Lebanese American University

LAU
School of Engineering

Computer Networks

COE-431 (section 31)

"Encounters App"

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Abstract

Due to the recent coronavirus pandemic we have been trying to reduce contact between people as much as possible. Our goal is to help reduce the risks of virus propagation, and let you know if you have been in contact with someone who tested positive, to confine yourself and reduce the risk of propagation. We decided to create an app to help people track their encounters.

Introduction

The main goal of our app was to be able to track the encounters of people who downloaded the app, and let them know if the encountered person was tested positive or not to Covid-19 to be able to reduce the spread of the coronavirus. Multiple tactics could have been adopted for the implementation of this project such as Bluetooth or GPS to track the encounters and a peer-to-peer or a client-server networking architectures. In this report we will be going through all of the choices we took to build this app and why we chose these options.

Implementation

Networking architecture

For the networking architecture of this app we opted to choose the client-server architecture for multiple reasons. First of all we wanted the server to be in charge of handling the users because we wanted to store all of the data on the server-side as is it is the most proficient way to go about for such an application, also to be able to change the Covid-19 known status at any point in time since it is us who will be making the decision to change the status based tests done in the multiple test centers in Lebanon to confirm all of our data to our users. Also storing the data in our server will allow a user to always get his information back in the scenario where he deleted the app and wanted to get it back after a few days.

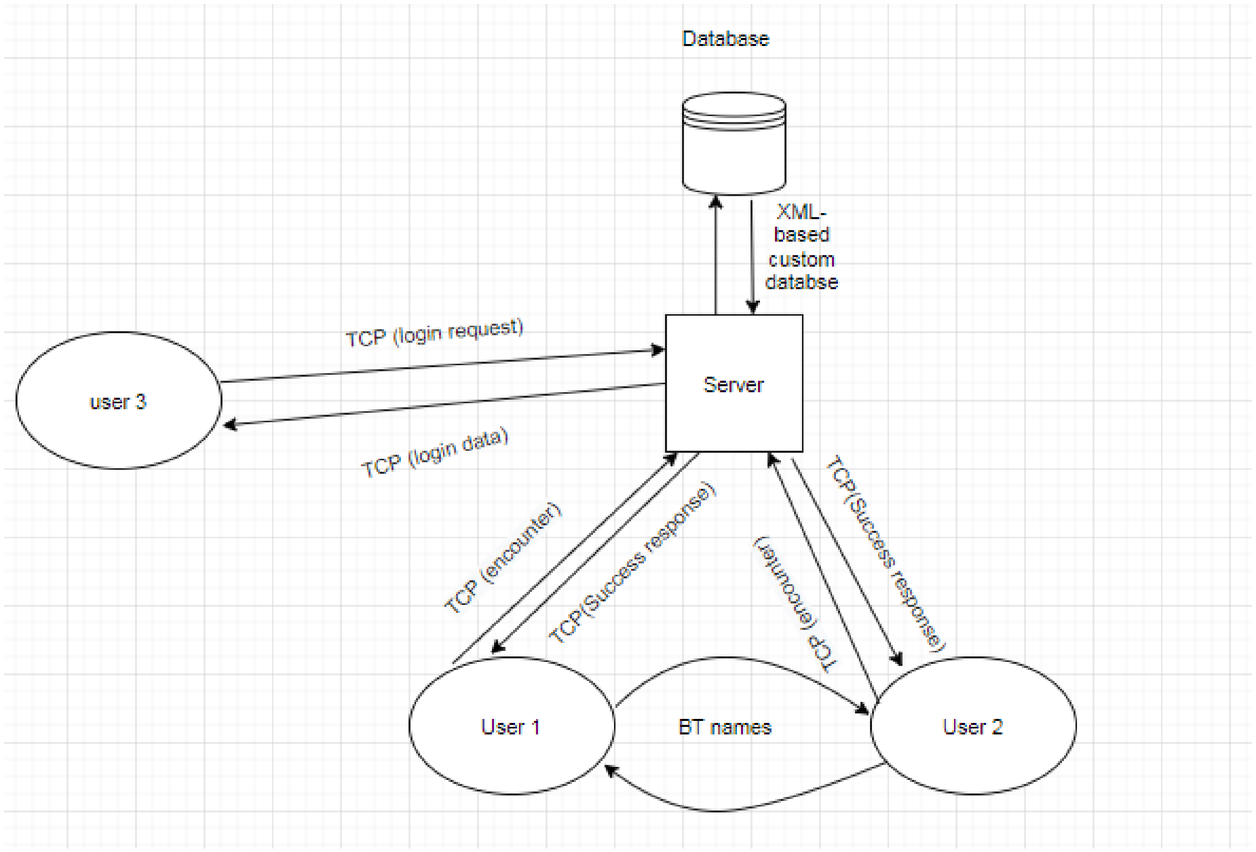


Figure 1 : Flow chart of network architecture.

