CS341 – WEB TECHNOLOGIES

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HEALTHCONNECT – RURAL TELEHEALTH PLATFORM

December, 2025

1. Project Title & Overview

Project Description (What I Built)

HealthConnect is a web-based telehealth platform developed to improve access to basic healthcare services for people living in rural and underserved communities. The system enables patients to submit health concerns online and receive medical advice from trained healthcare volunteers and verified medical doctors without the need to travel long distances to hospitals or clinics.

The platform supports remote consultations, structured medical triage, health education, and case escalation within a secure and responsive web application. By combining role-based access control with a well-designed health request workflow, HealthConnect reduces congestion in physical healthcare facilities while promoting early medical intervention and informed decision-making.

2. User Personas

To ensure the platform meets real-world needs, HealthConnect was designed around key user personas representing the major system stakeholders. These personas directly influenced system features, access permissions, and workflow design.

Persona 1: Patient – Amina Bello

Amina Bello is a 28-year-old small business owner living in a semi-urban community. Due to long hospital queues and limited healthcare facilities in her area, she often struggles to access timely medical care. She relies heavily on her mobile phone for communication and online services.

Her primary goal is to request medical advice without physically visiting a hospital, receive timely responses from verified professionals, track the status of her health requests, and feel confident that her personal and medical data is secure. However, she is frustrated by long waiting

times, poor follow-up on medical concerns, and fear of sharing sensitive health information online.

HealthConnect addresses these challenges by allowing Amina to submit health requests online, track their real-time status, and receive trusted guidance from verified professionals. Access to her health data is strictly limited to authorized users, ensuring privacy and security.

Persona 2: Doctor – Dr. Ibrahim Sule

Dr. Ibrahim Sule is a 42-year-old general medical practitioner working in an urban hospital. He volunteers part of his time to support remote healthcare initiatives and values professional credibility and ethical practice.

His goals include responding efficiently to legitimate patient requests, maintaining professional trust, accessing well-organized patient cases, and managing his verification and professional profile. He is frustrated by unverified platforms, poorly structured patient information, and time wasted on non-relevant cases.

HealthConnect supports Dr. Sule by requiring certificate uploads and administrative approval before doctors can access patient cases. The system provides a structured dashboard that clearly separates pending, assigned, and responded requests, while displaying verification status transparently.

Persona 3: Volunteer – Fatima Zakari

Fatima Zakari is a 23-year-old health outreach volunteer working with a community-based organization. She supports community health awareness initiatives and assists patients with non-critical health concerns.

Her goals include providing basic medical guidance, escalating serious cases to doctors, tracking her response history, and contributing meaningfully to community health. She is often frustrated by unclear task assignments, limited access to patient history, and poorly structured health platforms.

HealthConnect offers Fatima a clear and structured workflow by giving her access to assigned and pending requests, allowing her to track her responses, and supporting collaboration with doctors through well-defined role-based permissions.

Persona 4: Administrator – Samuel Mensah

Samuel Mensah is a 35-year-old platform administrator responsible for managing system operations, verifying users, and ensuring overall platform integrity.

His objectives include approving and managing doctors and volunteers, monitoring system activity, enforcing platform policies, and maintaining data security and stability. His challenges include manual verification processes, difficulty tracking misuse, and limited visibility into system activity.

HealthConnect addresses these challenges through a centralized admin dashboard that supports doctor verification, user and request monitoring, and activity logging for accountability.

3. Problem Statement

In many rural communities, access to healthcare remains limited due to long distances to medical facilities, shortages of healthcare professionals, high transportation costs, and delayed medical attention. The traditional healthcare system relies heavily on physical visits and manual processes, which leads to overcrowding in clinics and untreated medical conditions.

The core problem is the absence of a centralized and accessible digital platform that enables rural patients to seek medical advice, triage support, and follow-up care remotely.

4. Proposed Solution

HealthConnect provides a centralized online system where patients can submit health requests at any time, volunteers can offer initial medical guidance, doctors can handle complex or escalated cases, and administrators can ensure quality and compliance. This approach significantly reduces unnecessary hospital visits while improving healthcare accessibility and response times.

