Software Requirements Specification

Feeling Together

Major:	Robotics and Intelligent Devices
Team name:	EmoGenius Crew
Finish time:	November 3, 2023

Catalogue

1 Introduction

1.1 Purpose of writing

In today's society, emotional health is a prominent topic worthy of attention. With the acceleration of the pace of life and the rapid popularization of digital technology, people face unprecedented emotional challenges. These individuals may be surrounded by all kinds of emotions, but they are not sure how to effectively handle and express these emotions. Therefore, the purpose of the project is to develop an Android application that integrates emotional analysis, social interaction and emotional support. Our goal is to provide a platform that allows users to recover their emotions frankly, understand their emotional state, and share with others and get support.

1.2 Project background

Software name：Feeling Together
Project task proposer：EmoGenius Crew
Project developer：EmoGenius Crew

1.3 References

Norm of computer software requirements specification

2 Overall description

2.1 Objectives

2.1.1 Development intention

Based on humanistic care, our team strives to use the Android platform to relieve stress and share emotions through this Android platform. Let users frankly record their emotions, understand their emotions in depth, share with others, and get support. The motivation behind this application is to encourage positive emotional expression, promote social connection, enhance emotional health, and become more confident, positive and emotional elasticity.

2.1.2 Application goals and scope

This application is mainly for people who have rich desire for emotional sharing in daily life. This type of population is happy to publish on the Internet in the form of an emotional diary that can cause emotional changes in life. Essence Our group is expected to take the students as the first batch of promotion targets and gradually develop to those who intend to use the software, especially the target group that meets our plan.

2.1.3 Product prospects

Many chats and dating applications have emerged in the application market, but no application starts from the user's emotions: in the major exchange forums, users always carry different emotions to communicate, resulting in negative culture such as "weird" and "leopard jump". This is because many users cannot appreciate and understand the emotions of others, which leads to possible misunderstandings and inappropriate remarks. This requires a green and healthy product to provide users with a harbor for the soul.

There are clear differences between ours and the applications that have emerged. We not only provide a platform for social interaction, but also integrate intelligent emotional robots into it to provide users with a purer experience of emotional sharing and analysis. This means that users can choose to socialize with others, share emotions, get support, or just interact deeply with emotional bots. Our app is dedicated to building a warm, understanding and caring community, providing users with a deeper emotional experience to meet the emotional challenges of modern society. Not only that, although we strongly recommend users to join this beneficial social circle, it is not mandatory. Users have the right to choose whether to turn on the social function or only communicate with the smart terminal.

