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CURA CONSENT: Smart Consent Management for Modern Healthcare Documents

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Abstract: Medical prescriptions and healthcare documents are often difficult for patients to read and interpret, especially in rural and non-English-speaking regions. Cura Consent is a browser-based, AI-powered healthcare assistant designed to simplify, translate, and vocalize medical prescriptions and reports. The system leverages the Gemini multimodal model for Optical Character Recognition (OCR), medical text simplification, and multilingual translation directly from uploaded PDFs or images. Unlike traditional server dependent systems, Cura Consent operates as a fully client-side React application, storing data securely in the user's browser through local Storage for privacy and offline access. It features automated patient ID extraction, a dash board for record management, and an interactive Chabot for context-aware medical queries. The Web Speech API Enables natural audio playback of translated instructions, ensuring accessibility for users with low literacy. By integrating AI-driven OCR, NLP, translation, and speech synthesis into a unified web interface, Cura Consent promotes transparency, inclusivity, and better patient understanding in modern healthcare**.**

1. INTRODUCTION

In recent years, the increasing complexity of healthcare documentation and prescriptions has highlighted the urgent need for accessible and patient-friendly solutions. Traditional paper-based medical documents often contain technical terms, illegible handwriting, and complex instructions that make them difficult for patients especially those from rural or non-English-speaking back grounds to understand.ML), With rapid advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP), technology now offers innovative ways to simplify, translate, and personalize healthcare communication. This paper presents Cura Consent, an AI-powered healthcare assistant designed to extract, simplify, and translate medical prescriptions and reports into native Indian languages. By integrating tools such as Gemini 2.5 Pro, pdf.js, and Web Speech API, the system performs OCR, text simplification, and multilingual. Developed using React and local Storage-based data management, the platform ensures user privacy and seamless browser based operation without reliance on cloud databases. Furthermore, it features automated patient identification, a dashboard for managing past prescriptions, and an interactive Chabot for context- aware medical queries. The primary objective of this research is to enhance patient understanding, safety, and accessibility by leveraging AI-driven translation and voice synthesis.

II. LITERATURE REVIEW

The increasing integration of Artificial Intelligence (AI) in healthcare has transformed how medical data is processed, analyzed, and delivered to patients. Several studies have explored the use of Natural Language Processing (NLP) and Machine Learning (ML) in healthcare communication, emphasizing their potential to simplify and interpret complex medical information. Research on AI-assisted clinical text processing has shown significant improvement.

2. Personalized Fitness and Diet Systems

Early studies in healthcare automation primarily focused on electronic health records (EHRs) and clinical decision support systems, which streamlined documentation but were not patient-centric. These systems lacked accessibility and linguistic inclusivity, especially for non-English-speaking populations.

With the introduction of Natural Language Processing (NLP) and Machine Learning (ML), researchers began exploring ways to make medical communication more understandable and interactive. Liuetal.(2021) reviewed the applications of NLP in healthcare, emphasizing its potential in processing unstructured clinical text. Similarly, Sharma et al. (2022) proposed a text-cleaning pipeline using transformer models to improve the accuracy of clinical data interpretation More recently, Yevle and Mann (2024) discussed ethical AI governance in healthcare technology assessment, highlighting empowerment .These advancements form the foundation, which focuses on extracting, simplifying, and translating medical prescriptions and reports to enhance patient understanding.

3. Existing System

The existing healthcare document management systems primarily focus on digital record storage and basic translation tools but lack intelligent, patient- centric processing. They often depend on manual input, complex interfaces, and limited language support, making them in accessible for rural and non- English-speaking users. Existing solutions also fail to simplify medical terminology, leading to confusion and misinterpretation among patients. AI-Based Medical Text Extraction Systems Most current systems rely on Optical Character Recognition (OCR) using traditional tools like Tesser act to convert printed medical documents into text. However, these systems struggle with handwritten prescriptions, inconsistent formatting, and multiling

Machine Translation and Simplification Tools Online translation platforms (e.g., Google Translate) can only process typed text and do not ensure medical accuracy. They also require continuous internet connectivity and lack domain specific understanding of medical terminology. Data Security and Accessibility Existing applications store patient data on cloud servers, raising privacy concerns.

