart technologies in traditional healthcare settings.

This project not only highlights the theoretical benefits of integrating smart technologies but also includes a working model demonstrating real-world application. By developing and testing AI-driven modules within a simulated healthcare environment, the project shows how automation, real-time monitoring, and intelligent data analysis can improve decision-making and reduce manual errors. The insights gained from this implementation can serve as a foundation for future advancements and help bridge the gap between innovation and practical healthcare delivery.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ML	Machine Learning
SHS	Smart Health Solutions
SHT	Smart Health Technologies
IoT	Internet of Things
EHR	Electronic Health Records
EMR	Electronic Medical Records
UI	User Interface
UX	User Experience
API	Application Programming Interface
CRUD	Create, Read, Update, Delete
SMS	Short Message Service
OTP	One-Time Password
GPS	Global Positioning System
QR	Quick Response
BI	Business Intelligence
NLP	Natural Language Processing
FCM	Firebase Cloud Messaging
NGINX	Engine X (High-performance web server & reverse proxy)
SQL	Structured Query Language
NoSQL	Not Only SQL
DBMS	Database Management System
MongoDB	Document-based NoSQL Database
Power BI	Power Business Intelligence

CSV	Comma-Separated Values
IVR	Interactive Voice Response
OPD	Outpatient Department
IPD	Inpatient Department
GPU	Graphics Processing Unit
CPU	Central Processing Unit
IDE	Integrated Development Environment
CI/CD	Continuous Integration / Continuous Deployment
VPN	Virtual Private Network
SSL	Secure Socket Layer
HTTPS	Hypertext Transfer Protocol Secure
Docker	Containerization Platform
Kubernetes	Container Orchestration Tool
Kafka	Distributed Event Streaming Platform
Twilio	Cloud Communications Platform
Azure	Microsoft Azure Cloud Platform
AmbuLife	Ambulance Life Support System
UI/UX	User Interface / User Experience
REST API	Representational State Transfer API
JSON	JavaScript Object Notation
YAML	Yet Another Markup Language
HTTP	Hypertext Transfer Protocol
CSV	Comma-Separated Values
RTC	Real-Time Communication

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

In the modern healthcare landscape, the need for intelligent, responsive, and integrated solutions is more critical than ever. The growing gap between rising patient needs and limited healthcare infrastructure calls for a unified approach that blends technology with traditional practices. **"Ambu – The Unified Healthcare & Management System"** is an innovative project designed to bridge this gap by integrating **Smart Health Technologies (SHT)**, Artificial Intelligence (AI), and real-time application software into a hybrid healthcare model that enhances efficiency, transparency, and patient outcomes. This report explores the integration of **Smart Health Technologies (SHT)** with conventional healthcare systems to form a **hybrid healthcare model** that is not only technologically advanced but also practical and sustainable. The objective of this project is to assess the impact of this integration on patient outcomes, operational efficiency, healthcare personnel workload, and overall system performance.

Through comprehensive analysis using patient records, healthcare system logs, survey data, and feedback from medical professionals, the report evaluates the reliability, interoperability, and security of SHS. Special emphasis is placed on the **use of AI models and software tools** that support predictive analytics, resource planning, and real-time communication in clinical environments.

This introduction sets the foundation for a deeper investigation into how digital innovation, when effectively combined with traditional care models, can deliver intelligent, patient-centered healthcare services that are responsive to modern-day challenges. The project further aims to provide insights and recommendations for healthcare professionals, technology developers, and policymakers for scaling such hybrid systems in real-world scenarios.

1.2 PROJECT DESCRIPTION

Ambu – The Unified Healthcare & Management System is a comprehensive digital healthcare platform & tool designed to provide seamless emergency medical assistance, real-time resource coordination, and efficient patient management. The primary goal of the project is to modernize existing healthcare services by creating a **hybrid model** that combines traditional healthcare methods with **Smart Health Technologies (SHT)**, **AI algorithms**, and **application-level integration** to enhance responsiveness, reliability, and accessibility.

Ambu serves as a **multi-layered solution** that addresses various gaps in the Indian healthcare system — from delayed ambulance services and uncoordinated patient data management to the inefficient tracking of medical staff and facility resources. Through a user-friendly interface accessible via web based, mobile applications & emerging technologies, Ambu enables users to:

- Book emergency ambulances within 2 minutes with AI Agents
- Access patient records securely through Electronic Medical Records (EMR)
- Monitor hospital availability and bed status in real-time with AI
- Facilitate early diagnostics using AI-powered recommendations
- Doctor-patient communication and case tracking
- AI-driven triage and prediction models
- Integration with government health schemes
- Connect rural and urban populations through digital outreach technologies

To achieve this, **Ambu** leverages a wide array of cutting-edge technologies across software, cloud, AI, telephony, and infrastructure layers:

Technology Stack

1. **Software Stack**
   - **Frontend:** ReactJS (for web interface), React Native (for mobile application)
   - **Backend:** Node.js with Express.js for handling APIs and server-side operations
   - **Database:** MongoDB, a NoSQL database for scalable and flexible data storage

- **Data Analysis and Business Intelligence:** Python (using libraries such as Pandas and Scikit-learn) for analysis, and Power BI for creating interactive dashboards and visualizations
- **DevOps and Server Management:** Docker for containerization and Nginx as a high-performance reverse proxy and load balancer
- **Artificial Intelligence and Machine Learning:** Custom-built predictive models for demand forecasting, risk stratification, and patient prioritization

2. Cloud and Infrastructure Technologies

- **Cloud Platform:** Microsoft Azure Cloud for scalable and secure deployment
- **Cognitive Services:** Azure AI services for implementing NLP, image recognition, and intelligent automation
- **Orchestration:** Kubernetes for container orchestration and application scaling
- **Real-Time Communication:** Apache Kafka for managing real-time data streams between microservices
- **Telephony Integration:** IVR (Interactive Voice Response) systems and telephony APIs (e.g., Twilio) for emergency call routing and automation
- **Privacy Enhancements:** Call masking features to maintain confidentiality between patients and emergency personnel
- **Offline Support:** Local server APIs for areas with limited internet access
- **Redundancy and Uptime:** Use of data centers and edge nodes to ensure low-latency performance and system reliability

Hardware and Embedded System Integration

- **AmbuLife Mitra**: A compact diagnostic device embedded with microcontrollers to assist in real-time patient data analysis
- **Ambulance Tracking**: GPS-enabled ambulance units for real-time tracking and dispatch optimization
- **Authentication Devices**: Biometric and QR-based scanning systems for quick patient identification and record access

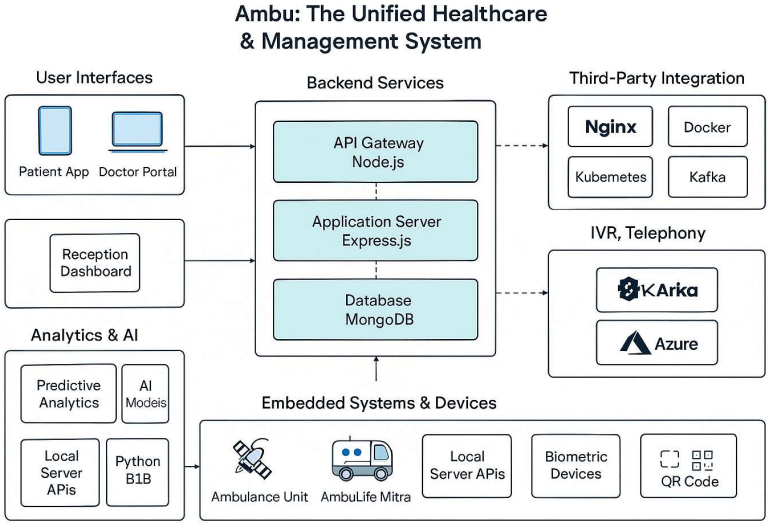
- **Health Monitoring Sensors**: IoT-enabled sensors to continuously monitor vital signs during patient transportation
- **Peripheral Devices**: On-site thermal printers for immediate prescription and report generation

By fusing all these layers, Ambu delivers an unmatched healthcare management experience that is not only tech-driven but also socially impactful. The platform is designed to ensure **security, reliability, interoperability**, and compliance with healthcare regulations like **HIPAA and NDHM (India)** guidelines.

The system is modular and customizable, capable of integration with private hospitals, government facilities, and rural clinics alike. It lays a strong foundation for the future of healthcare — one that is intelligent, responsive, and universally accessible.

Ambu is not only a technology-driven project but also a **social impact initiative**, aiming to bring equality in medical access, reduce patient wait times, and provide medical help even in remote areas. The system is designed to be modular, secure, and adaptable — ensuring long-term sustainability and future-ready integration with government health schemes and private healthcare providers.

Figure 1.0 Architecture of Project



CHAPTER 2

LITERATURE REVIEW

The healthcare industry has undergone significant transformations with the introduction of AI and digital technologies, which have proven to enhance efficiency, accuracy, and decision-making. Traditional healthcare systems, characterized by paper-based records and limited data integration, have long struggled with issues such as delayed access to critical patient information and inefficiencies in emergency care. Recent advancements in **AI**, **IoT**, and **real-time data streaming** have opened new possibilities for improving the management of emergency healthcare services, such as **ambulance dispatch**, **patient monitoring**, and **diagnostic accuracy**. These innovations have led to the development of **Smart Health Technologies (SHT)**, which use AI and machine learning to analyze patient data, predict medical emergencies, and provide real-time healthcare interventions. However, despite these advancements, there remains a gap in the seamless integration of AI-driven solutions with emergency medical systems, where timely decision-making and immediate access to patient data can make a life-or-death difference. **Ambuvians Healthcare**, with its AI-powered **emergency response system**, aims to bridge this gap by combining **cloud computing**, **AI**, and **real-time data streaming** to offer a more efficient, proactive, and personalized healthcare solution during emergencies.