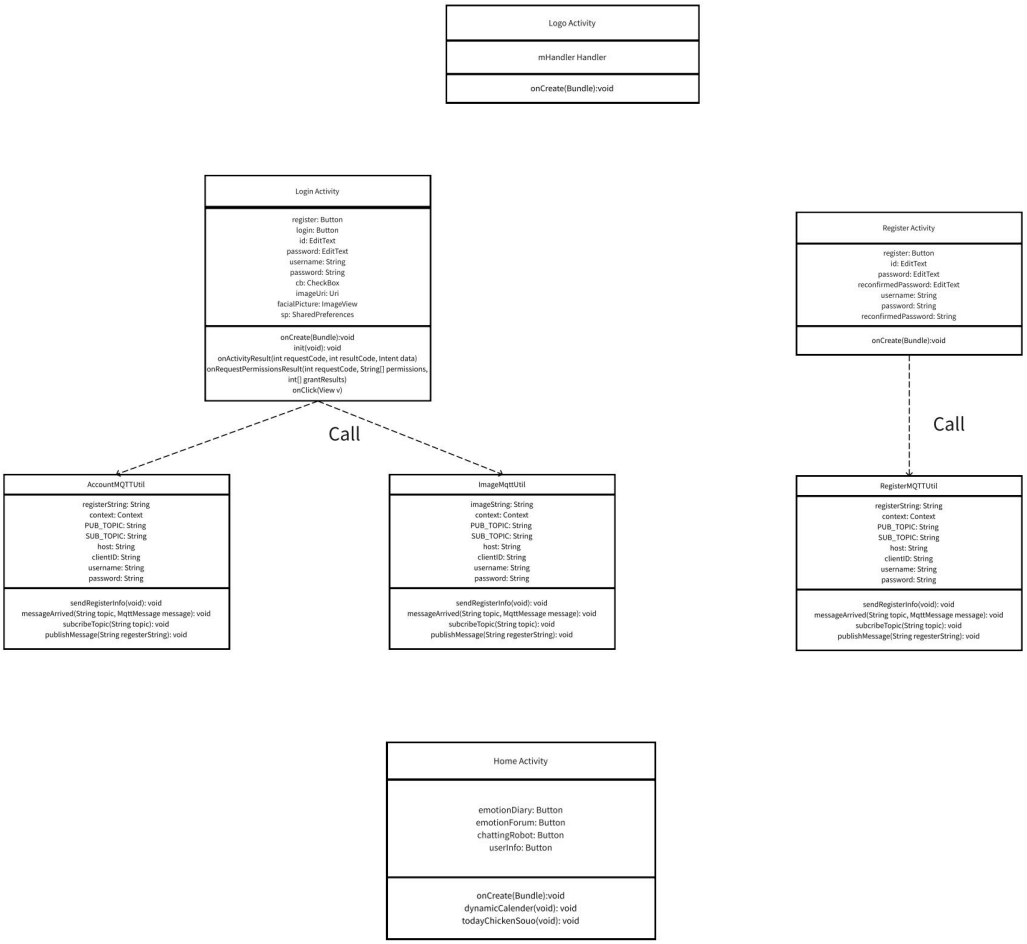
3 Specific requirements

3.1 Class diagram

3.1.1 Login, register, and home screen

First of all, the project realizes the basic account registration and login. Once the user completes the authentication, the application will guide it to enter the main interface. The main interface brings together emotional diaries, emotional forums, emotional

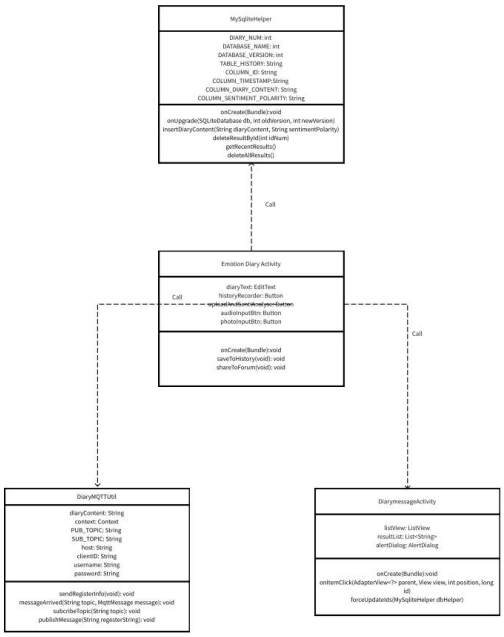
exchange robots, and personal information functions.



