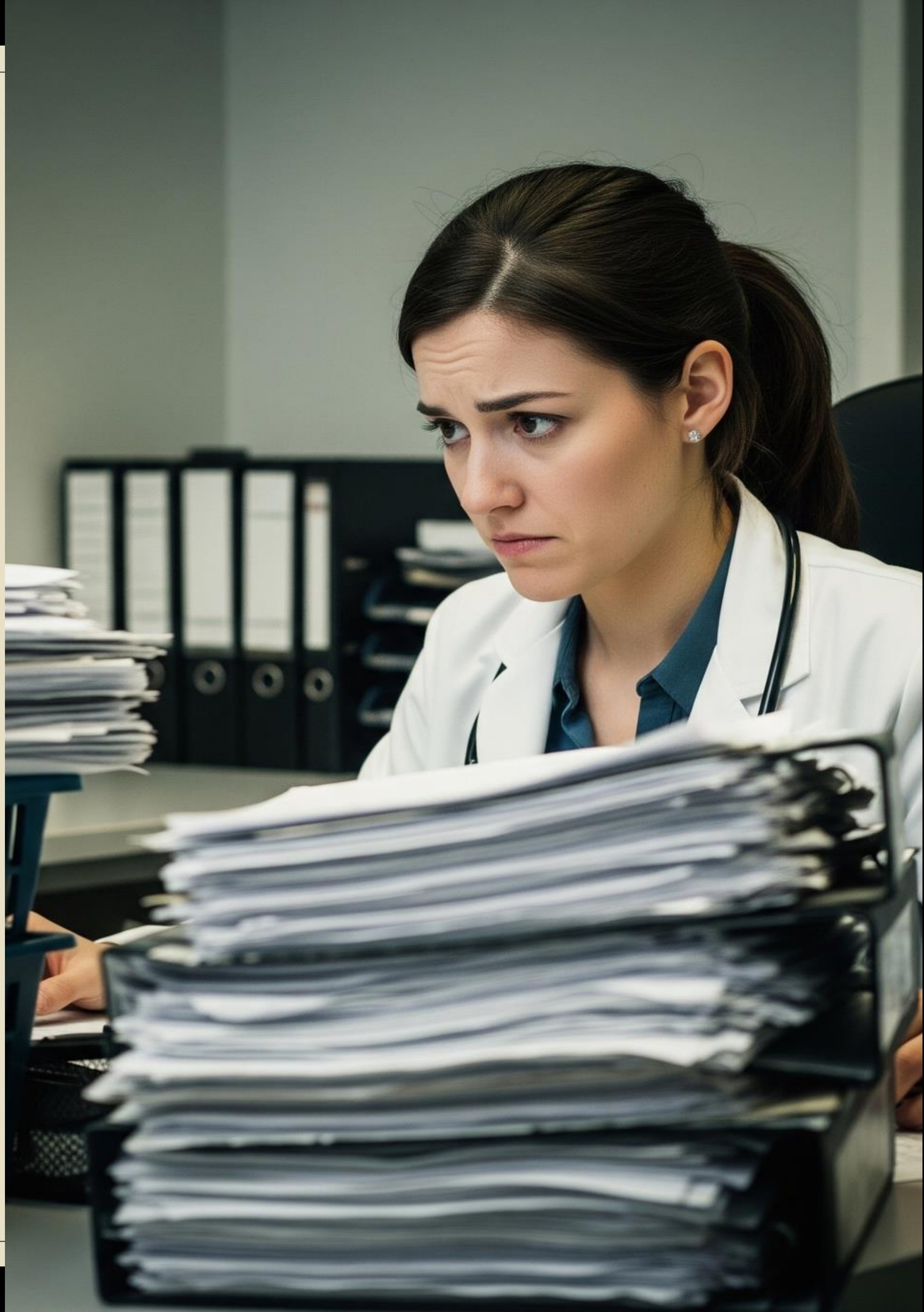
Healthcare Management System with Django & LLM agent
-By CleanCode

Welcome to our presentation on the AI-Assisted Doctor Dashboard with Personalized Prescription Generation. This innovative system combines the power of Django web framework with state-of-the-art Large Language Models to revolutionize how healthcare professionals manage patient information and generate prescriptions.

