# **Virtual Rural Healthcare Clinic for Adams, Washington Focusing on Geriatric Healthcare**

🚀 **Empowering Rural Healthcare Through AI & LLMs**

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## **Project Overview**

This project is part of the **Scaling Rural Healthcare with AI and LLMs** initiative at the University of Washington. The goal is to develop a **virtual healthcare clinic** leveraging **AI** and **Large Language Models (LLMs)** to improve access to **geriatric care** services in **rural Adams County, Washington**. The platform aims to help **elderly patients**, **healthcare providers**, and **community health workers** overcome the challenges of accessing quality healthcare in remote areas.

## **Location & Healthcare Focus**

**Rural Area**: **Adams County, Washington**

**Target Healthcare Issue**: **Geriatric Care** (Focusing on elderly patients who face challenges like limited access to healthcare, chronic disease management, and mental health support)

**User Groups**:

* **Rural patients**, particularly elderly individuals
* **Healthcare providers** including geriatric specialists, general practitioners, and nurses
* **Community health workers** helping bridge healthcare gaps in rural communities

## **Prototype Features**

* ✅ **AI-driven patient onboarding & triage**: Automated intake process where the AI gathers essential health information to streamline the patient onboarding experience.
* ✅ **Large Language Model integration for medical FAQs**: Provides real-time AI-powered responses to medical questions, helping patients access important health information instantly.
* ✅ **Virtual consultation & scheduling system**: Allows patients to book consultations with healthcare providers and easily manage appointments.
* ✅ **User-friendly interface tailored for rural access**: A simplified, intuitive interface designed to accommodate elderly patients who may have limited tech experience.
* ✅ **Real-time AI conversation**: Integrated **AI-powered chatbot** to engage with patients in real-time, providing medical guidance, answering questions, and assisting with appointment bookings.
* ✅ **AI Assistant for voice-to-text transcription**: Patients can interact with the system through voice commands, and the assistant can transcribe their speech into text, making it easier for elderly users to navigate and communicate.
* ✅ **Medication management integration**: AI assists patients in managing their medications by sending reminders, allowing easy prescription refills, and providing educational content on how to take medications correctly.
* ✅ **Mental health support via AI**: Offers mental health screening through AI-driven tools, directing patients to resources such as counseling services or local mental health professionals.
* ✅ **Nurse consultation scheduling**: Allows patients to easily schedule follow-up appointments with nurses for post-consultation care or chronic disease management.

## **Tech Stack**

* **Frontend**: React.js / Next.js
* **Backend**: Node.js
* **Database**: PostgreSQL
* **AI/LLM Models:** OpenAI API / Custom-trained LLMs / ElevenLabs API

## **How to Run**

* Clone the repository:  
    
  git clone https://github.com/your-org/your-repo.git

cd your-repo

* Install dependencies:  
    
  npm install # or yarn install
* Start the application:  
    
  npm start # or yarn start

## **User Research & Feedback**

We conducted user research sessions with elderly patients and healthcare providers in Adams County to refine the prototype. Key feedback includes:

* 📌 **Patient Testing Insights**: Elderly users preferred large text, easy navigation, and voice-assisted features to aid in navigation.
* 📌 **Challenges Faced**: Some patients struggled with tech literacy, especially with video consultations and scheduling.
* 📌 **Iterative Improvements**: Simplified user interface with **voice-to-text** features and clearer navigation based on patient feedback.

## **LLM Prompt Library**

This project utilized **Large Language Models (LLMs) and AI-generated prompts** for user research, prototype development, and hypothesis validation. Below is a library of key prompts used:

### **Prompts for User Research**

* *"What are the biggest challenges rural healthcare providers face in [County] when delivering telemedicine services?"*
* *"How do rural patients prefer to interact with AI-powered healthcare tools?"*
* *"Generate a structured interview guide to assess the needs of rural healthcare providers in [County]."*

### **Prompts for Lovable Prototype Development**

* *"Design a conversational AI prompt that helps rural patients schedule a virtual consultation with minimal friction."*
* *"What UX improvements can be made to a virtual clinic for non-tech-savvy patients?"*
* *"Generate a step-by-step patient onboarding flow that reduces drop-off rates."*

### **Prompts for Hypothesis Validation**

* *"Given user research findings, what additional data is needed to validate the hypothesis that AI-powered clinics improve patient retention?"*
* *"Summarize key statistical methods to analyze the effectiveness of AI-based virtual clinics in rural areas."*

### **Prompts for AI-Driven Decision Support**

* *"Generate an AI-powered symptom checker prompt that follows HIPAA-compliant guidelines."*
* *"Design a chatbot prompt that educates diabetic patients about lifestyle management."*

#### **How We Used These Prompts:**

🔹 Fine-tuned LLM-generated insights to match **real-world provider & patient needs** 🔹 Iterated on prototype designs based on **AI-assisted workflow recommendations** 🔹 Validated hypothesis through **AI-driven user feedback analysis**

## **Go-to-Market Strategy**

🎯 **Target Audience**:  
 The primary users of the virtual clinic will be **elderly residents** of **Adams County**, Washington, who face limited access to healthcare services. The clinic also targets **healthcare providers** in the region, including **geriatric specialists**, **general practitioners**, **nurses**, and **telemedicine practitioners**.

