

AI Email Template Builder: An Intelligent System for AI-Powered Professional Email Generation

Sanjana H S^{*1}, Manasa P A¹, Dr. Manjunath B^{*2}

Department of Master of Computer Applications¹

Associate Professor, Department of Master of Computer Applications²

Maharaja Institute of Technology, Mysuru, Karnataka, India

Abstract: *Crafting a well-written business email takes longer and more effort than it needs to. Many individuals fail to achieve the right tone and content due to the rush of modern life. The current paper introduces the AI Email Template Builder online application that employs Google's Gemini AI technology and is used to create automated email drafts that users need. What's more, instead of depending on static libraries of templates or asking an AI for unnecessary explanations of the situation, the clients just need to give a few inputs, namely the recipient, goal, tone, and keywords, which will be transformed into a template. After that, the users can modify, recreate, or save the draft they have received. The software is composed of four layers, including the interface layer based on React.js/Next.js, the application layer, which is based on Node.js/Express.js, the AI processing layer based on Gemini, and the database layer. The system is secured by Clerk Authentication*

Keywords: *Crafting*

I. INTRODUCTION

Effective communication has been recognized as one of the most essential and widely used tools in the field of academia, business, and professions today. Regardless of whether one is applying for a job, contacting a customer, running a project, or doing official communication, email correspondence remains the most common method of formal communication. A lot of effort is needed to compose an adequately structured, well-worded, and correctly toned letter since the required format and language require more attention than one can afford to give at times. Google Gemini and other large language models can produce a lengthy text simply by using a short prompt – thus giving rise to the creation of the AI Email Template Builder. Instead of presenting numerous predefined templates, where the chances are very slim that any one of them corresponds with the user needs, the system makes it possible to tell what kind of email is needed in terms of recipient, context, tone, key phrases, etc.

A. Objectives

- Design a website that is safe for AI computerised e-mail composition.
- Implement two-step authentication using the Clerk Authentication service, where users inputs are the receiver's details, email type, and key points.
- Use the Gemini AI platform to construct relevant email content automatically.
- Allow for feedback, editing and saves of the emails produced by the AI machine.
- Ensure that a record of emails produced is kept for future reference as well as access.
- Compile user information and previous emails in a database.
- Provide an easy-to-use interface that is simple and compatible.
- Ensure that the method can be upgraded in the future, probably to allow different languages outputs and other web applications.

The AI Email Template Designer can be used by students, professionals, companies etc. who need to prepare their emails fast and on consistent basis, where students can apply for internships, applying for jobs and job interviews, working



professionals can just send client messages, give updates on their work, make requests for meetings and so on. Generally, this project shows how AI can simplify everyday tasks in communication across the entire company.

II. METHODOLOGY

The approach used in designing the system consisted of a layered methodology that includes literature analysis, requirements assessment, modular architecture development, and iterative implementation supported by ongoing testing. Literature Review and Research Gap

Although Chen et al. [1] demonstrated that large language models can help in writing emails with minimum guidance from users producing output much more relevant than typical solutions, Koto and others [2] analyzed the pros and cons of generative AI for business correspondence noting that its major advantage is that it improves writing efficiency collapses in the need for human review. Further, the Transformer model presented by Vaswani et al. [3] supersedes recurrent neural networks and serves as a basis for most modern language models. Brown et al. [4] demonstrated that GPT-3 can create appropriate content from inputting plain language requirements with only several examples while Devlin et al. [5] presented BERT which improves the understanding of language in context. Finally, Google Gemini API documentation [6] mentions the use of structured requests in order to speed up the process of generating text.

B. Present Systems and Suggested System

The mere existence of two primary types of email writing systems is remarkable. For instance, pre-designed template libraries provide methods that eliminate red tape from the writing process. However, there are too strict for any audience in terms of a writing scenario, which makes it necessary to do plenty of editing.

C. Feasibility Analysis

The new system is viable and can be implemented thanks to the use of various known technologies – React.js, Next.js, Node.js, Express.js, Clerk Authentication and a relational database that makes the entire implementation feasible.

D. Software and Hardware Specifications

Functional specifications of the project include registration and logging in processes, entering the information, generating emails via the use of Gemini and content management processes like viewing, editing, creating copies, and using templates again.

Table 1. Software Requirements

Software Category	Software Used
Frontend & Full-Stack Framework	React.js, Next.js
Backend	Node.js, Express.js
UI Framework	Tailwind CSS
Authentication	Clerk Authentication
Database	Relational Database (MySQL)
Artificial Intelligence	Gemini AI API
Development Tools	Visual Studio Code, npm
Version Control	Git, GitHub

No special hardware is necessary; a regular PC or laptop capable of running a modern web browser and development environment is enough since the app utilizes various cloud-based services for authentication, storage of data, and AI processing.