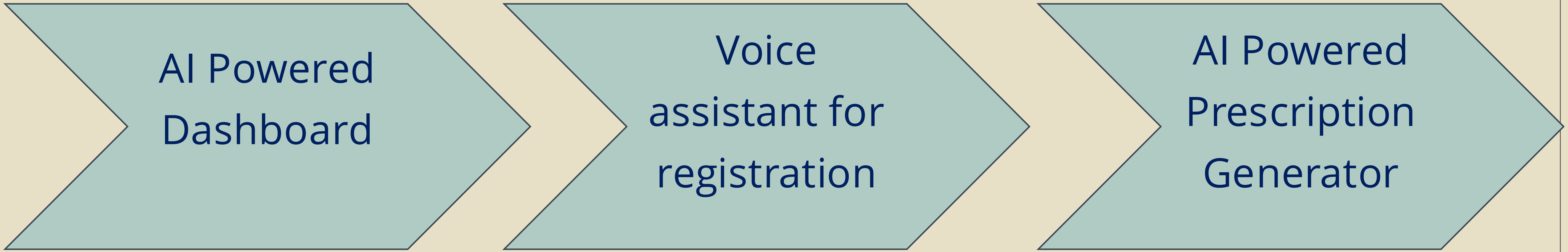
Our solution aims to reduce the cognitive load on doctors while improving prescription accuracy and patient outcomes through personalized AI assistance that adapts to each doctor's unique practice patterns.

What our Doctors Face?

- Scattered Records
- Time consuming prescription
- Large number of patients



The Solution



AI Powered Dashboard

Voice assistant for registration

AI Powered Prescription Generator

Key Benefits for Stakeholders

Doctors

- AI reduces cognitive load
- Saves consultation time
- Fewer prescription errors
- Adapts to clinical style

Hospitals & Clinics

- Higher physician throughput
- Standardized care quality
- Secure data handling
- EMR/HIS integration

Pharmacies

- Accurate prescription reading
- Better inventory forecasting
- Real-time digital fulfillment

Patients

- Clear prescription information
- Reduced medical errors
- Shorter waiting times
- Enhanced overall experience

Benefits to Doctors

Time Saved

Reduction in time spent on prescription writing

Error Reduction

Decrease in prescription errors and oversights

Productivity

Increase in patients seen per day

Satisfaction

Doctors reporting improved workflow

Our system delivers significant advantages to healthcare providers by streamlining the prescription process. By reducing the mental load associated with recalling medication details, potential interactions, and dosing guidelines, doctors can focus more on patient interaction and clinical reasoning.

The AI assistant also provides diagnostic suggestions based on entered symptoms, serving as a valuable second opinion that can help identify overlooked conditions or treatment options while adapting to each doctor's unique workflow preferences.

Overview

AI-powered healthcare application

A sophisticated platform designed specifically for doctors to streamline patient consultations and prescription writing

Django-based backend architecture

Utilizing MCP (Model-Context-Protocol) architecture for robust performance and scalability

Interactive symptom dashboard

Intuitive interface for symptom input with intelligent prescription suggestions based on patient data

Personalized LLM models

Custom fine-tuned language models that adapt to each doctor's prescription patterns and preferences

Why Django?

Mature & Full-Featured

Django provides a comprehensive framework that handles everything from user authentication to database operations, enabling faster development of complex healthcare applications.