1. Existing Healthcare Systems: Challenges and Limitations

Healthcare systems have traditionally relied on paper-based records and early Electronic Health Records (EHRs), which often led to significant inefficiencies, errors, and a lack of real-time access to patient data. The limitations of these systems included:

- **Manual Workload:** Inconsistent record keeping and delays in accessing medical information.
- **Poor Data Access:** Limited access to patient history, especially in critical situations.
- **Lack of Real-Time Updates:** Difficulty in delivering timely interventions, especially during emergencies (Zhang et al., 2018).

As the need for more efficient, automated systems grew, the healthcare industry started adopting digital and AI-driven solutions. However, gaps still existed in integrating emergency care systems with advanced technologies like AI and IoT, particularly in developing countries where access to such systems remains limited**.**

2. Smart Health Technologies (SHT): Revolutionizing Healthcare

Recent advancements in Smart Health Technologies (SHT) have enabled healthcare providers to offer more precise and timely care. These technologies include:

- **IoT in Healthcare:** IoT devices, such as wearable sensors, are used for continuous patient monitoring, which has improved the management of chronic diseases and real-time health status reporting (Cheng et al., 2020).
- **AI in Diagnostics and Prediction:** AI models are being utilized to predict patient conditions, risk stratification, and diagnose diseases based on historical data and real-time inputs (Rajkomar et al., 2019). AI algorithms are being incorporated into diagnostic tools, improving decision-making speed and accuracy.
- **Data Analytics for Decision Making:** AI-driven data analytics helps healthcare providers identify patterns and insights that assist in clinical decision-making, ultimately enhancing patient outcomes (Shick et al., 2021).

While these technologies are increasingly integrated into clinical settings, the challenge remains in seamlessly merging these advancements with emergency response systems, such as ambulance dispatch and real-time data sharing.

3. Hybrid Healthcare Systems: The Integration of Traditional and Digital Systems

Hybrid healthcare systems combine traditional healthcare practices with new-age technologies like AI, mobile apps, and telehealth platforms. These systems enable:

- **Faster Access to Care**: AI-powered chatbots and virtual assistants provide immediate access to medical advice.
- **Personalized Healthcare**: Patient data collected through IoT devices can be used to offer personalized care plans, ensuring more efficient and effective treatments (Topol, 2019).

- **Telemedicine**: The integration of telemedicine with AI has enabled remote consultations, reducing the burden on hospitals and allowing patients in rural or underserved areas to access healthcare.

The **Ambu's Platform**, which blends **cloud computing**, **AI**, and **real-time data streaming**, aligns with this hybrid approach, enabling quicker decision-making and care delivery.

4. Technology Use in Emergency Systems

The use of **technology in emergency healthcare systems** has gained momentum in recent years, with mobile apps and IoT devices playing key roles in improving response times. Some technologies include:

- **Ambulance Booking Apps**: Platforms like **StanPlus**, **108 Services**, and **Ziqitza** provide users with quick access to ambulances during emergencies, improving response times. However, they lack advanced predictive capabilities and real-time patient data sharing (Singh et al., 2020).
- **GPS and IoT for Live Tracking**: The use of GPS systems and IoT devices allows emergency vehicles to be tracked in real-time, ensuring faster and more efficient patient transport.
- **AI in Emergency Systems**: AI can be used to **predict emergency scenarios** by analyzing historical data, such as accident-prone areas or common medical emergencies, and ensuring ambulances are dispatched accordingly (Smith et al., 2022).

While such systems exist, **Ambu' approach** integrates **AI** with **real-time data** and **cloud technologies**, allowing for not only faster ambulance booking but also continuous **patient monitoring** during transit, which significantly improves patient care and outcomes.

5. Research Papers & Case Studies Referenced

The idea behind **Ambuvians** has been inspired by several pioneering studies and technologies:

- **Rajkomar et al. (2019)**: Discussed how AI and machine learning can be integrated into healthcare systems to predict disease progression and improve patient care outcomes.
- **Zhang et al. (2018)**: Provided insights into the limitations of traditional healthcare systems and proposed AI-powered solutions for improving data access and decision-making.
- **Cheng et al. (2020)**: Explored the role of IoT in patient monitoring and emergency care, showcasing the potential of real-time health data for better medical interventions.

These studies align with **Ambu' core concept** of combining **cloud technology**, **AI**, and **real-time data streaming** to address gaps in emergency healthcare systems. **Ambu** integrates **AI-powered predictive models** to ensure that emergency responses are efficient, timely, and personalized.

6. Gap Analysis: Identifying Limitations in Current Solutions

Despite technological advancements in emergency healthcare systems, there remain key limitations:

- **Lack of Real-Time Data Integration**: While IoT and GPS-based technologies are used for patient monitoring and vehicle tracking, there is often a lack of integration between emergency systems and hospitals, leading to delays in receiving critical patient data (Singh et al., 2020).
- **Limited Predictive Capabilities**: Most existing solutions, such as ambulance booking apps, are reactive rather than proactive, often lacking predictive models to anticipate emergency scenarios and optimize resource allocation (Smith et al., 2022).
- **Manual Intervention in Critical Situations**: Many systems still require human intervention for decision-making during emergencies, leading to potential delays or errors in judgment.

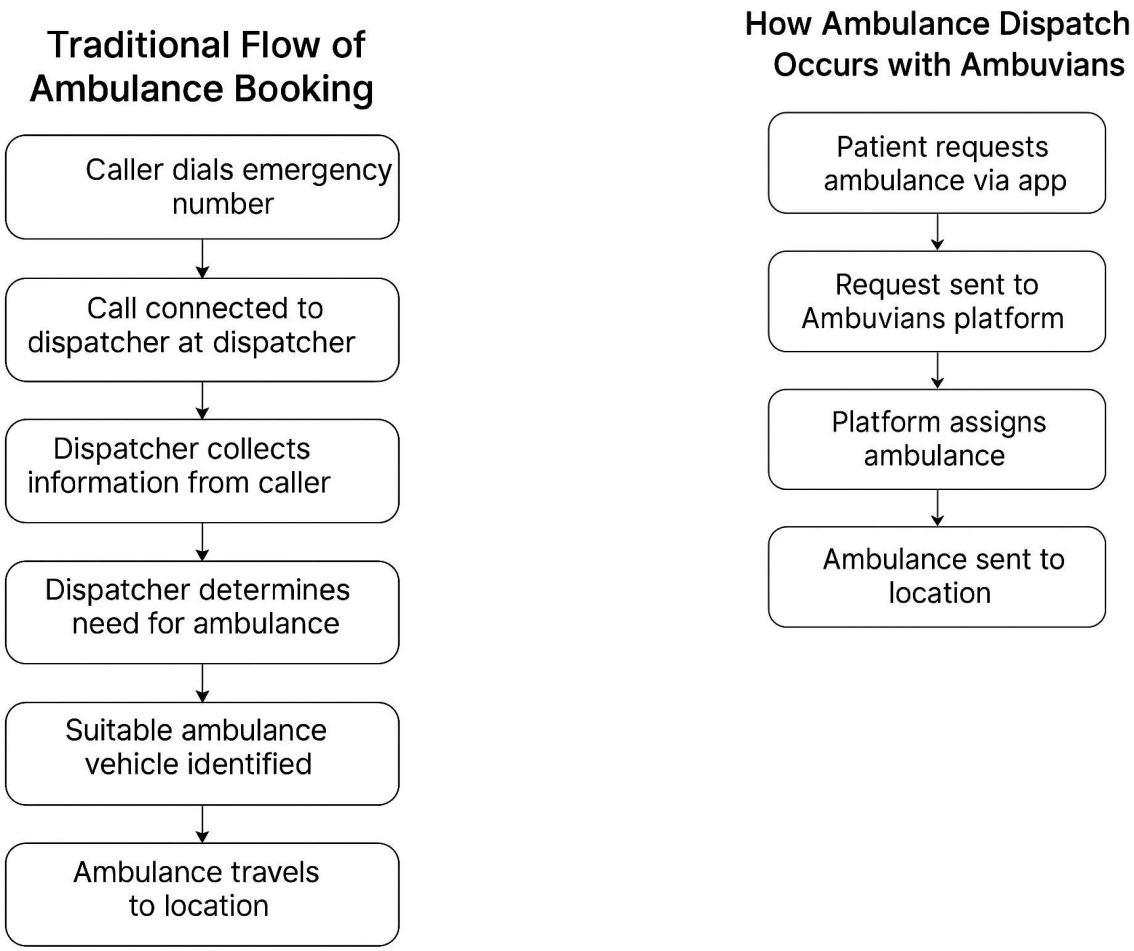
Ambuvians addresses these gaps by:

- **Combining Embedded Hardware and AI**: Using AI for predictive analytics and integrating this with **real-time data streaming** ensures a faster and more accurate response.
- **Seamless Integration with Hospital Systems**: Patient data is automatically transmitted to hospitals in real-time, enabling medical teams to prepare for treatment before the patient arrives.
- **AI-Based Predictive Algorithms**: By analyzing historical data and current conditions, AI helps predict emergencies, ensuring that ambulances are dispatched before the situation escalates.