III. DESIGN AND ANALYSIS

The AI Email Template Builder consists of four layers: the Presentation layer, the Application layer, the AI processing layer, and the Data layer. The Frontend layer uses React.js and Next.js technologies and includes login page, dashboard, email sending form, template editor, and history page. The Application layer is built with Node.js and Express.js technologies and authenticates every request, processes requests, and makes DB operations via RESTful APIs. The AI processing layer transforms validated and structured user input into a prompt for Gemini AI, and gets the generated email. The Data layer stores user profiles, templates created, and requests history in a relational database

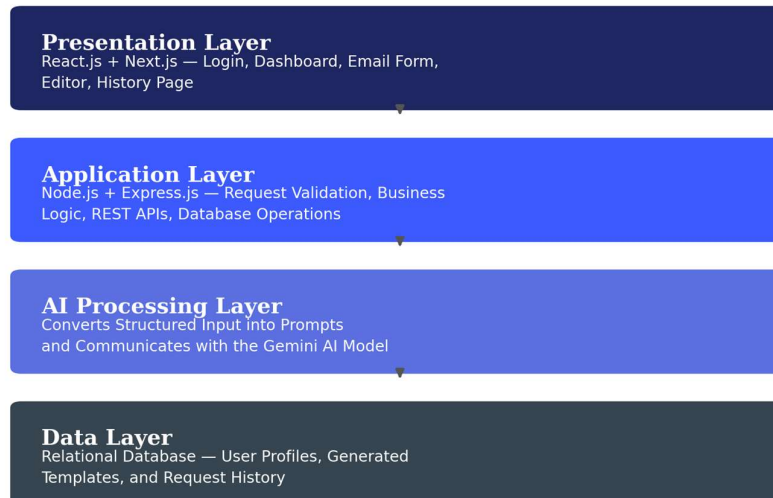


Figure 1: Four-Layer System Architecture of the AI Email Template Builder

Before implementation, UML diagrams were also used to further model the system, such as the use case diagram of registered users (creating, editing, storing, and retrieving templates) supervised by an administrator, and the sequence diagrams for both email generation and user authentication. Other diagrams created include the class diagram of User, EmailRequest, EmailTemplate, and SavedTemplate classes, as well as the entity-relationship diagram showing the link between and among users and their templates created in the system. The flow diagram showing how the user logs in until the point where the final template is stored in the system is shown in Fig. 2, which depicts the entire process.



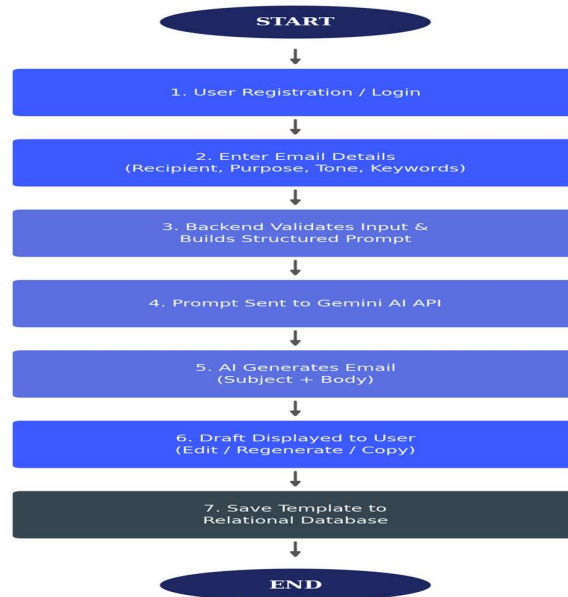


Figure 2: Workflow of the AI Email Template Builder

IV. FINDINGS AND DISCUSSION

The tectonic frontend was realized through the application of React.js and Next.js frameworks that allow for the creation of a user-friendly UI that has a responsive layout across different components of the application like landing page, authentication forms, dashboard, email creation screen, Editor feature, and history page. The backend was developed based on Node.js and Express.js that ensures the validation of the input, the implementation of business logic, communication with Gemini AI API, database operation through RESTful endpoints. All users' data, generated templates, and the history of requests find their place in the relational database and are reliably protected from SQL injection attacks through the application of parameterized queries and ORM techniques. Clerk Authentication ensures registration, login, session management, and protection of the application routes making sure that only authenticated users can create or access previously created templates.

The system achieved its validation via six different testing processes which are unit, integration, functional testing, performance testing, security testing, and user acceptance testing. The unit tests included testing the login process, input validation, prompt generation, performing operations in the database, and parsing AI responses.