3.1.2 Functions

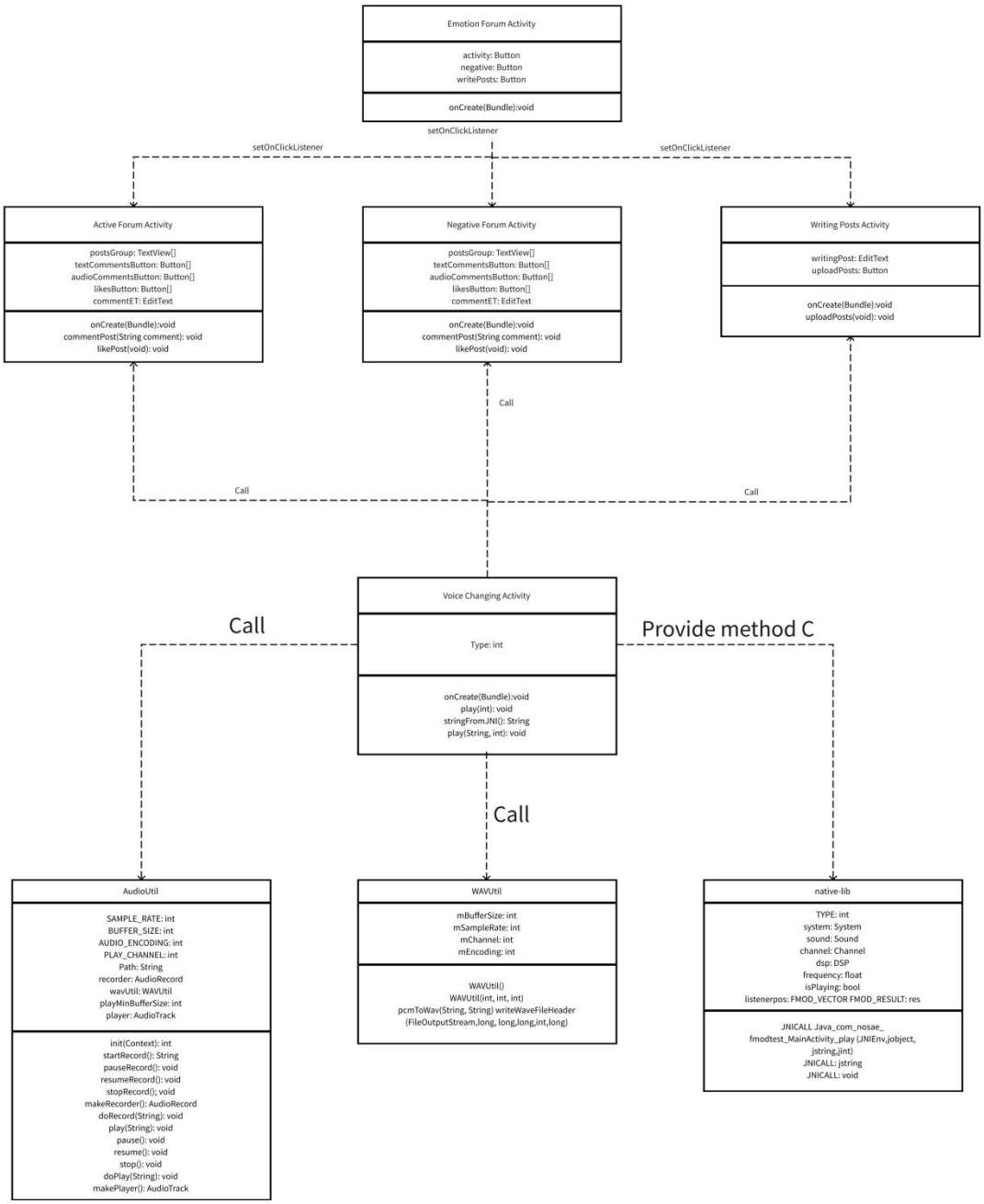
3.1.2.1 Emotional diary

The emotional diary function realizes the basic writing of the text, historical viewing, and voice record function. Through the MQTTUTIL tools, users can upload the diary content to the server and process the return response. Use the Audioutil and Wavutil class to achieve recording and playback functions. Relevant contents are stored in the SQLite database.