Built-in Components

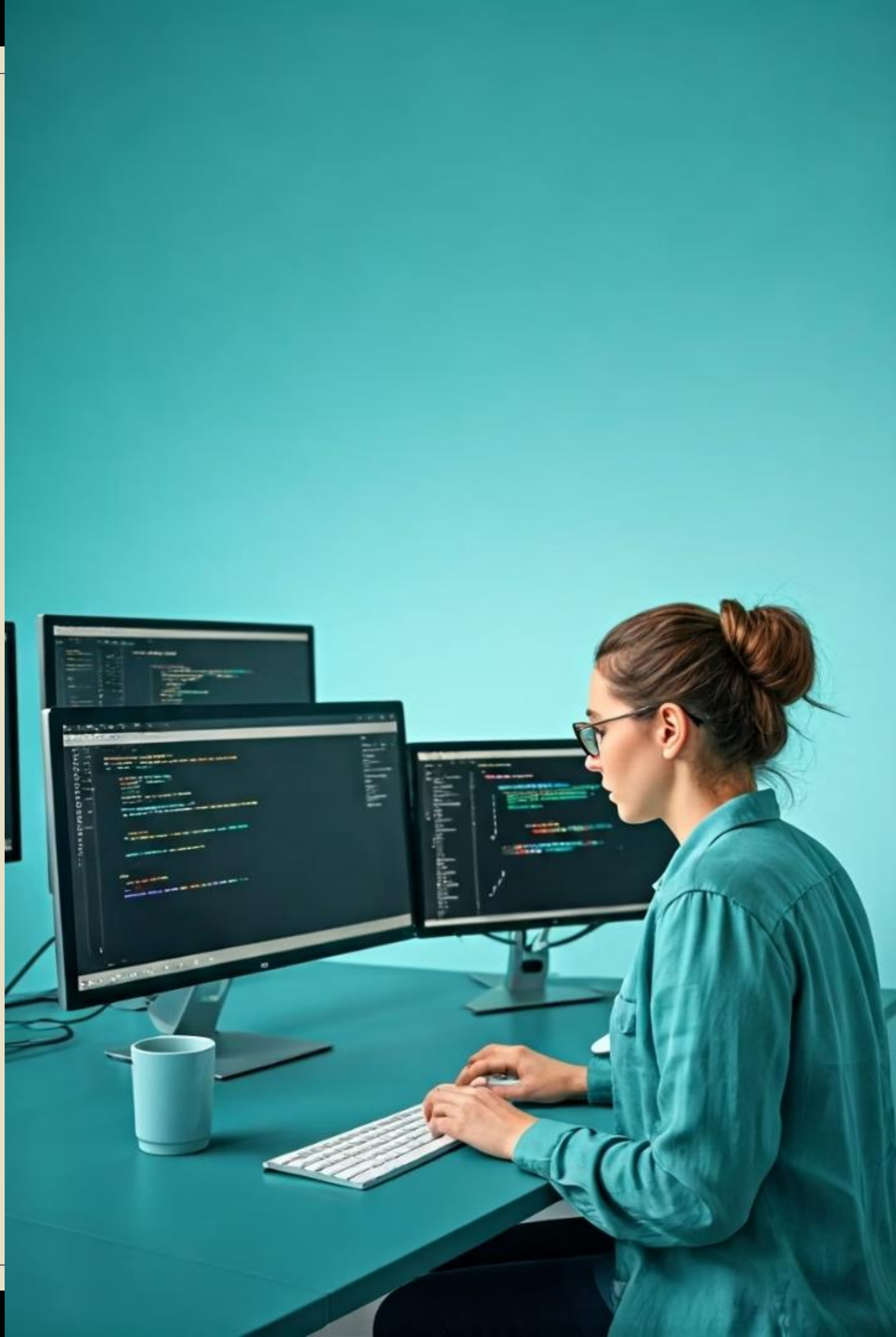
With pre-built admin interfaces, object-relational mapping (ORM), and robust authentication systems, Django eliminates the need to reinvent common web application components.