Table 2. Sample Test Cases and Results

Test Case ID	Module	Test Scenario	Status
TC-01	User Registration	Register a new user	Pass
TC-02	User Login	Login with valid credentials	Pass
TC-06	Email Generator	Generate professional email	Pass
TC-08	Gemini AI	Generate email with different tone	Pass
TC-11	Template Manager	Save generated template	Pass



TC-17	Security	Session validation (expired)	Pass
TC-19	Performance	Generate email under normal load	Pass

In every test, it became evident that the authentication was performed correctly, that emails were produced as per the data provided, and that templates were recoverable. Moreover, no decline in results was observed during the repeated tests, as critical problems at the system level were absent. All these results show that the use of the processed approach with AI-generated emails instead of direct dialogue enables the creation of an effective and dependable booking system.

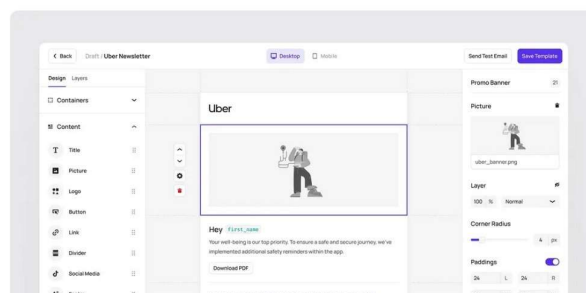
V. SNAP SHOTS



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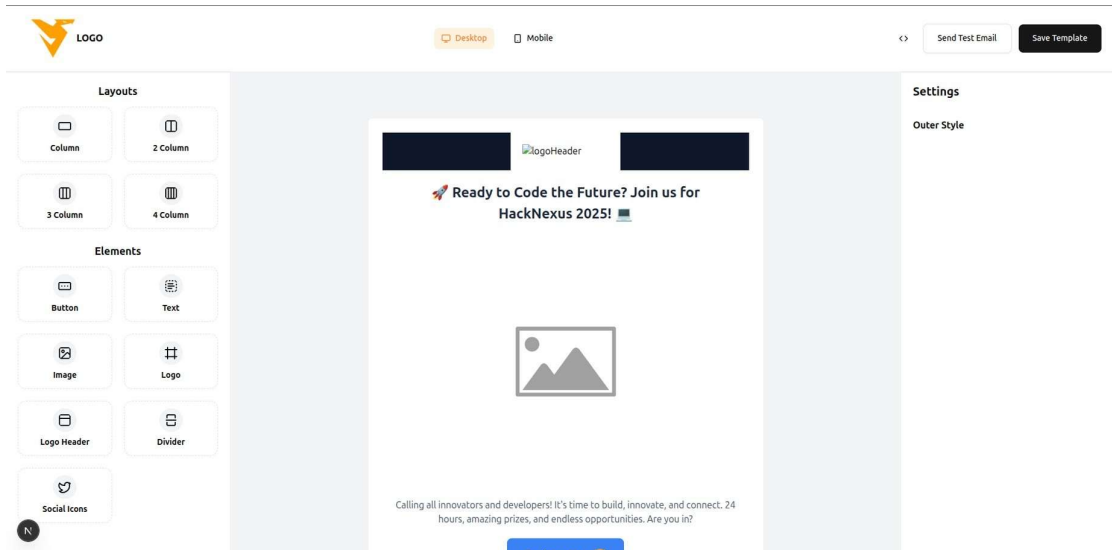
[Create with AI](#) [Start from Scratch](#)

Provide details about the Email Template you'd like to create

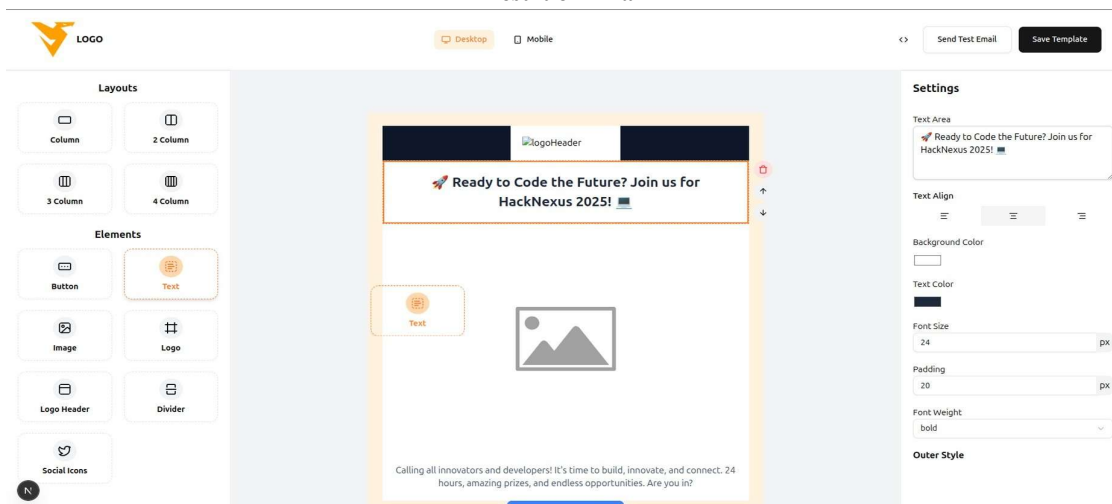
Start Writing here ...