5. Main Functions of the Website

User Authentication and Role Management

HealthConnect includes a secure registration and login system with role-based access control for patients, volunteers, doctors, and administrators. Doctors undergo verification through certificate uploads, while sessions are protected using secure session management and CSRF protection mechanisms.

Health Request Management

Patients can create, view, edit, and delete health requests, each categorized by urgency level. Volunteers and doctors can respond to these requests, escalate complex cases, and track request status throughout the resolution process.

Dashboards

Each role is supported by a dedicated dashboard. Patients can view requests and responses, doctors and volunteers can manage assigned cases and track activity, and administrators can manage users and monitor system performance.

6. User Experience Payoff Screens

The payoff screens demonstrate system transparency, usability, and role-specific feedback after successful user actions.

Each screen reassures users that their actions have been completed successfully, clearly communicates system status, and provides appropriate next steps. Patient confirmation screens reduce anxiety, doctor dashboards improve efficiency and accountability, volunteer dashboards highlight impact and structure, and administrator dashboards ensure centralized oversight.

These screens collectively demonstrate effective feedback, usability, and trust across the HealthConnect platform.

Payoff Screen 1: Patient Health Request Confirmation

System State: Successful health request submission by a patient.

========== HEALTH REQUEST SUBMITTED ==========

Request ID: HC-2025-0123

Patient Name: Amina Bello

Concern: Persistent Headache and Fatigue

Urgency Level: Medium

Status: Pending

Date Submitted: Tuesday, December 16, 2025

Time Submitted: 10:15 AM

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Next Steps:

• A healthcare volunteer will review the request within 1–2 hours.

• The patient will be notified via SMS and email once a response is provided.

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Available Actions:

[View Details] [Edit Request] [Cancel Request]

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Purpose:

This screen reassures the patient that their request has been successfully submitted, clearly communicates the request status, and provides immediate next steps and control options.

Payoff Screen 2: Doctor Dashboard Overview

System State: Verified doctor viewing assigned and pending medical requests.

========== DOCTOR PORTAL — DR. IBRAHIM SULE==========

Verification Status: ✅ Verified

Daily Statistics:

• Pending Requests: 4

• Responded Today: 7

• Escalated Cases: 1

Date: Tuesday, December 16, 2025

REQUEST ID | PATIENT NAME | URGENCY | STATUS

HC-2025-0120 | Kofi Mensah | High | Assigned

HC-2025-0118 | Adjoa Darko | Medium | Pending

Available Actions:

[View All Requests] [Publish Health Tip] [Set Availability]

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Purpose:
This dashboard enables doctors to efficiently manage patient cases, maintain professional accountability, and contribute health education content.

Payoff Screen 3: Administrator Dashboard

System State: Platform administrator monitoring overall system activity.

==========ADMIN PORTAL — HEALTHCONNECT ==========

Welcome, Samuel Mensah

Platform Overview:

• Total Patients: 35

• Registered Volunteers: 20

• Verified Doctors: 15

• Total Health Requests: 22

Date: Tuesday, December 16, 2025

Quick Actions:

[Approve Doctors] [Manage Users] [View Requests]

Pending Doctor Applications (3):

• Dr. Miriam Tetteh — Pediatrics

• Dr. Furairah Idi — General Medicine

• Dr. Ama Serwaa Bonsu — Surgery

Administrative Tools:

[Generate Reports] [System Logs] [Manage Content]

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Purpose:
This screen provides administrators with centralized control over user verification, system monitoring, and quality assurance.

Payoff Screen 4: Volunteer Dashboard

System State: Volunteer managing assigned cases and tracking community impact.

========== VOLUNTEER PORTAL FATIMA ZAKARI ==========

Welcome back, Fatima! Thank you for your service. 🩺

Weekly Impact Summary:

• Patients Assisted: 12

• Average Response Time: 22 minutes

• Escalations to Doctors: 3

• Health Tips Shared: 5

Quick Statistics:

🟡 Pending Requests: 8

🟢 Active Responses: 2

🔵 Closed Cases: 15

📚 Training Modules Completed: 4 / 6

Date: Tuesday, December 16, 2025

PENDING REQUESTS REQUIRING ACTION

REQUEST ID | PATIENT NAME | URGENCY | SYMPTOMS | ACTION

HC-2025-0125 | Kofi Asante | High | Fever, Cough, Fatigue | [Respond] [Escalate]