Application

We decided to build this application on Android Studio. The app takes care of the client-side of the process, it checks for the Bluetooth devices that are in range. The name of the Bluetooth is changed through the app to the unique id of the user, so that when it fetches the name of the Bluetooth device in range (after checking for encounter distance based on the signal strength), and sends it to the server where we can check if the ID received is actually a client of ours and is present in our database before adding it.

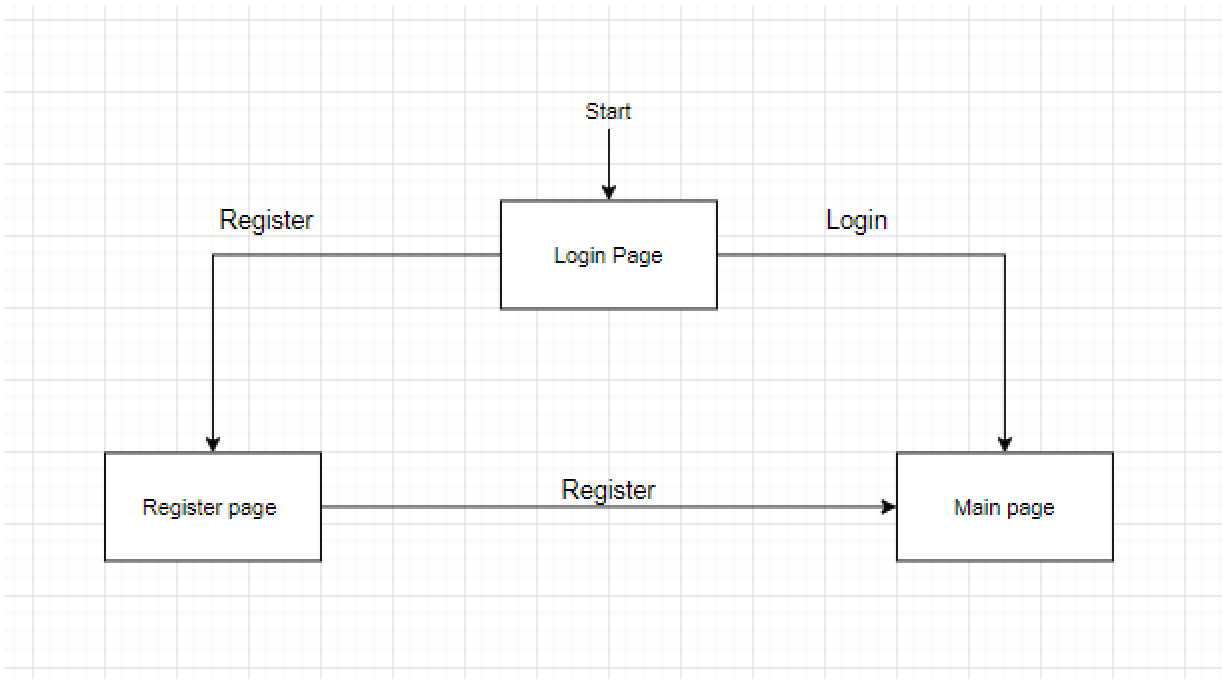


Figure 2: Flow chart of the apps registration and login.

In the flowchart shown above the squares represent the visual content seen in the app, and the arrows represent the button clicked.