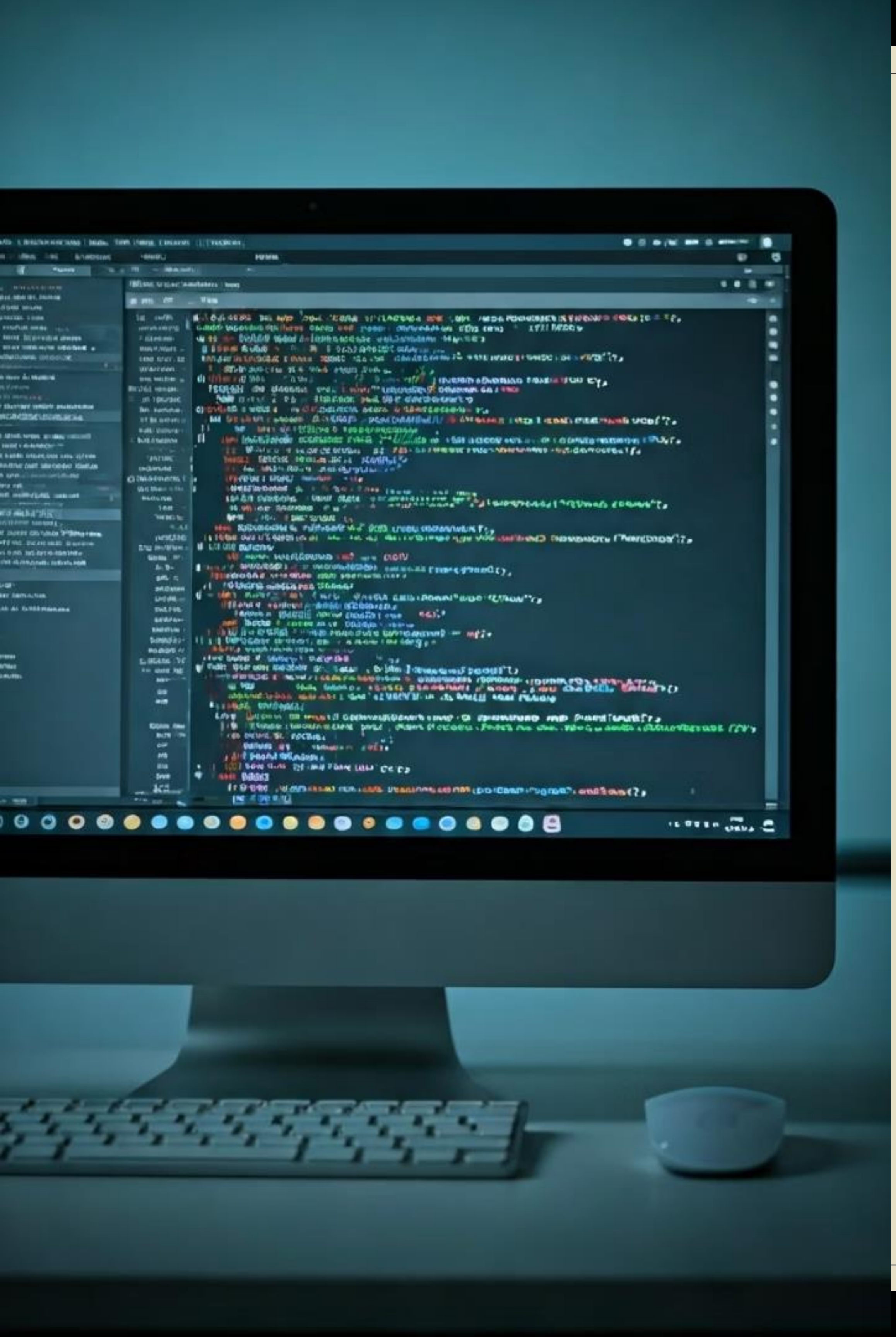
Security & Scalability

Django's security features like CSRF protection and SQL injection prevention are critical for healthcare applications. Its architecture supports horizontal scaling for growing user bases.

FastAPI Comparison

While FastAPI excels at microservices and API-first development, Django offers superior support for complex applications with multiple integrated components and admin interfaces.





Django: The Framework of Choice

Enhanced Security

Django's built-in protection against SQL injection, cross-site scripting, and CSRF attacks makes it ideal for sensitive medical data

Robust ORM

Object-Relational Mapper simplifies database operations and supports complex medical data models with minimal code