HC-2025-0124 | Efua Mensah | Medium | Headache, Dizziness | [Respond] [View]

HC-2025-0123 | Amina Bello | Low | Rash, Itching | [Respond] [Assign]

Volunteer Tools:

[View All Requests] [My Assigned Cases] [Response History]

[Quick Escalate] [Write Health Tip] [Impact Dashboard]

[Access Training] [Medical Resources] [Community Forum]

[Edit Profile] [Set Availability] [Performance Metrics]

Training & Resources (Recently Updated):

• Module 5: Recognizing Emergency Symptoms — Start

• Pediatric First Aid Guide — Download

• Webinar: Mental Health First Response (Dec 20) — Register

Need Help? [Contact Support] | [Volunteer Guidelines]

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Purpose:
This screen highlights the volunteer's contributions, provides structured task management, and supports professional collaboration with doctors.

FINISH

Patients (Amina Bello) are better off because they can seek medical advice **24/7 from anywhere**, without travelling long distances, waiting in queues, or incurring transportation costs. They have **clear visibility** into the status of their health requests and receive guidance from verified professionals, which reduces anxiety and encourages early medical intervention. This results in a more accessible, less stressful, and more dignified healthcare experience.

Volunteers (Fatima Zakari) are better off because they work within a **structured and supportive system** that clearly defines their responsibilities. HealthConnect allows them to respond to non-critical cases efficiently, escalate serious conditions to doctors when necessary, and track their impact over time. This structure improves coordination, reduces confusion, and enables volunteers to contribute meaningfully to community health.

Doctors (Dr. Ibrahim Sule) are better off because HealthConnect acts as a **digital triage and case management assistant**. The platform filters and organizes patient requests, ensuring that doctors focus only on relevant or escalated cases. Verification mechanisms protect professional credibility, while dashboards provide a clear overview of assigned cases, saving time and improving efficiency in delivering remote care.

Administrators (Samuel Mensah) are better off because they have a **centralized management and oversight system**. They can verify doctors, monitor platform activity, track health requests, and generate reports from a single dashboard. This improves accountability, strengthens data security, and supports informed decision-making to ensure the platform operates safely and effectively.

7. Health Education and Resources

HealthConnect supports health education by allowing doctors to publish health tips, enabling patients to browse medical advice, and providing volunteers with access to structured training materials and resources.

8. Terms of Service and Privacy Policy Implementation

During registration, users are required to explicitly agree to the Terms of Service and Privacy Policy. This is enforced through mandatory consent checkboxes, frontend and backend validation, and modal pop-ups displaying the full policy content.

The Privacy Policy clearly explains what data is collected, how it is used, and how it is protected using secure storage practices such as password hashing and restricted access to sensitive health data. This approach ensures ethical and legal compliance while building user trust.

9. System Architecture

HealthConnect follows a three-tier architecture consisting of a presentation layer built with HTML5, CSS3, Bootstrap 5, and JavaScript; an application layer developed using PHP 8+ and PDO to handle business logic, authentication, and CRUD operations; and a data layer implemented with MySQL to manage data storage, relationships, and constraints.

10. Security Measures Implemented

The system includes password hashing using bcrypt, prepared statements to prevent SQL injection, CSRF token validation on all forms, secure file upload validation, session-based authentication, XSS prevention, and strict role-based permission checks.

11. Benefits and Impact

HealthConnect benefits patients by providing 24/7 access to healthcare advice, reducing travel and waiting times, and ensuring secure handling of medical data. Volunteers and doctors benefit from organized workflows, clear escalation paths, and reduced overload on physical clinics. Administrators benefit from centralized monitoring, improved platform trust, and enhanced system accountability.

12. Project Status

HealthConnect is a fully functional Minimum Viable Product (MVP) featuring secure authentication, role-based dashboards, complete health request management, doctor verification workflows, administrative approval systems, a responsive modern interface, and a strong security foundation. The system is ready for deployment on a live server with minimal configuration adjustments.

13. Personal Reflection

Working on the **HealthConnect** project has been more than an academic requirement for me; it has been a deeply personal and meaningful experience that connects directly with my background, my values, and my long-term vision for using technology to improve access to healthcare. This project allowed me to translate both my technical skills and my personal motivation into a system designed to solve real problems faced by underserved communities.