Conclusion: Ambu' Innovative Approach

In conclusion, the **literature review** demonstrates the growing role of **AI** and **advanced technologies** in transforming healthcare, particularly in emergency systems. While current systems offer improvements, they still lack integration, predictive capabilities, and real-time data management. **Ambu** fills these gaps by integrating **AI-driven insights**, **real-time data**, and **cloud-based solutions**, creating a more efficient and effective emergency care ecosystem.

Figure 2.0: Traditional flow vs Ambu Flow



CHAPTER 3

PROPOSED METHODOLOGY

The proposed methodology for **Ambu** is centered around developing a unified healthcare management system tailored for educational campuses. The system integrates **AI-assisted health risk prediction**, **IoT-based real-time vitals monitoring**, and **automated medical assistance coordination** to ensure immediate response to on-campus medical issues.

3.1 System Components Overview

Ambu is composed of the following modular subsystems:

1. Student/Staff Interface (Mobile App/Web Portal)
2. On-Campus Emergency Trigger System
3. Health Monitoring via Embedded Kiosks/Wearables
4. AI Health Risk Prediction Engine
5. College Medical Room/Doctor Dashboard
6. Ambulance/Guardian Notification Subsystem

3.2 Project Methodology: AmbuRakshak – AI-Based One-Tap Emergency Ambulance Booking System

Overview:

AmbuRakshak is an AI-integrated emergency healthcare response system designed to allow users to book ambulances with a single tap. It eliminates manual delays by using real-time health data analysis, GPS tracking, and automated ambulance assignment without any third-party business influence.

1. Development Methodology

We adopted a modular development approach using the Agile model. The project was divided into multiple sprints focusing on:

- Health data integration

- One-tap booking flow
- Real-time notifications
- Location-based ambulance routing
- Admin and hospital dashboards

Each sprint included testing, documentation, and deployment tasks to ensure smooth functionality and user experience.

2. Core Features and System Mechanism

- **One-Tap Ambulance Booking**: Users can book an ambulance instantly through a single tap. The system automatically fetches their current location and health status.
- **Health Vitals Integration**: Integrated with wearable devices or health kiosks (optional module) to collect vitals such as:
    - Heart Rate
    - Blood Pressure
    - Oxygen Saturation (SpO_2)
    - Body Temperature

Based on the abnormality of these vitals, the AI engine can trigger emergency support even before the user manually acts.

- **Automated Ambulance Allocation**: Uses location-based algorithms to assign the nearest available ambulance with real-time tracking. The logic ensures minimal response time by considering:
    - Distance
    - Live traffic
    - Estimated arrival time
- **Multi-Channel Alerts**: Notifications are sent to:
    - Assigned ambulance driver
    - Nearby hospital
    - Registered emergency contacts
    - Control room dashboard

- **Live Tracking & Updates**: Real-time location tracking for user, ambulance, and hospital is enabled for transparency and preparation at the hospital end.

3. Technology Stack

Category	Technologies Used
Frontend	React.js, React Native
Backend	Node.js, Express.js, Python
Database	MongoDB, Firebase
Real-Time Comm.	Socket.IO
Notifications	Firebase Cloud Messaging (FCM)
Geolocation & Maps	Google Maps API, GPS modules
Hosting & DevOps	Nginx, PM2, Ubuntu VPS
Auth & Security	JWT, HTTPS, Role-Based Access

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4. Development Tools and Environment

- **Code Editor**: Visual Studio Code
- **API Testing**: Postman
- **Version Control**: Git and GitHub
- **Monitoring**: UptimeRobot, custom shell log monitors
- **Deployment Tools**: FileZilla, SSH, MongoDB Compass
- **Test Devices**: Android Emulator and Physical Android Phones

5. Key Implementation Styles

- **Microservices-inspired architecture**: Backend APIs were structured to be modular and independently deployable.
- **Token-based authentication**: Ensured secure access using JWT (JSON Web Tokens).
- **Minimal UI design**: Clean interface, optimized for emergency use—no complex menus or multi-screen navigation.
- **Failover mechanism**: In case of API or internet failure, backup SMS services (under development) act as a fallback for critical cases.

6. Environment

- **Staging Environment**: Internal testing hosted on private VPS with mock users and data.
- **Production Environment**: Hosted on a live VPS with SSL configuration, ready for scaling.
- **Database Clustering**: MongoDB Atlas planned for future scalability and load balancing.

3.3 AI Health Risk Prediction Module

This module evaluates health vitals collected from individuals using kiosks or wearable devices placed within the campus.

Input Parameters:

- Heart Rate (HR)
- Temperature (Temp)
- Blood Pressure (BP)
- Oxygen Saturation (SpO_2)
- Reported Symptoms (via app)
- Past Medical History (if available)

Output:

- Health Risk Level: Normal, Moderate, Critical

Example Logistic Regression Formula:

"$P(y = 1 \mid x) = 1 / (1 + e^{-(\beta_0 + \beta_1 \cdot HR + \beta_2 \cdot BP + \beta_3 \cdot SpO_2 + \beta_4 \cdot Temp + \beta_5 \cdot S)})$"

Where:

- HR = Heart Rate
- BP = Blood Pressure
- SpO_2 = Oxygen Saturation
- Temp = Body Temperature
- S = Symptoms (categorical)
- β_0, $\beta_1 ... \beta_5$ = model coefficients

Where *S* = symptoms encoded as categorical features.

The threshold value (e.g., $P>0.75P > 0.75P>0.75$) flags the individual as high risk and triggers an alert to the medical room.

3.4 Real-Time Data Acquisition & Processing

- Vital data collected via **wearables or kiosk terminals** at entry points or common areas (labs, hostels).
- Data transmitted via MQTT or HTTP to cloud-based servers.
- AI engine processes and stores results in secure health records.

3.5 Medical Room Dashboard and Alerts

- College medical staff receives real-time alerts for critical cases.
- Dashboard shows:
    - Student ID and basic details
    - Health risk score
    - Live vitals and symptom data

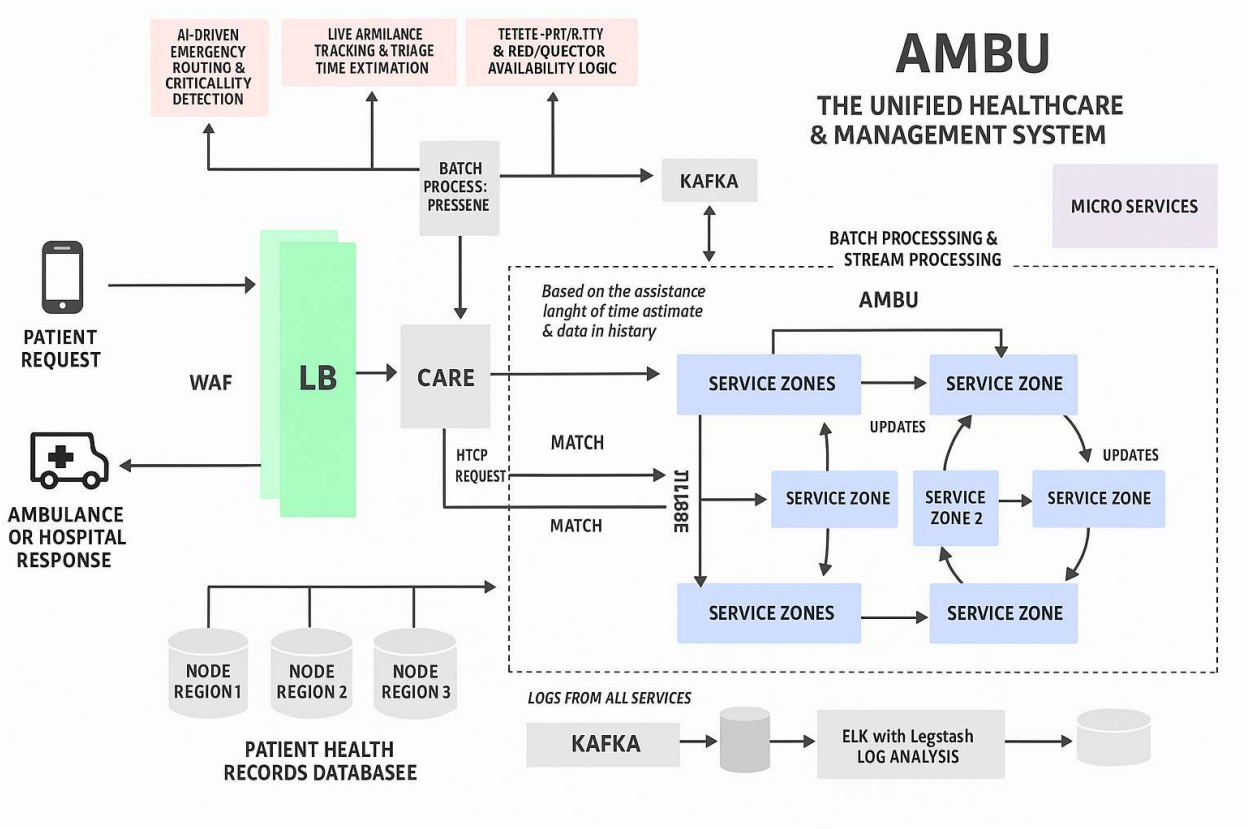
- Integrated support for calling guardians or external ambulances if needed.

