

# REFLECT: An GPT Based Android Application for Diary Writing and Emotional Support

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**Abstract**— Diary writing has long been acknowledged as beneficial for personal reflection and emotional well-being. This paper presents "Reflect," an innovative Android application designed to promote diary writing among users, mainly focusing on teenagers. The application combines the functionality of a diary with the support of a Chatbot powered by the GPT-3.5 turbo API, offering users an interactive and reflective experience. Users can authenticate using email/password or Google authentication via Firebase. The sentiment analysis feature provides insights into the emotional content of diary entries, presenting an emotional breakdown as a percentage. The Chatbot acts as a virtual companion, offering emotional support and guidance to users. "Reflect" use Android Studio, Kotlin, Firebase, and Cloud Firestore for data storage. Integrating the GPT-3.5 turbo API enhances the app's capabilities for sentiment analysis and Chatbot functionality. The goal of "Reflect" is to encourage diary writing among individuals, particularly teenagers, fostering self-reflection, gratitude, and emotional awareness. By combining diary writing, sentiment analysis, and a supportive Chatbot, the app provides an interactive platform for personal growth and well-being.

**Keywords**— Android application, diary writing, emotional well-being, sentiment analysis, Chatbot, self-reflection.

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## I. INTRODUCTION

Diary writing has been a time-honored practice, recognized for its numerous benefits in fostering self-reflection, emotional expression, and personal growth. Writing down one's thoughts, experiences, and emotions offers a therapeutic outlet and allows individuals to gain valuable insights into their lives. In an increasingly digital age, the development of mobile applications provides an opportunity to adapt this traditional practice to the modern world. The purpose of this paper is to

introduce "Reflect," an Android application aimed at promoting diary writing among users, with a particular focus on teenagers. The application serves as a digital diary that captures daily entries and incorporates advanced features to enhance the overall user experience and encourage engagement. The primary objective of "Reflect" is to provide a platform where users can conveniently document their daily experiences, express gratitude, and engage in self-reflection. By encouraging the habit of daily diary writing, users are prompted to take a few moments each day to unwind, introspect, and appreciate the positive aspects of their lives. To augment the diary writing experience, "Reflect" integrates a sentiment analysis feature powered by the GPT-3.5 turbo API. This feature automatically analyses the emotional content of each diary entry, providing users with an emotion breakdown presented as percentages. By visualizing their emotions over time, users can better understand their emotional well-being, recognize patterns, and make informed decisions regarding their mental health.

Furthermore, "Reflect" incorporates a chatbot component, leveraging the GPT-3.5 turbo API to create a virtual companion that mimics the role of both a professional psychologist and a supportive friend. The Chatbot engages users in conversation, offering empathetic responses, emotional support, and guidance. This interactive element adds a layer of personalized assistance and encouragement to the diary writing experience, making it more engaging and fulfilling. The development of "Reflect" involved utilizing Android Studio for application development and Kotlin for implementing the app's business logic. Firebase was employed for user authentication, ensuring a secure and personalized user experience. Cloud Firestore was utilized for efficient data storage, allowing users to access and retrieve their diary entries at any time.

The subsequent sections of this paper will delve into the technical aspects of the "Reflect" application, including its system architecture, implementation details, evaluation methodology, and results. Additionally, the limitations and potential areas for future enhancements will be discussed. In summary, "Reflect" aims to modernize and encourage the practice of diary writing through an intuitive and feature-rich

Android application. By combining traditional diary writing with sentiment analysis and a chatbot, the app provides a comprehensive tool for self-reflection, emotional support, and personal growth.

## II. RELATED WORKS

Diary writing and personal reflection have long been recognized as valuable practices for emotional well-being and personal growth. Several existing studies and applications have explored the intersection of technology and diary writing, emotion analysis, and chatbot technology. This section reviews some of the relevant works in these areas and highlights the unique contributions of the "Reflect" Android application.

One notable work in diary writing is the research conducted by Pennebaker et al. on expressive writing<sup>[3]</sup>. They found that individuals who engaged in daily expressive writing experienced improved psychological and physical well-being. These findings demonstrate the potential benefits of regular diary writing, which "Reflect" aims to facilitate through its user-friendly interface and advanced features. Emotion analysis in the text has also garnered significant attention in recent years. Ekman and Friesen have proposed models and techniques for identifying and categorizing emotions expressed in written text<sup>[1]</sup>. These approaches have been applied in various domains, including sentiment analysis in social media and customer feedback analysis. In the context of "Reflect," sentiment analysis is used to analyze the emotional content of diary entries, providing users with insights into their emotional states over time.

