Human Computer Interaction
Course Report

— Together APP

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1. Background

1.1 Product aim

Nowadays, many people are troubled by loneliness, such as, you may feel lonely when you run, study, and entertain by yourself. But there is no suitable app that allows us to find people in Tongji with common interests. Or sometimes, you want to go to an exhibition with new friends.

To solve the above problems, we designed a mobile app, through which users can release an activity or join an activity, so that people with the same interests and hobbies can study or play together.

1.2 Simple function introduction

Firstly, Users can create new activities in the main interface. They can be searched by other users, and if someone interest in it, they can “hand up” to apply. When users want to know more about the activity, they can ask through the chat window. But if you don’t want to be disturbed by strangers, you can set your personal center not to receive strangers’ chats. In the personal center, you can also view the activities you have posted and participated in.

2. Prototyping

2.1 Overview

To help users relax and participate in activities, for example, go camping with new friends, our app provides many popular activities on the homepage. And we can participate in these popular activities. Our prototype design is based on this function of our app. At the stage of prototyping, we have completed the basic interface design and a part of the interface switching design. However, the subsequent design also needs to consider many other factors, so we need to make changes based on the prototype.

2.2 Homepage

We choose the figure 2.2.1 as the homepage of our app. Because when users enter our app, they can directly see the popular interactions.

The operations that the user can complete in this interface are as follows:

By clicking the right arrow in the right corner, they can see the details of an event, such as: time and place.

2.3 Participate in an activity

For convenience, users can participate in an activity on the homepage.

The operations that the user can complete in this interface are as follows:

- ✧ Users only need to choose the activity they want to participate in, and a detail (figure 2.3.1) will be popped up to users.
- ✧ Choosing the join in button will highlight the activity as a reminder to users.
- ✧ To prevent users from touching the icons unintentionally, we set the cancel button too.

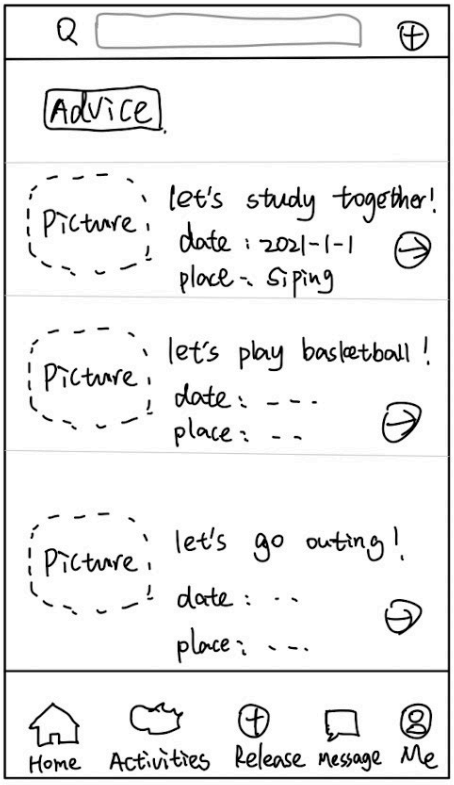


figure 2.2.1 homepage

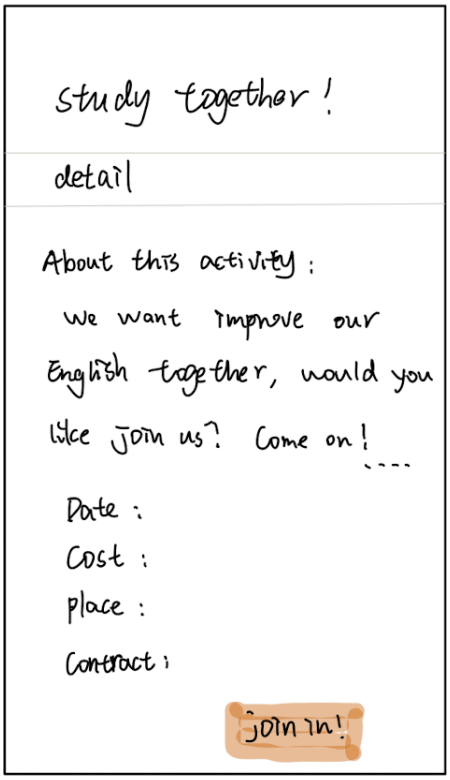


figure 2.3.1 detail of an activity

2.4 Release an activity

When users turn to the release interface (figure 2.4.1), the app provides several common kinds of activities as default for users to choose. We can see activities about study, life and sport like we just said.

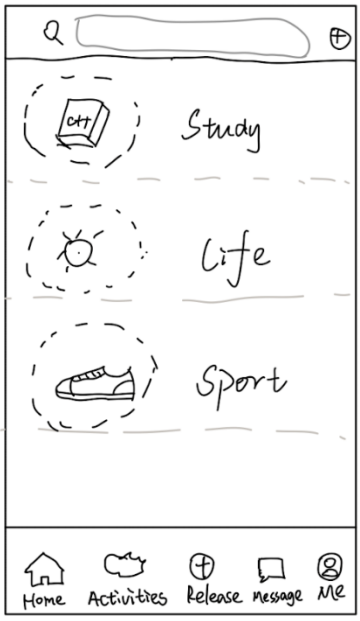


figure 2.4.1 release an activity

When the users choose a kind to release an activity, they can enter a new interface (figure 2.4.2). In this interface, users need to fill in the details about the activity, the more detailed the more users want to participate in.

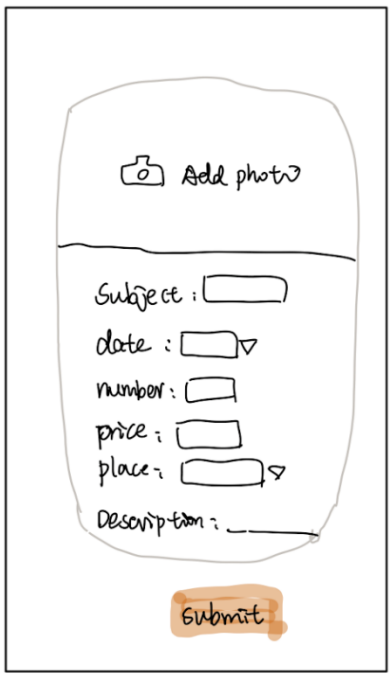


figure 2.4.2 fill in the blanks

2.5 Message page

To get more information about an activity you want to participate in, such as, the unclear information, they can turn to the message interface. We can do this turn easily using a bar. And then you can have a chat with the user who release the activity.

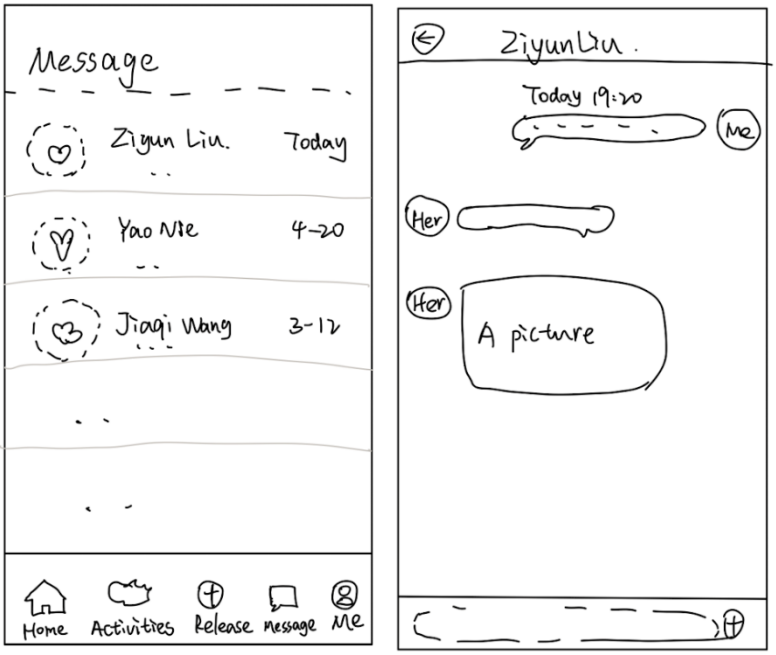


figure 2.5.1 message page and contact page

2.6 Me page

What's more, we planned to set a personal center to make users set preference. So, we design a me page. In this page, users can view the activities they have released and participated in. Furthermore, if users don't want to receive messages from strangers, they can also set here.

figure 2.6.1 me page

3. UI Design

3.1 Choice of color

3.1.1 Color assignment

According to a principle in UI design, namely 60-30-10 rule, 60% of our software pages are designed with primary colors, 30% with secondary colors, and 10% with accent colors.

For example, in the figure below (figure 3.1.1.1), 60% is the background color black, 30% is the item navigation bar color orange, and 10% is the other colors used for font and symbol demonstration.

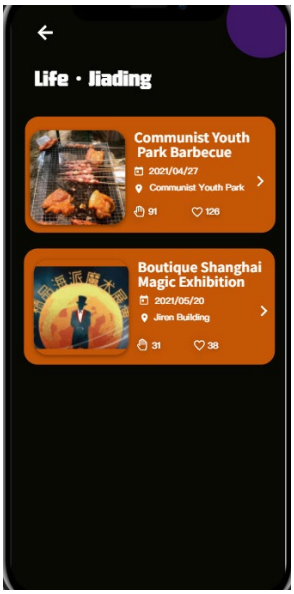


figure 3.1.1.1 color assignment example

There are some other rules about the color of UI design, such as:

- ✧ The color used for display shall be as clear as possible and not affected by contrast change.
- ✧ The color used shall conform to general practice and user expectation.
- ✧ Negative contrast improves reading performance (white characters on black screen).

3.1.2 Why we choose orange

Orange is a very eye-catching color, which gives people a dynamic, open and bright psychological feeling. When users see orange， they will be more motivated to complete their goals

Orange also shows young, fashionable and other attributes. And because the orange color is very eye-appealing, our app will be more attractive among similar apps.

3.2 Refer to Shneiderman eight golden rules and Norman's seven principles

As we all known, better design can be produced by simple rules than using nothing.

'Golden rules' or heuristics offer a simpler way to design as compared with principles, standards and guidelines. Provide a useful checklist or summary to good design.

This project refers to two types of rules：Shneiderman’s eight golden rules、Norman’s seven principles.

3.2.1 Shneiderman’s eight golden rules

Shneiderman’s eight golden rules provide a summary of the key principles of interface design. They can be used not only for design but also for evaluation.

✧ Strive for consistency in action sequences, layout, terminology, command use and so on.