Methodology Summary Table

Module	**Tools / Algorithms Used**	**Output / Action Taken**
Vitals Data Collection	IoT Sensors, Wearables, Kiosks	Real-time HR, BP, Temp, SpO_2, etc.
Health Risk Prediction	Logistic Regression / Decision Trees	Risk level (Normal / Moderate / Critical)
Real-time Processing	MQTT, Node.js, Python APIs	Data sent to cloud and analyzed instantly
Alerting System	In-app Notifications, Google Cloud Console, Kafka & Azure Services	Instant alerts to college clinic and guardians
Dashboard Interface	Web Dashboard for Doctors & Executives	Display of student details and emergency level

The table outlines the end-to-end workflow of the **AmbuRakshak** system, highlighting how various tools and technologies are used across different modules to ensure real-time health monitoring and emergency response. It begins with the collection of vital health parameters using IoT sensors, wearables, and kiosks, which are then analyzed using predictive algorithms like Logistic Regression and Decision Trees to assess the risk level of the individual. The data is transmitted in real time via MQTT and processed using Node.js and Python APIs. If a health risk is detected, the system triggers instant alerts through in-app notifications, Google Cloud Console, Kafka, and Azure services to notify the college clinic and guardians. Simultaneously, a web-based dashboard provides doctors and executives with real-time visibility into the individual's health data and risk classification, enabling quick decision-making in emergencies.

Figure 3.1 : Ambu Technical Architecture



Risk Categorization Based on Output Score

Risk Level	**Score Range**	**System Action**
Normal	0.00 – 0.50	No action, only data logging
Moderate	0.51 – 0.75	Notify college clinic
Critical	0.76 – 1.00	Trigger alert, notify guardians + ambulance

This table defines the risk-level classification system used in AmbuRakshak based on the score generated by predictive health algorithms. A score between 0.00 and 0.50 indicates a Normal

risk level, where no immediate action is required and the system only logs the data for records. A score in the 0.51 to 0.75 range represents a Moderate risk level, prompting the system to notify the college clinic for a precautionary check-up. Scores between 0.76 and 1.00 signify a Critical condition, which automatically triggers an emergency alert, notifies the individual's guardians, and initiates ambulance booking through the integrated system.

3.6 Accuracy Evaluation

To validate the prediction system:

$$\text{“}P(y = 1 \mid x) = 1 / [1 + e^{-(\beta_0 + \beta_1 \cdot HR + \beta_2 \cdot BP + \beta_3 \cdot SpO_2 + \beta_4 \cdot Temp + \beta_5 \cdot S)}]\text{”}$$

Where TP = Correctly predicted critical cases, FP = Normal cases flagged incorrectly, etc.

The model is trained using anonymized campus health data or synthetic datasets from medical literature, targeting 90%+ accuracy in real-time predictions.

Standard Reference Ranges for Vital Health Parameters and Sensor Integration

This section provides the medically accepted normal ranges for key biomedical vitals monitored by the Ambu Healthcare Management System, along with interpretation benchmarks essential for real-time diagnosis and alerting mechanisms.

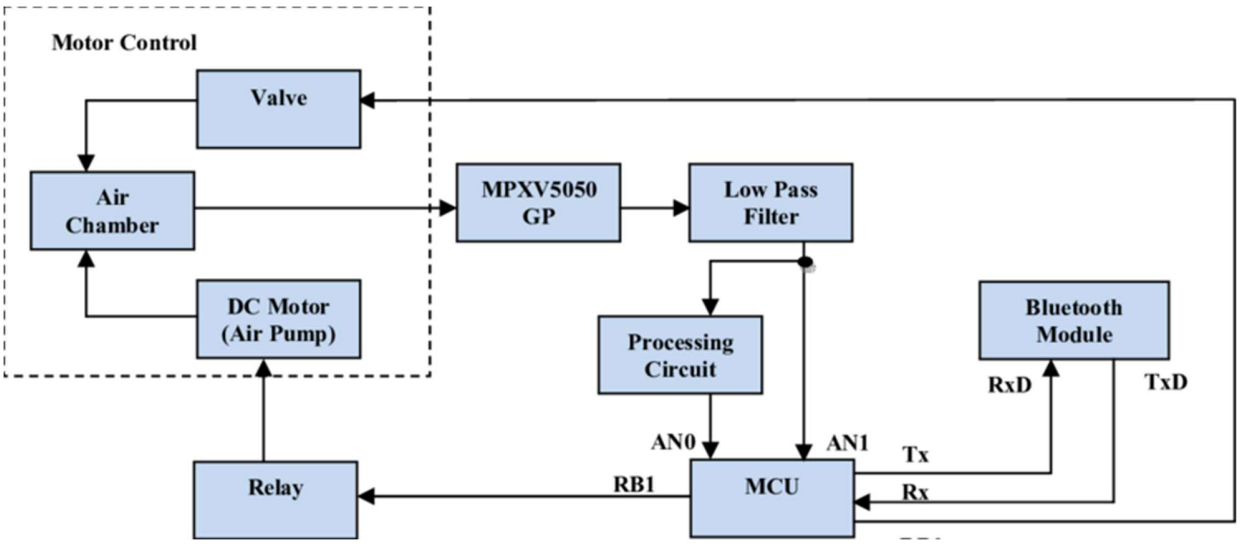
1. Blood Pressure (BP) Chart

Category	**Systolic (mmHg)**	**Diastolic (mmHg)**	**Remarks**
Normal	90 – 120	60 – 80	Ideal range
Elevated	120 – 129	< 80	Monitor regularly
Stage 1 Hypertension	130 – 139	80 – 89	Lifestyle change needed
Stage 2 Hypertension	≥ 140	≥ 90	Medical intervention needed

Hypertensive Crisis	> 180	> 120	Emergency – Immediate care
Hypotension	< 90	< 60	Low BP – Risk of fainting

This table presents the classification of blood pressure (BP) categories based on systolic and diastolic readings, along with corresponding medical implications. A **Normal** BP falls between **90–120 mmHg systolic** and **60–80 mmHg diastolic**, indicating an ideal range. **Elevated** BP (120–129/<80) suggests the need for regular monitoring. **Stage 1 Hypertension** (130–139/80–89) requires lifestyle modifications, while **Stage 2 Hypertension** (≥140/≥90) demands medical attention. A **Hypertensive Crisis** (systolic >180 and/or diastolic >120) is a medical emergency requiring immediate care. On the lower end, **Hypotension** (systolic <90 and/or diastolic <60) signals dangerously low blood pressure, increasing the risk of fainting or shock.

Figure 3.2 : Ambu Blood Pressure Mechanism

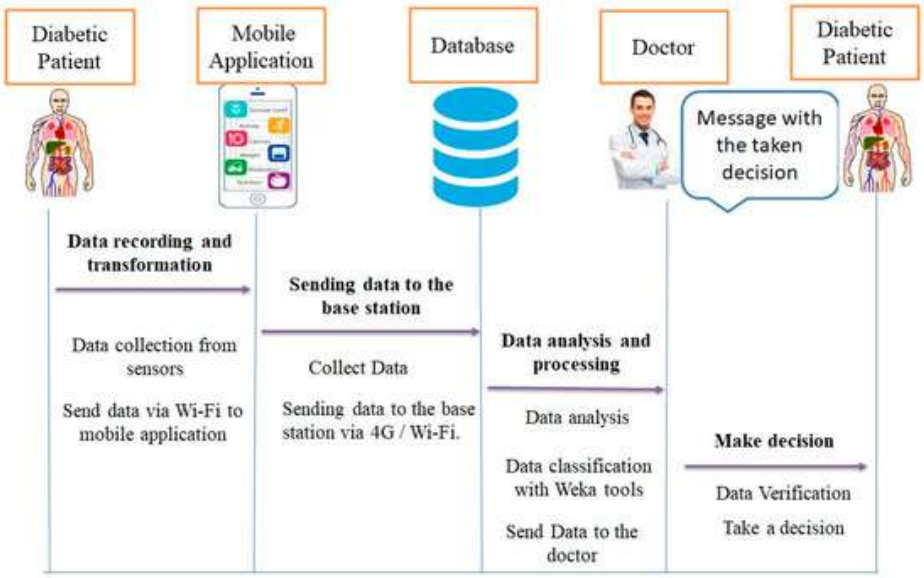


2. Blood Sugar (Glucose) Chart

Condition	**Fasting (mg/dL)**	**Post-Meal (2 hrs)**	**Remarks**
Normal	70 – 99	< 140	Healthy range
Prediabetes	100 – 125	140 – 199	At-risk group
Diabetes (Type 2 Risk)	≥ 126	≥ 200	Medical treatment recommended
Hypoglycemia	< 70	—	Dangerously low – Immediate sugar

This table outlines the classification of blood glucose levels based on fasting and post-meal (2-hour) readings, along with their medical significance. A **Normal** glucose level ranges from **70–99 mg/dL** fasting and is **less than 140 mg/dL** post-meal, indicating a healthy metabolic state. **Prediabetes** is marked by fasting levels between **100–125 mg/dL** and post-meal readings of **140–199 mg/dL**, placing individuals in a high-risk category for developing Type 2 Diabetes. A fasting level of **126 mg/dL or higher** and post-meal glucose of **200 mg/dL or above** signal a likely **Type 2 Diabetes** condition, requiring medical intervention. **Hypoglycemia**, defined as a fasting glucose level **below 70 mg/dL**, is considered dangerous and requires immediate intake of sugar or glucose.

