ChatBud: A Secure Mental Health Chatbot

DGIN 5201 Digital Transformation Final Project Report

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Introduction

Mental health is often overlooked in the fast-paced environment of a university. Students experience academic pressures, social stress, time-management challenges, and uncertainties about their future, especially around exam season. Many students are reluctant to seek professional therapy due to stigma, cost, or scheduling problems. Recognizing these challenges, we decided to develop an app called ChatBud: a private, user-friendly, and accessible mental health chatbot that can provide immediate general support and direct users toward professional resources when needed.

Initially, our vision was quite broad: a fully featured app to track long-term mental health challenges, offer crisis intervention links, and share data with professional counselors. However, as the project progressed, we refined our scope to a more manageable set of core features. This report details our app's value proposition, the services we provide, our milestone progress, user testing feedback, the architecture behind ChatBud, the lessons learned, and what we would do next with more time.

Our original plan was to build a mental health digital companion for students. We wanted to incorporate the following:

1. Immediate chat support – quick, AI-based chat for emotional support at any time
2. Long-term tracking – logged sessions to reveal patterns in emotional states over time
3. Crisis intervention – automatic alerts to professional services if an emergency or crisis is detected
4. Integration with institutional services – partnerships with counseling centers, wellness programs, and external resources

Value Proposition

Through the development process, we focused on a narrower, more achievable set of features. Our refined value proposition is as follows:

1. Private online chatbot – offers empathic, non-judgmental conversation using a large language model (LLM)
2. On-demand support – gives an alternative for student who feel stigma or hesitation about scheduling formal therapy sessions
3. Self-assessment & self-help – students can ask the chatbot about mild symptoms or daily stresses, it references DSM-5 guidelines to provide general coping strategies and resources
4. Secure data handling – all chats and user profiles are encrypted and only accessible by the user, ensuring confidentiality and peace of mind

Although we scaled down from the original concept, our value proposition remains the same: to make mental health resources and general emotional support accessible to students when they need it most, in a safe and stigma-free environment.

In its current form, this app provides a confidential chat where students can receive real-time support. The chatbot offers DSM-5 informed guidance on mindfulness exercises and stress management tips, explicitly avoiding diagnoses and instead referring to professional services. It

also includes a basic keyword safety check that will prompt users “If you are in crisis, please seek immediate professional help…” if certain terms arise.

Future Plans for Additional Features

We originally intended to include the ability to notify professional services or hotlines if critical risk factors were detected. While the system can generate warnings, more robust crisis intervention logic requires further development and collaboration with external resources.

Another feature we had planned on building is a student mental health profile. Currently each user’s conversation data is stored securely in a database, then decrypted only for that user to see. Though there is potential to implement an algorithm to analyze this conversational data over time to detect patterns and any changes in behavior. Once this more robust algorithm is in place, this tool would be able to generate a progress report indicating any changes in mood, frequency of negative thoughts, or types of stressors over weeks or months.

Pain relievers

Some key pain relievers of this app already in place include its accessibility, reduced stigma, and emotion/mood tracking. Its online availability 24 hours of the day is essential, with no need to schedule an appointment or book a time. With this feature, those with a busy schedule have easier access to general support. Individuals who are hesitant to seek professional help, can test the waters with this app, without immediately turning to face-to-face therapy. This has the potential to break down some of the barriers and stigma associated with therapy. In future iterations, regular usage could reveal patterns and triggers, giving students early coping strategies.

Gain creators

The app’s gain creators center on personalization and data-driven insights. As we refine the system, it could learn from user input to deliver increasingly relevant feedback. Collaborating with campus mental health centers or research institutions would also boost credibility and expand resources. Moreover, with user consent, anonymized and aggregated data could reveal broader mental health trends among the student population.

Overview of features

ChatBud provides a responsive mental health chat that lets students send and receive real-time messages and receive rapid responses from our AI model. It draws on DSM-5 guidelines and criteria on psychological conditions to guide conversation, while avoiding giving an official diagnosis. Should the conversation reveal potential crisis indicators through the keyword safety check (e.g. ‘harm’, ‘suicide’, etc.), the chatbot recommends that the use seek professional help. In terms of security, a login and encryption system ensures that each user’s credentials and chat logs remain secure in our database. Finally, past chat sessions can be accessed through a convenient sidebar and pop-up menu, and messages remain decrypted only as long as the user is logged in to see them.

Technical flow

When the user types a message in the chat box in the user interface, this input is handled by a Flask route (/get) in the backend. The route appends the message to an in-memory chat session and queries the GPT-4o API, guided by specialized instructions on how to respond. Once the model generates a reply, the backend checks for any crisis-related keywords such as “kill”, “harm”, “suicide”, etc., and adds a cautionary disclaimer if they are detected. Upon returning to the front end, the newly generated chatbot reply appears in a chat bubble for the user to see, alongside the option to view older sessions from past conversations. The conversation, including the user’s input and the chatbot’s reply, is then encrypted using the Fernet library and stored within a MySQL database, tied to the user’s ID as a foreign key.