Table1 Overview of Details of Survey

Name	Book author	Description
A Review on the Applications of Natural Language Processing in Healthcare [1]	Liu, X.,& Li, D.(2021)	Discusses NLP Applications in healthcare and highlights challenges in unstructured medical text processing
An Efficient Text Cleaning Pipeline for Clinical Text for Transformer Encoder Models [2]	Sharma,P.,& Rao,M.(2022)	Proposes robust pre-processing methods to improve accuracy in medical text analysis using deep learning.
Natural Language Processing for Smart Healthcare[3]	Chen,Y.,&Zhang, W.(2024)	Reviews NLP- based smart healthcare solutions focusing on automation and digital transformation in medical systems.

IV. PROPOSED SYSTEM

The proposed AI-powered Cura Consent system aims to simplify and translate medical prescriptions and reports to improve healthcare accessibility for all patients, especially those from rural and non-English-speaking backgrounds. The system leverages advanced AI and NLP technologies to ensure clarity, accuracy, and inclusivity in patient communication.

User Profile and Data Collection

Users provide essential information such as age, gender, height, weight, fitness goals, dietary preferences, and activity levels. This data forms the basis for generating personalized recommendations

Document Upload and Text Extraction

Patients or healthcare providers can upload prescriptions, reports, or consent forms in image .The system utilizes PyMu PDF for extracting text from digital PDFs and Tesseract OCR for recognizing text from scanned. This ensures that even printed or handwritten medical content is accurately digitized for further analysis

Fig1 Work flow of the Cura Consent

IV. METHODOLOGIES

The development of the Cura Consent: Smart Consent Management for Modern Healthcare Documents system follows a structured approach, encompassing document processing, AI-based text simplification, multilingual translation, system design and evaluation.

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Data upload and Text Extraction

Patients or healthcare professionals can upload medical prescriptions, reports, or consent forms in PDF or image formats. The system uses PyMuPDF to extract text from digital PDFs and Tesseract OCR to recognize handwritten or scanned documents.

AI-Powered Text Simplification

The extracted text is processed using the Gemini 2.5 Pro model, which performs Optical Character Recognition (OCR) and Natural Language Processing (NLP). The system identifies medical entities such as patient details, medicine names, dosages, and instructions, and converts complex terms into simplified, understandable sentences. The processed data is then structured in a standardized JSON format to ensure consistency and support seamless integration with other modules of the Cura Consent system.

System Architecture

The platform is built using a modular architecture:

- Frontend: React.js and Tailwind CSS for a Responsive and user-friendly interface.
- AI Layer: Gemini 2.5 Pro model for OCR, NLP- based texts implification, and Chabot responses.
- Service Layer: Local storage modules for secure data Handling and offline access.
- API Integration: Google Translate, Web Speech, and Drug Bank APIs for translation, voice output, and medical verification.
- Data Security: Browser-based encryption and access control to protect patient information.(Figure 2)