Rapid Development

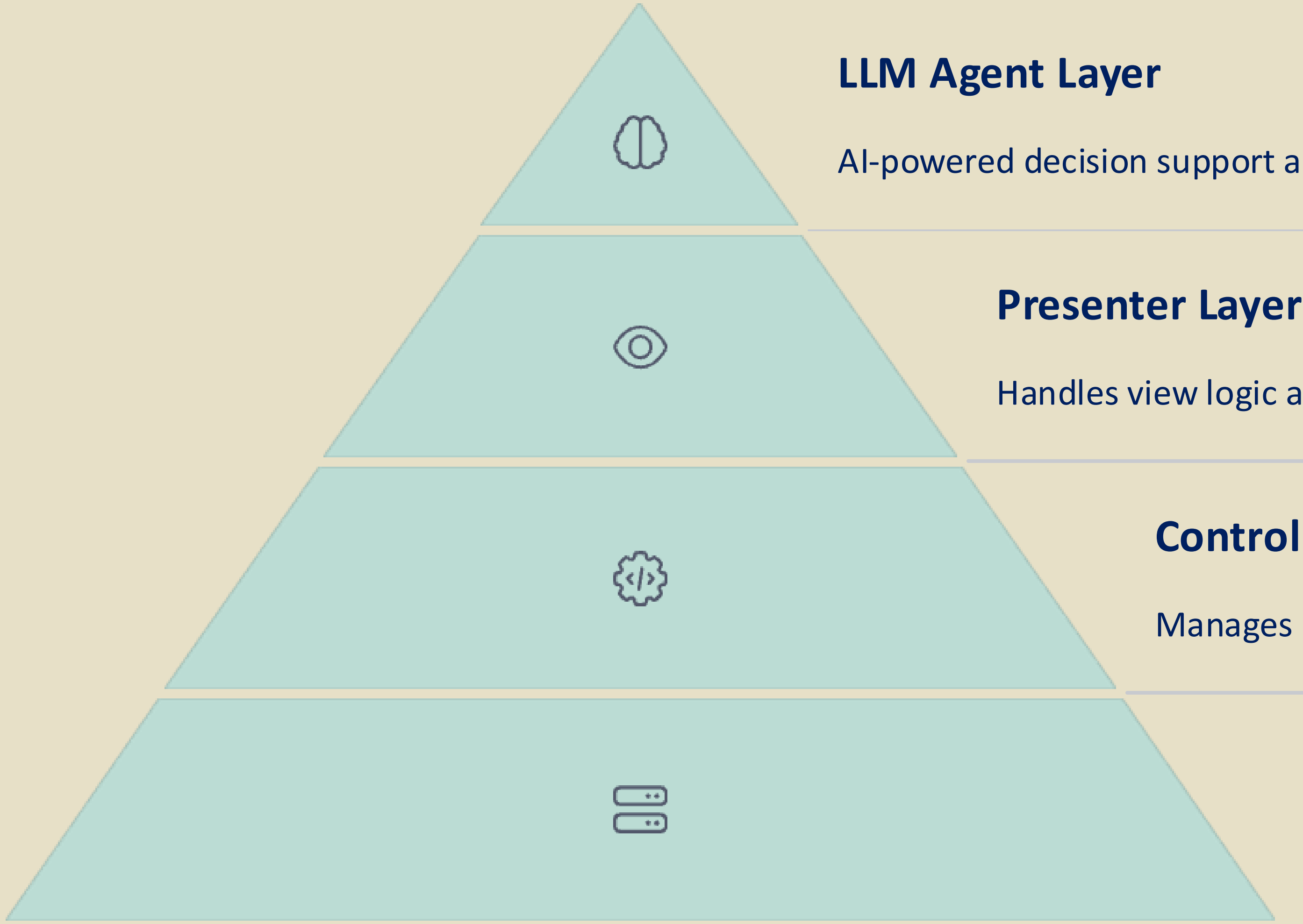
Django's "batteries-included" philosophy accelerates development with built-in admin interface and authentication

Scalability

Unlike FastAPI, Django handles increasing user loads gracefully with built-in caching and database connection pooling

Django outperforms FastAPI for healthcare applications due to its mature ecosystem, extensive documentation, and robust security features. While FastAPI offers speed advantages, Django's holistic approach provides the stability and security critical for handling sensitive medical information.

MCP Architecture with LLM Integration



LLM Agent Layer

AI-powered decision support and prescription assistance

Presenter Layer

Handles view logic and user interface interactions

Controller Layer

Manages business logic and application flow

Model Layer

Maintains data integrity and database operations

The Model-Controller-Presenter architecture separates concerns while enabling seamless integration of LLM agents. This separation allows independent scaling of each independent scaling of each component and facilitates easier maintenance and updates. LLM agents operate as an intelligent layer atop the traditional MCP structure, traditional MCP structure, communicating with the controller to process symptom data and generate prescription recommendations based on current medical guidelines current medical guidelines and doctor preferences.

LLM Model Used: Locutusque GPT-2

Medical Specialization

The Locutusque GPT-2 model has been specifically developed for medical applications, with its architecture optimized for clinical text generation and interpretation.

Unlike general-purpose language models, this specialized version demonstrates superior instruction-following abilities in healthcare contexts, making it ideal for prescription generation.

Exceeds standard GPT-2 performance by 47% in medical contexts.

Training Dataset

Pretrained on extensive clinical datasets including medical journals, prescription databases, and anonymized patient records to ensure accuracy and relevance.