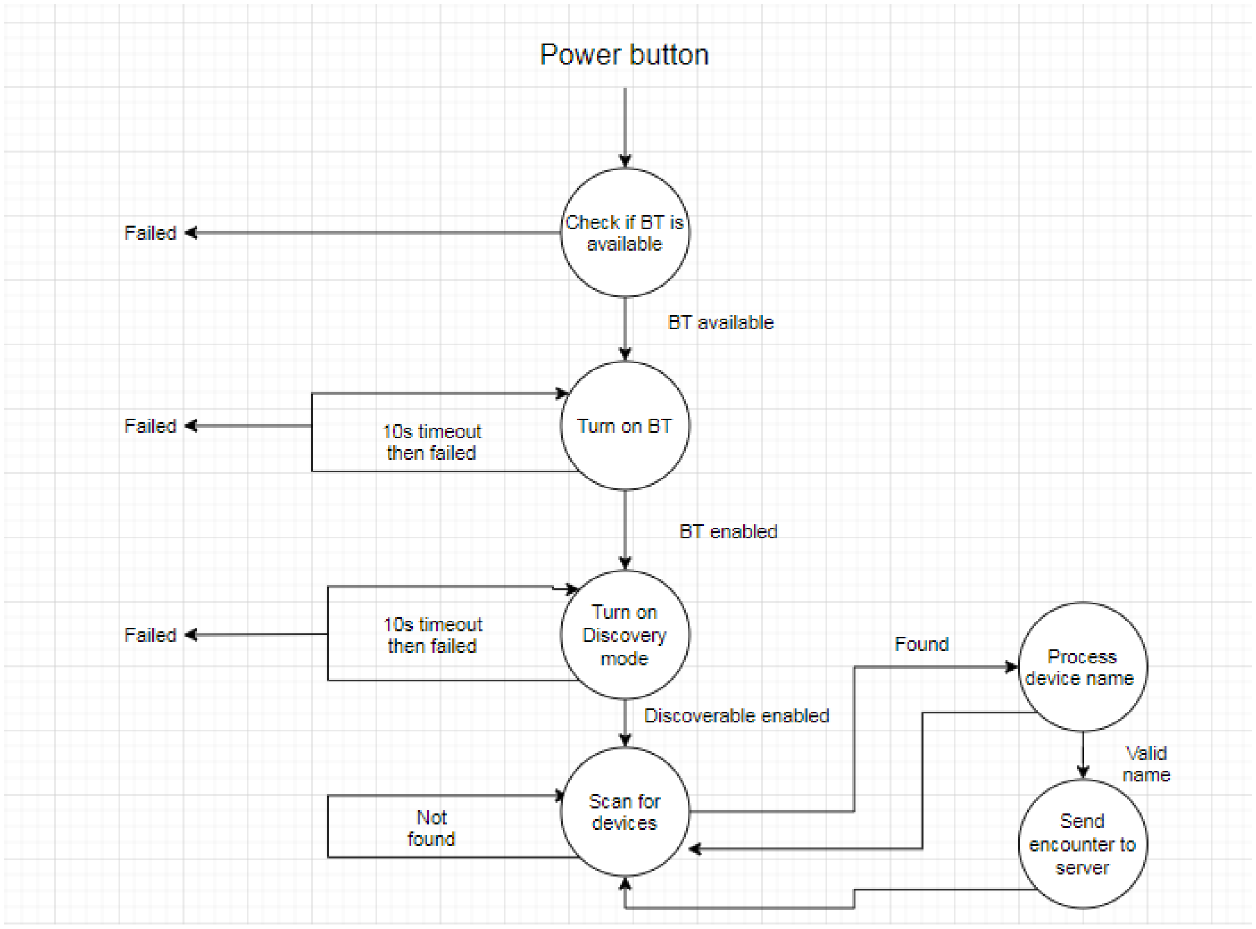


Figure 3: flow chart of scanning devices.

Database

For our database we decided to work with XML files as they are very proficient to store and retrieve data. For every client a new xml-file is created named “userID_userPhoneNB.xml”, in the folder we store ID, first name, last name, phone number, encounters and Covid-19 status. We also created a special file called “ffff.xml” in which we store the most recent ID since the last register and ID increment. Every time a user encounters someone the user sends the encountered ID, the client handler checks if the ID is available in our database and then stores it in the file of the client with the date of the encounter. Also when the server receives a login call from the user he then goes and fetches the ID of the user and the encounters that are within 14 days of the date of the login and sends back to the client his own ID to be locally stored and later used as Bluetooth device name, as well as the encountered ID and the date of each encounter.