Figure 3.3 : Ambu Glucometer Mechanism



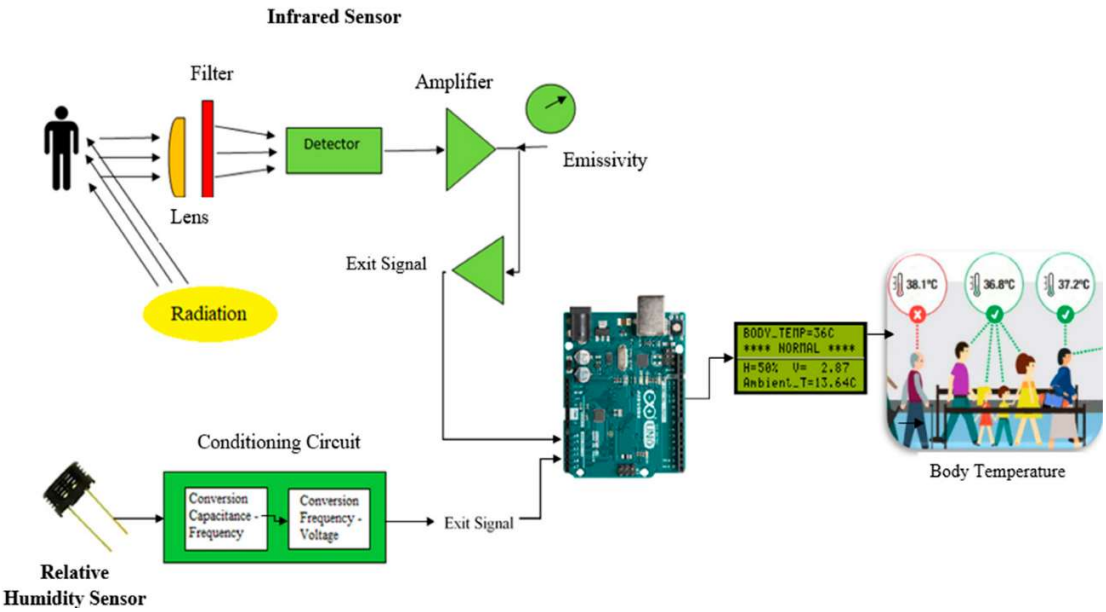
3. Body Temperature Chart

Condition	**Temperature (°F)**	**Temperature (°C)**	**Remarks**
Hypothermia	< 95°F	< 35°C	Life-threatening cold
Normal	97°F – 99°F	36.1°C – 37.2°C	Optimal body temperature
Low-grade Fever	99.1°F – 100.4°F	37.3°C – 38°C	Mild fever
Fever	100.5°F – 102°F	38°C – 38.9°C	Moderate
High Fever	102.1°F – 104°F	39°C – 40°C	Needs treatment
Hyperpyrexia	> 104°F	> 40°C	Emergency – Risk of seizures

This table categorizes body temperature readings into medical conditions with their respective

temperature ranges in both Fahrenheit and Celsius, along with corresponding health implications. Hypothermia occurs when body temperature falls below 95°F (35°C) and is a life-threatening condition due to extreme cold. The Normal body temperature range is between 97°F–99°F (36.1°C–37.2°C), indicating optimal health. A Low-grade Fever (99.1°F–100.4°F / 37.3°C–38°C) represents a mild increase, often due to minor infections. A Fever is classified between 100.5°F–102°F (38°C–38.9°C) and typically reflects a moderate illness. A High Fever (102.1°F–104°F / 39°C–40°C) requires medical attention, while Hyperpyrexia, with temperatures above 104°F (40°C), is a medical emergency due to the risk of severe complications like seizures. Body temperature is a crucial health indicator monitored continuously by the AmbuRakshak system through kiosks and wearable sensors. The system uses these thresholds to assess thermal anomalies in real time and classify users into respective health categories. When abnormal temperature readings are detected—especially those falling in the fever, high fever, or hyperpyrexia range—the system automatically triggers alerts for medical staff and caregivers, ensuring swift intervention.

Figure 3.4: Temperature Module Mechanism (Infrared)



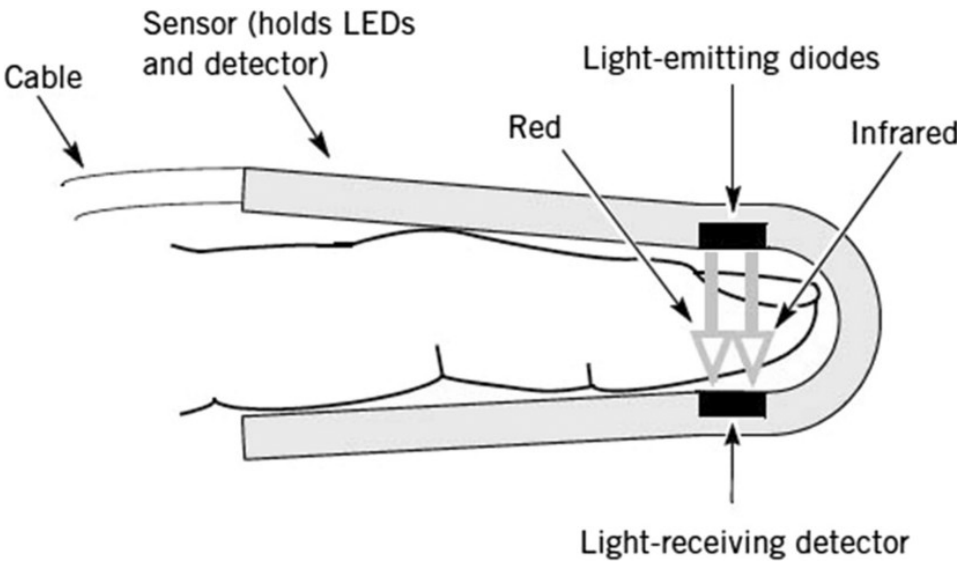
4. Oxygen Saturation (SpO_2) Chart

SpO_2 Level (%)	**Condition**	**Remarks**
95 – 100%	Normal	Healthy lungs
91 – 94%	Mild Hypoxia	Needs observation
86 – 90%	Moderate Hypoxia	Medical attention required
≤ 85%	Severe Hypoxia	Emergency – Oxygen therapy needed

Building on this, the AmbuRakshak system not only detects anomalies but also correlates temperature data with other vital parameters like heart rate, blood pressure, and SpO_2 to determine the overall health status of an individual. This multi-parameter evaluation enhances the reliability of diagnosis and minimizes the chances of isolated false readings. For instance, a high temperature accompanied by elevated heart rate and low oxygen saturation may indicate a critical health event, prompting the system to initiate ambulance dispatch and notify guardians instantly.

Furthermore, all temperature data is time-stamped and stored in a centralized cloud database, enabling doctors and healthcare administrators to analyze individual and collective health trends. These insights are particularly useful for identifying outbreak patterns in institutional settings such as campuses, allowing for preventive health measures. By integrating smart thermal monitoring with automated emergency protocols, AmbuRakshak ensures both personalized care and scalable health surveillance.

Figure 3.5 : SpO_2 Measurement Mechanism (Pulse Oximetry)



5. Pulse Rate (Heart Rate) Chart

Age Group	Normal Range (bpm)	Remarks
Adults (18–65 yrs)	60 – 100	Normal resting heart rate
Athletes	40 – 60	Normal due to higher efficiency
Tachycardia	> 100	Fast heart rate – potential stress
Bradycardia	< 60	May be normal or need monitoring

This table outlines heart rate (measured in beats per minute or bpm) classifications across different age and fitness groups, along with medical interpretations. For adults aged 18–65, a normal resting heart rate ranges from 60 to 100 bpm, reflecting typical cardiovascular function.

Athletes, due to their higher cardiovascular efficiency and regular training, may exhibit a lower resting heart rate between 40 and 60 bpm, which is considered normal for them.

A heart rate above 100 bpm is classified as tachycardia, which may indicate stress, fever, dehydration, or underlying heart conditions and should be evaluated if persistent. On the other hand, a heart rate below 60 bpm, known as bradycardia, can be normal in well-conditioned individuals like athletes, but in others, it may require monitoring to rule out potential issues such as heart block or thyroid dysfunction. This classification is integrated into the AmbuRakshak system to help identify abnormal heart rate patterns and initiate appropriate actions when needed.