The integration of chatbot technology within mental health applications has gained prominence due to its potential to provide emotional support and guidance to users. For example, Woebot, an AI-powered chatbot developed by Fitzpatrick et al.<sup>[4]</sup>, offers cognitive-behavioral therapy techniques to users experiencing stress, anxiety, or depression. Similarly, Wysa, developed by Jain et al.<sup>[3]</sup>, provides emotional support and conversation-based interventions to address users' mental health concerns. The chatbot component in "Reflect" aims to serve as a virtual companion, offering both professional and friendly support to users during their diary writing journey. While existing works have explored aspects of diary writing, emotion analysis, and chatbot technology individually, "Reflect" uniquely combines these elements into a single cohesive application. By integrating sentiment analysis and a chatbot within a diary writing platform, "Reflect" offers users a comprehensive tool for self-reflection, emotional awareness, and personalized support.

In summary, previous research has shown the benefits of diary writing, emotion analysis, and chatbot technology in promoting emotional well-being. The "Reflect" application builds upon these works by combining them into an integrated Android application, providing users with a unique and valuable experience for diary writing and emotional support. This section presents a reduced-order fluid-mechanics

model for flow past a fish body and a measurement equation to predict pressure differences between sensor locations in a bio-inspired artificial lateral-line.

## III. SYSTEM ARCHITECTURE

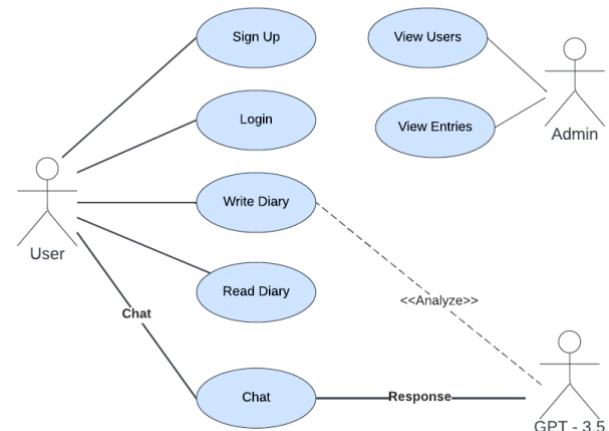
This section describes the system architecture of the "Reflect" Android application is designed to provide users with a seamless and intuitive experience for diary writing and emotional support. This section's Use-case, ER, and Architecture diagram showcases the various actors and their interactions within the system.

### A. Use-Case Diagram

Use-case diagrams model a system's behavior and help capture the system's requirements. They describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors.

The use case diagram represents the functional requirements and interactions between the actors in the system. The "User" actor is the primary user of the application, while the "Admin" actor represents the administrative role responsible for managing user data and system functionality. Additionally, the "GPT-3.5" actor represents the integration of the GPT-3.5 turbo API for advanced functionalities. The "User" actor can perform actions such as signing up for the application, logging in, writing diary entries, reading past entries, and engaging in chat conversations for emotional support. These functionalities are essential for users to document their daily experiences, access their entries, and seek guidance through the chatbot feature. The "Admin" actor, on the other hand, has functions related to system administration. They can view user information and entries, enabling efficient management and oversight of the application's user base.

Integrating the "GPT-3.5" actor allows for advanced capabilities within the application. It enables sentiment analysis of diary entries to provide users with insights into their emotional states.



**Figure 1:** Use Case Diagram of the "Reflect".

The chat functionality is enhanced through the GPT-3.5 integration, allowing the Chatbot to provide personalized and supportive responses to user queries.

### B. ER Diagram

An entity relationship diagram (ERD), an entity-relationship model, is a graphical representation that depicts relationships among people, objects, places, concepts, or events within an information technology (IT) system. An ERD uses data modeling techniques that can help define business processes and serve as the foundation for a relational database.

The ER diagram showcases three entities:

- USER
- DIARY ENTRY
- CHAT

Each entity has specific attributes that capture the necessary information for the application's functionality.