As a computer science student, I have often seen technology discussed in abstract terms—algorithms, databases, and systems operating in isolation from human realities. However, my lived experiences and exposure to healthcare challenges in rural and low-resource communities have shaped how I view technology: not just as a tool for efficiency, but as a bridge between people and essential services. This belief is at the core of my ongoing initiative, **Lafiyar Kowa**, which aims to make healthcare accessible to everyone, especially those in rural areas who face barriers such as distance, cost, and lack of medical professionals.

HealthConnect aligns strongly with the goals of Lafiyar Kowa. Both projects focus on reducing the gap between patients and healthcare providers by leveraging digital platforms. Through HealthConnect, I explored practical ways to implement this vision—allowing patients to submit health requests remotely, enabling volunteers to provide first-line support, and creating structured escalation paths to verified doctors. Designing these workflows reinforced my understanding that accessibility is not only about availability, but also about trust, transparency, and timely response.

From a technical perspective, this project helped me grow significantly. I gained hands-on experience in backend development, database design, user role management, and system security considerations such as privacy and access control. More importantly, I learned how to design systems with empathy. Each feature—from request confirmation screens to role-specific dashboards—was intentionally designed to reduce user anxiety, provide clarity, and respect

sensitive health information. This human-centered approach reflects my passion for building technology that serves people first.

HealthConnect also strengthened my confidence in pursuing technology for social impact. Seeing how concepts learned in class could be transformed into a functional, meaningful application reaffirmed my belief that computer science can and should be used to address real societal challenges. The project clarified my academic and professional direction: I want to continue building systems that intersect technology, healthcare, and community empowerment.

In conclusion, HealthConnect represents a significant milestone in my journey as a developer and as a changemaker. It is not an isolated academic project, but a step toward realizing my broader vision through **Lafiyar Kowa**. This experience has motivated me to keep refining my skills, deepening my understanding of real-world problems, and using technology to create solutions that are inclusive, impactful, and sustainable.

14. Project Links and Resources

Project Resources and Access Links:
The source code for this project is hosted on GitHub and can be accessed at:
GitHub Repository: https://github.com/Furairah3/healthConnect.git

The application is deployed on a live server and available at:
Live Application URL: http://169.239.251.102:341/~foureiratou.idi/healthConnect/

A complete video demonstration of the system, showing backend functionalities, CRUD operations, role-based access control, and live server interaction, is available at:
Video Demo (YouTube): https://youtu.be/aPo04kJhzzQ

Video Duration Note:
The demonstration video is approximately **10–11 minutes**, covering all major backend functionalities and role-based workflows on the live server.

Demo User Credentials (For Testing & Demonstration)

The following test accounts were created solely for demonstration and evaluation purposes. These accounts use non-sensitive credentials and contain no real personal or medical data.

Administrator Account

Email: **admin@healthconnect.org**
Password: **password**
Role: Administrator

Purpose:
Used to demonstrate doctor approval, user management, system monitoring, and administrative controls.

Doctor Account

Email: **furairah@ashesi.edu.gh**
Password: **Fou9187@!**
Role: Doctor (Verified)

Purpose:
Used to demonstrate doctor dashboard access, viewing escalated cases, responding to health requests, and publishing health tips.

Patient Account

Email: **fatma.patient@healthconnect.com**
Password: **Patient@123**
Role: Patient

Purpose:
Used to demonstrate health request creation, viewing request status, editing requests, and patient dashboard functionality.

Volunteer Account

Email: **sadiq.volunteer@healthconnect.com**
Password: **Volunteer@123**
Role: Volunteer

Purpose:
Used to demonstrate viewing pending requests, responding to non-critical cases, escalating cases to doctors, and tracking volunteer activity.

Non-Verified Doctor

Email: ibrahim.doctor@healthconnect.com
Password: Doctor@123
Role: Doctor *(Pending Verification)*

Purpose:
This account is intentionally left **unverified** to demonstrate the doctor verification workflow. When logged in, the user can upload medical credentials but cannot access the full doctor dashboard until an administrator approves the account. This allows evaluators to observe role restriction, certificate validation, and the admin approval process