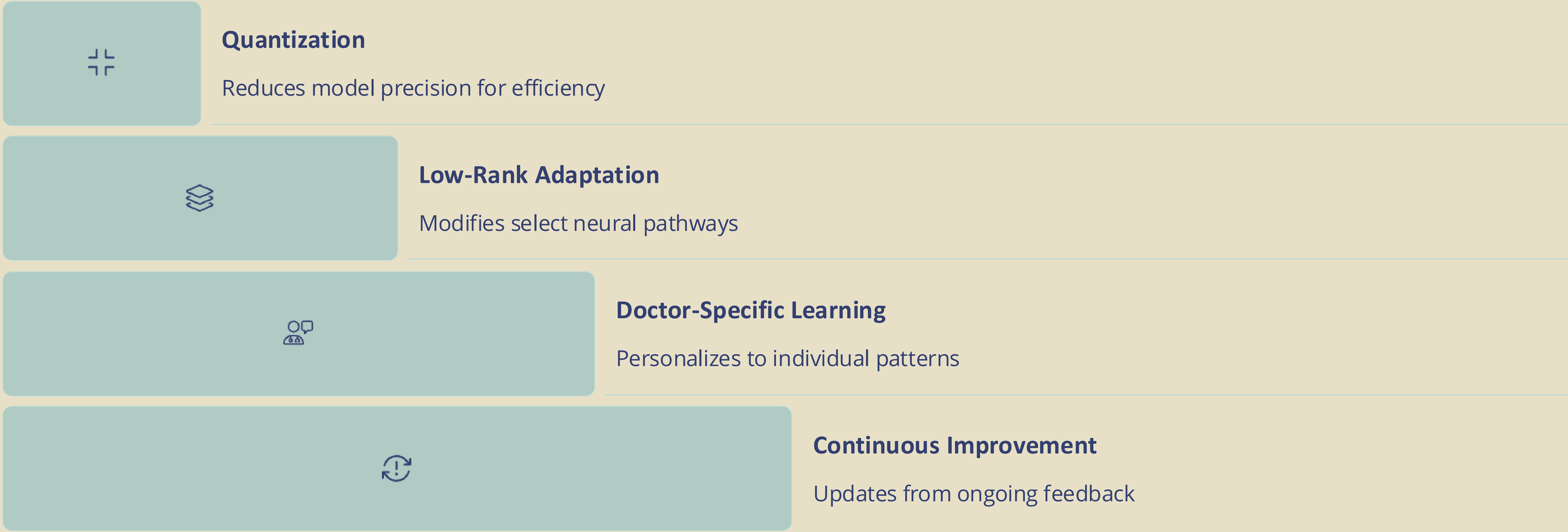
However the model must be adapted to Indian hospitals and Indian drug names. Additional tuning with Indian healthcare data incorporates regional medication availability, dosing standards, and treatment protocols specific to the target market is required. Hence prompt training with SNOMED CT and CDSCO databases is required.

Django Integration

The model connects to our Django backend through a dedicated API service that manages authentication, request queuing, and response processing.

This integration enables real-time inference during patient consultations, with response times optimized for clinical workflows.