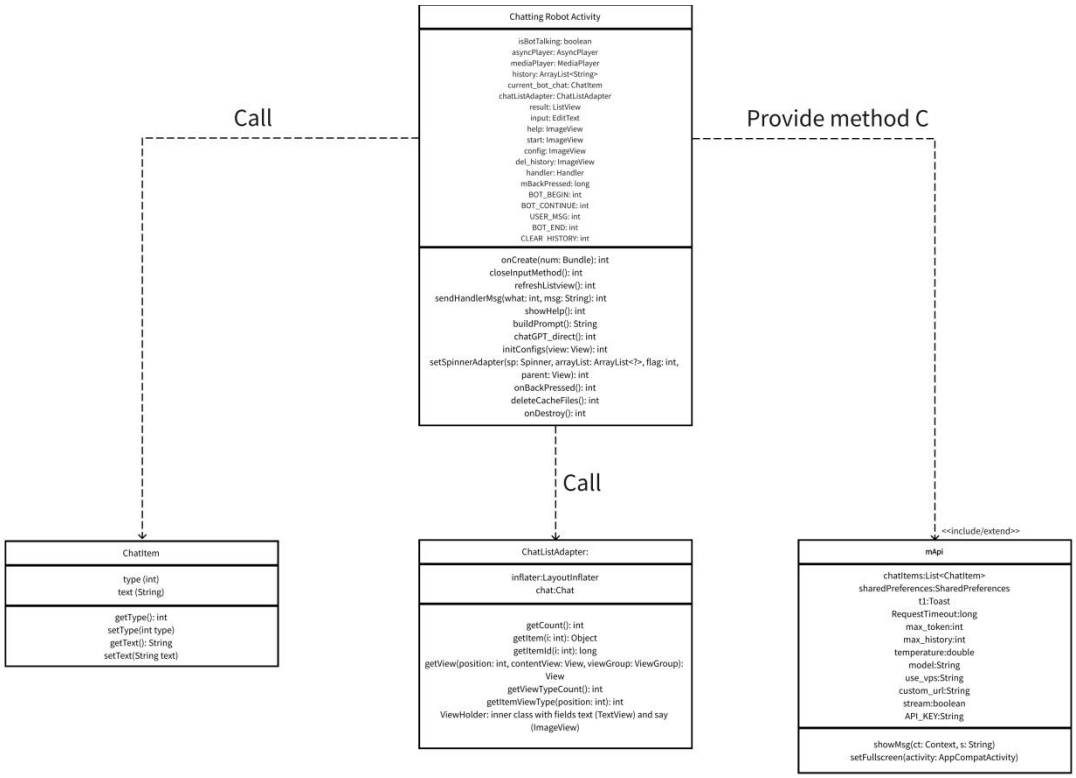


3.1.2.2 Forum

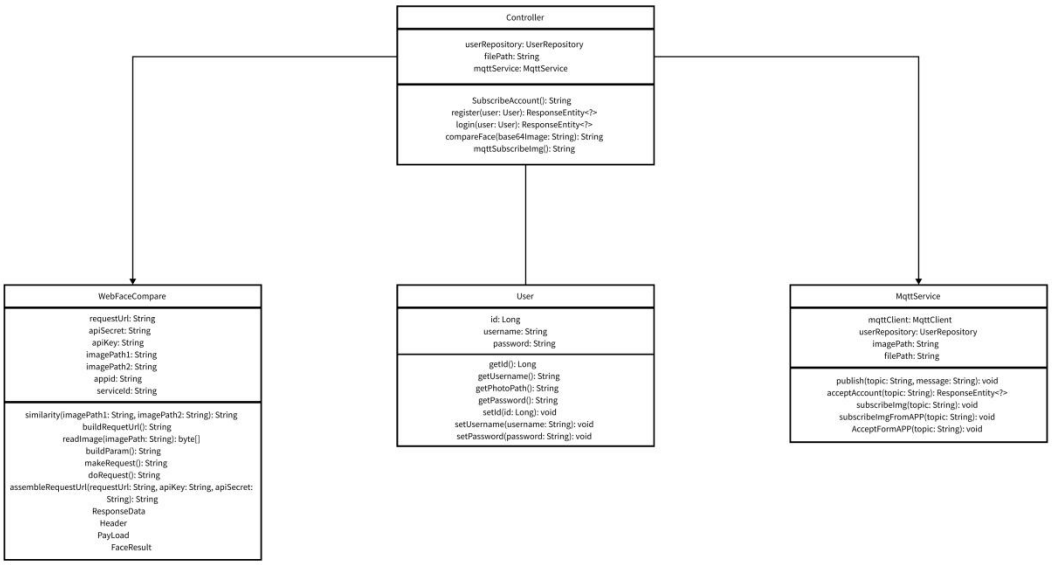
The forum feature consists of six activity classes and multiple auxiliary classes. It aims to provide higher quality user services by utilizing auxiliary tools such as the RichEditorUtil rich text editor and the FMOD audio morpher.


Emotion Forum Activity
activity: Button
negative: Button
writePosts: Button
onCreate(Bundle):void
setOnClickListener
setOnClickListener
setOnClickListener
Active Forum Activity
postsGroup: TextView[]
textCommentsButton: Button[]
audioCommentsButton: Button[]
likesButton: Button[]
commentET: EditText
onCreate(Bundle):void
commentPost(String comment): void
likePost(void): void
Negative Forum Activity
postsGroup: TextView[]
textCommentsButton: Button[]
audioCommentsButton: Button[]
likesButton: Button[]
commentET: EditText
onCreate(Bundle):void
commentPost(String comment): void
likePost(void): void
Writing Posts Activity
writingPost: EditText
uploadPosts: Button
onCreate(Bundle):void
uploadPosts(void): void
Call
Call
Call
Voice Changing Activity
Type: int
onCreate(Bundle):void
play(int): void
stringFromJNI(): String
play(String, int): void
Call
Provide method C
Call
AudioUtil
SAMPLE_RATE: int
BUFFER_SIZE: int
AUDIO_ENCODING: int
PLAY_CHANNEL: int
Path: String
recorder: AudioRecord
wavUtil: WAVUtil
playMinBufferSize: int
player: AudioTrack
init(Context): int
startRecord(): String
pauseRecord(): void
resumeRecord(): void
stopRecord(); void
makeRecorder(): AudioRecord
doRecord(String): void
play(String): void
pause(): void
resume(): void
stop(): void
doPlay(String): void
makePlayer(): AudioTrack
WAVUtil
mBufferSize: int
mSampleRate: int
mChannel: int
mEncoding: int
WAVUtil()
WAVUtil(int, int, int)
pcmToWav(String, String) writeWaveFileHeader
(FileOutputStream,long, long,long,int,long)
native-lib
TYPE: int
system: System
sound: Sound
channel: Channel
dsp: DSP
frequency: float
isPlaying: bool
listenerpos: FMOD_VECTOR FMOD_RESULT: res
JNICALL Java_com_nosae_
fmodtest_MainActivity_play (JNIEnv,jobject,
jstring,jint)
JNICALL: jstring
JNICALL: void

