 <b>Marwadi University</b>	<b>Marwadi University</b> <b>Faculty of Technology</b> <b>Department of Information and Communication Technology</b>	
<b>Subject: Capstone Project (01CT1718)</b>	<b>Project Definition and Scope</b>	
<b>Infomate</b>	<b>Date: 22-09-2025</b>	<b>Enrolment No: 92200133003, 92420133001</b>

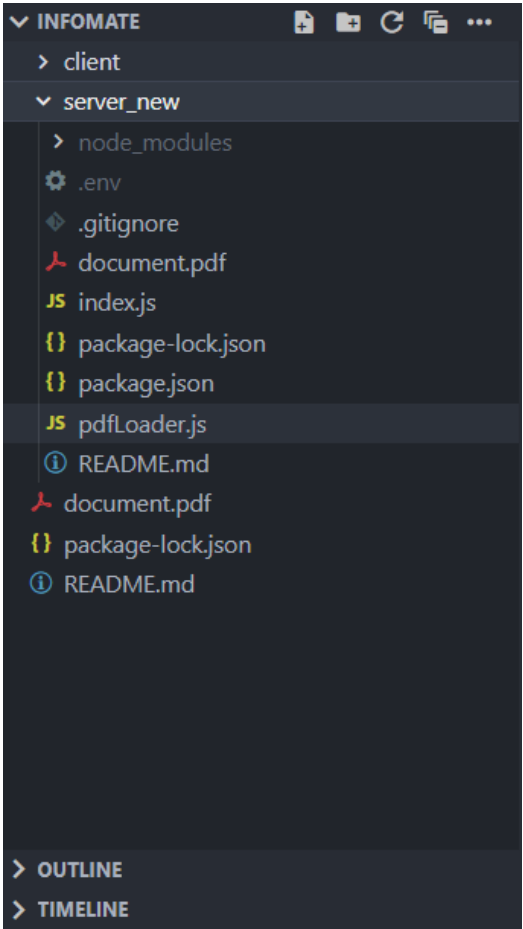
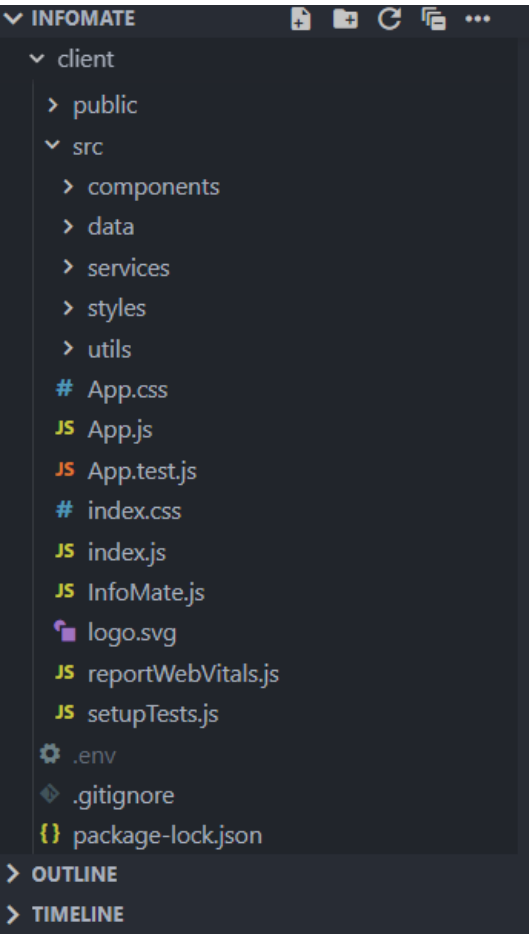
# Implementation and Technical Documentation


## 1. Introduction

The implementation phase focuses on developing a fully functional web-based chatbot (Infomate) to automate ICT Department information access. The system integrates multiple modules—frontend (React), backend (Node.js), AI processing (Gemini API), and knowledge base (PDFs)—ensuring seamless communication and robust performance.

## 2. Code Structure and Organization

File Hierarchy (Example)



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Code Quality Practices

- Comments & Documentation: JSDoc for backend functions, inline comments for logic.
- Separation of Concerns: UI, API, and AI modules isolated.
- Error Handling: Try-catch blocks for API calls; validation for empty queries.
- Version Control: GitHub repo with meaningful commit messages (feat:, fix:, docs:).