We designed all the interfaces into a unified board style, with black as the background and orange as the secondary color, such as the pages below: home page, activity detail page, and choose activities page. In this way, users will get a better experience and become more familiar with the interactive system as soon as possible. Such as figure 3.2.1.1:

figure 3.2.1.1 interfaces design

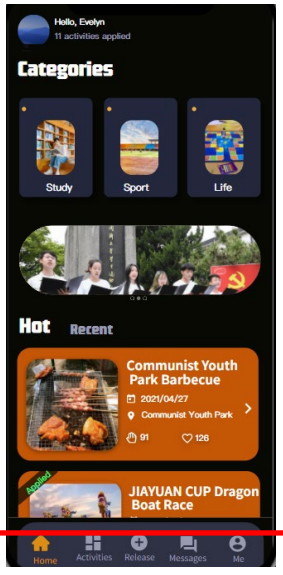


figure 3.2.1.2 navigation bar

✧ Enable frequent users to use shortcuts, such as abbreviations, special key sequences and macros, to perform regular, familiar actions more quickly.

In response to this rule, we have designed navigation bar on the bottom of the interface , so that frequent users can create personalized acitivites or attend their favourite ones. As the user has more and more experiences, they will browse and operate the system more quickly and easily. Such as figure 3.2.1.2:

✧ Design dialogs to yield closure so that the user knows when they have completed a task.

We have designed different pop-ups. After you complete the edit of the activity, if you touch the submit button, a reminder "Success!" will be displayed. This way users can clearly understand when they have completed the task. Such as figure 3.2.1.3:

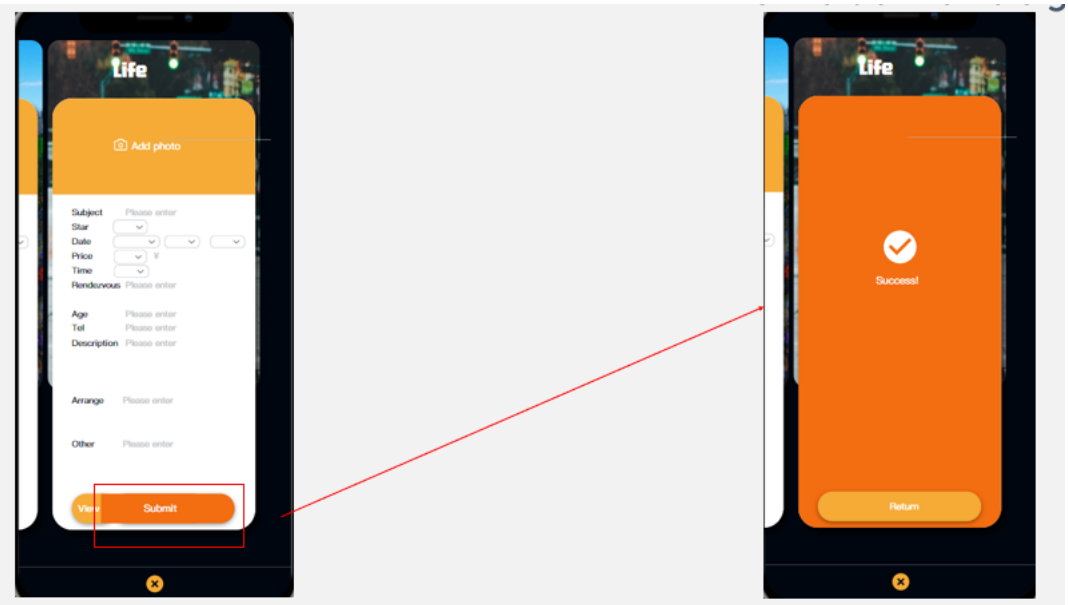


figure 3.2.1.3 already completed the activity

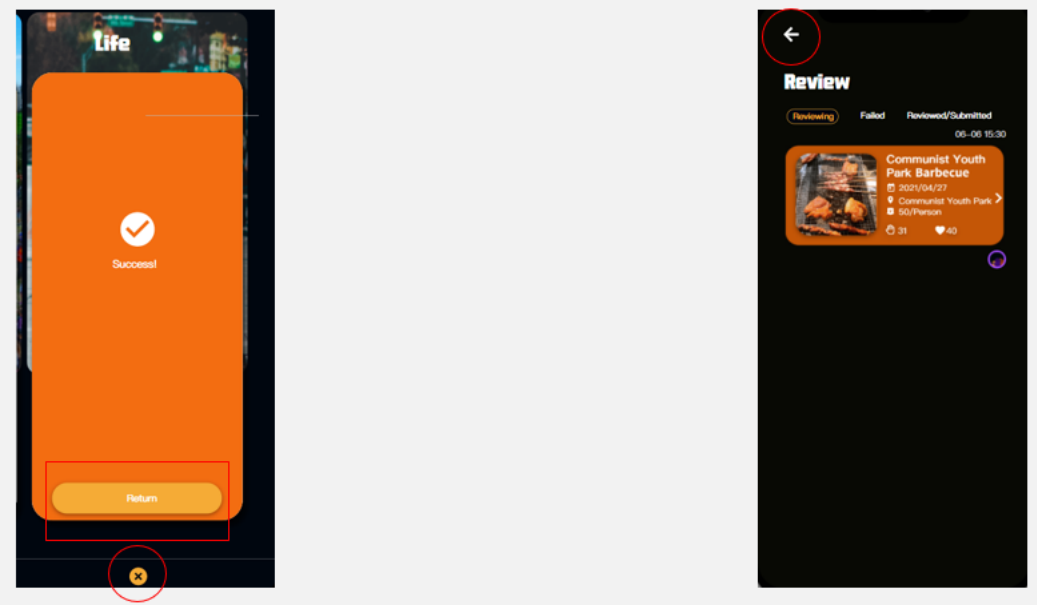


figure 3.2.1.4 easy reversal of actions

- ✧ Permit easy reversal of actions in order to relieve anxiety and encourage exploration, since the user knows that he can always return to the previous state.

In our system, when users are creating the detail of his activity ,he can cancel it after touching the target button, also can have a preview of the completed target. What's more in the secondary pages,we all desinged the necessary return button. In this way, users can boldly explore our system and reduce the anxiety of use. Such as figure 3.2.1.4:

3.2.2 Refer to Norman's seven principles

To assess the interaction between human and computers, Donald Norman in 1988 proposed seven principles. He proposed the seven stages that can be used to transform difficult tasks.

- Simplify the structure of tasks.
  - ✧ A number of ways to simplify the structure of tasks
  - ✧ provide mental aids to help user keep track of stages in a more complex task
  - ✧ use technology to provide user with more information about the task and better feedback
  - ✧ automate the task or part of it, as long as this does not detract from user's experience
  - ✧ change the nature of the task so that it becomes something more simple
  - ✧ It is important not to take control away from the user

If the user needs to hand up an activity, only need to touch the target to confirm it. Secondly, the satuas of each activity task can be seen clearly on the detail page. The system simplifies the current task, reduces the problems that need to be solved at the same time, and reduces the user's mental activity. Such as figure 3.2.2.1:

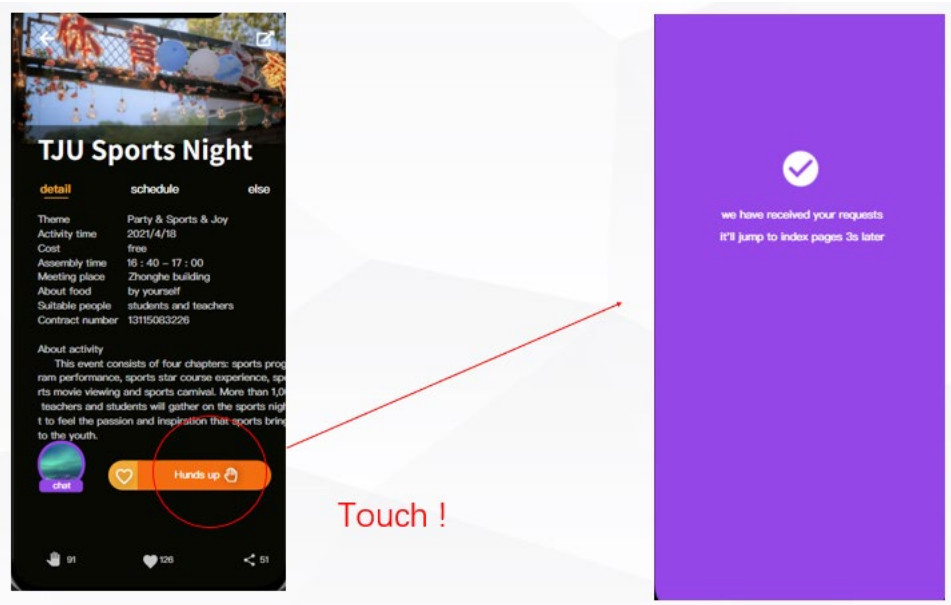


figure 3.2.2.1 hand up an activity

- Make things visible:
  - ✧ bridge the gulfs of execution and evaluation.

✧ The interface should make clear what the system can do and how this is achieved, and should enable the user to see clearly the effect of their actions on the system.

On the choose activity page, users can see that a sysmbol of Applied of activity. Such as figure 3.2.2.2:

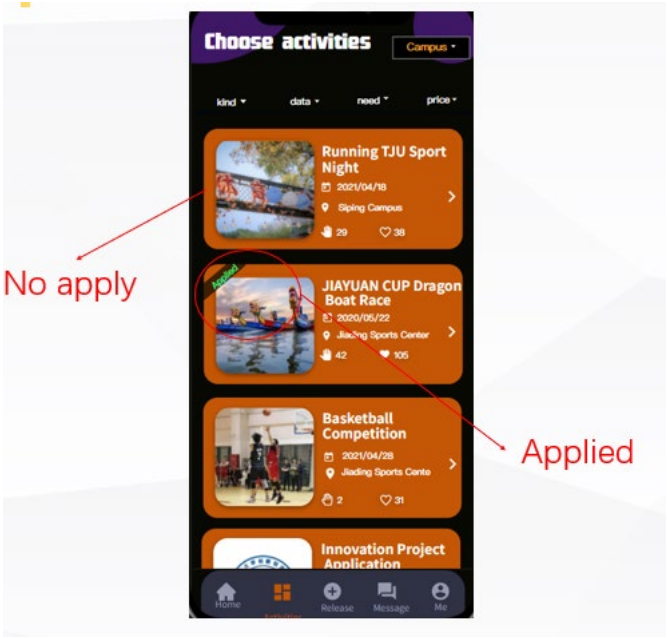


figure 3.2.2.2 choose activity page

From the message page, the user can there are small red dots on unread messages. What the user sees is what the user gets. It is easier for the user to understand the information given by the system. Such as figure 3.2.2.3:

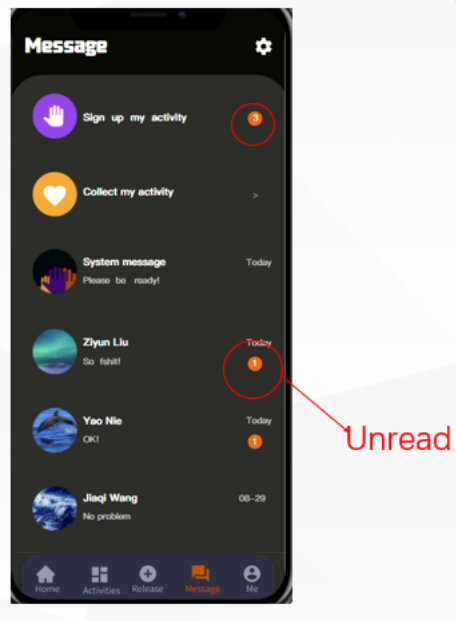


figure 3.2.2.3 message page

4. Evaluation

4.1 Evaluation methods

We used the following four evaluation methods:

- Experimental evaluation

One of the most powerful methods of evaluating a design: use a controlled experiment.