3.1.2.3 Chatting robot



3.1.3 Server



3.2 Properties

3.2.1 Availability

1. Stable Servers and Cloud Services: We can store application data on stable and highly available cloud servers to ensure that users can access their data at any time. Choosing reliable cloud services like iFlytek Cloud can reduce the risk of server downtime or service interruptions.
2. Performance Optimization: Ensuring that the application runs efficiently on various devices, without crashes or excessive response times due to performance issues.
3. User-Friendly Interface: The application features an intuitive and user-friendly interface that is easy to navigate and understand.

3.2.2 Security

1. Data Encryption: We utilize powerful encryption algorithms to protect user data and sensitive information. Personal diaries, images, and other private data are safeguarded during storage and transmission.
2. Secure Communication: We use the MQTT protocol to encrypt data transmission, preventing man-in-the-middle attacks and data theft, thus ensuring the security of information communication.
3. Permission Control: We only request the necessary runtime permissions for the application and provide clear explanations and prompts when users deny permissions.
4. Data Storage: We securely store user data, including avoiding storing sensitive information in plaintext. We utilize Android's secure storage options, such as SharedPreferences with MODE_PRIVATE or MODE_ENCRYPTED.
5. API Security: Before using external APIs, we ensure that these APIs and services themselves are secure and employ appropriate authentication and authorization mechanisms.
6. Compliance: We ensure that our application complies with applicable laws and privacy policies, especially concerning user data.

4 Interface prototype

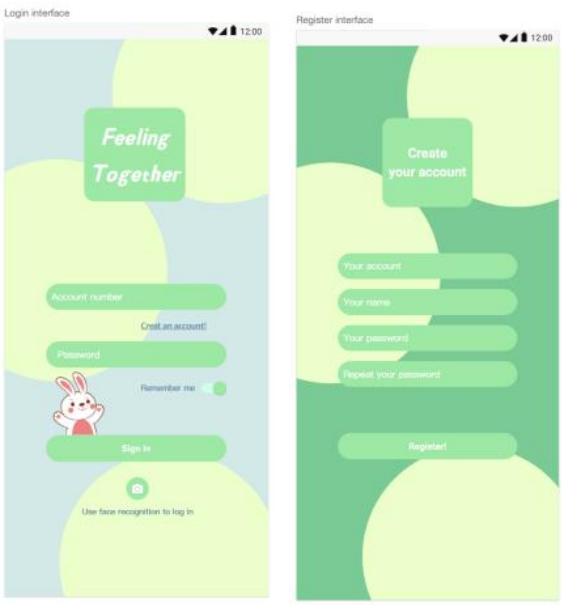
4.1 Opening page

The cover shows the product name and the creative team, with a green background and the

product logo.

4.2 Login interface

After seeing the frontpage interface, users come up with the Login interface with a big title of our app. A user can use account or face to log in our app. New users can click ‘Create an account’ to set the account password and other information in ‘Register interface’ page.



4.3 Home page

A user can touch profile picture to go to the individual center, touch one of three buttons to enter three different modules: diary, forum, and robot. Also, users can see their user name

and the sentence in daily sentence module. These positive sentences aim to evoke better emotions in the users.