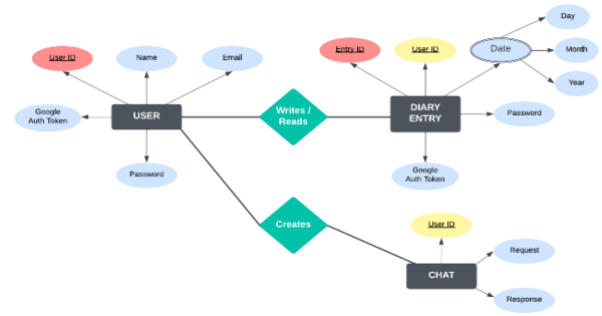
The "USER" entity represents the application's users and contains attributes such as User ID (primary key), Name, Email, Password, and Google Auth Token. These attributes store user-specific information and ensure secure authentication and identification within the system.

The "DIARY ENTRY" entity captures the details of each user's diary entry. It includes attributes such as Entry ID, User ID, Date, Entry, Gratefulness, and Emotions. These attributes allow users to create, store, and retrieve their diary entries while also providing insights into their emotional states through sentiment analysis.

The "CHAT" entity facilitates communication between users and the chatbot feature. It consists of attributes such as User ID, Request, and Response. These attributes store the user's chat interactions and the corresponding responses provided by the Chatbot.

The relationships between the entities are defined as follows:

- The "User" Writes/Reads to the "Diary entry" relationship signifies that each user can create and access their own diary entries.
- b. b. The "User" Creates "Chat" relationship denotes that users can initiate chat conversations with the chatbot feature.
- c. The ER diagram serves as a blueprint for the database design, ensuring efficient data management and retrieval within the "Reflect" application. It enables the seamless integration of user information, diary entries, and chat interactions, enhancing the overall user experience.



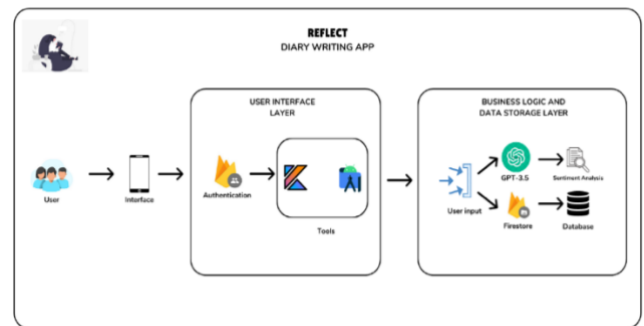
**Figure 2:** ER Diagram of the "Reflect".

### C. Reflect Architecture

The User Interface Layer serves as the front-facing component of the application, responsible for capturing user input and presenting information. This layer incorporates various tools to enable user interactions, including Firebase Authentication, Kotlin, and Android Studio. Firebase Authentication ensures secure user authentication, while Kotlin and Android Studio facilitate the development of the user interface.

The Business Logic and Data Storage Layer lies beneath the User Interface Layer and is responsible for processing user input and managing data storage. User input is received within this layer and branches into two pathways. The first pathway connects to the GPT-3.5 API, a powerful language model, enabling the application to leverage advanced natural language processing capabilities. The output from the GPT-3.5 API then flows into the Sentiment Analysis module, where the emotions within the user's diary entry are analyzed.

In summary, the architecture diagram illustrates the control flow of the "Reflect" Android application, encompassing the User Interface Layer and the Business Logic and Data Storage Layer. The User Interface Layer facilitates user interactions through Firebase Authentication, Kotlin, and Android Studio, while the Business Logic and Data Storage Layer handles user input, performs sentiment analysis through the GPT-3.5 API, and stores and retrieves data using Firestore and the Database component.



**Figure 3:** Architecture Diagram of the "Reflect"

#### IV. DISCUSSION

This section delves deep into the System implementation of the 'Reflect'. This section tells about the development environment of the application as well as other aspects.

##### A. Development Environment

The "Reflect" Android application was developed using a robust and efficient development environment, which provided the necessary tools and technologies to create a seamless user experience.

The primary components of the development environment include Android Studio, Kotlin programming language, and various libraries and frameworks.

Android Studio, the official integrated development environment (IDE) for Android app development, served as the foundation for building the "Reflect" application. It offers a feature-rich and user-friendly environment specifically tailored for Android development. With its comprehensive set of tools, such as a code editor, visual layout editor, and debugging tools, Android Studio streamlined the development process, ensuring code correctness and efficient resource management.