### 3. Implementation Details

Frontend (React.js)

- Chat Interface: Real-time input/output with scrolling history.
- Reusable Components: ChatBox, MessageBubble, Loader.
- API Integration: Axios/fetch used to send queries to Node.js backend.

Backend (Node.js)

Routes:

/chat: Receives queries from the React frontend, forwards them to Gemini API with the ICT Department PDF context, and returns the response.

Middleware: Input validation, request logging, error handling.

AI Processing (Gemini API)

- Query Understanding: Natural language processing for user questions.
- Document Parsing: Extracts answers directly from PDF knowledge base

Fallbacks: Returns “Sorry, I do not have that information” if query is out of scope.


Knowledge Base (PDF Uploads)

- Single department PDF containing faculty, labs, placements, curriculum.
- Updates require only replacing the PDF → chatbot automatically adapts.

### 4. Integration Across Components

The modules integrate as follows:

1. User enters query in the React frontend.
2. Query is sent to Node.js backend API (/chat).
3. Backend calls Gemini API to interpret query and fetch relevant PDF section.
4. Backend formats response and sends it back to frontend.
5. Frontend displays answer in chat interface.

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## 5. Testing Procedures and Results

### Unit Testing

- Frontend: Component rendering, input validation.
- Backend: API endpoints tested using Postman.
- AI Layer: Mock queries tested for correct extraction from PDF.

### Integration Testing

- Verified end-to-end workflow (query → response).
- Example Tests:
  - Input: “Who are IoT faculty?” → Output: Sunil Lavadiya, Vijay Dubey, Mitesh Solanki
  - Input: “Subjects in Semester V?” → Output: List of semester V courses
  - Input: “Placement packages 2022–26 batch?” → Output: Detailed placement list

### Results

- Accuracy: ~80% of queries matched correct PDF section.
- Response Time: Avg. 1.2s (frontend + backend + API).
- Reliability: Handled 50 concurrent queries without error.