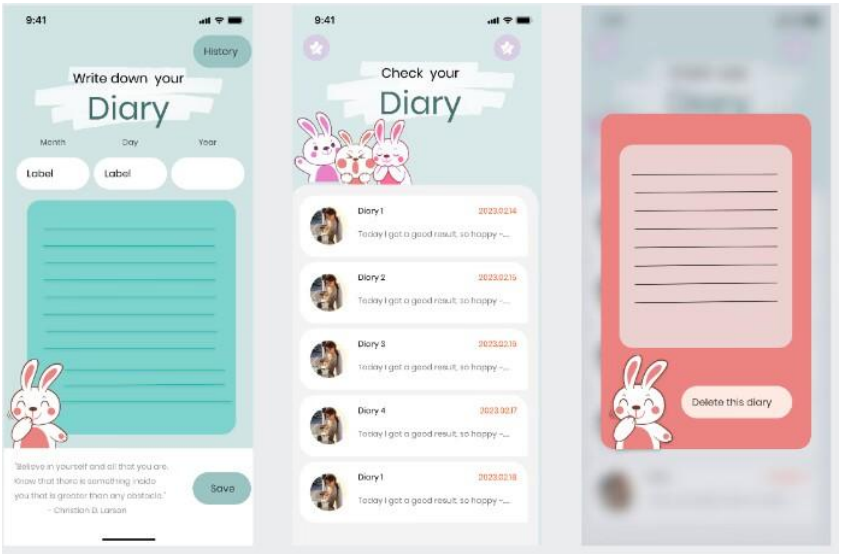
4.4 Functions

4.4.1 Emotional diary interface

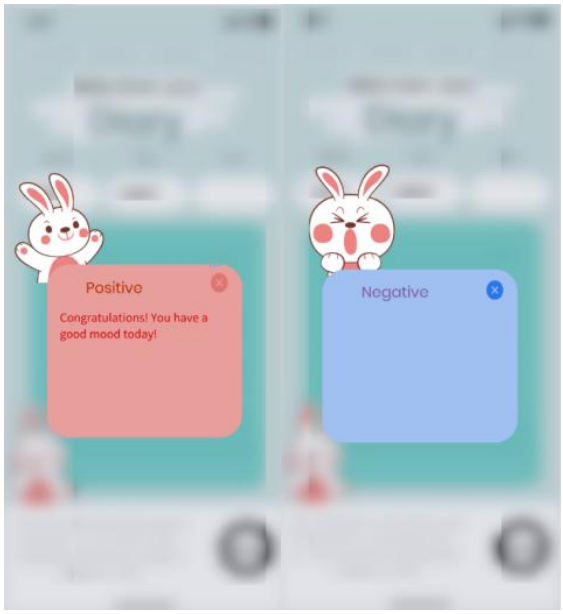
Our group plans to make the emotional diary module a separate interface, which can be entered after the "Emotional Diary" button on the homepage:

In this diary module, users can choose to create and save a new emotional diary or review the history by clicking one of the buttons at the very beginning page.

1. If the ‘History’ button has been pressed, users would see a ‘Check your Diary’ interface. By selecting a specific diary, users can review their spirit specifically and/or delete it.



2. If the user choose to upload a new diary, then it would come up with one of the two pop-up windows. Because the system identifies the diary content and determines whether it is a negative or positive partition. Then the interface corresponding to the emotional phase will pop up, as follows:



4.4.2 Forum

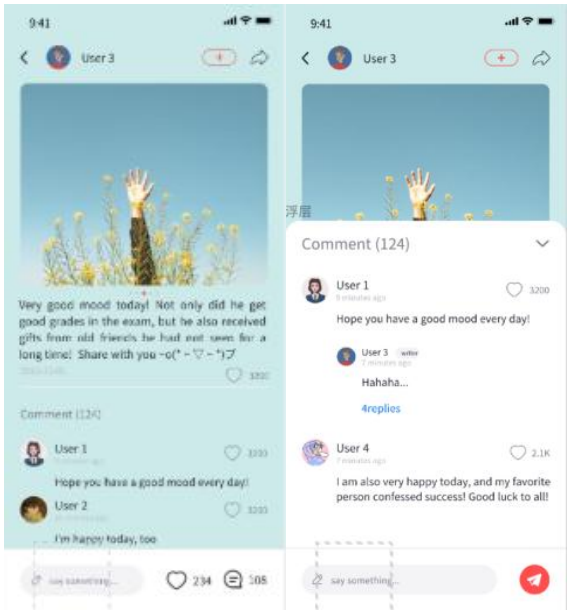
Our group plans to divide the forum into 4 interfaces, namely: main interface, specific partition interface, posting interface, likes, comments, and reply interfaces for each post.

1. Main interface: Contains entrances for two modules (positive and negative), and a post button at the base.

2. Specific partition interface: User can Click on any box to go to the corresponding details page or just click “like”on this page.

3. Posting interface: Enter after pressing " post", input box and publish button

4. Comment reply interface: After clicking on Specific partition interface, these interface will come up. You can comment on this module, and the author can reply.