Kotlin, a modern and expressive programming language, was chosen as the primary language for implementing the business logic of the "Reflect" application. Kotlin provides a concise and intuitive syntax, reducing boilerplate code and enhancing developer productivity. Its interoperability with Java allowed for seamless integration with existing Android libraries and frameworks.

Several libraries and frameworks were utilized to expedite development and enhance the functionality of the application. These include the Firebase Authentication library, Firebase Firestore library and Okhttp3 library etc.,

##### B. Firebase Authentication

The "Reflect" Android application incorporates Firebase Authentication to provide secure and streamlined user authentication. Firebase Authentication is a robust and reliable authentication service provided by Google that simplifies the implementation of user authentication mechanisms.

The Firebase Authentication library offers a range of authentication methods, including email and password credentials, social login providers (such as Google authentication), and phone number authentication. This allows users of the "Reflect" application to choose their preferred authentication method based on convenience and personal preference.

By leveraging Firebase Authentication, the "Reflect" application ensures secure user login and registration processes. When users create an account, their credentials, such as email and password, are securely stored and managed by Firebase.

This eliminates the need for developers to implement complex and error-prone authentication systems from scratch.

##### C. Cloud Firestore Integration

Cloud Firestore, a NoSQL cloud-based database provided by Firebase, is seamlessly integrated into the "Reflect" Android application to enable efficient data storage and retrieval. Cloud Firestore offers a scalable and flexible database solution that ensures real-time data synchronization across devices.

The integration of Cloud Firestore in the "Reflect" application allows users to securely store and retrieve their diary entries, user information, and other relevant data. This cloud-based approach eliminates the need for local storage and provides users with seamless access to their data from multiple devices.

Cloud Firestore follows a document-oriented data model, where data is organized into collections and documents. In the "Reflect" application context, each user has a dedicated collection containing their diary entries. Each diary entry is represented as a document within the user's collection and includes attributes such as entry ID, user ID, date, entry content, gratefulness content, and analyzed emotions.

Cloud Firestore automatically synchronizes data between the user's device and the cloud database, ensuring real-time updates and consistent access to the latest information. This enables users to seamlessly access their diary entries from any device, keeping their data in sync across platforms.

##### D. Cloud Firestore Integration

To provide advanced chatbot capabilities and sentiment analysis, the "Reflect" Android application leverages the power of the GPT-3.5 Turbo API. The GPT-3.5 Turbo API, developed by OpenAI, is a state-of-the-art language model that enables natural language processing and generation.

The integration of the GPT-3.5 Turbo API in the "Reflect" application allows users to engage in meaningful conversations with a chatbot that simulates the behavior of a professional psychologist and a supportive friend. The Chatbot serves as an interactive and empathetic companion, providing emotional support and guidance to users.

By leveraging the GPT-3.5 Turbo API, the Chatbot can understand user inputs, generate relevant and coherent responses, and simulate human-like conversations. The API utilizes advanced natural language processing techniques, including deep learning and contextual understanding, to provide accurate and contextually appropriate responses.

The "Reflect" application also utilizes the GPT-3.5 Turbo API for sentiment analysis of diary entries. When a user saves a diary entry, the GPT-3.5 Turbo API analyzes the text and extracts the underlying emotions expressed within the entry. These emotions are then categorized and presented to the user

as a percentage distribution, offering valuable insights into their emotional state.

## V. CONCLUSION

The "Reflect" application allows users to create a personal diary entry each day, capturing their thoughts, experiences, and expressions of gratitude. Users can easily access and review their past entries by providing an organized and secure platform, fostering self-awareness and personal growth. The inclusion of a chatbot powered by the GPT-3.5 Turbo API enhances the application's functionality, offering users an interactive and supportive companion. The Chatbot simulates the role of a professional psychologist and a best friend, engaging in meaningful conversations and providing emotional guidance. Furthermore, the sentiment analysis feature implemented using the GPT-3.5 Turbo API enables users to gain insights into their emotional state. The analysis categorizes and presents the emotions expressed in the diary entries, allowing the users to better understand and reflect on their emotions over time. Throughout the development process, careful consideration has been given to user experience, data security, and privacy. By leveraging Firebase Authentication, user authentication is secure and seamless, while Cloud Firestore ensures efficient and reliable data storage and synchronization. The integration of these technologies creates a robust and scalable system that meets the users' needs.

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