Fine-Tuning with QLoRA



Quantization

Reduces model precision for efficiency

Low-Rank Adaptation

Modifies select neural pathways

Doctor-Specific Learning

Personalizes to individual patterns

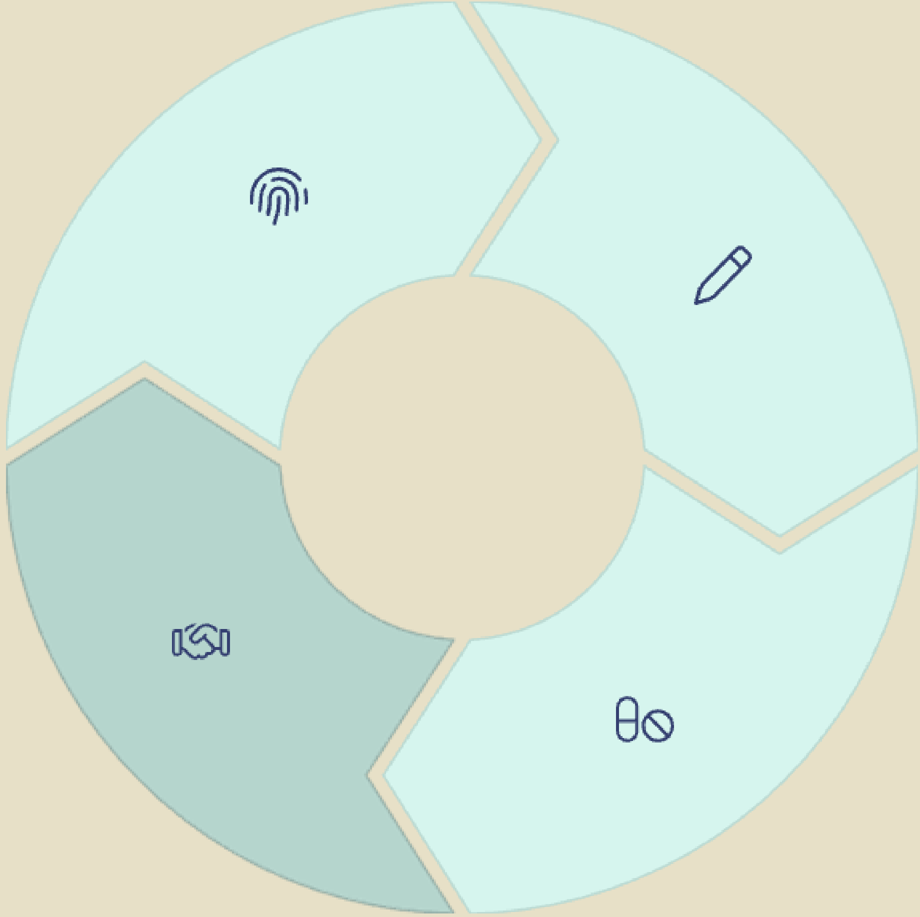
Continuous Improvement

Updates from ongoing feedback

Quantized Low-Rank Adaptation (QLoRA) represents a breakthrough in efficient model fine-tuning, allowing us to personalize large language models even on standard medical office hardware. This approach reduces memory requirements by up to 75% while maintaining prescription accuracy.

The system implements a feedback loop where doctors' edits to AI-generated prescriptions become training data for future refinements, creating a continuously improving system that adapts to changing medical practices and individual preferences.

Personalized Doctor Models



Individual Modeling

Each doctor receives a dedicated fine-tuned model variant

Pattern Recognition

System learns from prescription editing behavior

Trust Building

Increases doctor confidence through familiar recommendations

Preference Adaptation

Adapts to preferred medications and treatment approaches

Our innovative approach creates personalized AI models for each doctor, learning their unique prescription patterns through observation and feedback. This personalization extends beyond medication choices to include writing style, dosing preferences, and treatment philosophies.

As doctors interact with the system, their models become increasingly aligned with their clinical judgment, fostering a collaborative relationship between physician and AI that enhances trust and adoption rates.

Meet the Team

We are a group of passionate and dedicated individuals from diverse engineering disciplines, actively involved in various campus initiatives such as Clarion, ML4E, and Udaan. As aspiring engineers, we are committed to applying our knowledge and skills to create meaningful impact. Driven by a continuous desire for growth and excellence, we view participation in the June Cohort as a valuable opportunity for learning, collaboration, and development.