- Cognitive walkthrough

Proposed by Polson et al as an attempt to introduce psychological theory into the informal and subjective walkthrough technique.

- Heuristic evaluation

A heuristic is a guideline or general principle or rule of thumb that can guide a design decision or be used to critique a decision that has already been made.

- Query techniques

Query techniques are useful in eliciting detail of the user's view of a system

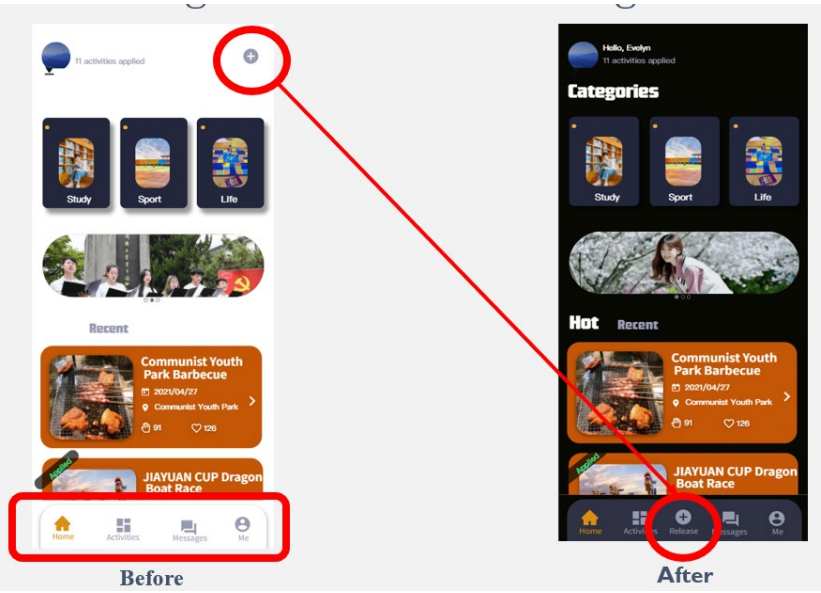
4.2 UI change and evaluation based on task1

Walkthroughs

In this part , I will use an example, releasing your first activity, to illustrate how the cognitive walkthroughs evaluation technique help us change.

4.2.1 Stage one

Problem 1



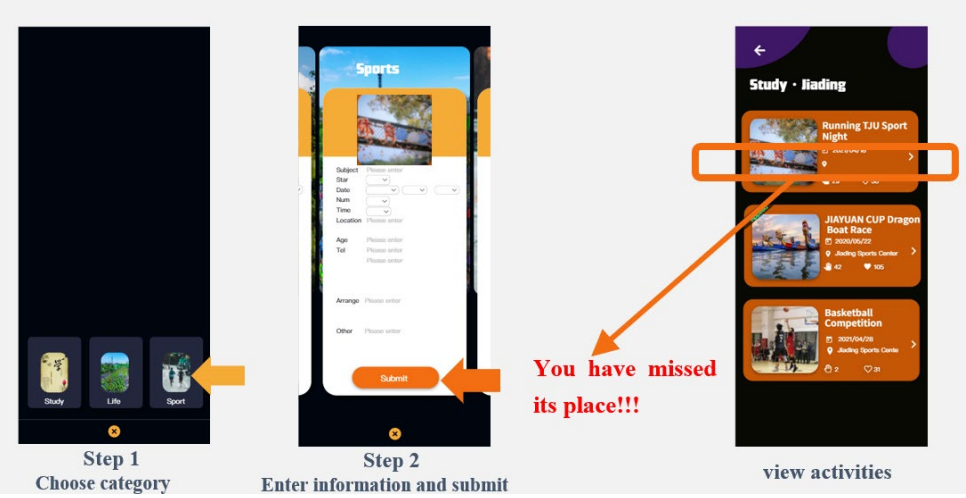
You look for buttons in the bottom menu bar that may contain releasing activities function, but find that only the activity bar looks more likely. After clicking it you discover it is not, so you feel very upset.

It turns out that the releasing activity button is just in the upper right corner.

Update 1

Therefore, we adjust the releasing activity button to the middle of the menu bar for easier searching.

4.2.2 Stage two



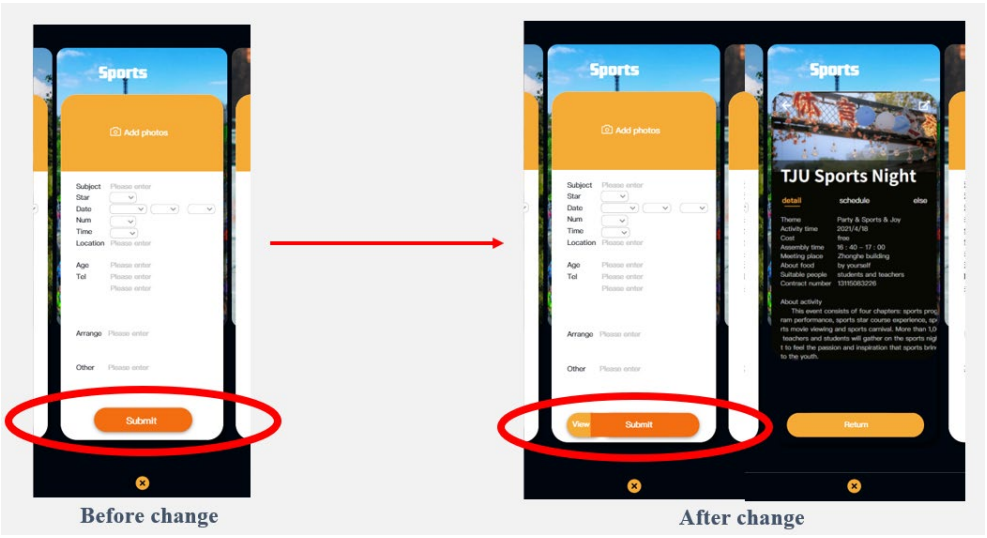
So after finding the releasing activity button, you then choose a category, suppose that you choose the sports category because that you want to release a Tongji University Sports Night activity.

So you cheerfully enter the basic information such as the time, requirements and so on. After that, you submit it at once.

In a happy mood, you exit the releasing interface and enter the viewing part. However, you find that you have missed the place of this activity. What a terrible thing!

Problem 2

So problem coms that you can' t view final display in real time when you submit your activity.



Update 2

Therefore, a view button is added next to the submit button, which is convenient for viewing the final state after submitting and for timely modification.

4.3 UI change and evaluation based on task2

4.3.1 participants

- **The Choice of Participants**

Participants should be chosen to match the expected user population as closely as possible. Because the target users of our product are students of Tongji University, we only need to choose from the students around us as participants to achieve this goal perfectly.

- **The Sample Size of Participants**

Usability testing with 1 participant will find about a third of the usability problems, while there is little to be gained from testing with more than 5. If the intention is to run a controlled experiment and perform statistical analysis on results, at least 10 is recommended. Thus, we choose 10 as the sample size.

- **Our Participants**

Our participants are made up of 5 males and 5 females. Their age is between 18 ~ 22 years old. And they are all students of Tongji University.

4.3.2 Variables

- **Independent Variable：Where the Notification Settings Page is Placed**

We can manipulate the position of the notification page to produce different conditions for comparison, so it is an independent variable.

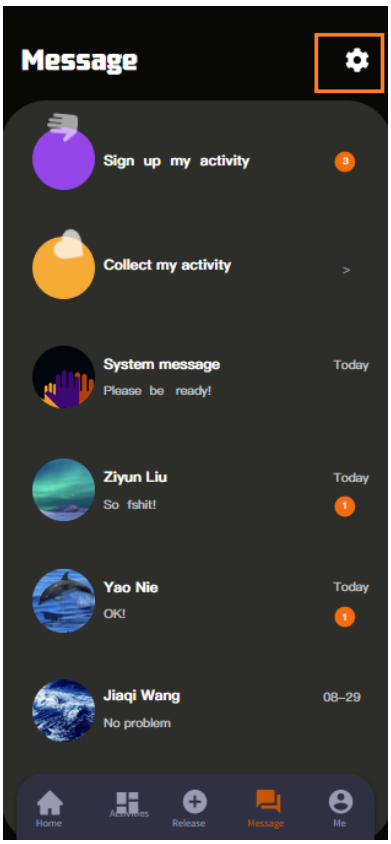
One of levels of this IV is that the notification settings page is placed on the message page, and another is that it is placed in the Me->>Settings->Notifications together with other settings.

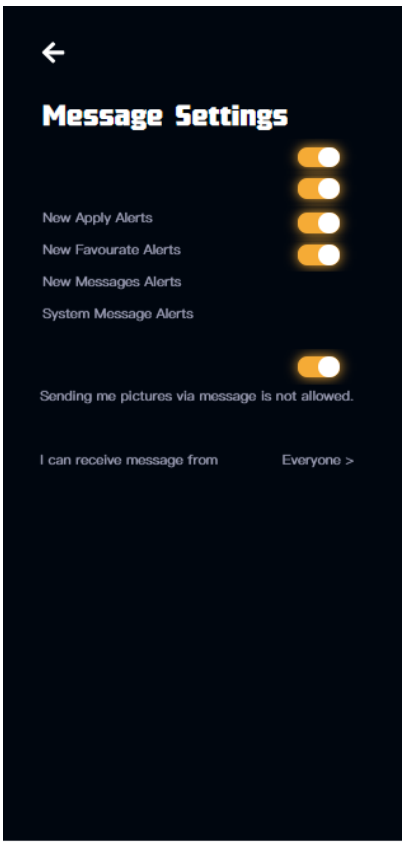
- **Dependent Variable：Time Users Takes to Find Notification Settings**

Time taken by users to find notification settings, which depends on the changes of IV, can be measured in the experiment, so it is a dependent variable. When the depth increases, users need to click more button and view more page, which may influence the time.