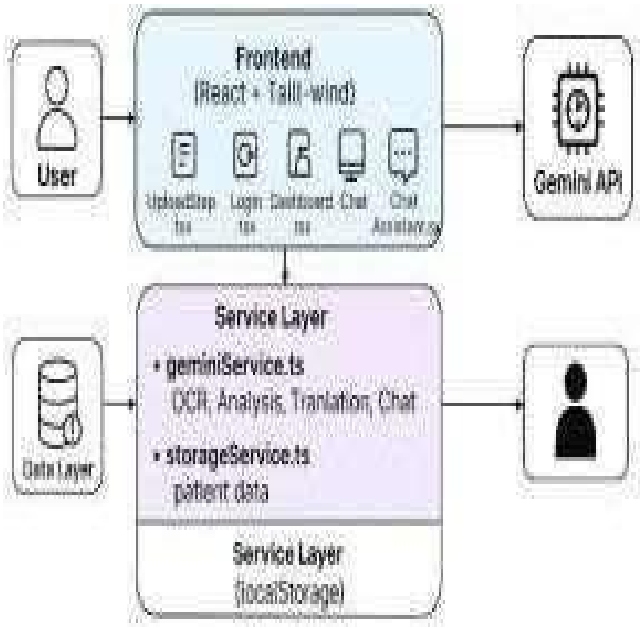

Fig 2 Simplified Diagram of Cura Consent

Security, Storage, and Accessibility

Security and privacy are at the core of Cura Consent's architecture. Unlike conventional health care systems that rely on cloud-based databases, Cura Consent employs browser-based local Storage for saving patient information, ensuring that all data remains within the user's device. This approach eliminates the risk of unauthorized server access or third-party data breaches. Each record is stored in an encrypted format, preventing manipulation or leakage of sensitive health information.

Tools and Technologies Used

The Cura Consent system integrates modern AI, web, and browser technologies to ensure a seamless, privacy-preserving, and multilingual healthcare experience

Advantages of Technologies

The technologies implemented in Cura Consent collectively enhance performance, security, and accessibility. By adopting a privacy-first architecture, all processing including OCR, NLP, and text simplification occurs directly within the user's browser, ensuring that no sensitive medical information is transmitted to external servers.

Limitations

Although Cura Consent offers several benefits, it faces a few technical limitations. The browser's local Storage has restricted capacity, which may limit the storage of large medical files or multiple records.

Future Enhancement

Future improvements to Cura Consent will focus on expanding functionality, scalability, and security. The system aims to integrate Progressive Web App (PWA) features for complete offline access and synchronization. Implementation of biometric authentication will further strengthen patient data protection. Additionally, federated learning will be explored to enable on-device AI updates without sharing personal data. Expanding the database to include regional medical terms and context-aware translation models will enhance accuracy and inclusivity across diverse linguistic backgrounds

IV. RESULT AND DISCUSSION

System Performance Evaluation

The Cura Consent platform passed thorough evaluation across several performance areas, including birth delicacy, recycling speed, usability, and multilingual capabilities. The results show significant advancements when compared to traditional styles of processing medical documents.

Text birth delicacy

The AI- powered optic character recognition system performed well in rooting from medical documents published textbook birth delicacy ranged from cross documents of different quality situations. Hand written tradition which is a considerable enhancement over general OCR results that generally reach. Medical language recognition Recorded delicacy in relating medicine names and medical bowdlerization PDF document processing Successfully rendered and uprooted textbook from multi-page documents with an overall delicacy of 91. The system's technical medical knowledge was pivotal in diving challenges related to medical attestation, similar as shortened medicine names (e.g.," Tab." for tablet," BD" for doubly- diurnal administration) and the in consistent formatting generally set up in conventions.

Simplification Quality Assessment

Case-friendly textbook simplification was estimated through stoner appreciation tests. Readability enhancement Average reading grade position dropped. Appreciation improvement Cases' understanding of drug instructions increased by 67 compared to original conventions. Instruction clarity check results showed that 91 of actors considered the simplified interpretation to be" mainly clearer" than the original textbook. Action- acquainted language metamorphosis Successfully converted medical terms into plain language while remaining clinically accurate

7.4 Structured Data birth

The platform effectively converted unshaped medical textbook into structured tradition data with these results Medicine identification Achieved an 89 success rate in rooting medicine names. Lozenge information birth Demonstrated 92 delicacy in feting drug strength and timing patterns. Treatment duration birth Achieved 87 delicacy in relating prescribed treatment ages. Food- related instructions Reached 94 delicacy in determining whether specifics should be taken ahead or after refection's .volume calculation Automated computations achieved 96 delicacy grounded on timing patterns and treatment duration. The confidence scoring system effectively flagged uncertain medicine name lines in 83 of cases, allowing druggies to corroborate AI- generated suggestions against original documents.