Milestone progress

Our initial project scope and plan was extensive. We planned to integrate a front-end template, establish the OpenAI API with a basic safety keyword check, referencing DSM-5 criteria and disclaimers. We aimed to implement a login system that encrypted not only passwords, but also chat history, followed up by more advanced features like long-term tracking, advanced crisis intervention, and user surveying and testing.

We successfully implemented a front-end template that we modified to house our chat interface connected to our Flask backend. We integrated the GPT-based API with specialized DSM-5 based prompts and added a basic safety check for potentially harmful keywords. Our login system uses hashed passwords, and we have encrypted chat logs within the MySQL database to maintain confidentiality. A sidebar in the user interface displays previous user sessions, and we conducted a user survey to collect feedback from classmates. However, we did not complete an in-depth crisis intervention feature like automating messages to a third party as it did not fit the scale of this prototype, nor did we fully develop long-term tracking analytics or progress reporting due to the time scale that we had to work with. Despite these omissions, we believe we met our essential milestones in providing a secure, user-friendly chatbot.

User testing & feedback

Our user testing consisted of distributing a survey out to our target users (university students) and following that up with a few individuals interacting with the chatbot then providing feedback. With this approach we were able to gather insights about our target population’s general pains regarding mental health support, and whether an app like ChatBud would help with those. The feedback we gathered from those who tested the app, helped us evaluate whether users found the chatbot approachable and how relevant they considered its suggestions, as well as gauging their preference for human counselors over the AI solution.

Our survey consisted of 9 fellow classmates, and 66% stated that they had never gone to seek out mental health support or resources, 77% had never used the university services while the rest stated they don’t meet their needs. Just over half the respondents either talk to friends or family to seek support and almost as many stated they never seek support. Of these same respondents, two-thirds stated that if ChatBud provided helpful support they’d refer it to a friend, and over

half would feel comfortable using the app if it were university-funded or possibly covered by health-insurance.

From our user-testing, the majority of users noted that the interface was intuitive, and praised the responsiveness of the app and the support it provides without the hassle of scheduling a face-to-face session. Furthermore, they appreciated the sense of privacy and the encryption measures taken to provide confidentiality. Nevertheless, one user found the bot's replies somewhat impersonal or "robotic", but also claimed that was due to their coding experience, background, and understanding of the app structure, they would still prefer the deeper empathetic connection offered from human counselors.

In terms of pain relievers, the testers found that having quick access to a chat was appealing for immediate emotional needs. Regarding gains, one user noted how easily ChatBud could deliver self-help tips that might otherwise be overlooked. Nonetheless, there are inherent limitations in the AI's empathic abilities, as certain testers expressed a preference for genuine human contact for sensitive discussions.

Architecture & Technology Choices

Our system is based on a Python-Flask backend that handles the API calls, security checks, and encryption. The GPT-4o API is customized to process user queries according to system prompts informed by DSM-5. A MySQL database holds both user credentials, secured password hashing, and chat logs that are further protected with Fernet encryption. The front-end user interface was built using HTML/CSS/JavaScript, with an easy-to-use and navigate organization and session history view.

We found Python convenient for integrating with the API and for setting up a quick prototype. MySQL's integration with Python using the 'mysql.connector' library made executing queries very simple, to store and access info in the database. To ensure the database would be safe in case of a data breach, the data was encrypted server-side, this way any accessed information is unreadable, as it can only be decrypted using the separately stored encryption key.

Reliance on the GPT-4o API means the user needs internet access to use the app, and we depend on the model's availability. Ideally, we would be using a locally hosted in-house trained model like Llama, this would not only allow for offline access on devices with processing power strong enough to run the model but boost data privacy as the prompts and messages being exchanged would only be processed locally, and not through the servers of a third-party company. Though due to the nature of this project and our goal to produce a MVP, we opted to use Open AI's GPT-4o model. Furthermore, the front-end UI template that was chosen proved more complex to adjust that coding a simpler UI from scratch. Nevertheless, we still managed to develop a functional MVP that addresses our core requirements for security and usability.

Project Reflections

One important success was our decision to reduce the scope of the project. Rather than aiming for advanced features that would be complicated to implement , like the crisis intervention or

long-term tracking, we prioritized core features that would prove the feasibility of the app. Putting a large emphasis on data security and encryption was another positive decision, as it is crucial for building user trust and protecting privacy.

Some decisions we made set us back a few steps, like choosing to use a template UI. This required more time customizing the UI than expected. Additionally, we found that forging official partnerships with university resources/services would require additional administrative collaboration. Such an endeavor would be more viable in a longer-term initiative rather than in a brief MVP project.

