SportTogether

An Android application for grouping random people together to enjoy sports.

CS 6365 Introduction to Enterprise Computing

Final Project Report

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Motivation and Introduction

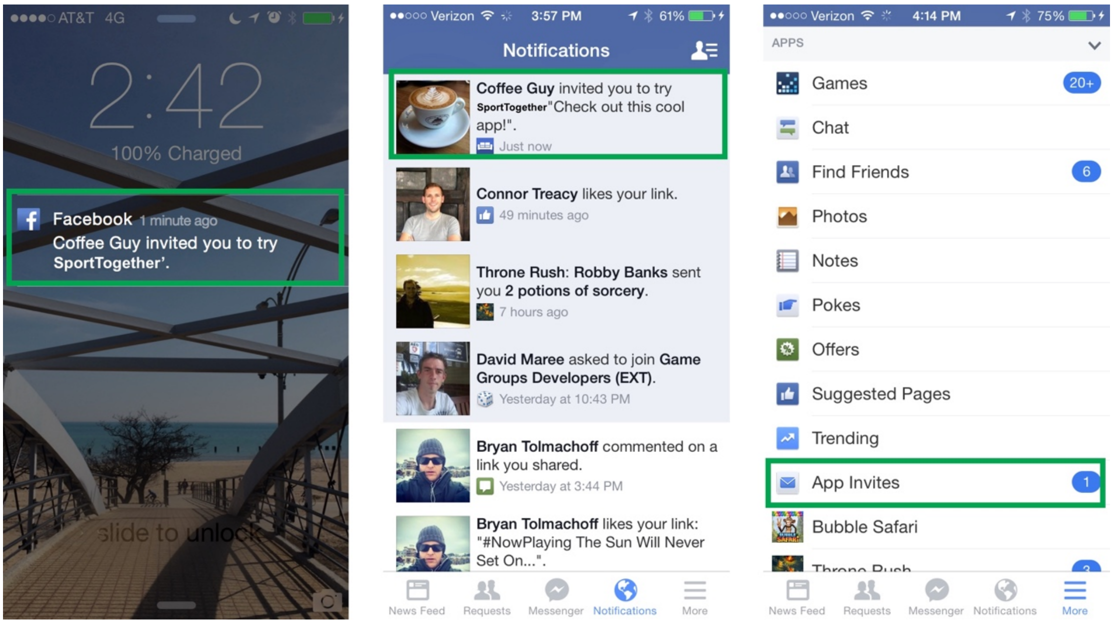
Sometimes, people cannot play the sports they like because of minimal number of player requirement. For instance, a soccer game requires 22 people. It might be difficult for some people to gather enough people to play sports with them due to many reasons. Maybe their friends are busy preparing for exams. Maybe the sports they are interested in are less popular. Maybe they just come to a new environment and do not know many people. Take our team member Kuan-Yu as an example. He loves playing volleyball. However, there are not many people playing volleyball in Georgia Tech, and it requires 12 people for a volleyball game. Therefore, he wants to meet new friends who are also interested in volleyball and live in Atlanta. Our application will solve this problem for him.

In this project, we build an Android application that can help people group up for playing sports. One could also use it as a way to make new friends who are interested in the same sport. The main function of our application is the player matching system which group people together based on their preferred sports, location, time, etc. Also, we built profile system, group chat room system, review system, and friend system. All features will be introduced in detail in the later section. A user first logs in and requests for grouping with some requirements. After the group is formed, players could discuss about the detail (e.g. exact location, time) of their event in the chat room. After the game ends, they could review each other.

User Recruiting Strategy

Since the purpose of our application is to organize people to play sports that require many people, we need a big user base to make matching fast. We have thought of some methods of recruiting users to use our application.

1. Promote our application to social media sports clubs. Members of sports clubs are very likely to enjoy our application. Also, we could start from promoting our application to school clubs, since we might know some students in the clubs. The school is a good starting point for the new business. The famous Facebook was starting as a social network within Harvard.
2. Use the Facebook app invitation functions to allow our users to send an invitation to their Facebook friends to use our application. We illustrate this idea in the Figure-1. This could be a great promotion since the spreading pattern of this kind of advertising is exponential.
3. Promote our application to the new students or faculties at the campus. These people are not familiar with the environment and don't have existing sports friend to play with. Our application can help them make the new friend through grouping and playing the sports they like. We can do this by introducing our application at the student orientation events.



Facebook 1 minute ago
Coffee Guy invited you to try SportTogether'.

Coffee Guy invited you to try SportTogether"Check out this cool app!". Just now

Connor Treacy likes your link. 49 minutes ago

Throne Rush: Robby Banks sent you 2 potions of sorcery. 7 hours ago

David Maree asked to join Game Groups Developers (EXT). Yesterday at 10:43 PM

Bryan Tolmachoff commented on a link you shared. Yesterday at 3:44 PM

Bryan Tolmachoff likes your link: "#NowPlaying The Sun Will Never Set On...".

Figure 1-Invite friends to use Our App through Facebook.

Related Works

There are some existing sports team management application on the market, such as Teamstuff [1], and TeamSnap [2]. There are also some appointment scheduling applications, such as SetMore [3], which can help people arrange business meetings. However, none of them has the same features as our application does; in other words, we are the pioneer in this area. Table-1 shows the difference between those applications and SportTogether.

Teamstuff - Free Sports Team Management

Teamstuff is an application that allows players to manage games, training, and team communication. Players can manage their availability and duties. Coaches and managers can manage the team roster and make announcement to the whole team. The main users for this application are team members. They can use it to communicate more efficiently.

The biggest difference between Teamstuff and our application is the target user groups. Teamstuff focus on existing sport club It helps club players to manage games and training events. On the other hand, our application focus on general users They can play with existing friends or make new friends by playing sports together.

TeamSnap - Sports Team, Club & League Management

TeamSnap is a sports team management application for coaches, managers, and organizers to save time organizing their teams and groups online. The main features are contact information, team schedule, messages, member availability, and payment tracking. The main users for this application are existing teams. They can use it to easily make appointments.

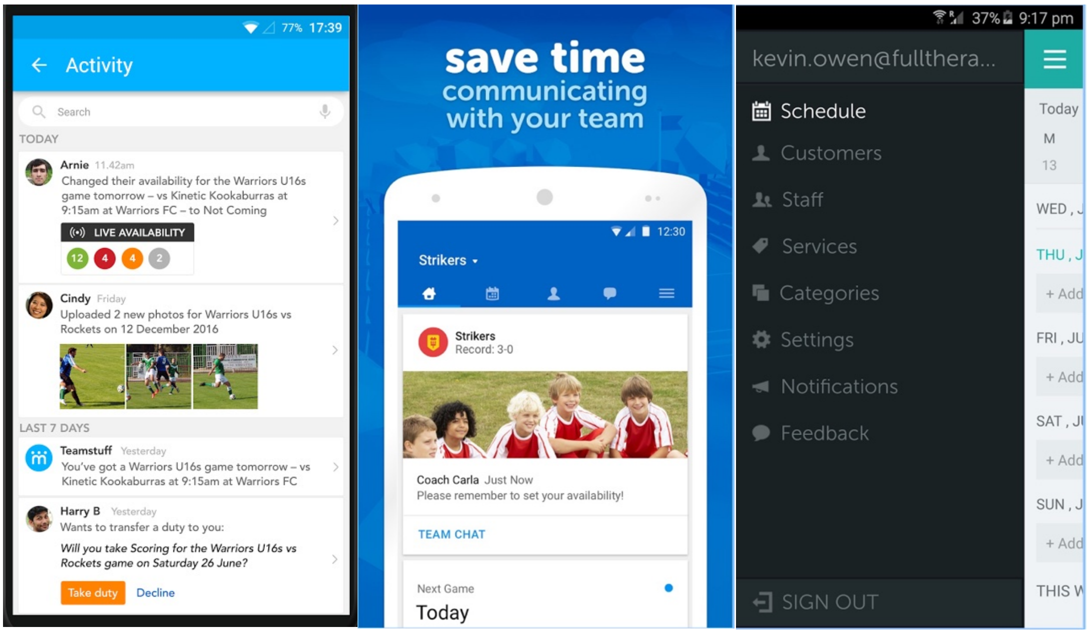
SetMore – Appointments Scheduling

SetMore is an appointment scheduling application for business people. The main features are notification of appointments, weekly view of upcoming appointments, and canceling or confirming appointments. The main users for this application are the business people. They can use this application to manage their schedule and get notification of their appointments.

There are some difference between our application and SetMore. SetMore is aiming for business event. However, our application mainly focuses on sport grouping events. Besides, SetMore does not have the map feature, our application show direction to their meeting with a build-in Google Maps.

	SportTogether (Our App)	TeamStuff	TeamSnap	SetMore
Target user group	General User	Sport clubs	Sport clubs	Business man
Scheduling Event	Yes	Yes	Yes	Yes
Player matching	Yes	No	No	Yes
Built-in Map	Yes	Yes	Yes	No
Chatroom	Yes	Yes	Yes	Yes
Player review	Yes	No	No	No
Friend system	Yes	Yes	Yes	Yes
Multi-language	No	Yes(15)	No	Yes(4)

Table 1- Comparison Our App and related Apps



Arnie 11.42am
Changed their availability for the Warriors U16s game tomorrow – vs Kinetic Kookaburras at 9:15am at Warriors FC – to Not Coming

Cindy Friday
Uploaded 2 new photos for Warriors U16s vs Rockets on 12 December 2016

Teamstuff Yesterday
You've got a Warriors U16s game tomorrow – vs Kinetic Kookaburras at 9:15am at Warriors FC

Harry B Yesterday
Wants to transfer a duty to you:
Will you take Scoring for the Warriors U16s vs Rockets game on Saturday 26 June?

Strikers
Record: 3-0

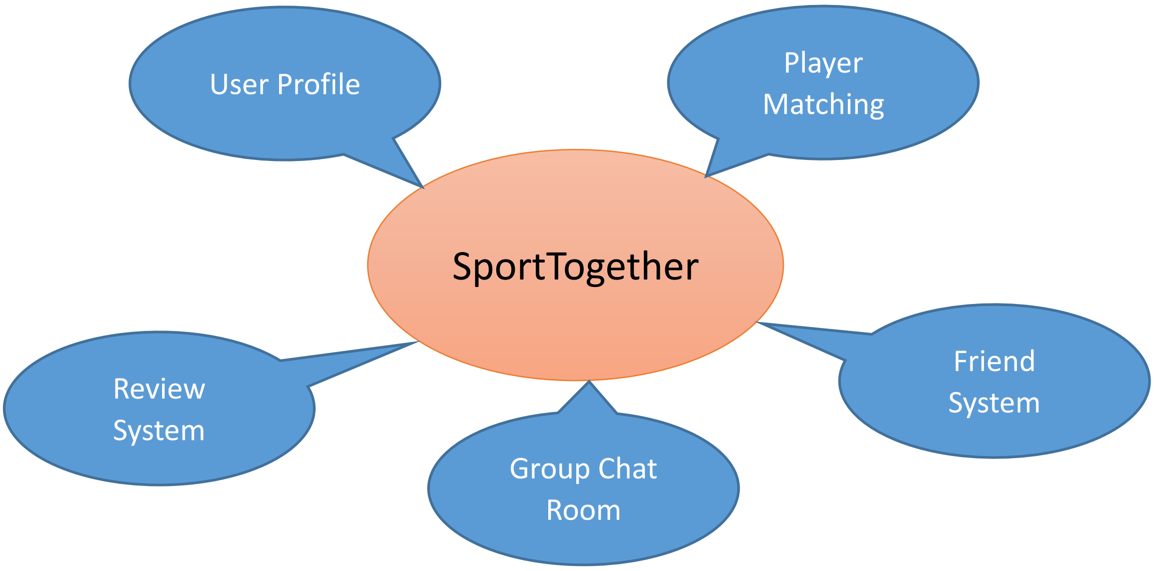
Coach Carla Just Now
Please remember to set your availability!

Next Game
Today

Figure 2 Related Apps snapshot, from left to right: TeamStuff, TeamSnap, SetMore

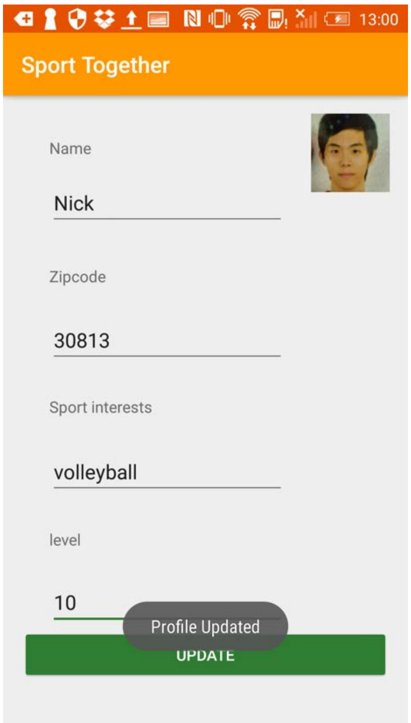
Project Features

The following are the main features and functions of SportTogether.



Player profile:

Each player has a profile which includes a picture, his/her nickname, a short self-introduction, sports he/she is interested in, and his/her level of proficiency in each sport. We utilize the existing social media account – Google account as our login authentication. We achieve this with the Google Firebase authentication, this allow us to get basic information. Figure 3 shows the profile page in our application.



13:00

Sport Together

Name

Nick

Zipcode

30813

Sport interests

volleyball

level

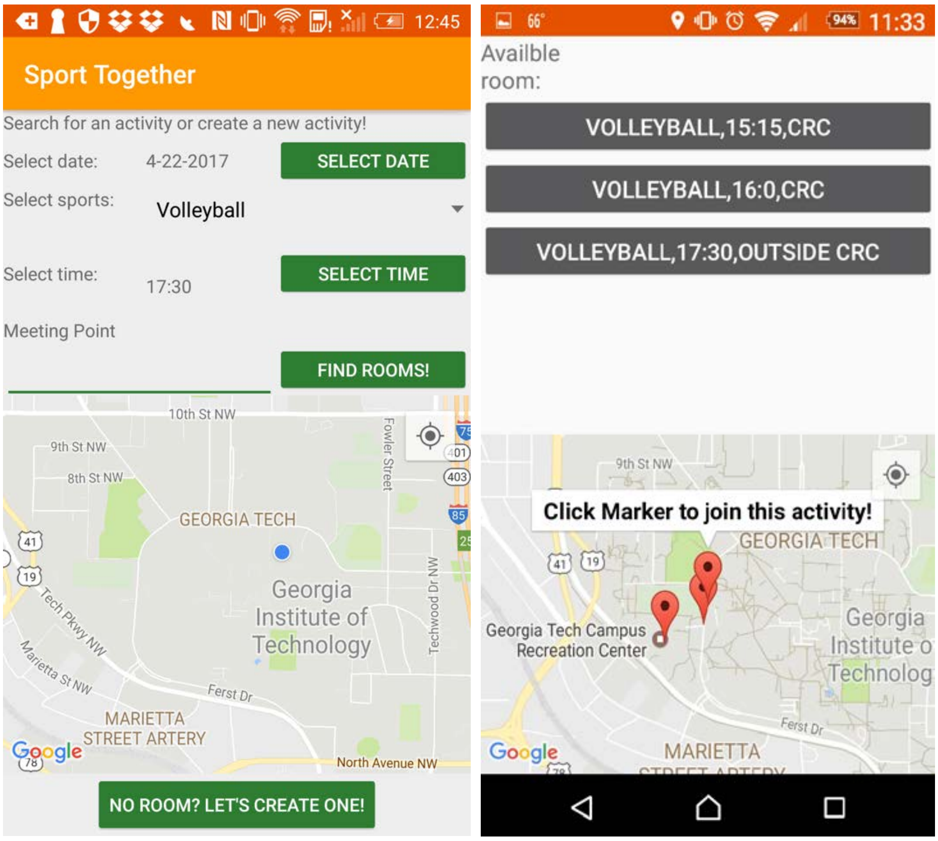
10

Profile Updated

Figure 3-user profile page

Players matching system:

This is the main feature of our application. We match players who do not know each other to play the sport they are interested in together. After logging in, a player could find existing nearby group or initiate a group. Users can find an existing group with the following filters: type of sport, preferred location, and preferred time. Our system lists all qualified events based on the filters and neatly displays the results in a Google map. The player could join the group events he/she want. In some cases, if no matched group is found, the player would create an event to wait for other players to join.



Sport Together

Search for an activity or create a new activity!

Select date: 4-22-2017

Select sports: Volleyball

Select time: 17:30

Meeting Point

Availble room:

VOLLEYBALL,15:15,CRC

VOLLEYBALL,16:0,CRC

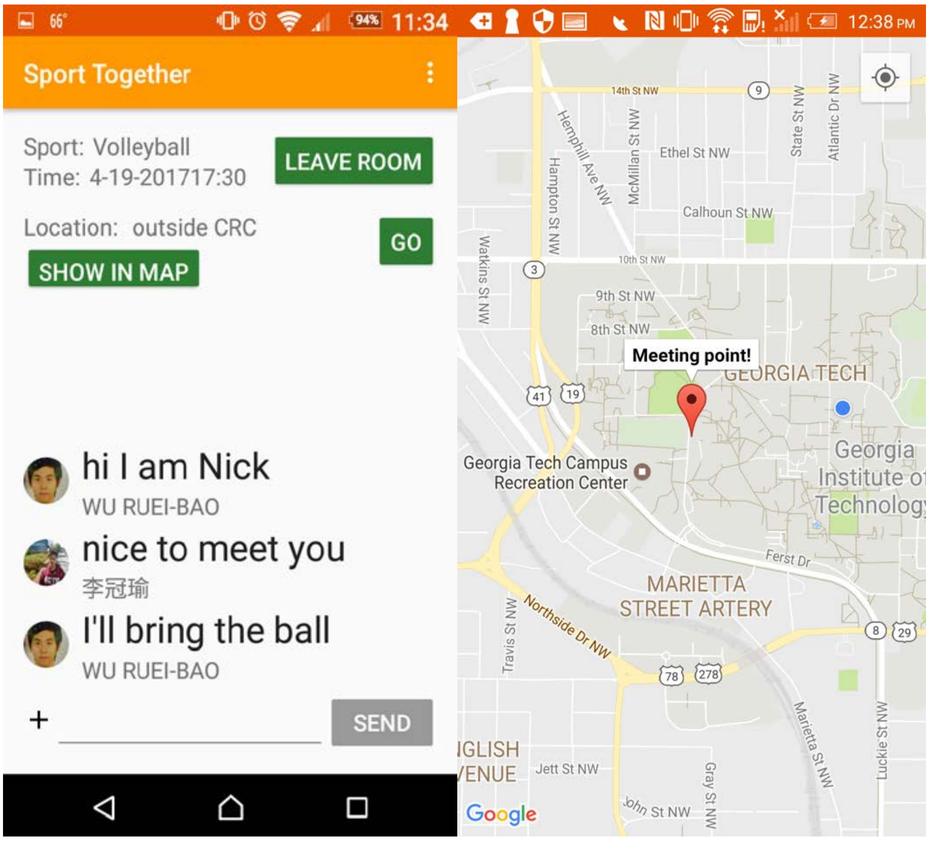
VOLLEYBALL,17:30,OUTSIDE CRC

Click Marker to join this activity!

Figure 4-Event matching page(left), result page after filtering(right)

<u>Group chat room and built-in map:</u>

After being matched, players would join the activity room. In the activity room, players could discuss details about their event in the chat room. Also, User can send both text and images within the chatroom. For example, user can discuss about when and where exactly are they going to meet, who will bring the ball, etc. The activity room also provide a “Show in MAP” button to help user see the meeting point in the built-in Google Map. Users can see their current location and their meeting point shown as a pin on the map. Figure 5 shows the chatroom page and the map direction point.



Sport Together

Sport: Volleyball
Time: 4-19-201717:30

Location: outside CRC

hi I am Nick
WU RUEI-BAO

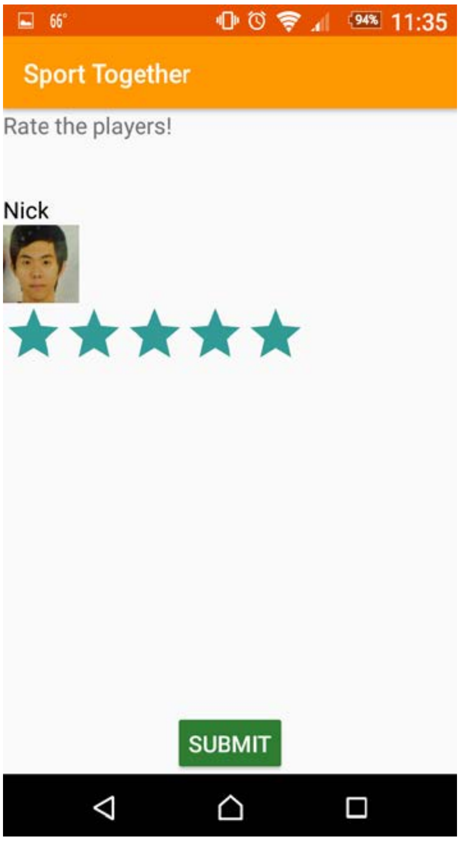
nice to meet you
李冠瑜

I'll bring the ball
WU RUEI-BAO

Figure 5- Chatroom page(left), Meeting point page after clicking "show in map" button

Review system:

After the game, players could review each other. They can evaluate other users with stars, which range from zero to five. People who often are absent, tend to be late, or are unfriendly would receive fewer stars. When grouping, players could avoid people with low review scores. Figure 6 shows the review page.



Rate the players!

Nick

★★★★★

Figure 6- player evaluation page

Friend system (bonus feature):

In our proposal, we propose the friend system feature as potential feature because of the project scope and implementation difficulty. After we work on the project, we are ahead of schedule and accomplish every milestone, thus we decide to implement this bonus feature.

If people were having good time playing sports together, they could add each other as a friend. A player could send direct message to his/her friends or invite them directly to join a group event.

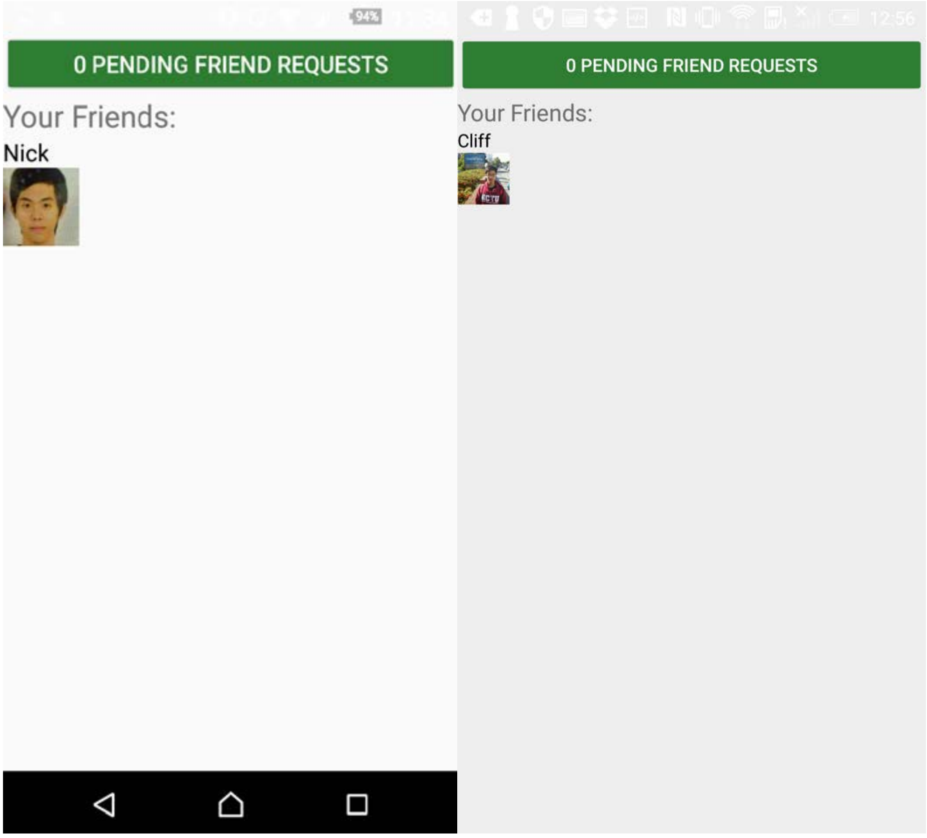
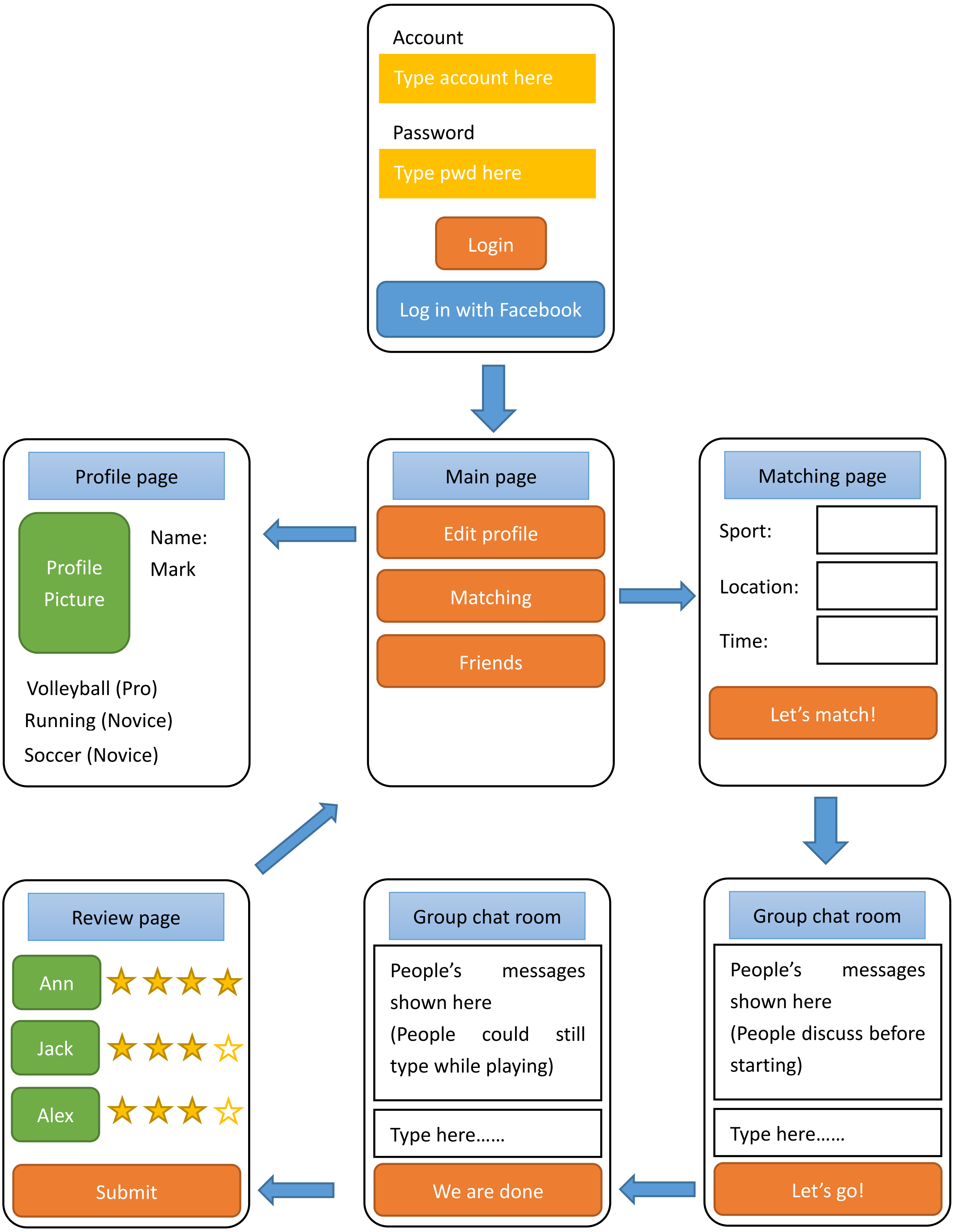


Figure 7- Friend list page.

Proposed Application User Interface



Name: Mark

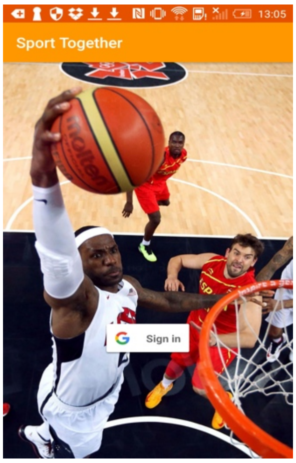
Volleyball (Pro)
Running (Novice)
Soccer (Novice)

Ann ★★★★
Jack ★★★☆
Alex ★★★☆

People's messages shown here (People could still type while playing)

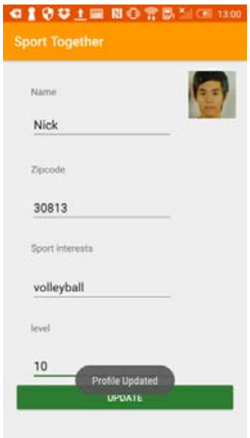
People's messages shown here (People discuss before starting)

Actual Application User Interface



Sport Together

Sign in



Sport Together

Name

Nick

Zipcode

30813

Sport interests

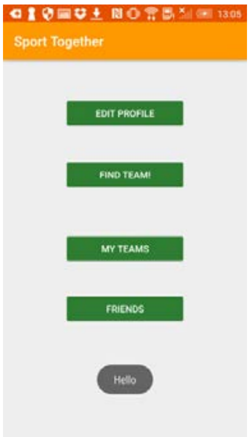
volleyball

level

10

Profile Updated

UPDATE



Sport Together

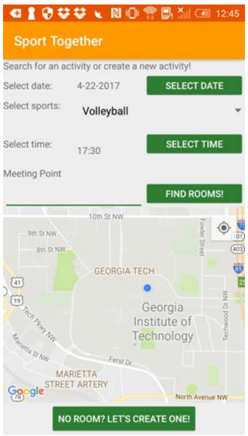
EDIT PROFILE

FIND TEAM!

MY TEAMS

FRIENDS

Hello



Sport Together

Search for an activity or create a new activity!

Select date: 4-22-2017 SELECT DATE

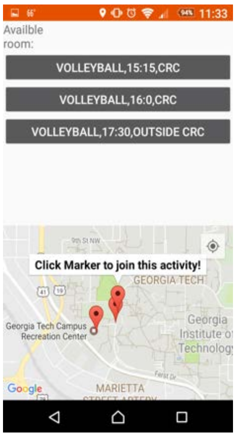
Select sports: Volleyball

Select time: 17:30 SELECT TIME

Meeting Point

FIND ROOMS!

NO ROOM? LET'S CREATE ONE!



Availble room:

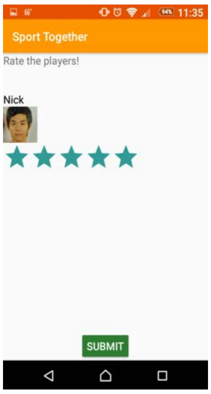
VOLLEYBALL,15:15,CRC

VOLLEYBALL,16:0,CRC

VOLLEYBALL,17:30,OUTSIDE CRC

Click Marker to join this activity!

GEORGIA TECH
Georgia Tech Campus Recreation Center
Georgia Institute of Technolog
MARIETTA
Google



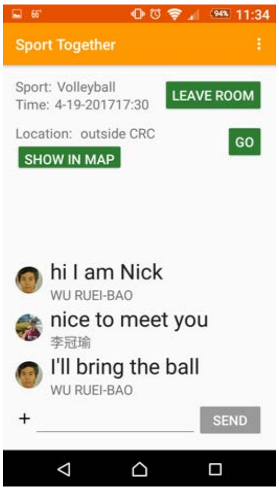
Sport Together

Rate the players!

Nick

★★★★★

SUBMIT



Sport Together

Sport: Volleyball

Time: 4-19-201717:30

LEAVE ROOM

Location: outside CRC

GO

SHOW IN MAP

hi I am Nick

WU RUEI-BAO

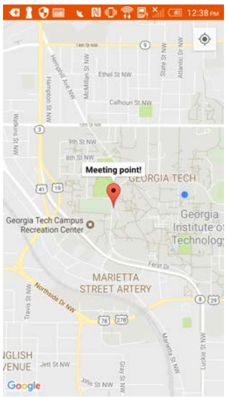
nice to meet you

李冠瑜

I'll bring the ball

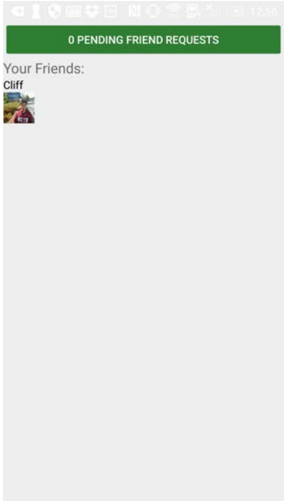
WU RUEI-BAO

+ SEND



Meeting point!

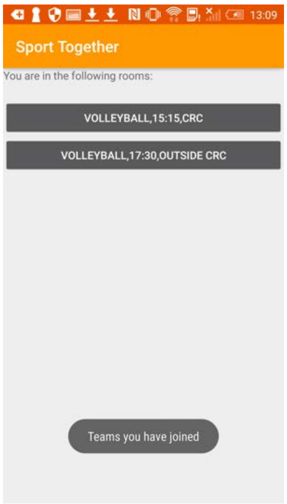
GEORGIA TECH
Georgia Tech Campus Recreation Center
Georgia Institute of Technolog
MARIETTA STREET ARTERY
Google



0 PENDING FRIEND REQUESTS

Your Friends:

Cliff



Sport Together

You are in the following rooms:

VOLLEYBALL,15:15,CRC

VOLLEYBALL,17:30,OUTSIDE CRC

Teams you have joined

Implementation Details

We decide to use Google Firebase [4] as the back-end server and database. Firebase provides many features which fit our application very well. For example, the real-time database of Firebase could be used to implement the group chat feature. Using Firebase, we do not have to run a backend server by ourselves. Users' devices could directly communicate with the Firebase server hosted by Google. We will use Android Studio to develop our application, since Firebase is already integrated into the IDE. Figure 8 shows features supported by the Firebase. In this project, we mainly rely on these three features: real-time database, authentication and storage.

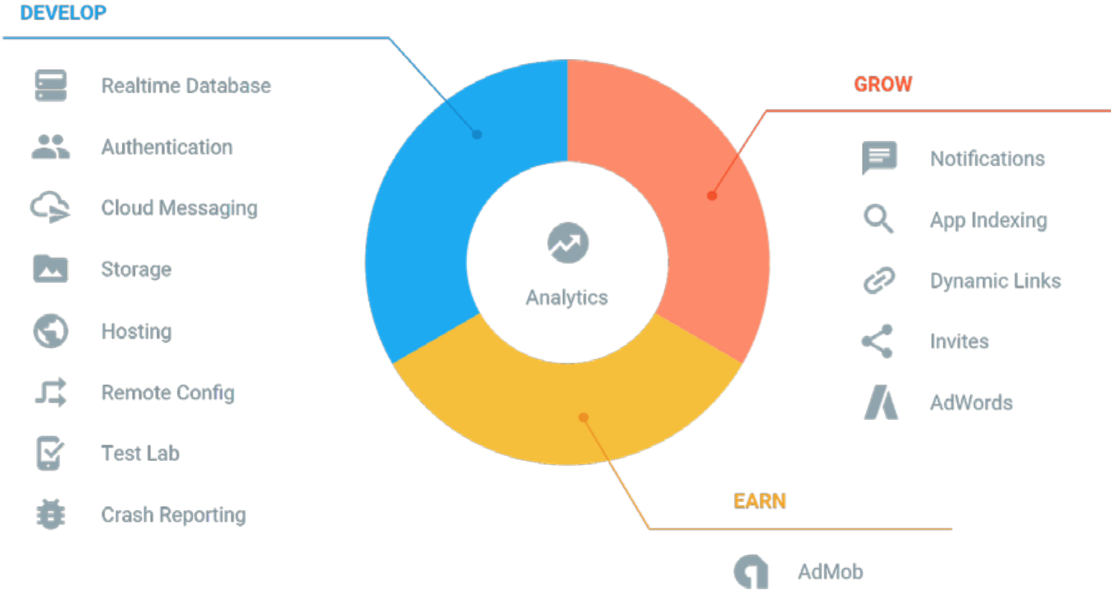
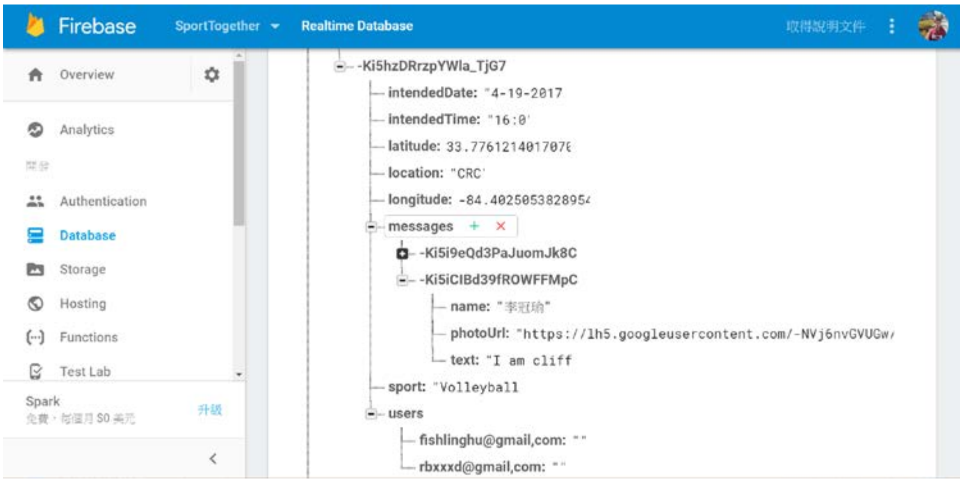


Figure 8-Firebase databases

- ➢ Firebase Real-time Database

  We rely much on the Firebase Real-time Database to implement many functions. It is a NoSQL database that could be structured by json. It has an important feature which is real-time updating. Every function / page which is monitoring the database could see all updates in the database instantly. An example of its nested structure looks like this:



```
-Ki5hzDRrzpYWla_TjG7
  intendedDate: "4-19-2017
  intendedTime: "16:0'
  latitude: 33.776121401707ε
  location: "CRC'
  longitude: -84.402505382895ʌ
  messages + ×
    -Ki5i9eQd3PaJuomJk8C
    -Ki5iCIBd39fROWFFMpC
      name: "李冠瑜"
      photoUrl: "https://lh5.googleusercontent.com/-NVj6nvGVUGw/
      text: "I am cliff
  sport: "Volleyball
  users
    fishlinghu@gmail,com: ""
    rbxxxd@gmail,com: ""
```

The usage of the database is very simple. All data are stored as key-value pairs in the database. To reach the inner most data, one needs to use the “child(key)” function to go from a node to its deeper branch. When the desired node is reach, one could use “getKey” to get the key of that node, or “getValue” to get the value of that node.

- Log In and Profile

We use Firebase Authentication, which supports logging in with social media account, such as Facebook, Google, etc., to implement log in session. Then we use Firebase real-time database to store all information including user profiles, reviews, etc.

- Chat room

We use Firebase Database to implement group chat systems. Firebase Database is a real-time database, which is perfect for any chat room application. Clients could see all updates in the database instantly. We do not have to manage the connection between users. They could see sent messages in real-time by monitoring the database.

The group matching mechanism consists of following steps:

1. User sent the matching request with requirements.
2. We search for existing chat rooms in the Firebase Database.
3. If a chat room satisfied the user’s requirement, we add the user to the chat room.
4. If no available chat room was found, we create a new chat room for the user and add the user to the chat room.
5. After the event ends, remove the chat room from the Firebase Database.

- Map

We implement the map in the chat room selection page with Google Maps API. To connect our app to the Google Maps servers, we specify our API key in the "google_maps_api.xml" files. The API key can be activated from the Google API Console. After we have a valid API key, we can add a MapView to the existing activity xml page. With proper MapView in the xml file, we can instantiate a MapView in the activity.java file and connect it to the MapView with its identification. Then, we can show a map in our app.

To get user's current location, we need to specify an "ACCESS_COARSE_LOCATION" permission in the android manifest file. We also need to request permission at runtime since, after Android 6.0 (API level 23), users grant permissions to app when the app is running, not the time when they installed the app. With the permission, we can easily get user's current location by an API "setMyLocationEnabled".

Another feature we used in the map the marker. The precise locations of events are shown on the map with the marker. To implement this, we first store every sport event's longitude and latitude in the Firebase database. After the Mapview is instantiated, we use the "addMarker" API with event's longitude and latitude to add a marker on the map.

- Friend System

  The friend system consists of two major parts:

  - Friend request

    When viewing other user's profile page, one could send a friend request to that user. After it is accepted, those two users become friends and have a private chat room. This feature is implemented using the Firebase real-time database. In the database, there is a field "request" in each user entry. When a request is sent to that user, the sender's ID would be inserted into "request" field. Later, when the receiver visits the friend page, he/she will see the pending request, and he/she could reply to the request.

  - Friend chat room

    A friend chat room is created when a friend request is approved. It implementation is very similar to group chat room. The difference is that the review function and map are removed, and there are only two people in the room.

Main Challenges

1. Matching algorithms:

   How close in time/ location/ proficiency should players be grouped together? The algorithm should be dynamic, depending on number of waiting users, to make waiting time acceptable. Since this is just the beginning, we just use a static strategy first.

2. Implementation:

   Although the Firebase real-time database provides many useful features, writing codes is not an easy task. To use the database, lengthy and nested codes are required. Accessing the entry of the database is a very complex operation. One has to take a snapshot of the database first. Then you have to use a chained child() function to reach the desired data. This is actually one disadvantage of Firebase that many developers complain about.

3. Android application layout:

   Although the Android Studio has visualized the layout part of Android application very well, it takes us some time to design and debug the layout part. One problem we have encountered is that the layout looks very different on devices with different sizes. For example, the layout might look nice on a 6-inch mobile phone, but some texts would overlap on a smaller mobile phone. The other annoying problem is that the default color of text is white. We have spent much time looking for a missing piece of text, because it is white.

4. Testing:

   Since many of the functions involved multiple users, for example, chatting and friend system, it is difficult to develop the application individually. Therefore, we scheduled many meetings during the semester to work on the application together

User Feedbacks

We have introduced our application to some of our friends. Here are their feedbacks and reviews of our application.

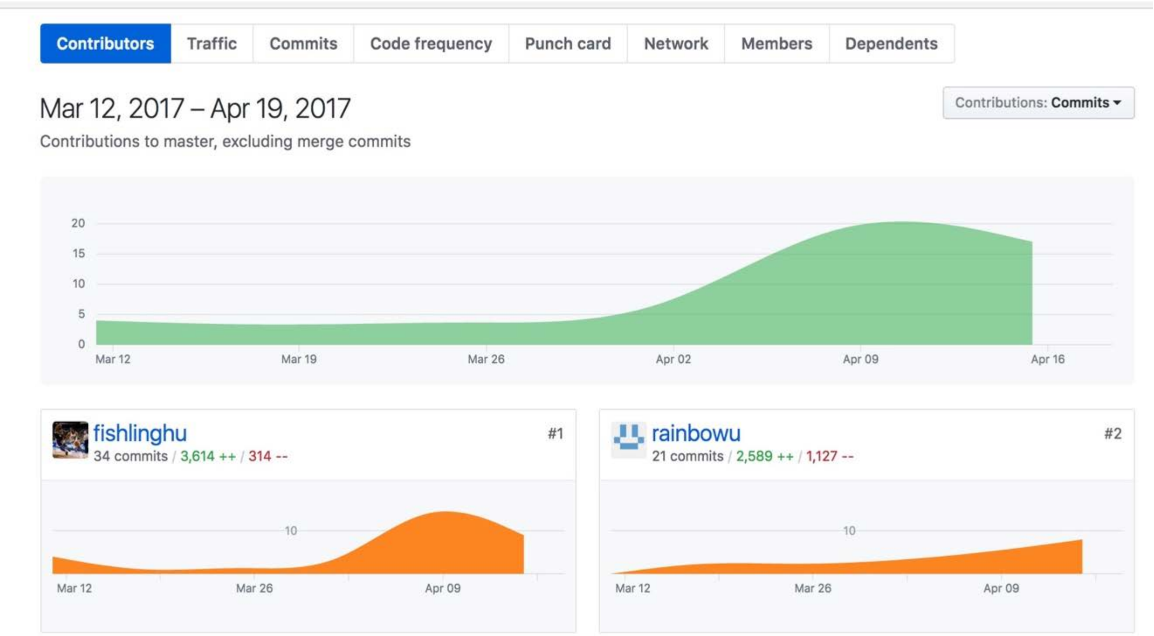
- User A: “Your applications functions are interesting and complete, but you need to have more users to motivate me to use it.”
- User B: “The interface is a bit too simple. Probably adding some animations of fancy pictures, buttons will be better.”
- User C: “You have rich functionalities, but it is a little difficult to figure out how to use it. Maybe you can add a tutorial for new users or some hints in pages. ”

Future Work

- Gathering users: One of the key to a successful user matching application like SportTogether is a large user base. We need a large amount of active users to make it faster to form a group. No one will use the application, if it takes long time waiting for others to join the group. Therefore, effectively promoting and advertising our application is a very important task.
- Improve appearance: We spend most of time working on functionality of our application. To compete with other apps and attract user, we need to make our application more beautiful.
- Support different kinds of events: Actually we do not have to limit the events to sport. We could allow user to freely create events of other kinds, such as concert, picnic, board game, etc.
- Reservation function: As the professor suggested during the demo time, we agree that our application would be more attractive if the reservation function is supported. For example, users could reserve the badminton court before organizing the event, instead of gathering many people and found that there is no available court.

Work Plan and Project management

We successfully follow our work plan in Table 2. As we mentioned before, we are ahead of schedule and have extra time to implement the bonus feature - friend system. We use GitHub to do the version control. Github also allows us to visualize our effort in the Figure 9. We totally have 50+ commits for this project. We wrote totally 20 Java files and the number of lines of codes for this project is 2886.



Mar 12, 2017 – Apr 19, 2017

Contributions to master, excluding merge commits

fishlinghu
34 commits / 3,614 ++ / 314 --

rainbowu
21 commits / 2,589 ++ / 1,127 --

Figure 9- GitHub commits contributions results

	Feb-21	Feb-28	Mar-7	Mar-14	Mar-21	Mar-28	Apr-4	Apr-11	Apr-18
Features analysis	🟧	🟧							
Go through tutorials to try out the features and function of Firebase		🟨	🟨						
Implementation: User profile system preliminary UI design			🟩	🟩					
Implementation: Player matching system				🟩	🟩				
Implementation: Group chat system					🟦	🟦			
Implementation: Player review system						🟦	🟦		
Reserved time for unexpected task							🟦	🟦	
Improve UI design								🟪	🟪
Project Presentation and Demo									🟥
Documentation	🟫	🟫	🟫	🟫	🟫	🟫	🟫	🟫	🟫

Table 2- Work schedule

Work Distribution

The work is evenly distributed to team members.

Tasks	Members
User profile system & UI design	Kuan-Yu Li
Chat room system implementation	Kuan-Yu Li
Player matching system implementation	Ruei-Bao Wu
Review system implementation	Ruei-Bao Wu
Testing	Ruei-Bao Wu, Kuan-Yu Li

Final deliverables

- ❖ Final report
- ❖ Source codes
  - ➢ https://github.com/fishlinghu/SportTogether
- ❖ Presentation slides:
  - ➢ https://goo.gl/zY9A2s
- ❖ Demo video
  - ➢ https://www.youtube.com/watch?v=OJvLhT4xL3w

Reference

[1] Teamstuff, https://teamstuff.com/

[2] TeamSnap, https://www.teamsnap.com/

[3] SetMore, https://www.setmore.com/

[4] Google Firebase, https://firebase.google.com/

[5] Firebase Chat Room Tutorial, https://goo.gl/HRLDm3

[6] Our Application source code on Github, https://github.com/fishlinghu/SportTogether

[7] Our Application Demo video on Youtube,