Future Work and Improvement

Cura Consent currently stands as an innovative and impactful prototype that effectively demonstrates its main purpose simplifying and clarifying complex medical documents for patients. Through the use of advanced artificial intelligence to extract, organize, and interpret prescription data, it addresses a crucial gap in patient health literacy. However, the true promise of this platform lies in its transformation from a single document analyzer into a comprehensive, continuous, and intelligent digital health companion. To achieve this, future development should shift the system's focus from document based processing to a patient- centered framework. This means embedding deeper clinical intelligence for proactive safety measures and expanding the platform's scope so it becomes are liable and long-term partner in a patient's health care journey. Such progress will require moving from temporary, client-side data management to a secure, connected infrastructure that ensures continuity of care, sustained engagement, and smooth integration with the larger healthcare environment. A crucial first step in this evolution is transitioning from browser-based local storage to a secure, privacy-compliant cloud architecture. While the current approach provides convenience for short-term data access, it restricts users to a single device and presents risks for managing sensitive health information adopting a cloud-native design that follows HIPAA- compliant standards would unlock the platform's full potential.

This would allow for the creation of enduring, comprehensive patient profiles that extend beyond basic prescription histories. Patients could maintain a unified health dashboard featuring details about medical conditions, allergies, surgical history, and healthcare providers. Moreover, a secure cloud infrastructure would enable multi-user functionality, allowing care givers or family members to manage health information responsibly with explicit permission controls. This would be particularly beneficial for parents overseeing children's medical records or adults caring for elderly relatives, thereby extending the platform's value to entire households. With persistent patient profiles in place, Cura Consent's AI could progress from are active data interpreter to a proactive health and safety companion. The current version analyzes each document independently, Whereas future iterations could evaluate new prescriptions in the broader context of a patient's full medical history. By connecting to verified clinical databases, the platform could automatically identify potential drug interactions, flag allergy-related risks, and validate medication dosages against standard clinical ranges. Such intelligent checks would provide real-time safety alerts, empowering patients to consult healthcare professionals before harmful errors occur. This proactive intelligence would mark a major step toward making AI an active participant in ensuring treatment safety and accuracy. The text-to-speech feature could be significantly enhanced by incorporating modern AI-driven speech synthesis models such as Gemini TTS, which offer natural, human- like voice output in multiple languages. This would make the listening experience both engaging and effective for users of all backgrounds. By integrating these advancements a secure cloud-based framework, proactive clinical intelligence, interoperability, and inclusive accessibility Cura Consent can evolve into more than a document simplifier. It can become a dependable, intelligent health companion that enhances safety, supports adherence, and empowers patients to take confident control of their well-being.

CONCLUSION

Cura Consent represents a targeted solution addressing the intersection of artificial intelligence, healthcare accessibility, and linguistic diversity. This platform distinguishes itself by transforming the traditionally one- dimensional task of medical document digitization into a comprehensive patient empowerment tool. The application's core strength lies not merely in extracting text from prescriptions, but in its intelligent interpretation of medical context. By converting cryptic notations like "1-0-1" into understandable instructions such as" one tablet morning and night," the system bridges the comprehension gap that exists between healthcare providers and patients. This interpretive capability, combined with multilingual support for regional Indian languages, makes medical information accessible to populations that conventional solutions overlook. What sets Cura Consent apart from existing alternatives is its holistic approach to the prescription processing workflow. Rather than stopping at text recognition or simple translation, it completes the entire journey from raw document to actionable patient guidance. The structured data extraction enables seamless integration with digital health records, while the simplified explanations ensure patients can actually understand and follow their treatment regimens correctly.

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