

Design & Implementation Summary for HealMate: Smart Hospital Onboarding System

1. The Challenge

Intelligent Patient Onboarding in Healthcare:

Modern hospital onboarding processes often pose significant hurdles for elderly, uneducated, and digitally unfamiliar patients. These users typically struggle with touchscreens, online appointment systems, or filling out medical forms, often requiring in-person staff assistance. The challenge was to design and build a smart, virtual assistant-powered system that empowers these users to complete the onboarding process independently using an accessible and intuitive interface.

2. Key Design Decisions

User Experience (UX):

- A touchscreen-first design using large icons and high-contrast text
- Step-by-step guidance through either manual interaction or a Virtual Doctor/Nurse assistant
- Multilingual voice support and Text-to-Speech (TTS) narration for every step
- Input validation and correction suggestions using basic ML logic
- Optional voice input for form filling using the Web Speech API

System Behaviour:

- Dual interaction mode: Continue Manually or Get Virtual Assistance
- Auto-suggest departments based on entered symptoms
- Predict wait time using static logic and suggest available time slots
- Dashboard with easily tappable, self-explanatory options like Appointments, Payment, Map, etc.

Agent Roles:

- **Virtual Doctor/Nurse:** An animated avatar with voice guidance assists users through the process, highlighting UI elements visually
- **Machine Learning Agent:** Validates patient input and auto-suggests the appropriate department

- **Voice Interface Agent:** Converts text to speech and captures spoken input
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3. Overview of Implementation

Frontend:

- **React.js:** Modular, component-based architecture
- **React Router:** For managing multi-page navigation
- **Plain CSS:** Responsive layout, touch-optimized
- **Web APIs:** SpeechSynthesis (TTS) and SpeechRecognition for voice guidance/input

UI Structure:

- **Login/Signup Page:** Basic auth interface
- **Mode Selection Page:** Manual vs Virtual Assistant
- **Form Page:** Inputs for name, age, pin code, symptoms (dropdown), department (suggested)
- **Slot Allocation Page:** Predicted wait time and bookable slots (dummy data)
- **Dashboard Page:** Icons like See Doctor, Appointments, Map, Payment, etc.
- **Payment Page:** Simulated UPI/QR code mockup

Logic:

- Dummy ML logic implemented in JavaScript to map symptoms to department
- Static JSON simulates available slots and wait times
- Alert simulation for SMS/email confirmation and reminders

Architecture:

- All views/components are rendered by React and connected via routes
 - State is managed through props and local state
 - Dummy JSON simulates real-time data in place of backend/database
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4. Testing & Dataset Explanation

Testing Strategy:

- Component-wise testing during development

- Manual user flow testing with varied inputs (elderly personas simulated)
- Accessibility audit: High-contrast testing, text-to-speech confirmation, touch usability check

Dataset:

- Symptom-to-department mapping: Simple static JSON mapping e.g.,

```
{
  "cough": "Pulmonology",
  "joint pain": "Orthopedics",
  "vision problem": "Ophthalmology"
}
```

- Slot Prediction: Simulated data like:

```
[
  { "time": "10:30 AM", "wait": "5 mins" },
  { "time": "11:00 AM", "wait": "10 mins" }
]
```

- User inputs tested for edge cases like blank fields, gibberish input, and voice input recognition errors

Conclusion

HealMate addresses the critical accessibility gap in hospital onboarding systems. Through a combination of intuitive UX design, voice-enabled interaction, and basic intelligent decision-making, the platform enables elderly and digitally illiterate patients to independently complete medical onboarding processes in a comfortable and stress-free way. This implementation, while currently based on static logic and simulation, provides a scalable framework for real-world deployment using real-time hospital data and integration with backend systems.