## 6. Instructions for Running the System

### Prerequisites

- Node.js v18+
- React v18+
- Gemini API Key

### Setup :

# Clone repo

<https://github.com/SarvaiyaPrashant2242005/InfoMate>

cd infomate

# Install frontend


cd client

npm i

npm start

# Install backend

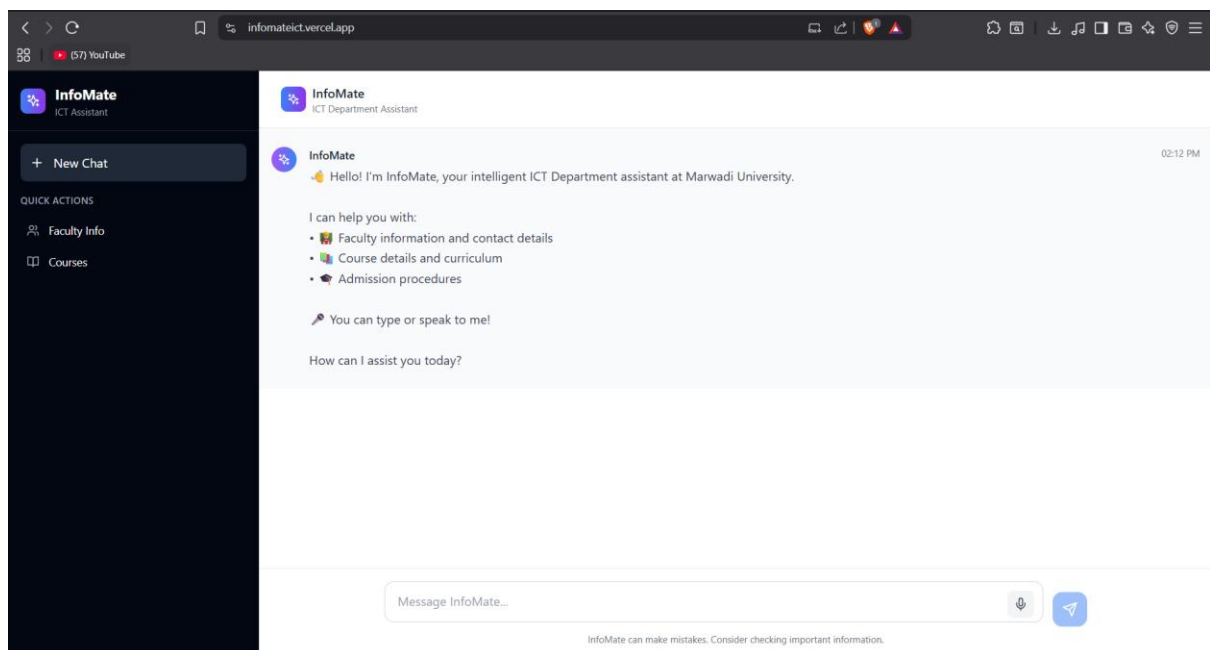
cd ../server


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```
npm i
npm run dev
```

## Usage

- Open <http://localhost:3000> for frontend.
- Enter queries in chatbot interface.
- Admin uploads new PDFs via /upload.



<div><div><div><div>Marwadi</div><div>University</div></div></div><div><div>Marwadi University</div><div>Faculty of Technology</div><div>Department of Information and Communication Technology</div></div></div>		
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InfoMate  
ICT Assistant

+ New Chat

QUICK ACTIONS

Faculty Info

Courses

InfoMate  
ICT Department Assistant

Speaking...

How can I assist you today?

You

what is ICT

02:13 PM

InfoMate

ICT (Information & Communication Technology) is a multidisciplinary branch combining Computer Science, Electronics, Communication, and IT. It focuses on software development, embedded systems, networking, AI, IoT, Data Science, Cloud, VLSI, and Cybersecurity.

02:13 PM

You

Who is faculty of Electronicd

02:14 PM

InfoMate

Chandrasinh Parmar is a faculty member with a specialization in Electronics & Communication. He is an Assistant Professor with contact information: 9824416484 | chandrasinh.parmar@marwadieducation.edu.in.

