



## **Mid Term Project – AI Code Reviewer**

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Github Link : [https://github.com/shershahkx/Gen\\_AI\\_Mid\\_Term](https://github.com/shershahkx/Gen_AI_Mid_Term)

# AI Code Reviewer - Project Report

## 1. Project Scope

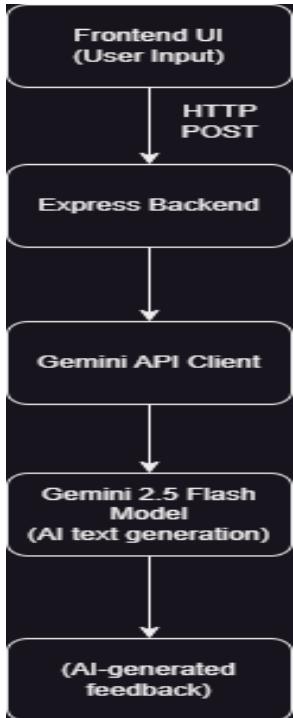
The **AI Code Reviewer** project is a lightweight Node.js backend that integrates **Google Gemini (Generative AI)** to automatically analyze and review code snippets.

The primary goal is to assist developers by providing **AI-driven feedback** under three categories:

- **Readability** – evaluates code clarity, naming conventions, and formatting.
- **Best Practices** – identifies unsafe coding patterns or design issues.
- **Optimization** – suggests performance or simplicity improvements.

This project demonstrates how **AI APIs** can be embedded into developer tools to enhance code quality checks, acting as an intelligent assistant for software teams or students.

## 2. Design



### 3. Implementation Steps

Set up Environment:

Install dependencies

```
npm install express cors body-parser dotenv @google/generative-ai
```

Backend Initialization

API Integration

API Endpoint

### 4. Input/Output



Paste Your Code

```
private List<Reservation> reservations = new ArrayList<>();

public void makeReservation(Reservation reservation) {
    reservations.add(reservation);
}

public void cancelReservation(int reservationId) throws Exception {
    boolean removed = reservations.removeIf(reservation -> reservation.getReservationId() == reservationId);
    if (!removed) {
        throw new Exception("Reservation not found");
    }
}
```

Upload File

Review Code

This screenshot shows a code editor interface for a Java application. The code defines a class with two methods: `makeReservation` which adds a reservation to a list, and `cancelReservation` which removes a reservation by its ID. If the reservation is not found, it throws an `Exception`. The code is pasted into a text area with a dark background. At the top, there's a header bar with "Paste Your Code" and "Upload File" buttons. At the bottom right, there's a purple "Review Code" button.

**AI Feedback**

## Readability

- Issue: Missing Javadoc comments.
- Suggestion: Add Javadoc comments for the class and its public methods to explain their purpose, parameters, and return values.

## Best Practices

- Issue: Using generic `Exception` for "not found" scenarios.
- Suggestion: Use more specific custom exceptions (e.g., `ReservationNotFoundException`) or return `Optional<Reservation>` for `getReservationById`.
- Issue: `getAllReservations()` returns the internal mutable list directly, breaking encapsulation.
- Suggestion: Return an unmodifiable view of the list using `Collections.unmodifiableList()` or a defensive copy to protect the service's internal state.

## Optimization

- Issue: `getReservationById`, `cancelReservation`, and `updateReservation` operations involve linear searches ( $O(n)$  time complexity).
- Suggestion: Consider using a `HashMap<Integer, Reservation>` to store reservations, allowing for average  $O(1)$  time complexity for ID-based lookups, updates, and removals.

## 5. Reflection

### Challenges Faced

1. Response Extraction — The Gemini API sometimes returns output in multiple formats (raw text), requiring dynamic extraction logic.
2. Prompt Tuning — It took several iterations to craft a prompt that ensures concise, structured, and relevant feedback instead of verbose explanations.
3. Error Handling — Managing incomplete API responses or network errors required careful try/catch wrapping.

### 6. Learnings

- Gained hands-on experience integrating **Google's Generative AI SDK** into a Node.js app.
- Learned how to handle asynchronous API calls, dynamic object parsing, and response normalization.
- Understood the importance of **prompt design** for achieving predictable AI behavior.

## 7. Prompt Design Insight

The prompt emphasizes clarity, brevity, and structure, ensuring consistent output under three headings. By specifying format and tone, the AI consistently returns concise and professional reviews.