Figure 3.6 : Pulse Rate working model with sensor

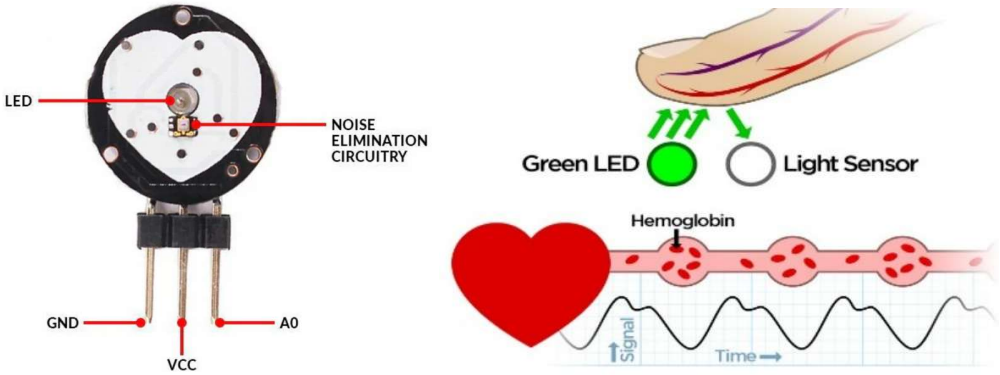


Table: Biomedical Vital Parameters – Normal Ranges & Sensor Types

Vital Parameter	Normal Range	Common Sensor/Device	Measurement Units	Notes
1. Blood Glucose	70 – 140 mg/dL (fasting < 100)	Glucometer, CGM (Continuous Glucose Monitor)	mg/dL	Post-meal up to 180 mg/dL; Diabetic risk if fasting > 126 mg/dL
2. Blood Pressure	90/60 – 120/80 mmHg	BP Cuff (Oscillometric), MEMS Sensors	mmHg	Above 140/90 is hypertensive; below 90/60 is hypotension
3. Electrocardiogram (ECG)	60 – 100 bpm; PQRST waveform analysis	ECG Electrodes, AD8232, 3/5-lead sensors	bpm / mV waveform	Detects arrhythmia, heart rate, cardiac abnormalities
4. Body Temperature	97°F – 99°F (36.1°C – 37.2°C)	Thermistor, Infrared Sensor, DS18B20	°F / °C	Fever > 100.4°F; Hypothermia < 95°F

5. Oxygen Saturation (SpO_2)	95% – 100%	Pulse Oximeter (MAX30100, MAX30102)	%	Below 90% is critical (hypoxemia)
6. Heart Rate (HR)	60 – 100 bpm	Pulse Sensor, ECG, Photoplethysmography (PPG)	bpm	Athletes may have lower normal HR (40–60 bpm)
7. Respiratory Rate (RR)	12 – 20 breaths per minute	Piezoelectric Belt, Thermistor, Spirometer	breaths/min	Tachypnea > 20 bpm; Bradypnea < 12 bpm

CHAPTER 4

RESULTS AND DISCUSSION

The proposed system, **Ambu: The Unified Healthcare Management System**, has evolved beyond a conceptual or academic project and is now actively operational in a real-world startup ecosystem. The project is being implemented under the banner of **Ambuvians Healthcare Private Limited**, a recognized and officially registered startup in India. Below are the key milestones and results achieved:

1. Startup Recognition and Legal Compliance

Ambuvians Healthcare Private Limited has received formal recognition under key national and state-level initiatives:

- 1.1 DPIIT Certification: Recognized under the Startup India initiative by the Department for Promotion of Industry and Internal Trade, Government of India.
- 1.2 StartInUP Recognition: Accredited by the Government of Uttar Pradesh under the StartInUP program.
- 1.3 MCA Registration: Incorporated as a Section 8 company under the Ministry of Corporate Affairs, affirming its not-for-profit and social impact mission.

Startup Registration Details

Category	**Registration Number**
MCA Registered Number	U86909UP2023PTC186049
DPPIT Number	DIPP140595
StartInUP Number	R/STARTUP/UP/LKO/2023/00006700
Sayuj Number	SAYUJ106058
Bhaskar ID	OI-0723-5250RD

2. Intellectual Property and Legal Assets

Ambuvians has actively secured and is expanding its intellectual property portfolio:

- 2.1 Published Patent: A patent related to emergency healthcare delivery systems has been officially published.
- 2.2 Upcoming Patents: Two more patents focused on embedded healthcare devices and real-time data monitoring are in process.
- 2.3 Research Submission: A paper on system architecture and impact is under review in a reputed technical journal.
- 2.4 Trademark Filings: Two trademarks associated with AmbuRakshak and AmbuLife Mitra are under registration.
- 2.5 Copyright Protection: All digital content, source code, and designs are under copyright.

3. Government Approvals and Quality Certifications

- 3.1 ISO Certifications: Ambuvians is pursuing ISO 13485, ISO 27001, and ISO 9001 certifications for product quality and data security.
- 3.2 HIPAA Alignment: All backend systems follow HIPAA-aligned data handling protocols ensuring patient confidentiality and compliance.

4. Real-Time Deployment and Product Verticals

- 4.1 AmbuRakshak: AI-based ambulance booking and emergency response platform.
- 4.2 AmbuLife Mitra: A fully indigenous device for vitals monitoring and AI-driven triage, designed and built in-house.

5. Technical Methodologies and Architecture

- 5.1 IoT and Embedded Devices: Health data collected through kiosks, wearables, and embedded sensors.
- 5.2 Real-Time Processing: Uses MQTT, Node.js, Python APIs, and cloud integration for instant analytics.
- 5.3 AI Chatbot & IVR Engine: Streamlined patient communication and automated resource dispatch.
- 5.4 Fleet Management: GPS and dashboard-based ambulance tracking and routing system.
- 5.5 Secure Cloud Backend: Hybrid infrastructure for real-time operations and secure data handling.

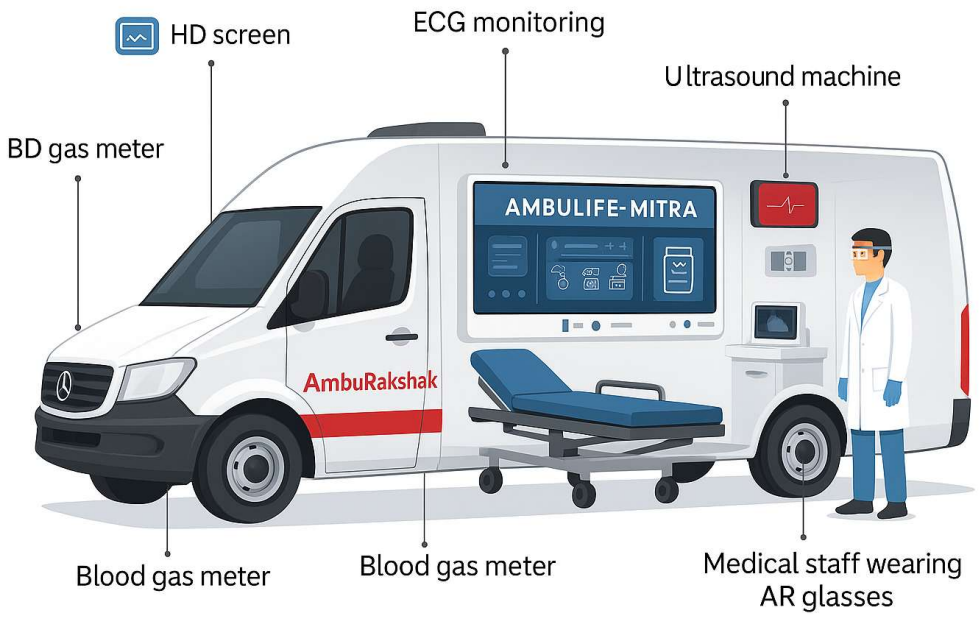
6. Impact and National Contribution

- 6.1 National Missions: Supports Healthy India, Make in India, and Viksit Bharat 2047 through health tech innovation.
- 6.2 Indigenous Development: AmbuLife Mitra is a 100% in-house, India-made product.
- 6.3 Deployment Scope: Systems are live in health camps, semi-urban outreach, and telemedicine pilots.

7. Strategic Vision and Future Scope

- 7.1 Partnerships: Plans to work with state hospitals, emergency response units, and private healthcare providers.
- 7.2 R&D Focus: Expansion into predictive diagnostics, remote surgery tech, and IoMT-based systems.
- 7.3 Global Outreach: Preparing for academic, research, and clinical collaborations globally to scale impact.

Figure 4.0 : Advanced Ambulance with Ambulife Mitra



CHAPTER 5

CONCLUSION AND FUTURE SCOPE

Conclusion

The creation of **Ambu: The Unified Healthcare Management System** marks a significant milestone in revolutionizing India's emergency and real-time healthcare delivery landscape. By integrating cutting-edge technologies—including **AI-driven analytics**, **cloud computing**, **embedded systems**, and **IoMT devices**—Ambu delivers a seamless and proactive healthcare experience, bridging the gap between emergency needs and timely response.

What distinguishes Ambu is its holistic approach: the platform not only facilitates **real-time vital monitoring** and **predictive risk analysis**, but also provides **automated ambulance dispatch**, **electronic health records (EHR) access**, and **document management**—all under a unified digital ecosystem. This synergy empowers healthcare professionals to act faster, patients to receive timely care, and institutions to optimize resources.

The project's recognition by the Government of India as a **registered and certified startup**, its **Section 8 incorporation**, **patent publication**, and **academic acceptance** through journals and conferences, solidify its credibility and national significance. Moreover, real-world execution through **Ambuvians Healthcare Private Limited** demonstrates the system's **viability**, **scalability**, and **market readiness**.

Ambu is not just a product—it's a mission to build a healthier, safer, and more connected India. Through indigenous innovation and scalable design, it supports national initiatives such as **Make in India**, **Digital Health Mission**, and **Viksit Bharat 2047**, setting a benchmark for future-ready healthcare technology.