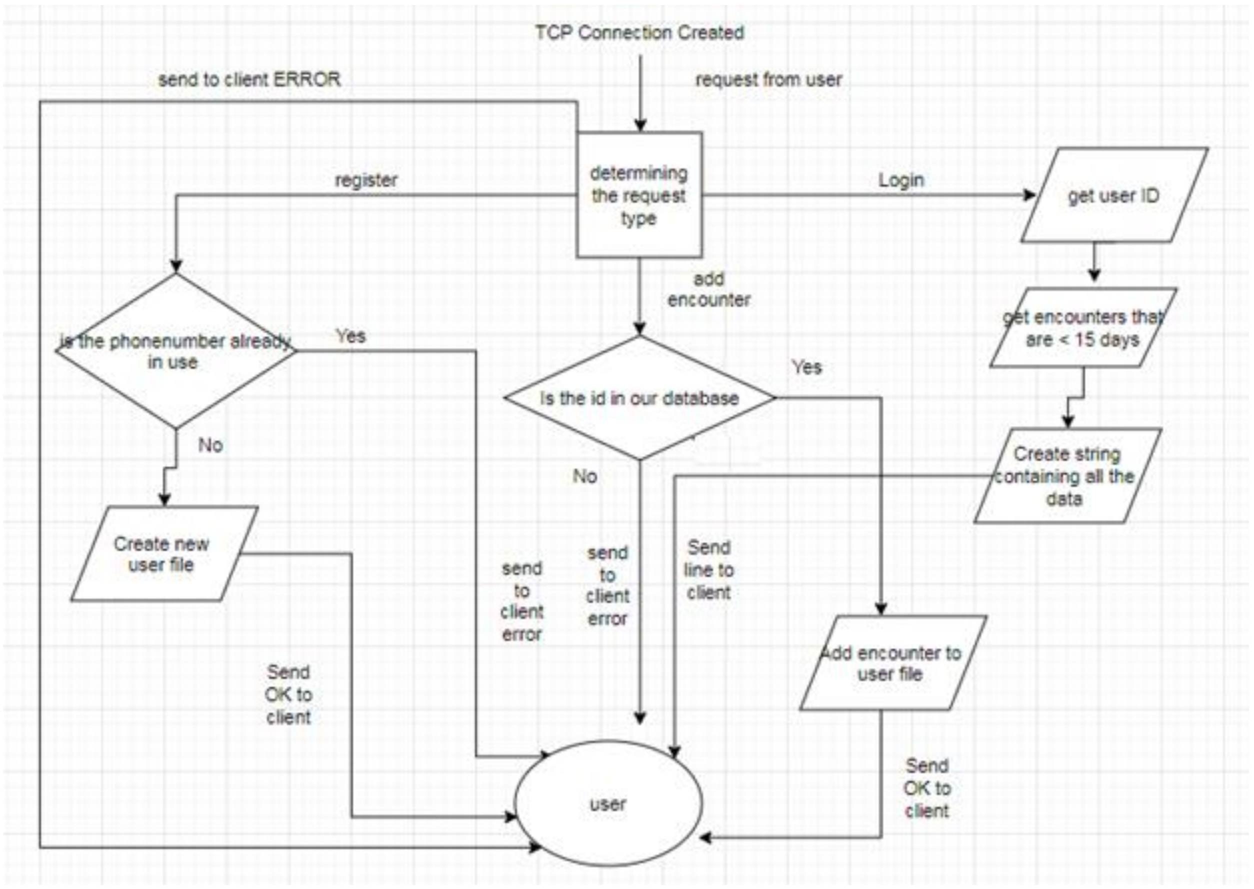
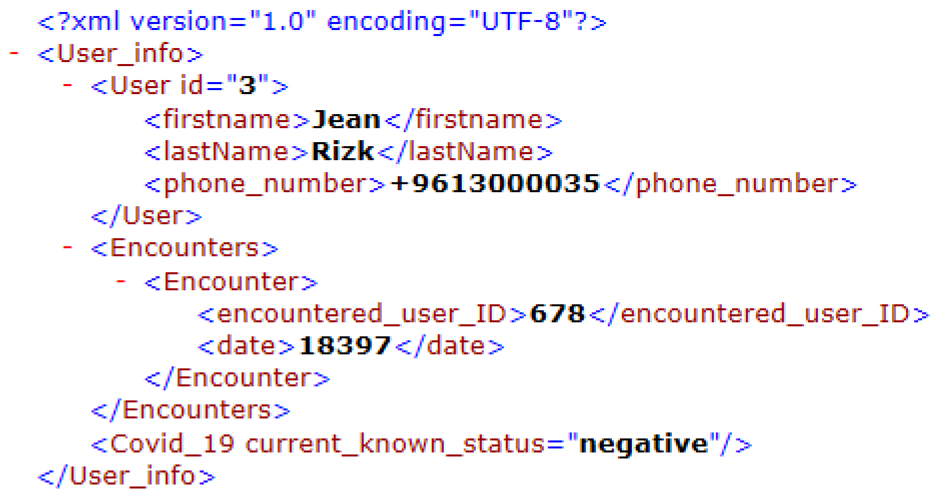


Figure 4: Flow chart of the client handler.



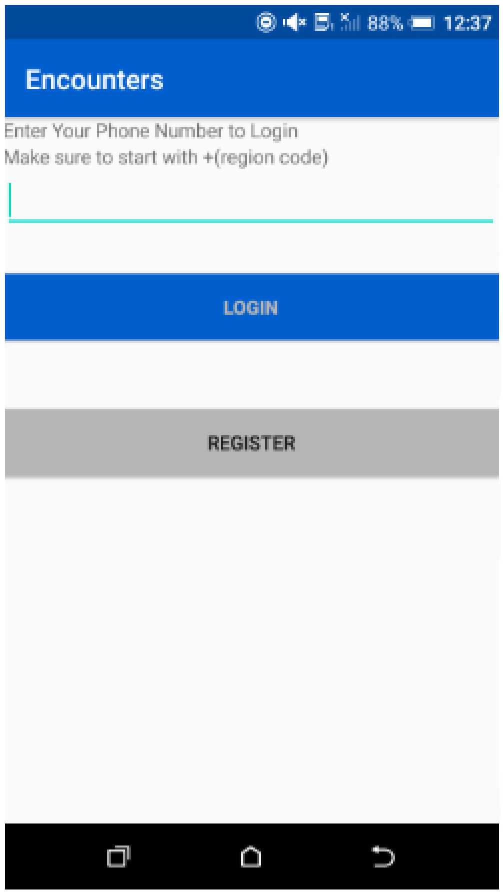
```
  <?xml version="1.0" encoding="UTF-8"?>
- <User_info>
  - <User id="3">
        <firstname>Jean</firstname>
        <lastName>Rizk</lastName>
        <phone_number>+9613000035</phone_number>
    </User>
  - <Encounters>
      - <Encounter>
            <encountered_user_ID>678</encountered_user_ID>
            <date>18397</date>
        </Encounter>
    </Encounters>
    <Covid_19 current_known_status="negative"/>
  </User_info>
```

Figure 5: Format of the XML files built

Final design of the app

In this part we will show what our application looks like and how it would look when a client is using it to track his encounters.