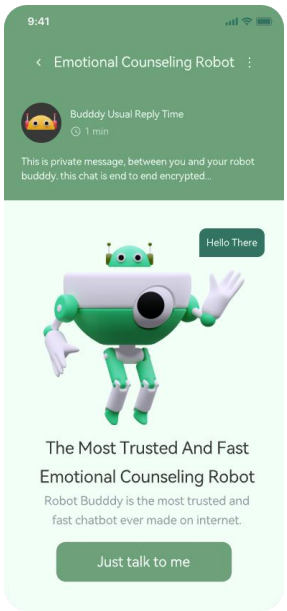


4.4.3 Emotional counseling robot

The function of emotional counseling robot is divided into three interfaces: main interface, conversation interface, and messages interface.

1. The main interface consists of: emotional counseling robot function introduction, emotional counseling robot cartoon image display and chat start button (Just talk to me).

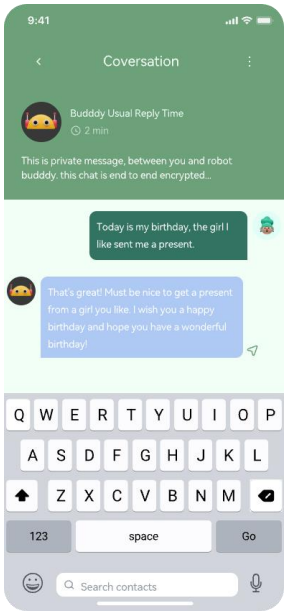
   After clicking the chat Start button on the main interface, the user can enter the conversation interface.



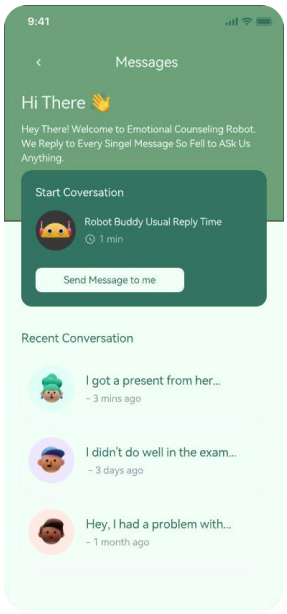
2. In this conversation page, users can click the text input field at the bottom to enter text to talk with the robot buddy, or click the voice recognition button at the lower right corner to convert the user's voice into text information.

   The robot will analyze your emotional state based on your words and make

responses that help you regulate your emotions.



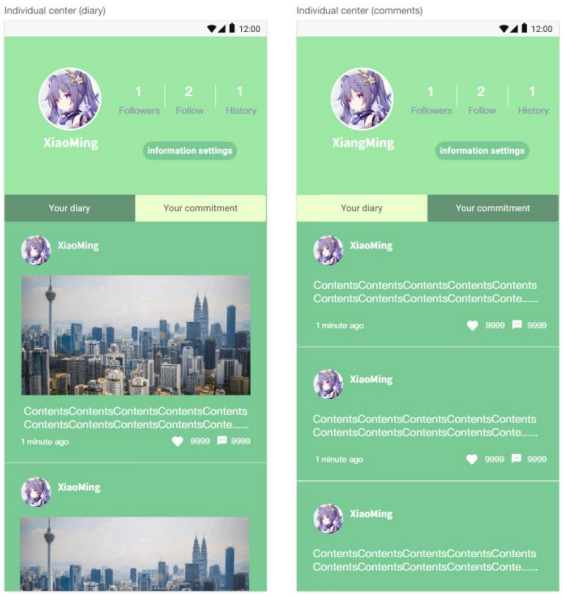
3. Tapping the top right corner of the home screen or conversation takes you to the messages screen, where you can see the bot's specific response time and the user's question history. Users can re-enter the previous conversation by clicking the button next to historical content.



4.5 Individual pages

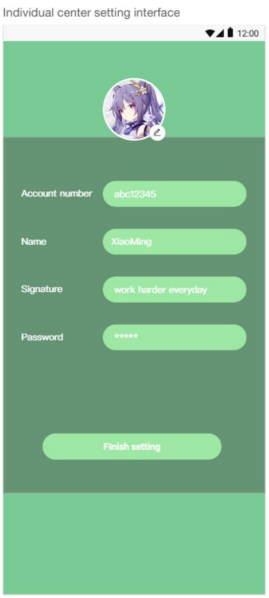
4.5.1 Individual center

Individual center has four functions: checking the numbers of follows and followers, looking the browsing history, looking user’s all diary and comments, and setting personal information.



4.5.2 Individual center setting interface

Individual center setting interface provides the function of modifying user information. A user can change profile pictures, account number, name signature and password. These changes would be saved when the user presses' Finish setting '.