Future Scope

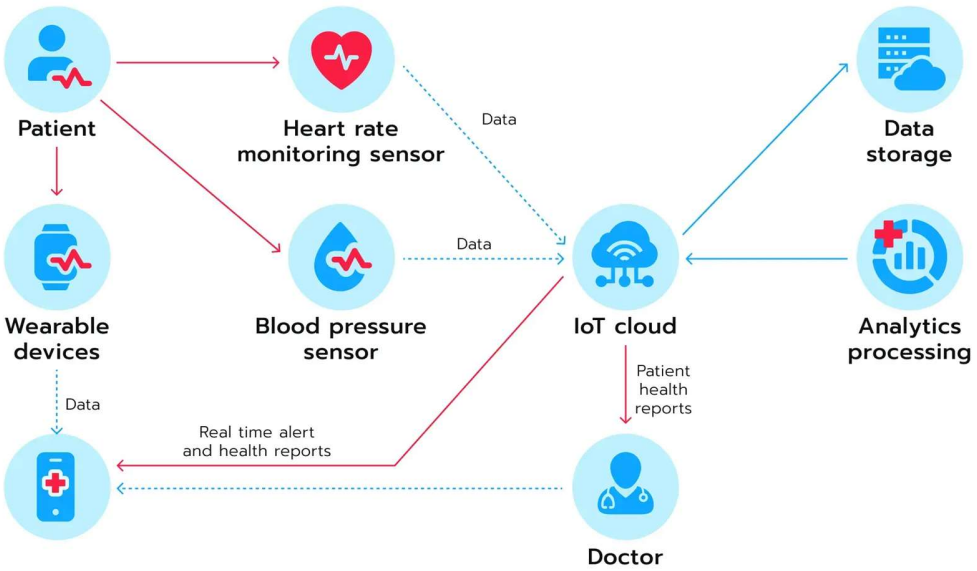
1. **Nationwide Institutional Integration**: The system can be adapted for integration in colleges, hospitals, public health centers, and even corporate offices to ensure timely health monitoring and emergency readiness.

2. **AI Model Enhancement**: Further improvement in the AI model for risk prediction using deeper neural networks, time-series vitals data, and more demographic parameters (e.g., age, medical history).

3. **Telemedicine Integration**: Incorporating remote consultation and prescription features for rural and semi-urban users through voice/video conferencing with medical professionals.

4. **IoMT Device Network Expansion**: Building a secure and scalable IoMT (Internet of Medical Things) network with low-power embedded health monitoring devices.

Figure 5.1: IoMT Architecture



5. **Multilingual Voice Assistance**: Integrating NLP-based voice assistants to guide users during emergencies in multiple Indian languages.

6. **Blockchain for Medical Records**: Implementing blockchain to secure medical data and ensure tamper-proof access to health records.

7. **Partnership with Emergency Services**: Collaborating with national ambulance services, police, and disaster management authorities for pan-India deployment.

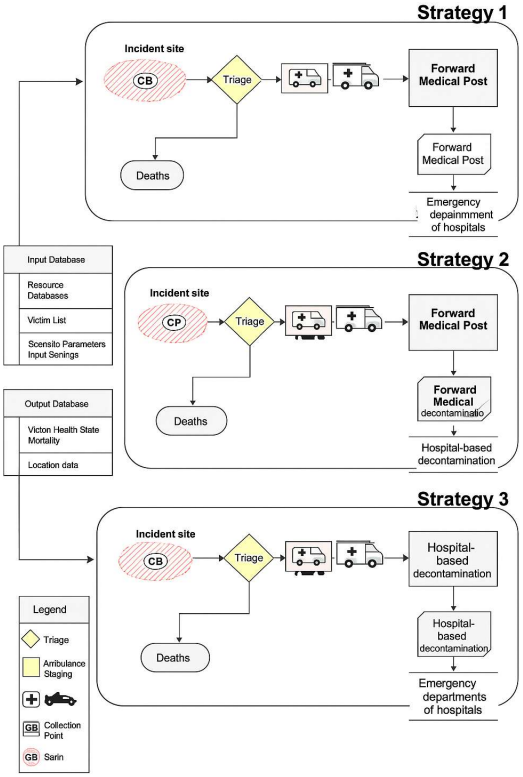
8. **Regulatory Compliance & Global Expansion**: Aligning with international standards like GDPR and HIPAA to explore opportunities in other developing nations facing similar healthcare delivery challenges.

9. **Cross-border Collaboration with SAARC Countries** Explore bilateral healthcare partnerships with **SAARC nations** (Nepal, Bangladesh, Sri Lanka, Bhutan) facing similar healthcare challenges, establishing Ambu as a **global impact solution** from India.

10. **Disaster Management & Mass Casualty Events** Equip disaster response teams with Ambu's mobile health units and data dashboard during floods, earthquakes, and pandemics for **live patient triaging** and **resource allocation**.

This expanded vision reaffirms **Ambu's** potential as a national and global healthcare catalyst—positioning it not just as a product, but as a critical enabler in the **healthcare 5.0 revolution**

Figure 5.2: Ambu Simulator Disaster Management



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APPENDIX

Appendix A: System Architecture Overview

The architecture of the AMBU platform comprises the following integrated components:

- **Embedded Health Monitoring System:** Sensors and microcontrollers continuously capture vitals such as pulse rate, blood pressure, oxygen saturation (SpO2), and body temperature.
- **AI-Driven Risk Analyzer:** A machine learning model classifies health risk levels (Low, Medium, High) in real-time based on collected data.
- **Cloud Integration:** Real-time data is transmitted to a secure cloud environment for analytics, storage, and remote access.
- **Ambulance & Document Management Module:** Allows rapid ambulance booking and secure document uploads to reduce treatment delays.
- **Real-Time Dashboard Interface:** A web-based interface built for emergency operators and medical professionals to monitor vitals and emergency cases live.

Appendix B: Tools and Technologies Used

Component	**Technology/Tool Used**
Front-End Development	React JS, HTML5, CSS3, JavaScript
Mobile App Interface	React Native, Firebase
Embedded System	Arduino, NodeMCU, Sensors (Pulse, Temp, etc.)
Back-End Development	Node.js, Express.js
Database	MongoDB (NoSQL), Firebase Real-Time DB
Data Visualization & Analytics	Power BI, Matplotlib, Seaborn
AI/ML Model	Python (Scikit-learn, Pandas)

Cloud Services	AWS, Google Firebase, VPS Hosting
DevOps Tools	Nginx, Git, Docker (where applicable)

Appendix D: Ethical Considerations and Data Privacy

- The platform adheres to HIPAA-inspired design principles for securing medical data.
- All communications between embedded devices and servers are encrypted using TLS/SSL protocols.
- Patient data is anonymized where possible and stored using industry-standard NoSQL and cloud security practices.

Appendix C: Features Summary

Feature	**Description**
Real-Time Vitals Monitoring	Tracks and logs patient health metrics continuously
AI-Based Risk Prediction	Classifies emergency levels using machine learning
Ambulance Booking System	Enables users to book the nearest ambulance in under two minutes
Document Upload & Access	Allows emergency uploads and retrieval of medical records
Unified Web & Mobile Platform	Seamless integration across web dashboard and mobile app
Admin & Doctor Dashboard	Provides role-based access to real-time data for healthcare providers

Appendix D: Glossary of Terms

Term	Definition
AI (Artificial Intelligence)	Simulation of human intelligence in machines for decision-making
IoMT (Internet of Medical Things)	Network of connected health devices that collect and transmit data
NOC	No Objection Certificate
HIPAA	Health Insurance Portability and Accountability Act (USA Standard)
VPS	Virtual Private Server – Used for scalable cloud deployment
DPIIT	Department for Promotion of Industry and Internal Trade, Govt. of India

APPENDIX

Outcome - 01

Patent Filing Certificate

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E-mail: delhi-patent@nic.in
Website: www.ipindia.gov.in

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GOVERNMENT OF INDIA

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PATENTS | DESIGNS | TRADE MARKS GEOGRAPHICAL INDICATIONS

Docket Number:7886

Date/Time : 20/01/2023
Agent Number:

To,
YASH KUMAR GOEL
KIET GROUP OF INSTITUTION GHAZIABAD UTTAR PRADESH -201206(INDIA)

Sr No.	CBR No.	Reference Number /Application Type	Application Number	Title/Remarks	Amount Paid
1	2991	ORDINARY APPLICATION	202311004024	AMBU-THE UNIFIED HEALTH CARE AND MANAGEMENT SYSTEM	1750
2		E-2/119/2023-DEL	202311004024	Form2	0
3		E-3/2974/2023-DEL	202311004024	Form3	0
Total :					**1750**

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Payment Mode	Bank Name	Cheque/Draft Number	Cheque/Draft Date	Amount in Rs
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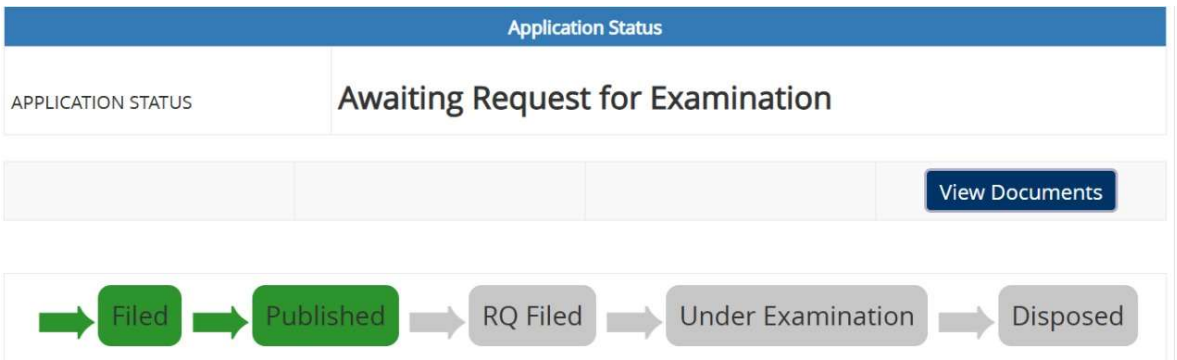