[GENERATE](#)



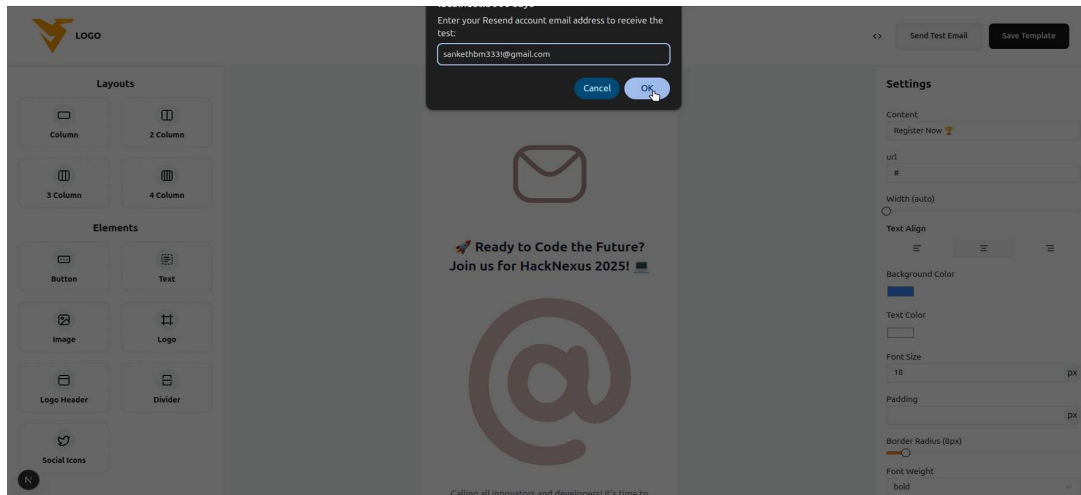


Result of Email

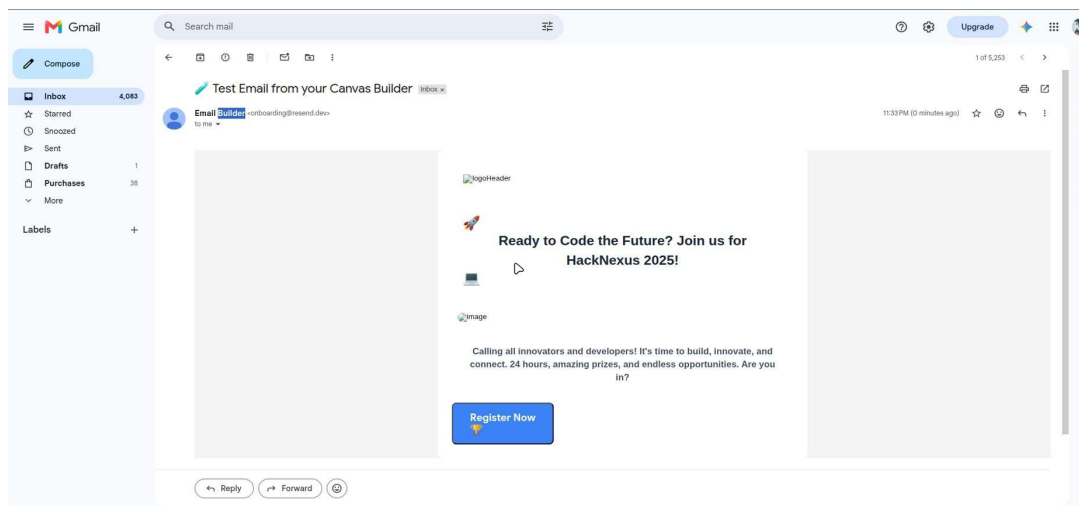


Editable Email





Send Through Mail



Final Result

VI. CONCLUSION

This project aimed to solve a simple but ongoing issue: writing professional emails takes too much time and requires more refinement than most people can manage under daily time constraints. The AI Email Template Builder uses a React.js and Next.js frontend, a Node.js and Express.js backend, and the Gemini AI model to convert a few structured inputs—recipient, purpose, tone, and keywords—into an email that truly matches the situation. Meanwhile, Clerk Authentication and a relational database ensure secure access and allow for reusable content. Testing across authentication, generation, editing, and storage showed that these components work well together, both on their own and as part of a unified system. The results support the broader conclusion that generative AI, used within a clear, structured workflow instead of a simple chat interface, can significantly cut down the time and effort needed for everyday professional writing without making the output feel generic or inconsistent. This approach closes a real gap for students, job seekers, and professionals.



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