📈 **Adoption Plan**:

* **Partnerships with Local Healthcare Providers**:  
  + **Adams County Medical Clinic**: This clinic serves a significant portion of the rural population and could help promote the platform to elderly patients who already seek care there.
  + **Pioneer Health Services**: Located nearby, this clinic provides important healthcare services to rural residents and could be a key partner in introducing the platform to elderly patients.
* **Collaboration with Senior Services and Aging Networks**:  
  + **Adams County Senior Services**: Partnering with this organization will help with outreach efforts to elderly individuals in the county, as they already engage with seniors for services like transportation and wellness checks. This partnership can also help with **patient education** on how to use the virtual clinic.
  + **Washington State Area Agency on Aging (WSAAA)**: This agency focuses on improving services for elderly individuals across Washington. Collaborating with them could expand outreach and awareness about the virtual clinic within senior communities.
* **Community Engagement and Education**:  
  + **Health Fairs and Community Workshops**: Host **virtual health fairs** or in-person workshops with local community centers to demonstrate the benefits of using the virtual clinic. These events will provide a hands-on opportunity for seniors to see the platform in action and ask questions.
  + **Local Senior Centers**: Partnering with places like the **Adams County Senior Center** can provide a venue to host informational sessions and workshops. These centers are trusted local resources where elderly residents gather, making them ideal locations to educate seniors on how to access healthcare through telemedicine.
* **Leveraging Local Media**:  
  + **Local Newspapers and Radio Stations**: Utilize Adams County’s community newspapers and radio stations (like **Adams County News** and **KARO 1230 AM**) to spread awareness about the virtual clinic. These media outlets are trusted sources of information in rural communities and can help ensure the platform reaches elderly residents.
* **Collaborating with Local Pharmacies**:  
  + **Pioneer Pharmacy** in Othello and **Thrifty White Pharmacy** in neighboring towns could be strong partners in helping promote the virtual clinic, especially by integrating medication management features. Pharmacy staff can educate patients about using the platform for scheduling consultations and managing prescriptions.

💰 **Sustainability**:  
 To ensure the platform’s long-term sustainability, we will:

* **Secure Reimbursement from Medicare and Medicaid**: Since many elderly patients in Adams County are covered by Medicare, negotiating with insurers like **Premera BlueCross** and **Regence BlueShield** will allow patients to use their insurance to cover telehealth consultations.
* **Grants and Funding from Local Health Initiatives**: Work with organizations such as **Washington State Department of Health** to apply for grants aimed at improving rural healthcare access through technology. Additionally, look into **HRSA** (Health Resources and Services Administration) funding, which supports healthcare services in underserved communities.
* **Partnerships with Local Health Systems**: Collaborate with larger regional health systems like **Providence Health & Services** to ensure that the virtual clinic becomes a seamless extension of existing healthcare networks. This will allow for easy integration into the broader healthcare ecosystem while providing financial backing.

By combining **strategic partnerships** with local healthcare providers, **community outreach**, and **insurance reimbursement models**, we can ensure that the virtual clinic effectively serves Adams County's elderly population while remaining sustainable and scalable.

## **Legal & Compliance Considerations**

This virtual clinic is designed to comply with **state and local healthcare regulations** to ensure ethical and legal operation. Key considerations:

* **HIPAA Compliance** – All patient data is handled according to **HIPAA (Health Insurance Portability and Accountability Act)** regulations.
* **State & Local Regulations** – The solution adheres to **Washington State health policies** governing **telemedicine, AI-assisted diagnostics, and patient privacy.**
* **Medical Liability & Scope** – AI-based medical recommendations must comply with state guidelines on **decision support tools** and **licensed healthcare provider oversight.**
* **Data Retention & Consent** – All patient interactions follow strict **consent and data retention policies** in line with **Washington State law.**

## **Security & Data Protection**

We prioritize **patient data security** with the following measures:  
 🔒 **End-to-End Encryption** – All sensitive data transmissions are encrypted (TLS 1.2+).  
 🔑 **Role-Based Access Control (RBAC)** – Only authorized users (providers, staff) can access certain data.  
 🛡️ **Secure Storage** – Patient records are stored in **HIPAA-compliant cloud infrastructure** (AWS, Google Cloud, or Azure).  
 ⚠️ **Incident Reporting** – A **security response protocol** is in place to address data breaches or unauthorized access.

## **Licensing**

This project operates under:

* **Open Source Licensing**: MIT
* **Medical Software Certification**: Pending review for **FDA** and **state-level digital health approval** (if required).
* **Usage Restrictions**: AI models used in this project are for **clinical decision support**, not autonomous medical diagnoses.

## **Collaboration with Local Health Jurisdictions & ACH Organizations**

To ensure effective deployment, we are coordinating with:

* **Local Health Jurisdictions (LHJ)**: Engaging with **Adams County Health Department** to ensure alignment with public health goals.
* **Accountable Communities of Health (ACH)**: Partnering with **Washington’s ACH organizations** to integrate with existing rural healthcare networks and Medicaid-funded services.
* **Provider Networks**: Collaborating with rural hospitals, clinics, and telemedicine providers to validate workflows.
* **Community Outreach**: Conducting educational programs for patients on using the virtual clinic effectively.

## **Contributors**

* **Katherine Zhang**– Research, UX/UI Design, Frontend Development
* **Christopher Li** – Research, Backend Development, AI Integration