Outcome – 02

CERTIFICATE NO:
DIPP140595

#startupindia

Government of India
Ministry of Commerce & Industry
Department for Promotion of Industry and Internal Trade

CERTIFICATE OF RECOGNITION

This is to certify that ***AMBUVIANS HEALTHCARE PRIVATE LIMITED*** *incorporated as a* ***Private Limited Company*** *on* ***24-07-2023****, is recognized as a startup by the Department for Promotion of Industry and Internal Trade. The startup is working in 'Healthcare & Lifesciences' Industry and 'Healthcare Services' sector as self-certified by them.*

This certificate shall only be valid for the Entity up to **Ten** years from the date of its incorporation only if its turnover for any of the financial years has not extended ₹ **100 Cr.**

28-07-2023	23-07-2033
DATE OF ISSUE	**VALID UPTO**

Ambu – The Unified Healthcare & Management System is an innovative product developed by Ambuvians Healthcare Private Limited, a registered startup under **Startup India.**

Outcome – 03

CERTIFICATE

OF REGISTRATION

This is to Certify that Ambuvians Healthcare Private Limited Incorporated/Registered with Registration No. R/STARTUP/UP/LKO/2023/00006700 as Private Limited Company is recognized as a Startup by Department of IT & Electronics, GoUP through its nodal agency Uttar Pradesh Electronics Corporation Ltd. (UPLC).

Date of Issuance: 30-09-2023 **Place of Issuance:** Lucknow

The certificate shall only be valid for the entity:
-- Period of existence and operations should not exceed 10 years from the Date of Incorporation/Registration, and
-- Annual turnover of the entity should not exceed more than INR 100 crores for any of the financial years since its incorporation.

Note:
-- Authorities accepting this Certificate may check its validity on the Start In UP Portal (www.startinup.in).
-- This is a system generated Certificate does not require any physical signature.

Ambu – The Unified Healthcare & Management System is an innovative product developed by Ambuvians Healthcare Private Limited, a registered startup under **StartIn UP.**

Palagarism Report

Yash kumar Goel

RE-2022-587623

Batch 6

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Yash Kumar Goel's Resume

Yash Kumar Goel

+91 7505853812 yash.2125cse1009@kiet.edu linkedin./yash-kumar-goel/ github.com/Yash080902

Education

B.Tech in Computer Science& Engineering **2021 – 2025**
KIET Group Of Institutions, Affliated to AKTU *CGPA 9.225*

XII CBSE **2020 – 2021**
St.R.C. Scientific & Convent School *Score: 95 %*

X CBSE **2019 – 2020**
St.R.C. Scientific & Convent School *Score: 94.5 %*

Experience

Ambuvians Healthcare Pvt. Ltd. **July 2023 – May 2024**
Project Manager & Business Analyst *Ghaziabad ,Uttar Pradesh*

- Responsible for providing leadership, setting objectives, and overseeing overall operations. Adeptly manage operations, driving the company's innovative execution.

Microsoft Learn Student Ambassador **Nov. 2023 – Present**
Global Community Ambassador *KIET Group of Institutions*

- Proven ability to educate students in technology. Delivered workshops on Git, GitHub, Azure, data visualization tools (Power BI), and business essentials to over 1,000 students worldwide.

Physics Wallah **Feb. 2024 – Present**
College Ambassador *Uttar Pradesh India*

- As a PW Campus Ambassador, I foster campus community, organize events, and represent PW brand with professionalism.

MLSA KIET Chapter **Feb. 2024 – Present**
Chapter Leader *Uttar Pradesh India*

- I have hosted 8+ international events and 10+ national event, I empower students to acquire practical skills and knowledge in utilizing these tools to their fullest potential.

Projects

Emergency Service Portal | *Figma, VPS, FCM, Ngnix Server, React Native, MongoDB* **May 2024**

- Built web & Android emergency portal with React & React Native. Used MongoDB, FCM, and WebSockets for data & real-time updates. Designed & deployed the entire system architecture for smooth operations.

Sales Performance Analysis | *Excel, SQL, Python (Pandas, Matplotlib, Seaborn), Power BI* **March 2024**

- Detailed reports and dashboards showing sales performance by product, region, and time period, with actionable insights for improving sales strategies.

Churn Prediction & Financial Analysis with Forecasting | *Python (Pandas, Scikit-learn), R, SQL* **February 2024**

- A comprehensive financial analysis and forecasting system that provides accurate and actionable insights into the company's financial performance.

AmbuKalyan Janseva | *Figma, Javascript, React, MongoDB, FCM, Flask,VPS* **November 2023**

- AmbuKalyan is a comprehensive healthcare assistance portal provided by Ambuvians, dedicated to guiding individuals towards accessing government healthcare schemes effectively.

Courses and Certificates

UX/UI Designer FIGMA: Linked in & Udemy
Competitive Tools & Software: Microsoft Learn
Product Management: PMI (Linked-in)
Programming language C++: Udemy
Healthcare Management & Excel Essential: Linked-in

Additional Skills

Programming Languages: Python,C, C++, HTML/CSS, JavaScript, MongoDB, NodeJS, SQL, R, Ruby, DAX, OOPS
Developer Tools: VS Code, Google Cloud Platform, VPS, Figma, JIRA, Notion, Git/Github, Azure, Copilot, Fabric, Power BI
Technologies/Frameworks: Linux, Apache Spark, Version Control
Positions of Responsibilities: Student Internship Coordinator (SIC), MyGov Campus Ambassador (Indian Government)
Patents & Research paper: 2 Patent filled and one Research paper

Vidushi Singhal's Resume

Vidushi Singhal

+91 9368257209 LINKEDIN LEETCODE GITHUB CODECHEF svidushi184@gmail.com

Education

KIET Group of Institutions,Delhi NCR(AKTU) **2021-2025**
B.TECH in CSE(9 CGPA) *Ghaziabad, Uttar Pradesh*

N.R Public School(CBSE) **2020-2021**
Intermediate School(97 percentage) *Khurja, Uttar Pradesh*

N.R Public School,Khurja(CBSE) **2018-2019**
High School(96 percentage) *Khurja, Uttar Pradesh*

Skills

Languages: C,C++, Python, HTML,CSS, JavaScript, SQL
Library:Tailwind CSS, React.js
Frameworks:Express.js, Node.js
Database:MongoDB, MySQL
Developer Tools:VS Code, Git/GitHub
Soft Skills: Problem Solving, Teamwork and Collaboration, Leadership, Time Management.

Coursework

Database Management System, Data Structures and Algorithms, Object Oriented Programming

Professional Experience

ProcDNA **July 2024- Present**
Programmer Analyst Trainee Intern

- Developed a Document Analyzer to generate summaries, with repository management (brains) for secure file storage, multi-user collaboration, and integrated chat functionality.
- Utilized React.js and Tailwind CSS to develop dynamic web pages, ensuring a intuitive user experience and deployed the solution on AWS to ensure scalability.
- Leveraging Python and FastAPI to build Retrieval-Augmented Generation (RAG) systems and exploring OCR libraries for processing scanned documents.

Projects

E-Portfolio: *React.js, Tailwind CSS* GitHub Link **Individual Project-December 2023**

- Developed a single-page web application designed to showcase skills, experiences, and projects in an interactive and visually appealing manner. A responsive platform for individuals to present their professional profiles to potential employers, clients, or collaborators.

Chat Web App: *React.js, MongoDB, Node.js, socket.io* GitHub Link **Group Project-February 2024**

- Created a real-time web-based messaging platform that allows users to engage in instant communication through text-based chat rooms.They are password protected.
- Launched user chat interfaces along with setting avatar functionality. Users can browse through over 10,000 avatars for their profiles by utilizing an Axios-fetch API.

Job Portal: *React.js, Node.js, MongoDB* GitHub Link **Individual Project- March 2024**

- Developed a centralized platform where users can browse job listings, submit job applications, and manage job postings.
- Included functionalities for creating, updating, and deleting job posts. Using Node.js for providing robust backend functionalities along with MongoDB database.

Certificates

React JS-Complete Guide for Web Development Course: LINK
Minor Specialization Project Internship by IIPC: LINK

Achievements

Hack IT Sapiens:Achieved 4th rank out of 120 teams. Collaborated within a team to develop a healthcare web app, including ambulance booking service using MERN stack(April-2023)
INNOTECH:It was an institute-level college event, and we secured the first position at the department level.(Decemeber-2023)
LEETCODE:Solved more than 400+ problems on LeetCode and successfully reached 386 submissions in a year and contest ranking of 1400.
EPOQUE PRASTUTI: Participated in department wise Rangoli competition and won 1st price among all.(April 2024)