The first page of the app shows the Login/Registration page where, depending on if the user already has an account or not, will decide to either login directly or create a new account through the register button.



Enter Your Phone Number to Login
Make sure to start with +(region code)

Figure 6 : Login/Registration page

In the case where it is a new client and they wish to create a new account the registration page comes up, where the user will need to enter their First name, Last name and Phone number then click on Register.

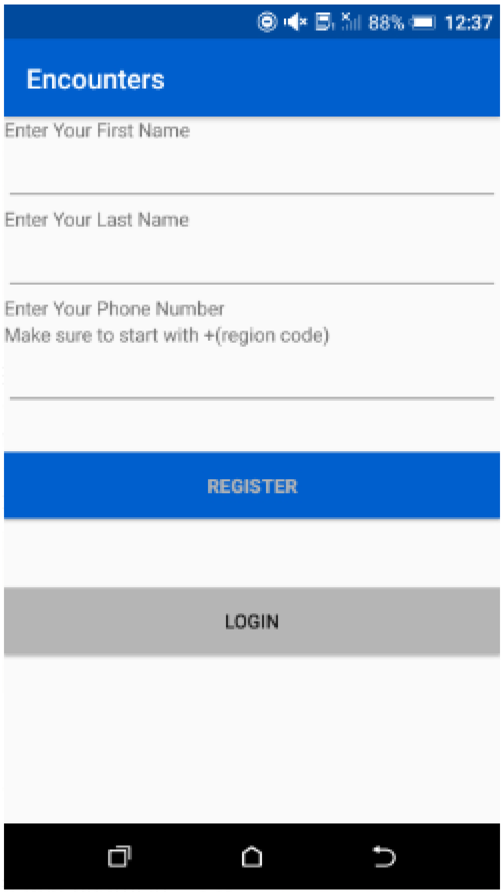
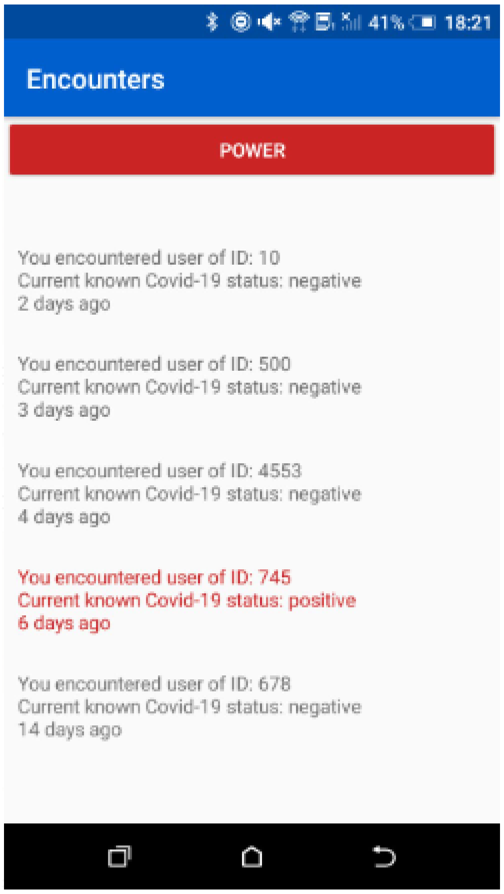


Figure 7 : Registration Page

Finally once the client is logged in or once they created their new account they will be directed to our final page of the app from where they can turn on or off the tracking device. Once turned on the device will start searching for users in range and all encounters will be placed below, where the ID of the encountered user will be shown along with the date of the encounter plus the Covid-19 status. Encounters will only be shown if they happened less than 15 days ago and encounters with users that turned out to be positive will be marked in red to be more noticeable for users. In the future we will add an SMS-Verification step when registering or logging in, as well as an SMS-Alert message when an encountered user tests positive.



You encountered user of ID: 10
Current known Covid-19 status: negative
2 days ago

You encountered user of ID: 500
Current known Covid-19 status: negative
3 days ago

You encountered user of ID: 4553
Current known Covid-19 status: negative
4 days ago

You encountered user of ID: 745
Current known Covid-19 status: positive
6 days ago

You encountered user of ID: 678
Current known Covid-19 status: negative
14 days ago