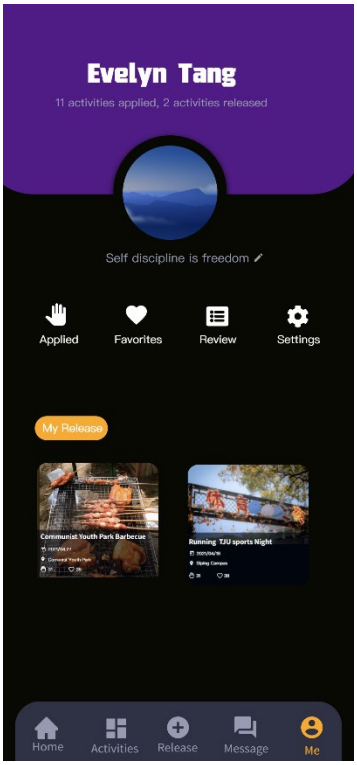
4.3.3 Condition

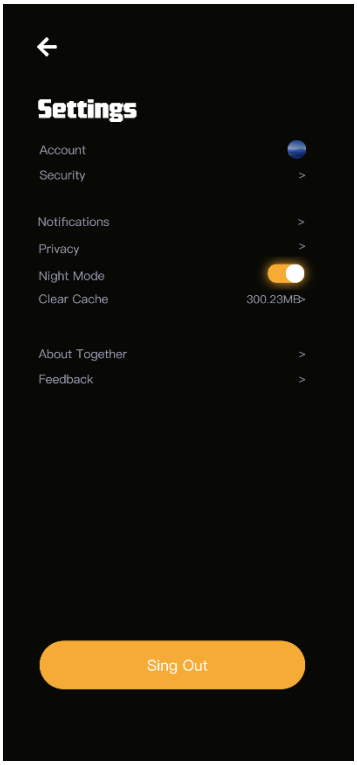
- **Experimental Condition - System 1:**

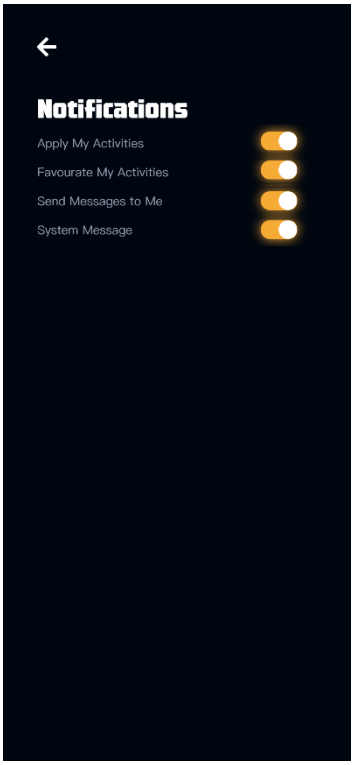




- **Control Condition - System 2:**







4.3.4 Hypothesis

Hypothesis	Null Hypothesis
With the decrease of the depth of page level, time taken by users to find the notification setting page will decrease.	No change happens with the decrease of the depth of page level.
System 1 takes less time.	System 1 and 2 take the same time.

4.3.4 Experimental design

- **Experimental Method**

We use the within-subjects method.

- **Group Division**

The participants are divided into 2 groups. Each group has 6 people, performing under each different condition.

- **Experimental Procedure**

All of them need to find notification settings page with the main page as the starting point.

4.3.5 Statisitcal data

Group	Group A					Group B						
ID	01	02	03	04	05	06	07	08	09	10	Sum	Avg
System 1/s	3.82	3.53	3.78	3.22	3.51	4.72	2.82	3.92	3.62	2.27	35.21	3.52
System 2/s	8.73	6.36	5.40	8.75	9.60	10.28	9.64	5.24	7.31	9.55	79.86	7.99

According to the hypothesis mentioned above, we can get

$$H_0 = \mu_1 - \mu_2 \leq 0$$

$$\mathrm{H}_0 = \mu_1 - \mu_2 > 0$$

As is known to us

$$T = \frac{\bar{X} - \bar{Y} - \delta}{\sqrt{\frac{1}{n} + \frac{1}{m}} S_w} \sim T(n + m - 2)$$

So we can obtain the critical region

$$T \geq t_\alpha(n + m - 2)$$

we are 99.93% certain that simpler layout reduce the time to learn the interface.

4.4.5 Conclusion

- **Experimental Condition**

User take less time under experimental condition, which means that system with experimental condition is more friendly to users.

- **Control Condition**

But from the perspective of system integrity, all setting options need to be arranged together.

- **Final Decision**

We finally decided to keep these two pages, which not only guarantees the integrity of the system, but also makes it easy for users to immediately enter the notification setting page when they see the message.

4.4 UI change and evaluation based on task3

In this part , I will use this example to illustrate how Query techniques, experimental evaluation and Heuristic evaluation help us change .

4.4.1 Query techniques and experimental evaluation

There are many activities waiting for our participation. We need to filter to find suitable activities. Initially, based on the internal discussion of the group, we decided to set the optional items as kind, date, price, such as the picture 4.4.1 below.

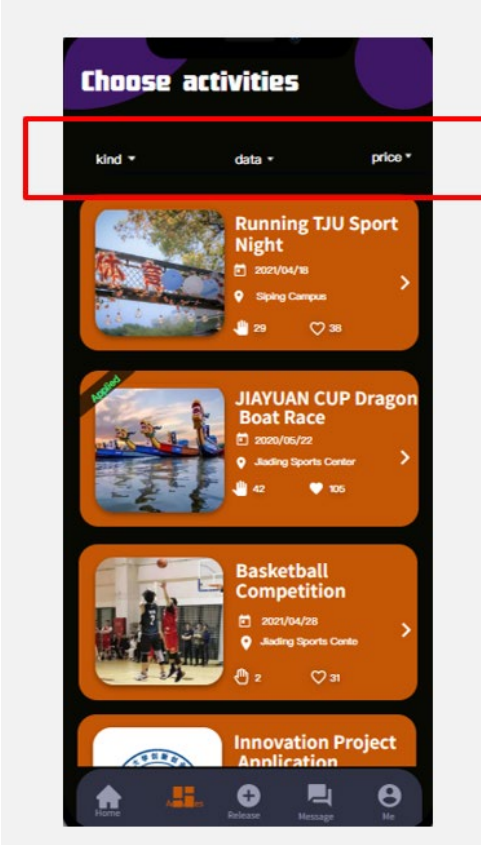


figure 4.4.1 select

As mentioned in the teacher's courseware, Query techniques can get the user's viewpoint directly and reveal issues that have not been considered by the designer. The above-mentioned categories were discussed and decided by our team members. But it may not take the situation into consideration . Therefore, we want to use Query techniques to make our products more user-friendly. There are two main types of query technique: interviews and questionnaires. To save time and get more result, we choose questionnaires.

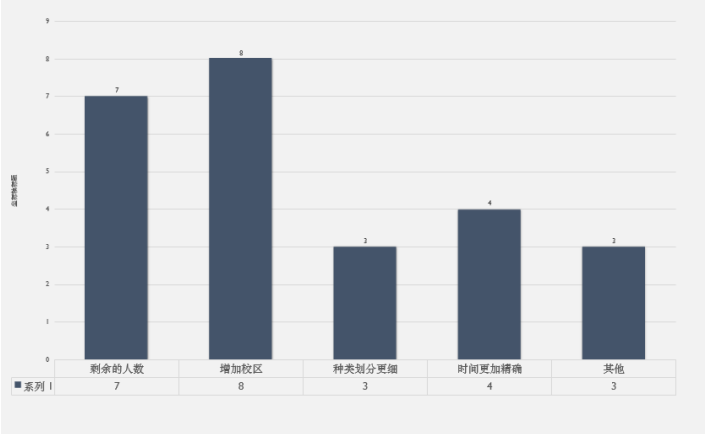
As what we learn in our class, when designing a problem, we have to make the problem general and open-ended . We decided to design text answer questions instead of multiple choice questions. What' s more, in order to allow more participants to answer our questions, we have simplified the content of the questionnaire as much as possible. We only set one question in the questionnaire. We posted picture 4.4.1 in the questionnaire, and then asked users if they had any shortcomings. Considering that the users of this APP are students of Tongji University, we also released questionnaires to students of Tongji University.

So，we made the following questionnaire as follow1:

针对图片中红框的部分，您认为这几个筛选因素怎么样，有什么建议给我们吗（第2.3.4张图是筛选的具体内容）？

*

We send out questionnaires to let others comment if there is any shortcomings. A total of 22 effective questionnaires were received, and the following feedback was obtained. Results are as follows2. The most in demand is to know the remaining number of people and the campus



So , we change our page. The left picture below is before modification, and the right picture below is after modification.

figure 4.4.2 meituan

figure 4.4.3 taobao

[1] In order to allow more students to participate in answering the questions, we did not set the language to English.

[2] This histogram is automatically generated, so there will be Chinese.

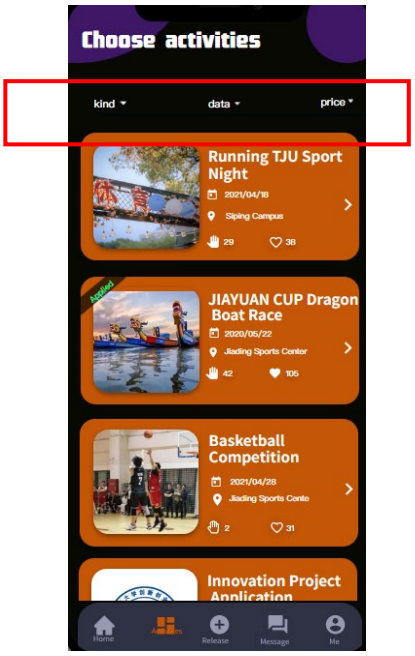


figure 4.4.4 three buttons

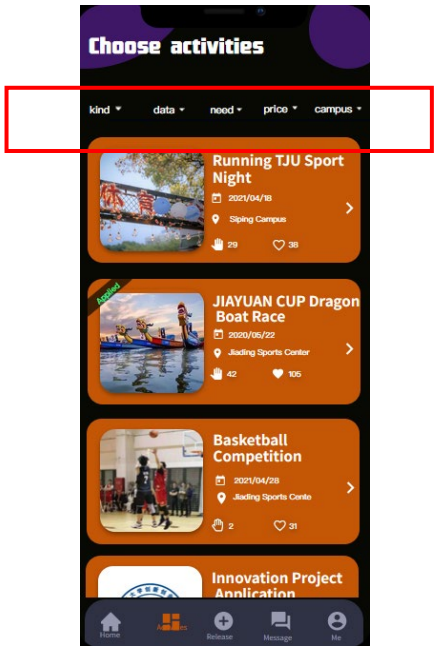


figure 4.4.5 five buttons

However, five buttons in a row(figure 4.4.5) seems to be a little crowded ,and may cause more mistouch .When we found the common app(figure 4.4.2 ,4.4.3) , such as Meituan and Taobao， they both have four buttons. Five buttons in a row and four buttons in a row with a button above, which is better?