Future Directions

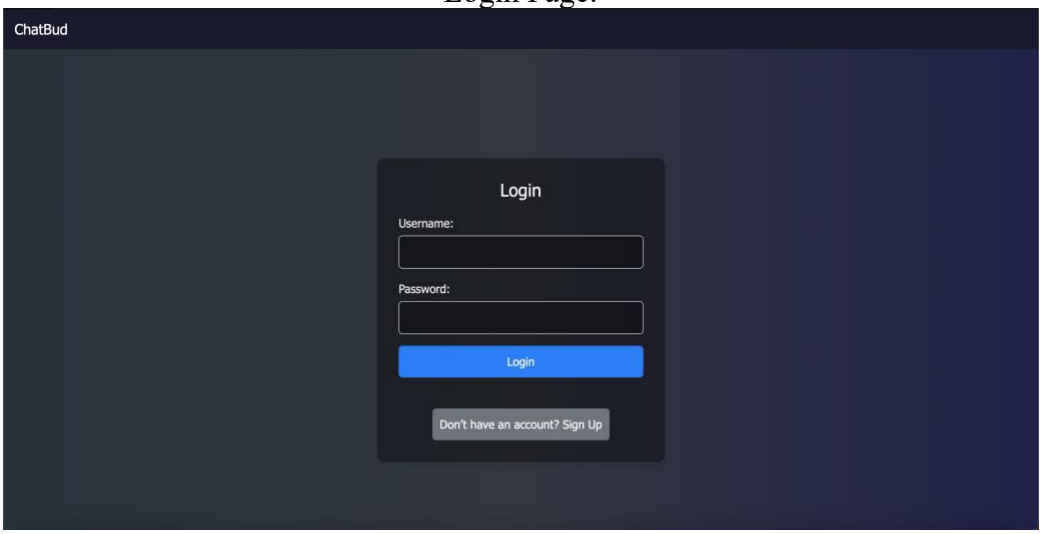
If offered more time or resources, aside from implementing the previously mentioned features like long-term tracking and sophisticated crisis intervention, we hope to open the app to collaborate with mental health professionals or campus services. A clinician portal would enable authorized therapists to monitor user-consented data and/or progress updates. Another goal would be to refine the model's personalization so it can better suit each user's communication style. This, along with a revised UI/UX might help bridge the emotional gap between a chatbot and a real counselor. Having extensive UI customization options could significantly increase the comfort level of the user with using the tool.

Conclusion

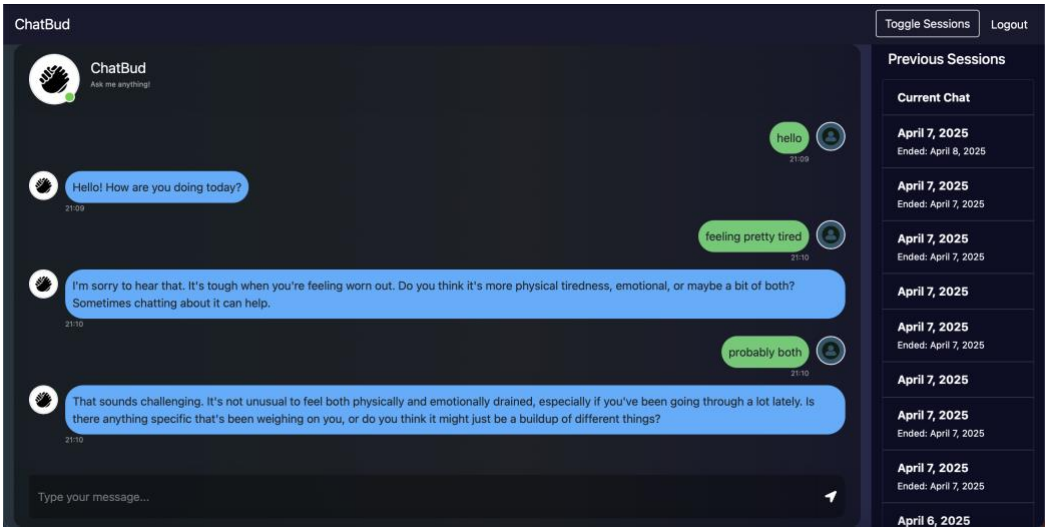
Throughout the development of ChatBud, we aimed to create a technology bridge between students in need of mental health support and existing counseling resources. While this system in no way attempts to replace licensed therapists, it provides an immediate, easily accessible alternative for students seeking general support or basic mental health information. The lessons and skills we learned mainly revolved around scope management of GPT-based development, security, and user-centered design; these skills will help guide future iterations. We believe ChatBud demonstrates the potential for chatbots to serve as a supplement to conventional mental health services in a campus environment and beyond.

Appendix A: UI Screenshots

Login Page:



Chat Screen:



Previous Chats: