CureCloud: AI-Powered Health Management System

CureCloud Development Team

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1 Introduction

CureCloud is an AI-driven web application designed to modernize healthcare management for hospitals and clinics by replacing physical health records with a centralized, cloud-based system. It provides functionalities for patient information management, online bookings, AI-assisted diagnostics, and predictive healthcare analytics.

2 System Requirements

2.1 Functional Requirements

- **User Authentication**
  Role Management
  - Secure login/signup for patients, doctors, nurses, and admins
  - Role-based access control (RBAC)
  - Multi-factor authentication (MFA)
- **Patient Record Management**
  - Secure electronic health records (EHR)
  - AI-assisted summarization of patient history
- **AI-Driven Diagnostics**
  Recommendations
  - AI-based symptom checker
  - Integration with medical knowledge bases (WHO, CDC)
- **Appointment**
  Specialist Booking System
  - AI-driven doctor recommendations based on symptoms
  - Virtual consultations with video conferencing

2.2 Non-Functional Requirements

- Scalability: Cloud-based architecture with auto-scaling
- Performance: Optimized for real-time AI predictions
- Security: End-to-end encryption for patient records

3 Technology Stack

3.1 Frontend

- React.js (or Next.js)
- Redux / Recoil for state management
- Tailwind CSS / Material UI

3.2 Backend

- Node.js with Express.js / Nest.js
- PostgreSQL (structured data) + MongoDB (unstructured data)

3.3 AI
Data Science

- NLP: OpenAI API / Google Healthcare AI
- Computer Vision: OpenCV, TensorFlow for medical scans

4 AI Models
Features

Feature	AI Model/Tech Used
Symptom Checker	NLP-based Diagnosis Model
Predictive Healthcare	Time-series forecasting with LSTMs
Anomaly Detection	Autoencoders for detecting outliers
AI Chatbot	OpenAI / Dialogflow
Image Analysis (X-rays, MRIs)	CNN-based image classification

Table 1: AI Features and Technologies

Phase	Tasks	Duration
Phase 1	System Design, Tech Stack Selection	1 Month
Phase 2	AI Model Prototyping	
	Testing	2 Months
Phase 3	Backend	
	Database Development	3 Months
Phase 4	Frontend Development	
	Integration	2 Months
Phase 5	Security	
	Compliance Implementation	1 Month
Phase 6	Testing	
	Deployment	1 Month

Table 2: Development Timeline

5 Development Roadmap

6 Challenges Considerations

- **AI Bias**
  Ethics: Ensuring AI recommendations are unbiased
- **Regulatory Compliance**: Adhering to HIPAA, GDPR, POPIA
- **Security**: Preventing unauthorized access to patient records

7 Conclusion

CureCloud aims to revolutionize healthcare through AI-powered automation, making patient management and healthcare coordination seamless while ensuring compliance with strict medical data privacy standards.