We don't know which kind is better, so we use experimental evaluation to find the better one. Experimental evaluation provide empirical evidence to support particular claim or hypothesis and can be convincing.

The following are our design and reasons for the experimental parameters:

Independent variables :Should we choose a pattern with five buttons in a row or a 4+1 pattern? The former is visually more intuitive, but because of the small spacing between the buttons, it is easy to cause accidental touches. The latter buttons are farther apart, but if there is a button on it, will it be difficult for users to find it?

Dependent variable :Our Dependent variable is the time used by the user to specify the filter. The shorter the time, the more friendly design of the interface. At the same time, time is also a better measurement and calculation amount.

Hypothesis :Because we found that most apps now use 4 buttons in a row, so we also think that with 4 buttons in a row, the user experience is better.

Method: We use the Within-subjects method. Because the advantage of this method is less costly than between-subjects since fewer users required and less chance of effects from variation between participants. Because in school, it is difficult for us to find many people to conduct experiments. Therefore, this method that requires fewer experimenters is more suitable for us.

Our experimental parameters are as follows:

Participants	**10**
Independent variables	Five buttons in a row or four buttons in a row?
Dependent variables	Time taken by users to choose specified activities
Hypothesis	Four buttons in a row is better
Method	Within-subjects

You can see two designs as follows(figure 4.4.6 and figure 4.4.7). In the first design, we put five buttons in a row. And in the second design, we put four buttons in a row and a button above.

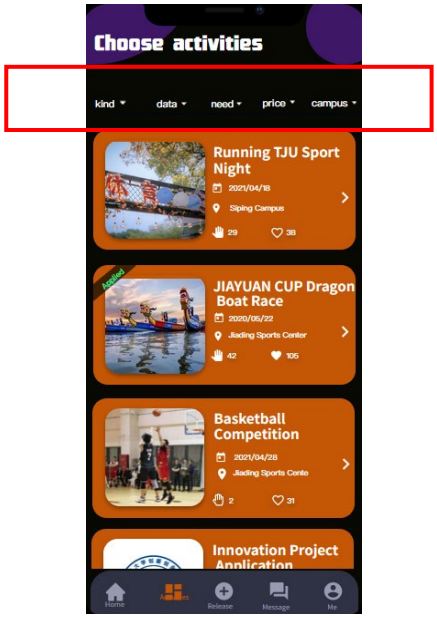


figure 4.4.6 five buttons in a row

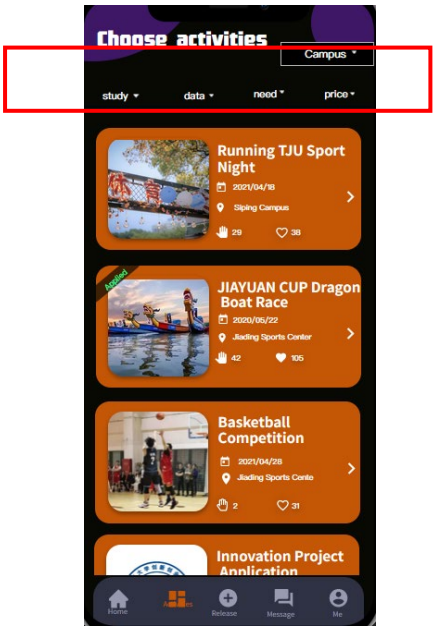


figure 4.4.7 4+1mode

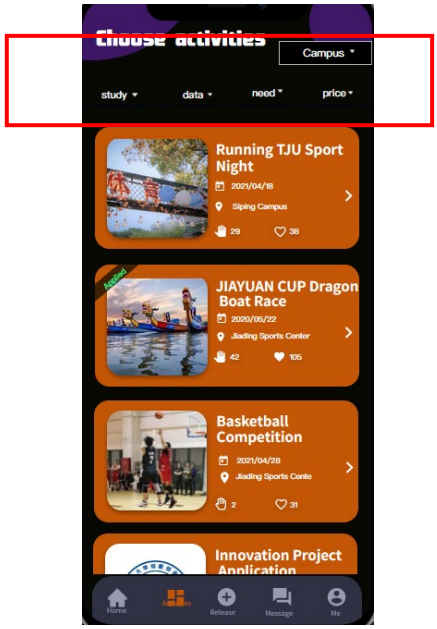
There are ten people participated in our experiment ,six male and four female. They are divided into group A and group B. In the following results, numbers 1 to 5 are group A. They perform a test with 5 buttons in a row first, and then perform a test about 4+1 mode. Members in Group B perform a test about 5 4+1 mode first, and then perform a test with 5 buttons in a row.According to the requirements, they select the required items, repeat 5 times, and take the average result. The result are as follows:

Group	ID/	5 /sec	4+1 /sec	5/ Error times	4+1 / Error times
A	1	4.1	2.9	2	0
A	2	4.8	3.1	3	1
A	3	4.6	2.7	3	0
A	4	4.5	4.5	3	2

A	5	5.1	2.9	4	0
B	6	4.5	3.2	2	1
B	7	4.9	3.1	3	0
B	8	5.3	3.0	4	0
B	9	4.6	2.8	3	0
B	10	5.0	3.2	4	1
	total	4.74	3.14	3.1	0.5

We can find it cost less time and make less errors if we put four buttons in a line.

Through the above experiment, we find that 4+1 mode is better. Finally we determined the final interface.



4.4.2 Heuristic evaluation

What's more ,we use Heuristic evaluation to find potential usability problem. As what we learn in our class, a heuristic is a guideline or general principle or rule of thumb that can guide a design decision or be used to critique a decision that has already been made. We chose Nielsen's experience because this method only requires 3-5 evaluators, which is similar to the number of members in our group.

Here are a few theories we have adopted:

Theory 3 User control and freedom

As what we learn in class , people like exploring than read document. In the process of the user exploring the function, he cannot find his target immediately. We have set up an obvious exit in the interface, so that users can easily find(figure 4.4.8). People use apps every day, and many of them have formed guidelines. We use this design to allow users to get started more quickly[1]. In order to

make it easier for users to find the back button, we adopted most APP solutions: put the back button in the upper right corner.

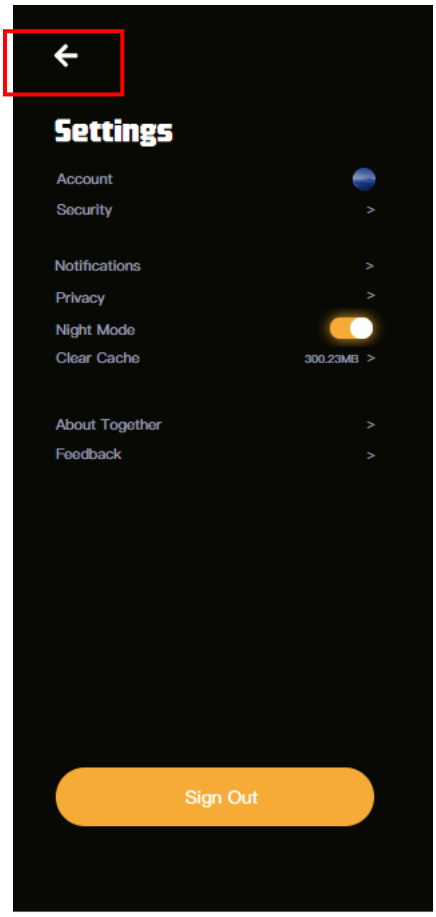


figure 4.4.8 easily found exit

Theory 6 Recognition rather than recall

We try to mark the function of the page on each page, so that users know which page they are on, instead of remembering what they just clicked. Just like the picture shown below(figure 4.4.9), we have marked the functions of the current page in the upper left corner. Therefore, users do not need to meet what they have just clicked on or infer what page they have entered based on the content of the page.

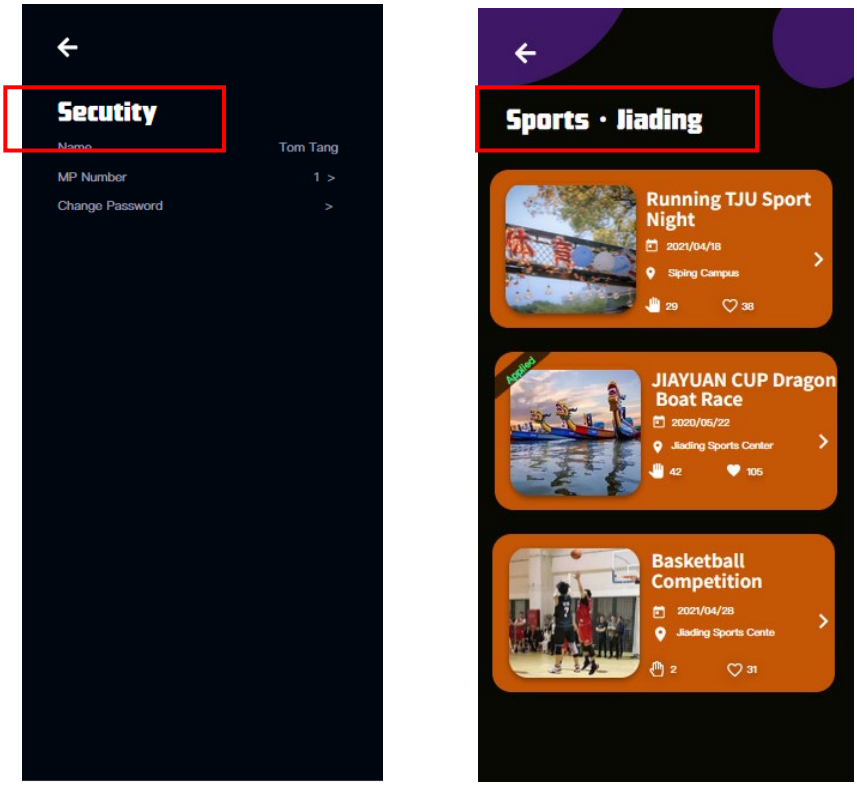
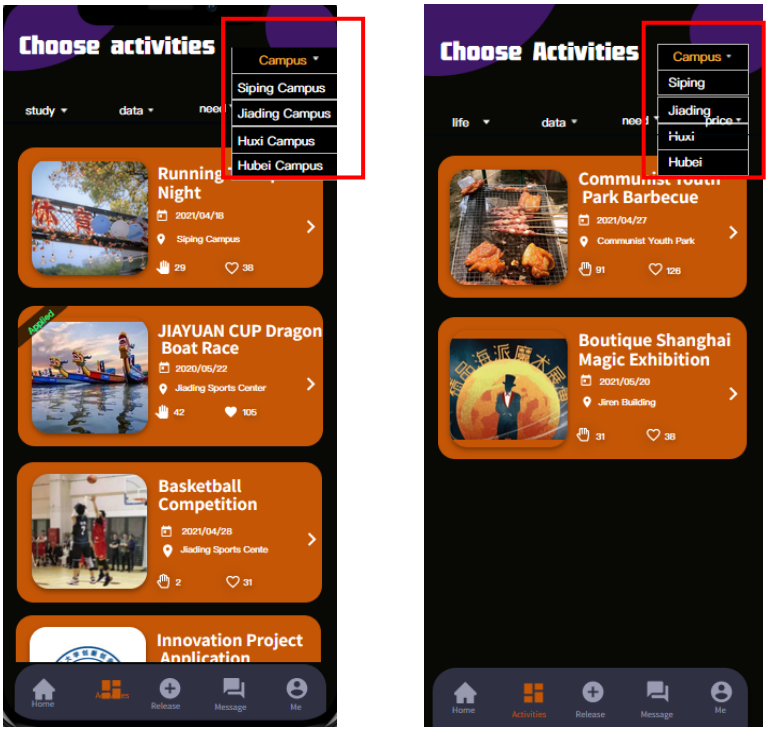


figure 4.4.9 know which page

Theory 8 Aesthetic and minimalist design

Considering that this APP is for students of Tongji. We know that it is the Siping Campus when we see Siping, so we can delete the campus in the option to make it clear. After we delete the word campus, it will not cause ambiguity to the students. At the same time, the content of the page appears more concise.



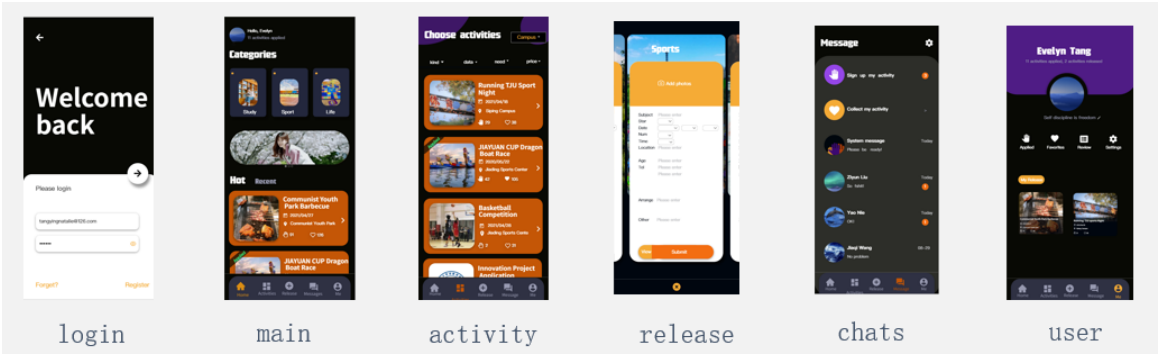
4.4.3 Short summary

Let me make a short summary. We use four kinds of evaluation in our project. They are Cognitive walkthrough ,Query techniques ,experimental evaluation and heuristic evaluation. We think that experimental evaluation is the most useful in helping us correct problems. Because the result of experimental evaluation is more objective and meaningful. Heuristic evaluation is the most useful in helping us find the problem. The reasons why heuristic evaluation is usability are as follows:

- Evaluate the entire system at the same time
- Use less people
- Give reference direction

5. Final interface

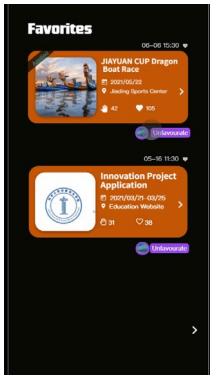
5.1 The functionality



The functionalities of our application mainly include six parts, login part, main part, activity part, release part, chats part and user part.

In the login section, you can enter your account and password to log in; in the main section, you can observe an overview of recent activities and popular activities, and you can browse activities in three parts: learning, sports, and entertainment; in the activity section, you can view the specific content of the activity event in detail; in the publishing section, you can publish the activities you like and are willing to share; in the chatting section, you can send messages to the event initiator and other people; in the user section, you can set your own preferences.

5.2 The difficult part



In our opinion, the most difficult is not which part, but every detail.

For example, We use the animation effect to make the entire interface more friendly. This kind of detail is what we think the most difficult.

Details determine success or failure, especially in human-computer interaction design.

5.3 How to run

Install our final apk file on your Android phone, so you can run it.

6. References

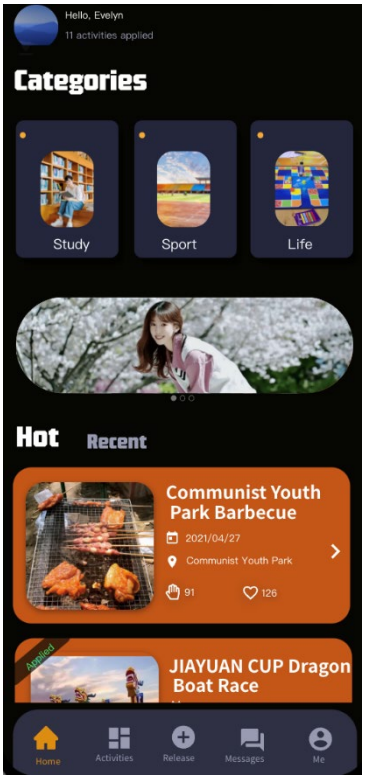
[1] Ling ma. User interface design analysis based on interactive experience and visual experience[J]. industrial design, 2021(03) : 80 - 81.

[2] Nuno Correia and Atau Tanaka. From GUI to AVUI: Situating Audiovisual User Interfaces Within Human-Computer Interaction and Related Fields[J]. EAI Endorsed Transactions on Creative Technologies, 2021, 8(27)

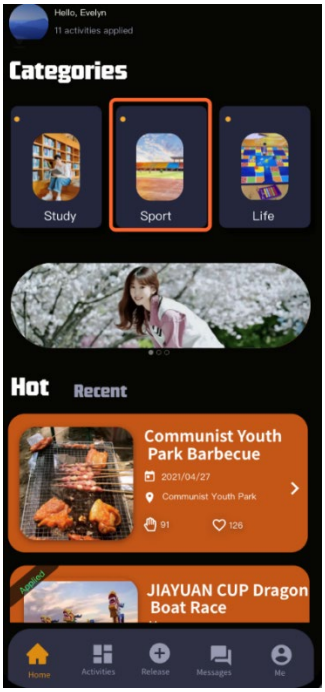
7. Appendix: User manual

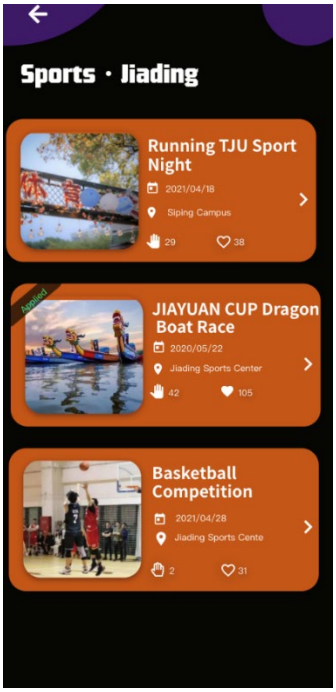
7.1 All activities

When you enter the home page, you can see all popular activities can participate in.

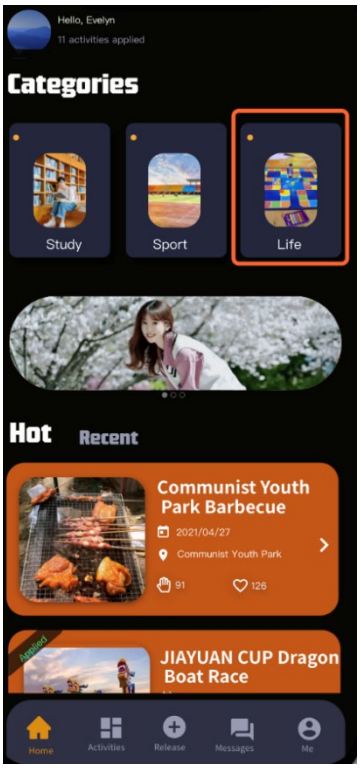


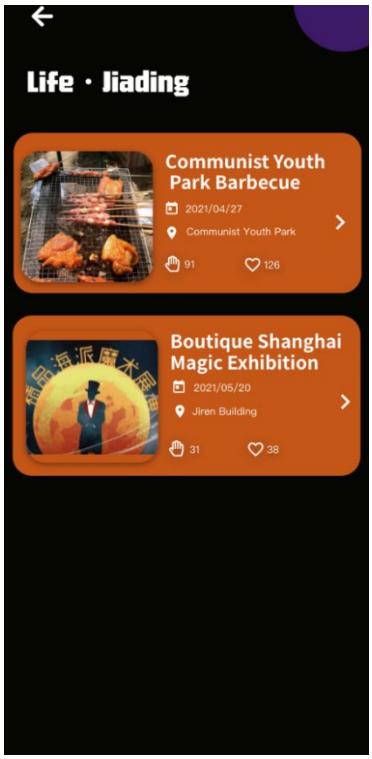
You may feel too messy to see these activities, so we provide shortcut keys to select activities by label. If you only want to view sports-related activities, you can click on the sports tab here to filter out the sports-related activities.





Or you just want to view the activities related to life, you can click the life tab here to filter out the activities with the theme of life.