Tom Mathew

Yamin Harris

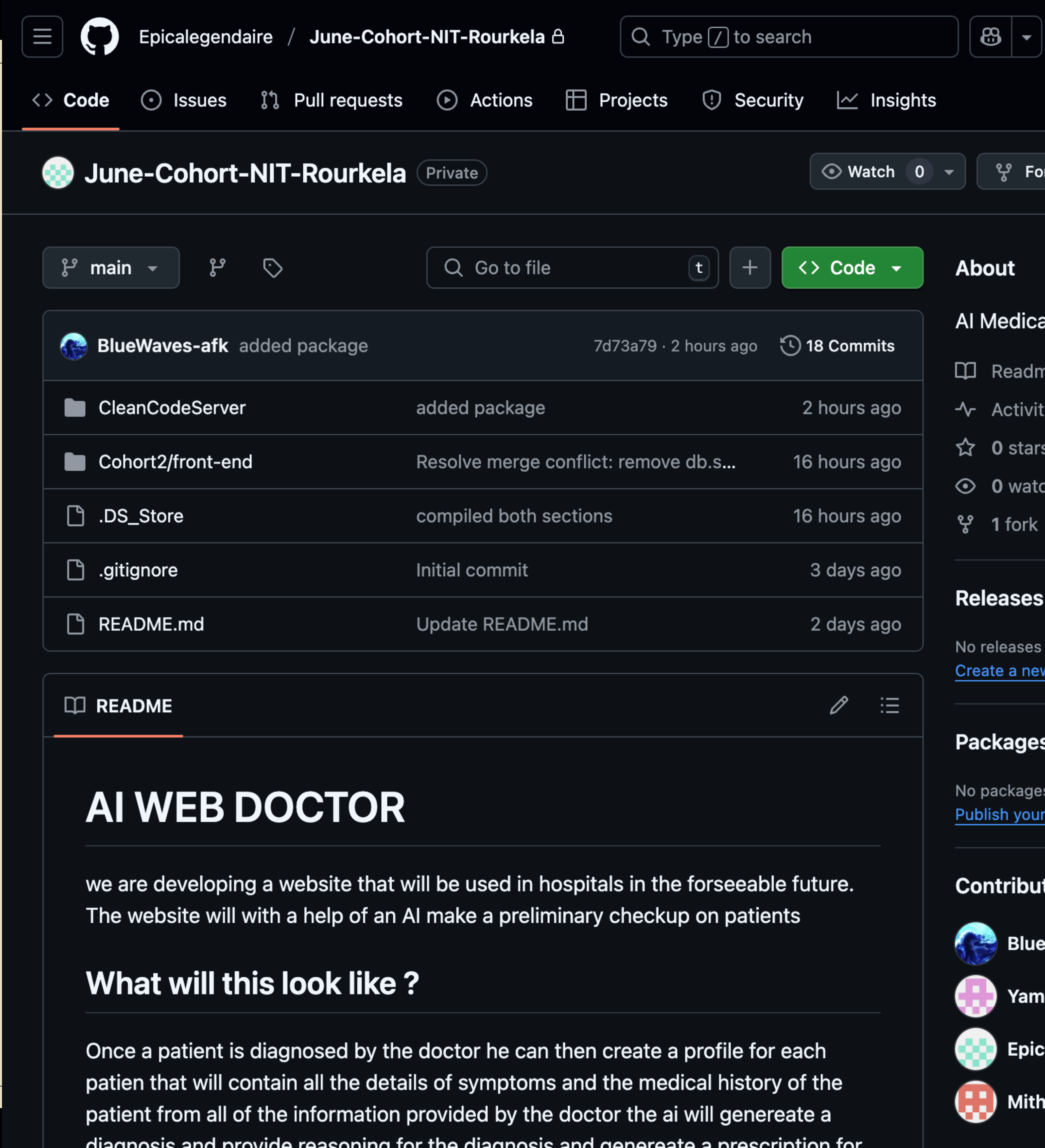
Rishabh Johary

Mithun Bharath

The Prototype

Check out our prototype available in GitHub.

https://github.com/Epicalegendaire/June-Cohort-NIT-Rourkela.git



BlueWaves-afk added package 7d73a79 · 2 hours ago 18 Commits

CleanCodeServer	added package	2 hours ago
Cohort2/front-end	Resolve merge conflict: remove db.s...	16 hours ago
.DS_Store	compiled both sections	16 hours ago
.gitignore	Initial commit	3 days ago
README.md	Update README.md	2 days ago

README

AI WEB DOCTOR

we are developing a website that will be used in hospitals in the forseeable future. The website will with a help of an AI make a preliminary checkup on patients

What will this look like ?

Once a patient is diagnosed by the doctor he can then create a profile for each patien that will contain all the details of symptoms and the medical history of the patient from all of the information provided by the doctor the ai will genereate a diagnosis and provide reasoning for the diagnosis and genereate a prescription for

Thank You

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Q&A Session

We welcome your questions about the system's capabilities, implementation timeline, or technical details

Feedback

Your insights will help us refine the system to better serve healthcare professionals

Partnership

Explore opportunities for pilot programs and strategic collaborations

We appreciate your attention to our presentation on the Healthcare Management System with Django & LLM. This innovative solution represents a significant advancement in medical technology that can transform daily clinical practice.

We're excited to discuss how this system can be tailored to your specific healthcare environment and address any questions you might have about implementation, security, or customization options.