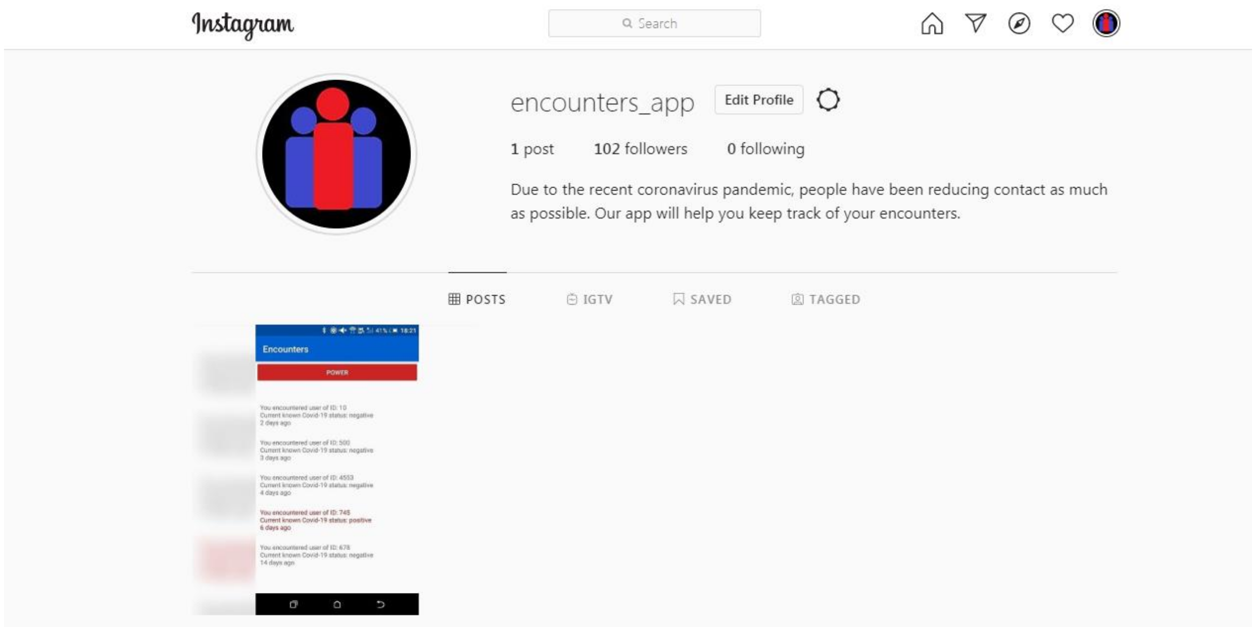
Figure 8 : Main page of our application.

This 3 pictures shown above represent the totality of our app. The goal was to create a user friendly app, so that anyone could use the application with no difficulties whatsoever.

Social Media attention

For this project we decided to advertise it on Instagram since it is a platform that suited our needs, because of all the options you have to advertise a product (page, ads, polls, posts…). We started by creating a page dedicated to our application where we explained what was our goal and how our app worked. In a story we also explained why we created this app and how it worked and asked if the viewers would like to use such an app. The results we got were pretty flattering as the majority of the people voted yes.

Below is the page we created dedicated to our app.



encounters_app

1 post 102 followers 0 following

Due to the recent coronavirus pandemic, people have been reducing contact as much as possible. Our app will help you keep track of your encounters.

You encountered user of ID: 10
Current known Covid-19 status: negative
2 days ago

You encountered user of ID: 500
Current known Covid-19 status: negative
3 days ago

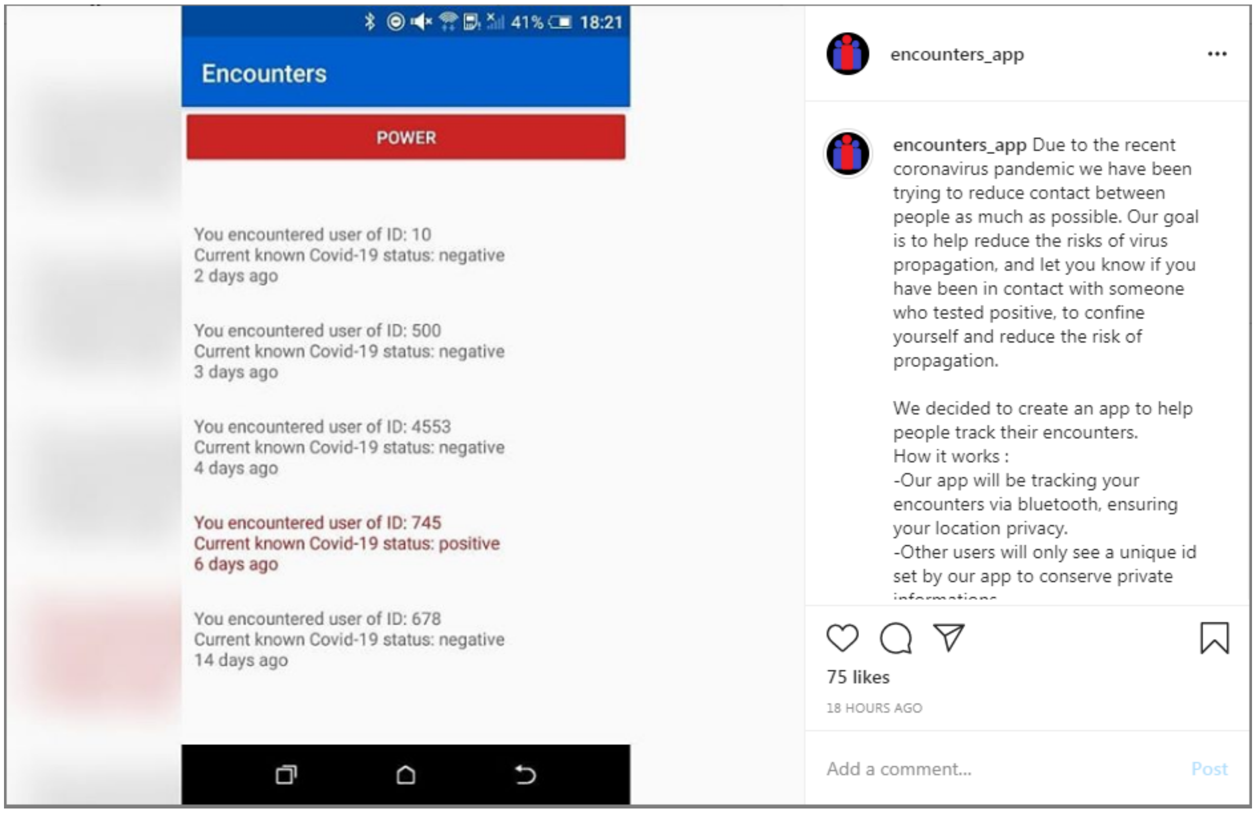
You encountered user of ID: 4553
Current known Covid-19 status: negative
4 days ago

You encountered user of ID: 745
Current known Covid-19 status: positive
6 days ago

You encountered user of ID: 678
Current known Covid-19 status: negative
14 days ago

Figure 9: Picture of our Instagram page.

Here we can see our main page and see that we have gathered 102 followers so far, in less than 24 hours.



You encountered user of ID: 10
Current known Covid-19 status: negative
2 days ago

You encountered user of ID: 500
Current known Covid-19 status: negative
3 days ago

You encountered user of ID: 4553
Current known Covid-19 status: negative
4 days ago

You encountered user of ID: 745
Current known Covid-19 status: positive
6 days ago

You encountered user of ID: 678
Current known Covid-19 status: negative
14 days ago

encounters_app

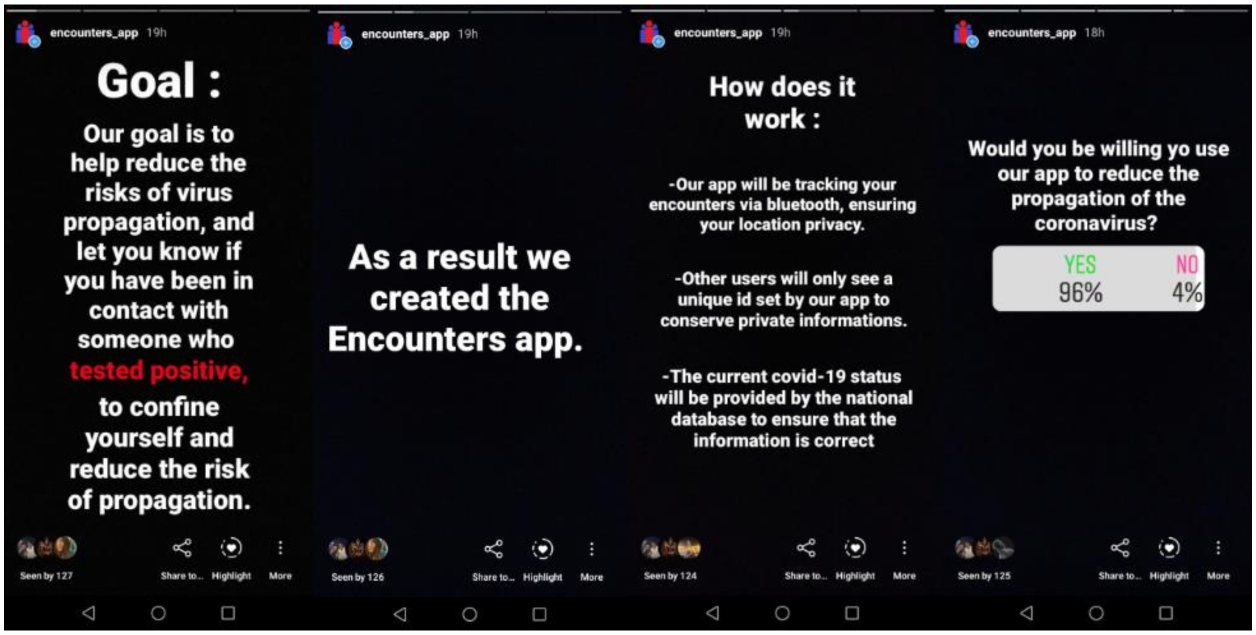
encounters_app Due to the recent coronavirus pandemic we have been trying to reduce contact between people as much as possible. Our goal is to help reduce the risks of virus propagation, and let you know if you have been in contact with someone who tested positive, to confine yourself and reduce the risk of propagation.

We decided to create an app to help people track their encounters.
How it works :
-Our app will be tracking your encounters via bluetooth, ensuring your location privacy.
-Other users will only see a unique id set by our app to conserve private

75 likes
18 HOURS AGO

Figure 10: Picture of our post on Instagram.

In our first post we showed the main page of our app, explained what our goal was and depicted how it works. The result was 75 likes thus far, which is very good comparing it to our number of followers. Almost 73% of our followers which is rare as usually you can get a minor share of your followers to like your posts.


encounters_app 19h

Goal :

Our goal is to help reduce the risks of virus propagation, and let you know if you have been in contact with someone who tested positive, to confine yourself and reduce the risk of propagation.

Seen by 127

encounters_app 19h

As a result we created the Encounters app.

Seen by 126

encounters_app 19h

How does it work :

-Our app will be tracking your encounters via bluetooth, ensuring your location privacy.

-Other users will only see a unique id set by our app to conserve private informations.

-The current covid-19 status will be provided by the national database to ensure that the information is correct

Seen by 124

encounters_app 18h

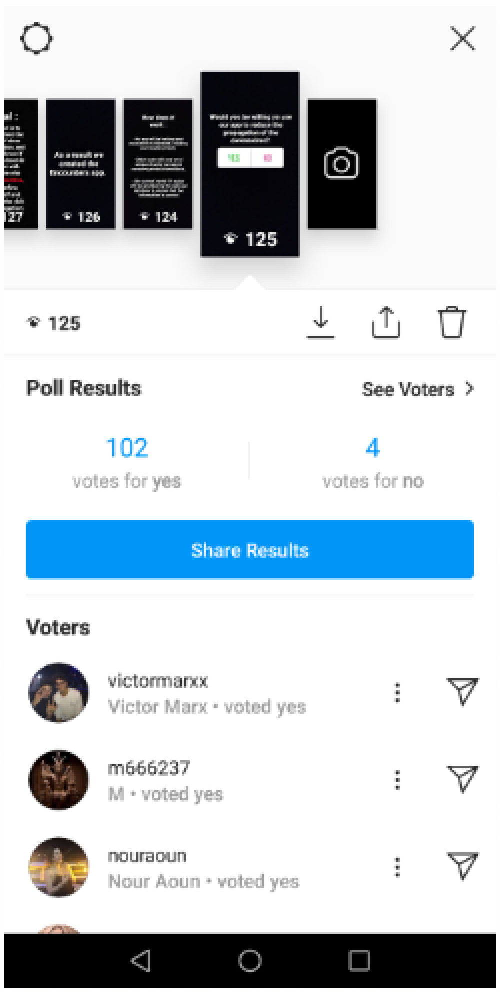
Would you be willing yo use our app to reduce the propagation of the coronavirus?

YES	NO
96%	4%

Seen by 125

Figure 11: Picture of the stories posted on our page.

We can see in our stories that we had a fluctuation between 124 and 127 people who saw our story, which is great since our page has not been up for more than 24 hours.


125

Poll Results

See Voters

102
votes for yes

4
votes for no

Share Results

Voters

victormarxx
Victor Marx • voted yes

m666237
M • voted yes

nouraoun
Nour Aoun • voted yes

Figure 12: Results from our poll question.

As we can see in the above figure we had 125 viewers of which 102 voted that they would like to use our app, 4 voted they did not want to use our app and 19 people did not vote. Overall, relatively speaking, this was a good poll for as the majority of people who saw our page provided positive feedback indicating it is an interest of theirs to use the app we advertised.

Conclusion

Once every aspect of this project was built separately we started recombining them together and making sure they were working together efficiently. The app is very responsive and works greatly with our server, basically we think that the application could be launched with a little more work especially on the server side to be sure to accommodate all the clients if the number of users increases a lot. Our goal was to create a user friendly app that would not invade the privacy of the user to encourage them to use the app, and we believe that this goal was achieved as we created an app that conserves the users' privacy as much as possible and the application was successful in tracking encounters. Also due to the good social media attention we got, we believe that people would like to get our app and start using it.

References

Tabian, M. [CodingWithMitch]. (2016, November 3). Bluetooth Tutorial - Enabling Bluetooth in Android Studio [Video file]. Retrieved from: https://youtu.be/y8R2C86BIUc

Tabian, M. [CodingWithMitch]. (2016, November 5). Bluetooth Tutorial - Bluetooth Discoverability in Android Studio [Video file]. Retrieved from: https://youtu.be/QVD_8PrvG4Q

Tabian, M. [CodingWithMitch]. (2016, November 12). Bluetooth Tutorial - Discover Devices in Android Studio [Video file]. Retrieved from: https://youtu.be/hv_-tX1VwXE