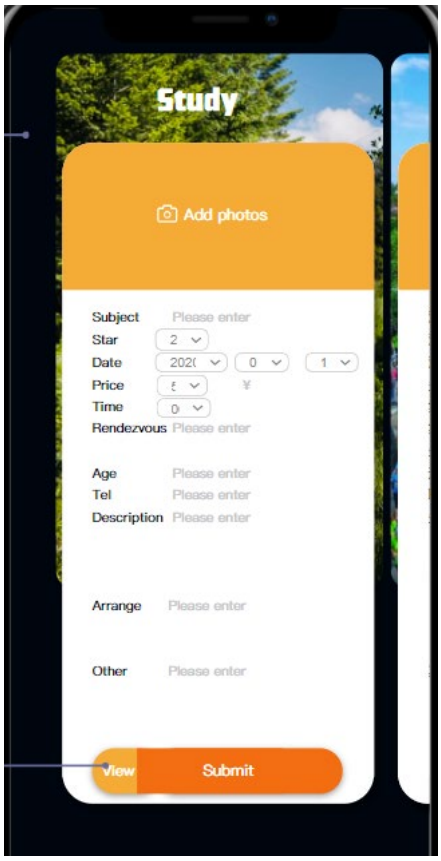


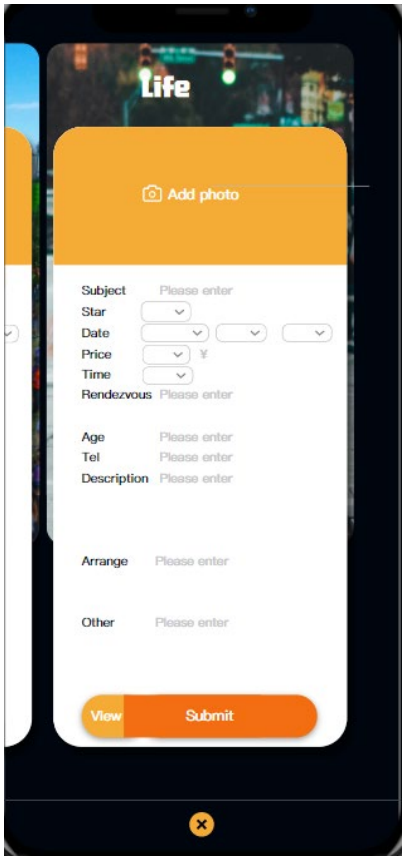
If someone likes my activity, they can choose to hands up. And I will receive the message in "sign up my activity"

7.2 Release activities

You can also create the activities you want, divided into learning, sports and life.

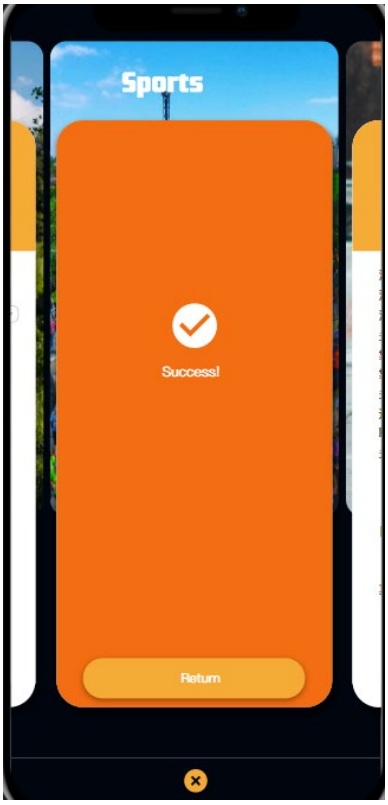
Activity details creation page



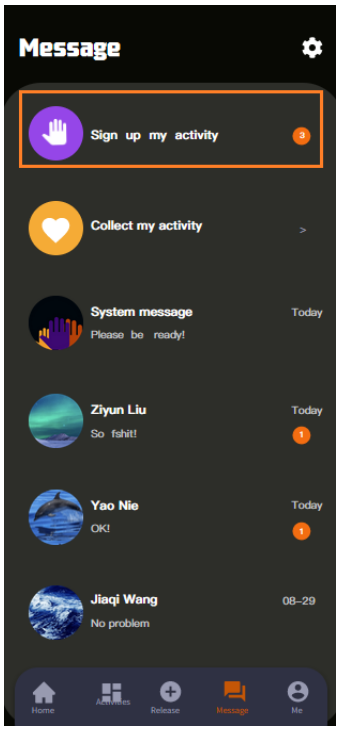


There can be an advance preview to prevent error submission.

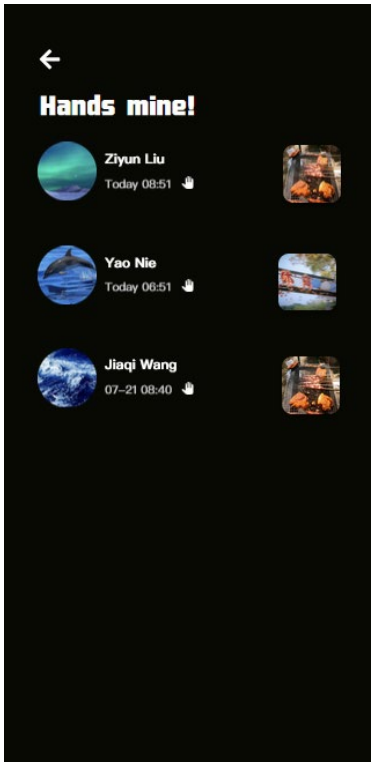
Submit success interface



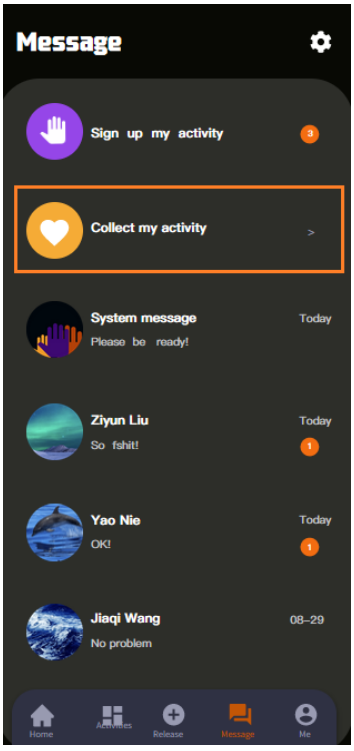
7.3 Chats

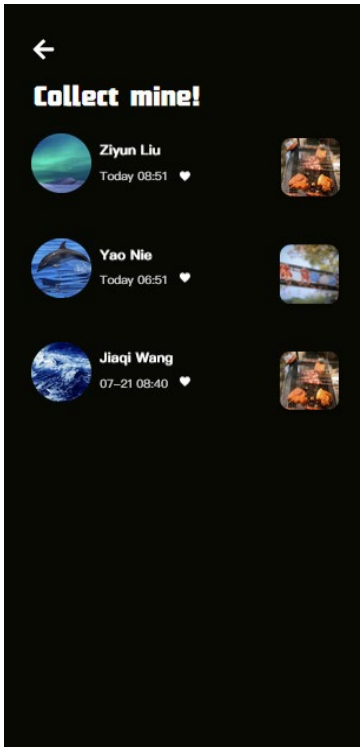


You can see other people’s hands up from it

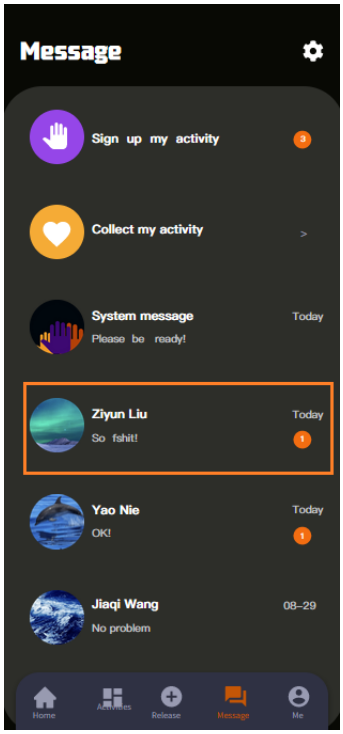


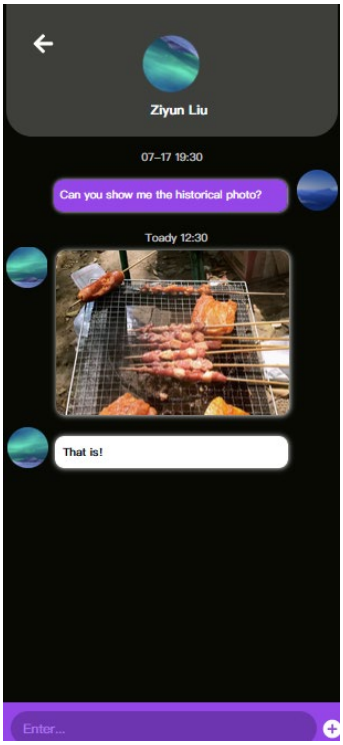
From the current interface, you can enter the page to see who has favorited your activities



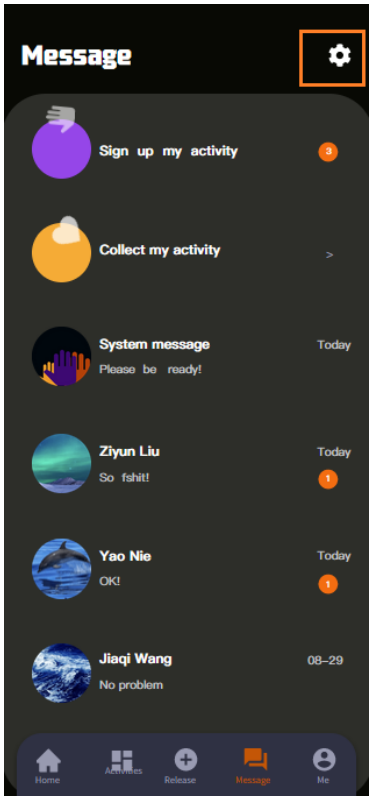


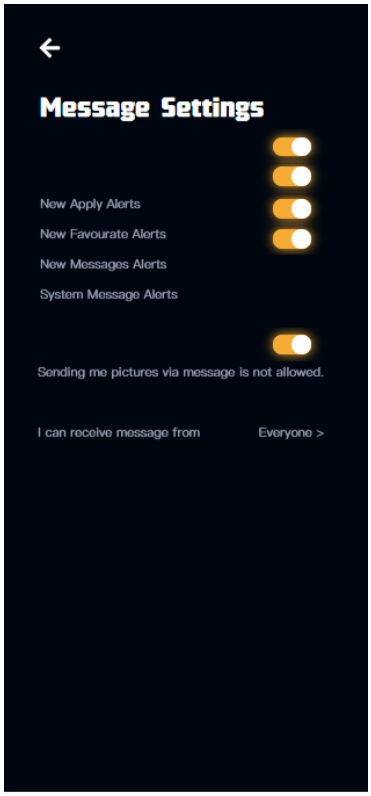
What' s more , you can receive messages from others, click on the message to view the details.





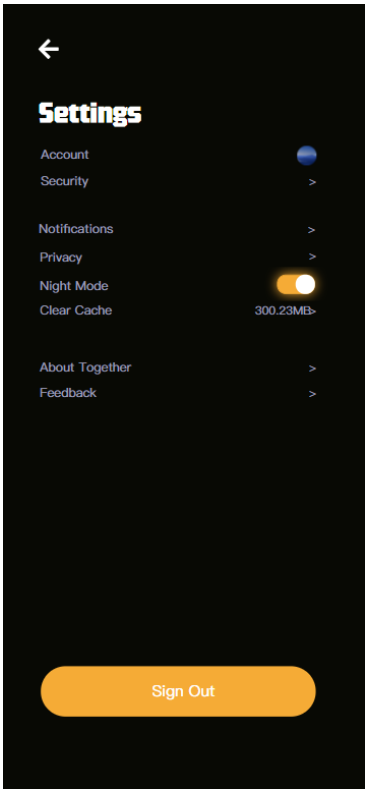
User can enter the message setting page through the setting button in the upper left corner of the page. On this page, the user can set the message situation



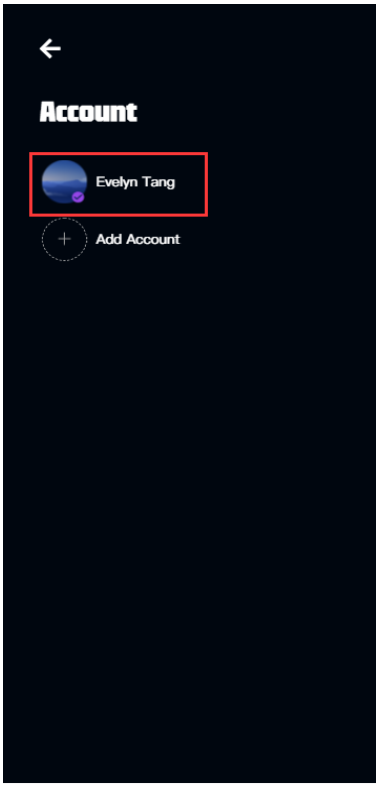


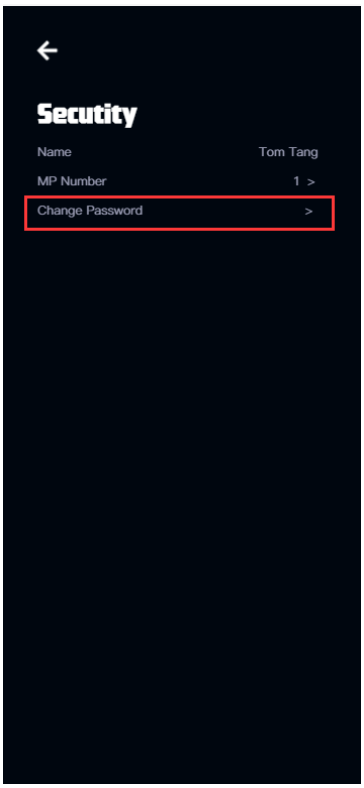
7.4 Settings

When you click the settings button, you will enter this page.

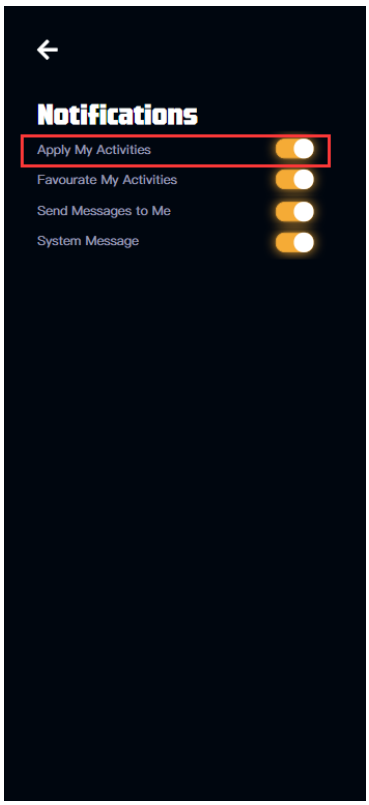


You can enter the **Account Settings** to log in or log out of your account. And you can enter the **Security Settings** to manage your security information, such as, change your password.

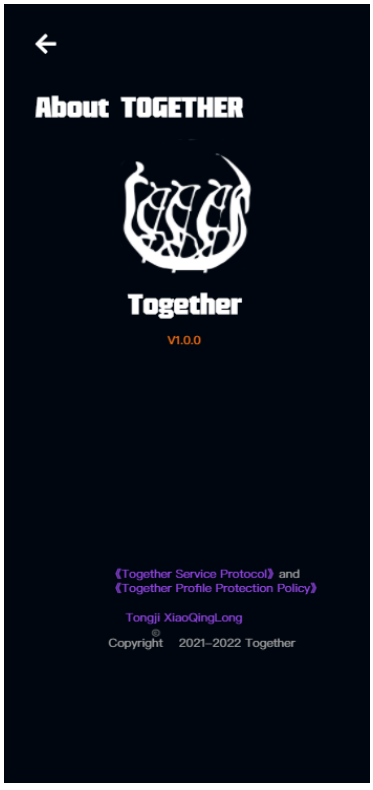


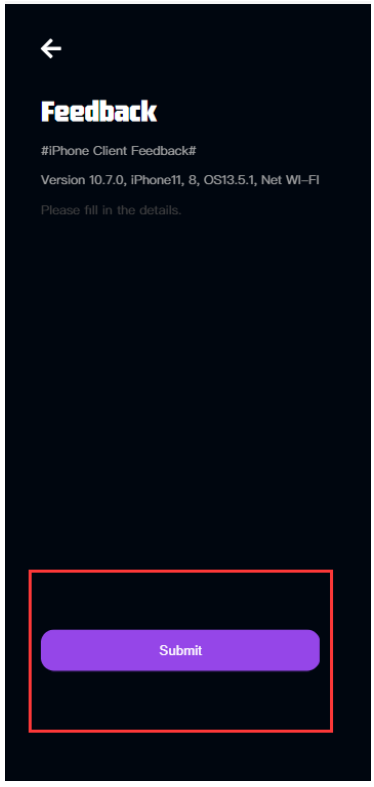


In **Notifications Settings**, you can decide what messages you can receive. If you don't let somebody send message to you, you can enter the **Privacy Settings** and turn off that button.



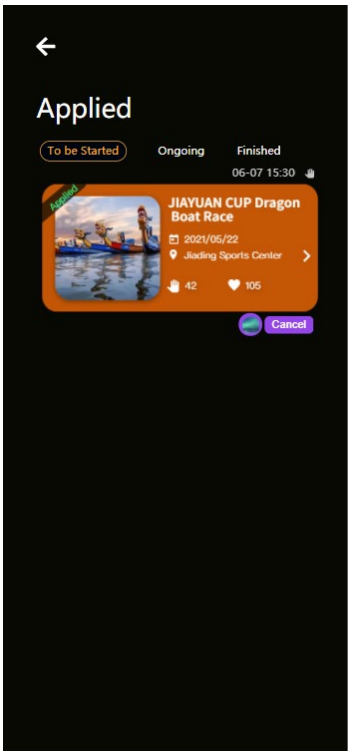
You can also enter **About Together** page to view the basic information of Together, or submit your feedback to us in the **Feedback** page.

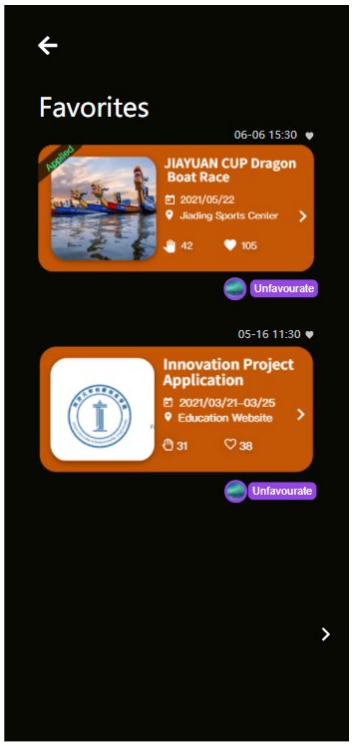




On the **applied** page, you can see the activities signed up for, and you can click the cancel button to recall the registration.

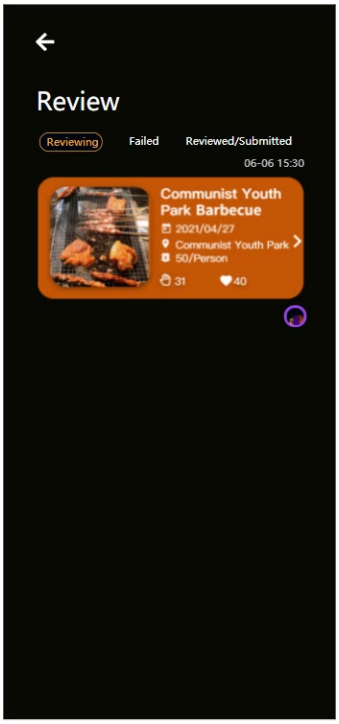
On the **favorites** page, you can see the activities you like. You can also cancel your likes.

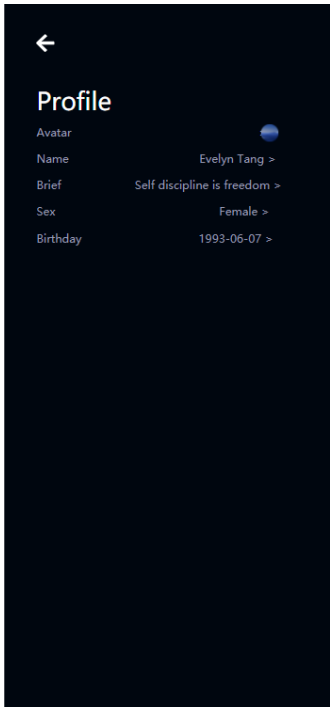




On the **reviewed** page, you can see the activities that are being reviewed. Click the button to view system information.

On the **profile** page, you can see some of your information, such as avatar, name, brief, sex and birthday.





7.5 Me(not signed in)

On the **unlogged** page, you can click the button to log in, otherwise your activity function will be restricted, for example, you can't release activities.