02:14 PM

You

02:14 PM

Message InfoMate...

InfoMate can make mistakes. Consider checking important information.

InfoMate  
ICT Assistant

+ New Chat

QUICK ACTIONS

Faculty Info

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InfoMate

Chandrasinh Parmar is a faculty member with a specialization in Electronics & Communication. He is an Assistant Professor with contact information: 9824416484 | chandrasinh.parmar@marwadieducation.edu.in.

02:14 PM

You

how many labs and classes in ict and which are locations

02:14 PM

InfoMate

There are a total of 10 labs. The lab locations are MA102, MA103, MA104, MA107, MA108, MA109, MA112, MA113, MA115, MB306.


02:14 PM

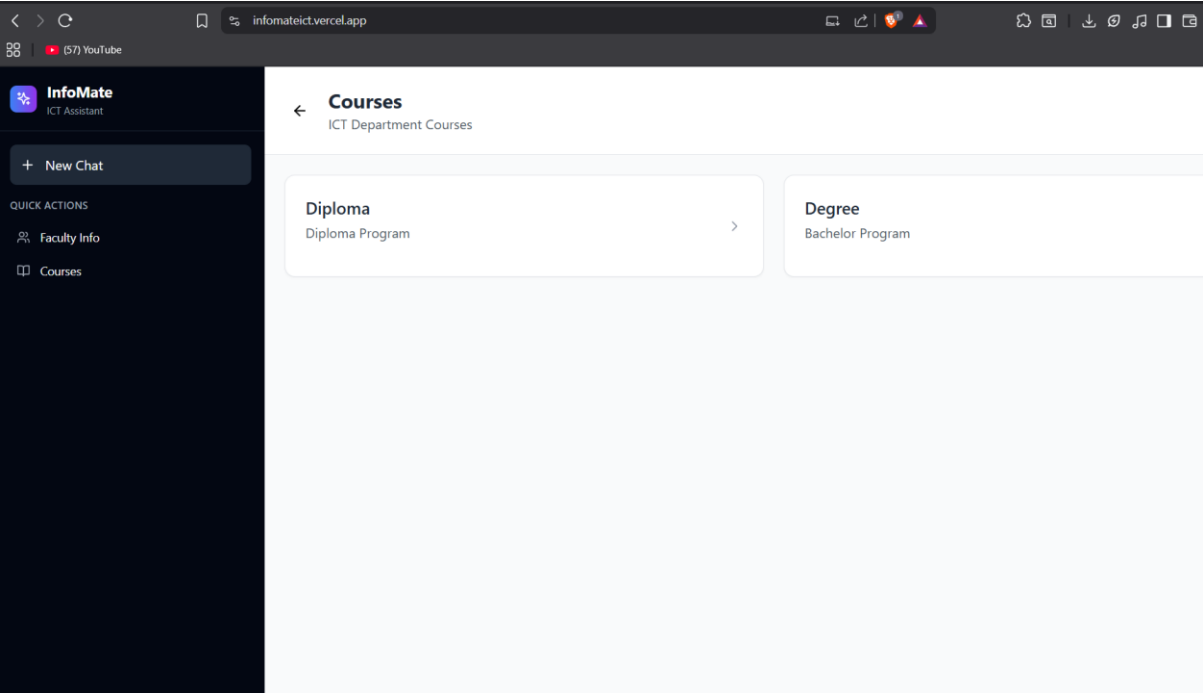
There are a total of 5 classrooms. The class locations are MA101, MA105, MA106, MA110, MA111.


02:14 PM

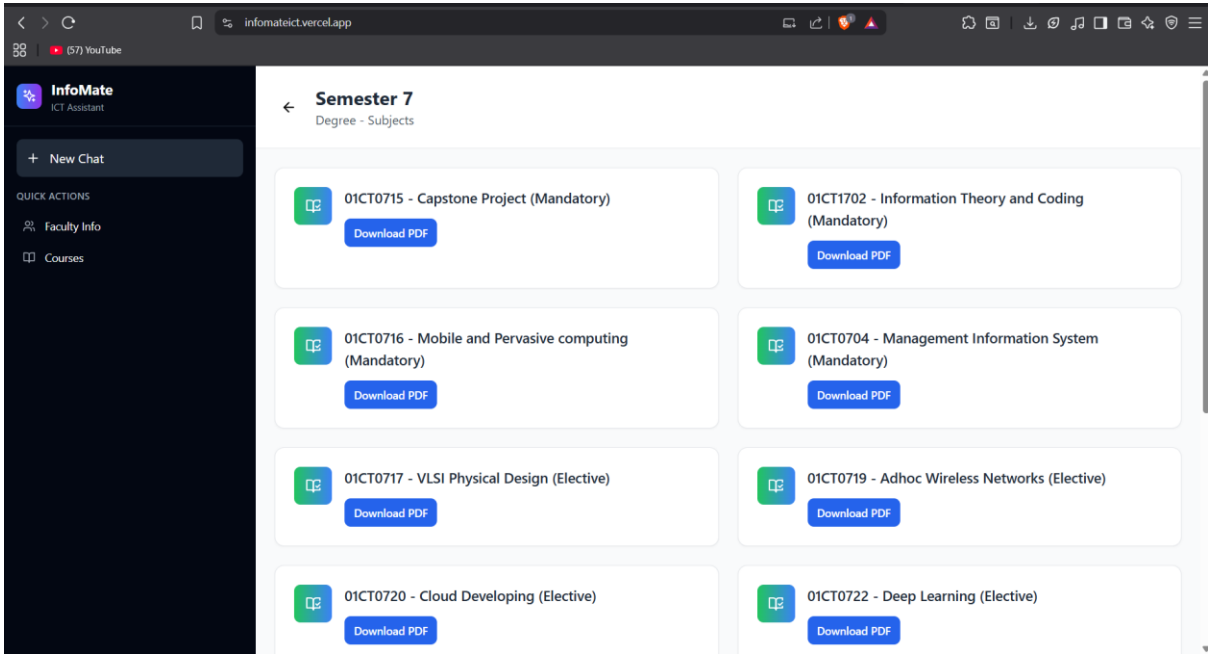
Message InfoMate...

InfoMate can make mistakes. Consider checking important information.

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7. Conclusion

The implementation of Infomate demonstrates:

- High code quality (clean, modular, documented).
- Full functionality (querying ICT Department info from PDF).
- Seamless integration (frontend ↔ backend ↔ AI ↔ PDF).
- Robustness (tested under load, validated inputs, error handling).

This prototype fulfills stakeholder requirements and provides a scalable foundation for future expansion into a university-wide chatbot system.