5 Function description and acceptance verification standards

5.1 Detailed function description

5.1.1 Registration and login

Users can log in to the system by entering their username and password or using facial recognition. The system verifies whether the login user is a legitimate user in the system. For users who are using the software for the first time, registration is required. During registration, relevant account information such as username and password is stored on the server for comparison during login. The software also provides the option of logging in using facial recognition, making the login process more convenient for users.

5.1.2 Emotional diary

Upon entering the software's homepage, users can see an entrance labeled "Emotional Diary". Clicking on it allows users to engage in text editing, where they can record their current positive or negative personal emotions, feelings, and moods in our "Emotional Diary". The application sends the diary text to a cloud server and utilizes the advanced pre-trained ERNIE model to analyze the emotional content of the text. Based on the emotional polarity of the text, the application dynamically adjusts the user interface to resonate with the user's emotions.

5.1.3 Emotional exchange forum

We have designed a "moments" where users can post and choose to manually categorize or use the system's automatic topic recognition to distribute their posts to different theme forums. Users can reply and comment on these forums, sharing their emotional experiences and receiving emotional support.

On these theme forums, users can interact with others, share emotional stories, and provide support and advice. This helps establish an emotional support network, making users feel that they are not alone and can receive understanding and assistance from the community. This feature aims to promote social interaction, provide opportunities for emotional support, while effectively preventing inappropriate comments.

5.1.4 Emotional communication robot

The software introduces a highly intelligent emotional communication robot aimed at providing users with more personalized emotional support. This robot integrates natural language processing technology and is capable of understanding and responding to users' emotional needs. Users will be able to engage in conversations with this robot, share their emotional experiences, and receive encouragement, advice, and support. We hope that this robot will become users' emotional companion, providing support whenever needed.

Technical implementation: GPT-3 is used to build a customized dialogue system, combined with Botpress (an open-source chatbot development platform) to create a customized chatbot with emotional analysis capabilities.

5.1.5 Voice input and change

We will integrate speech recognition technology, allowing users to record emotional diaries through voice input rather than just using text. This includes basic voice input functionality as well as using a voice changer to send voice messages on forums, providing more than ten different voice effects such as "loli," "uncle," and "ethereal." This offers multiple options for recording emotions while also meeting the users' privacy needs.

5.1.6 Emotional health suggestions

The system assesses users' emotional states based on their emotional diaries and provides certain emotional health suggestions for users with negative emotions. For example, stress management advice and anxiety relief suggestions may be given.

5.2 Functional acceptance criteria

5.2.1 Accuracy

The emotion analysis model used is the ERNIE model. ERNIE is a knowledge-enhanced natural language understanding model proposed by Baidu Research Institute. It is an extension and improvement of the BERT model. The ERNIE model performs well in natural language processing tasks, especially in sentiment analysis tasks. Its knowledge-enhanced ability helps to more accurately understand emotional content in text, and improves the performance of sentiment analysis. The system's emotion

analysis results should have a high degree of consistency with manual evaluation results. Accuracy can be verified by comparing the system's analysis results with the results of a manually annotated testing dataset.

5.2.2 Real-time capability and stability

Use the MQTT protocol to transmit credentials, text, and other information with the server. Connect to the server via an MQTT client, subscribe to specific topics, and then publish information to the corresponding topics. The server will receive and process this information, and respond accordingly as needed. The advantages of using MQTT include real-time capability, efficiency, and reliability. The system should respond promptly within a short period of time after the user submits text. The real-time capability of the system can be validated through performance testing.

5.2.3 User friendly

The system interface should be concise and clear, and be mapped to the user's emotions. After the user inputs text, the system should clearly present the results of emotion analysis, help users understand the emotional color of the text, and soothe the user's emotions through appealing graphics. Additionally, to protect the user's privacy, the project supports the use of a voice changer for communication. Audio processing for voice changing is implemented by importing the FMOD library. FMOD is an audio engine written in C/C++, while Android applications are usually written in Java or Kotlin. Therefore, it is necessary to create a bridge through JNI to allow Java code to communicate and integrate with native C/C++ code.

5.2.4 security

The system must ensure the confidentiality of data to protect text information input by users from unauthorized access. Additionally, the system must have the ability to handle sensitive text, including appropriate security measures such as data de-identification. In the project development process, we implemented the functionality of an emotion communication robot by calling relevant APIs of GPT-3.5. Throughout the design and implementation of the entire project, we repeatedly confirmed the security of the relevant APIs and adopted appropriate identity verification and authorization mechanisms to ensure the full protection of user data security and privacy.