Find Roadmates! --A Web App that Ensures Students' Travel Safety

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Motivation(why it is interesting):
Living in the Manhattan area can be stressful especially during dark nighttime. Columbia University students who reside outside the campus will have a high risk of getting involved in robberies and dangerous events. Columbia University has reported more than 400 safety-related cases [1]. Although Columbia University has taken several measures to protect our students, including providing free night shuttle buses and 7/24 hours campus security watch, students who live outside the shuttle bus area will have to either take a public bus home or simply walk back. Many students prefer to study late at libraries in the university, which makes them have a higher probability to encounter dangers. However, at night they have limited choices to go home. The safest way - the school shuttle is not available during weekends and is very rare during the night. [2] In some cases, students may not have a friend commuting with them along the way home and the fear of walking or riding along can also be enlarged by severe weather conditions. [3][4]

Similar Work and Innovations:
There have been similar apps such as "Lion Safe" that protect Columbia students' safety. The Lion Safe App has some features like health service, calling public safety. It also provides a feature called "friend walk", which allows students to grant access to their location to their friends for monitoring. When emergency events emerge, students can press the "Panic" button to inform their friends. It seems that these features can protect students from dangers. However, all of the above protections are based on the assumption that users have friends that are available to keep eyes on them all the time. Even if there are people on the other end of the screens monitoring the users, when they encounter dangers, the fact that students are helpless and alone does not change, and the damages are still unavoidable. To avoid this hindsight, our solution is to develop a specific app for students to find their suitable partners and form a 3-4 person team to go home together and send them an alert ahead of time when their walking route crosses dangerous zones. This largely enhances the protection of students' safety. With a team of three or four, robbers will think twice before taking action.

In our application, we will ensure Columbia University students can walk home safely with the following features:

1. **Personalized Partners Recommendation.** Users are registered with their preference & info including their home address, commute time, name and gender, emergency contacts, etc… After filling in your destination, based on your profile and your live location, our app will select the most suitable partners for you.
2. **Route Planning.** After a team is formed, based on New York City Crime Reports, our App will generate the most suitable route.

3. **Risk Detection.** In order to get home, sometimes one has no choice but to get through danger zones in New York. In these circumstances, before starting to walk home, our app will inform the team about the risk and let them keep alert.

If time allows, we will also work on below features:

1. **Live Time Monitoring.** When a team starts walking home, the emergency contacts of the team will have access to the live location of each team member. For each team member, if a member arrives at the destination, by pressing the “Finished” button, emergency contacts will lose the access to monitor this member’s route while access to others remains the same.
2. **Hazard Detection.** When abnormal movements are detected(e.g. Running quickly, deviation of route, standing in one place for a long time, Delay of arrival, etc), the app will automatically send alerts to the users’ emergency contacts.

Reference:

[1]College Factual - Columbia University in the City of New York Crime and Safety in 2019 (https://www.collegefactual.com/colleges/columbia-university-in-the-city-of-new-york/student-life/crime/)
[2]Columbia University - Columbia Transportation (https://transportation.columbia.edu/content/intercampus-shuttle)
[3]Weather Spark - Climate and Average Weather Year Round in New York City (https://weatherspark.com/y/23912/Average-Weather-in-New-York-City-New-York-United-States-Year-Round)
[4] WABC-TV New York - 6 Hurt in 19-car Pileup on Henry Hudson Parkway in New York City (https://abc7ny.com/henry-hudson-crash-parkway-manhattan-multi-car-pileup-nyc/8831157/)

Prototype

https://invis.io/9D11WKISHUB7#/460023000_login

Screenshots:

lionwalk.com

Sign In With Columbia UNI

Sign In

lionwalk.com

Create Your Profile

Nickname:

Gender:

Cellphone:

Emergency Contact:

Save

lionwalk.com

Edit My Profile

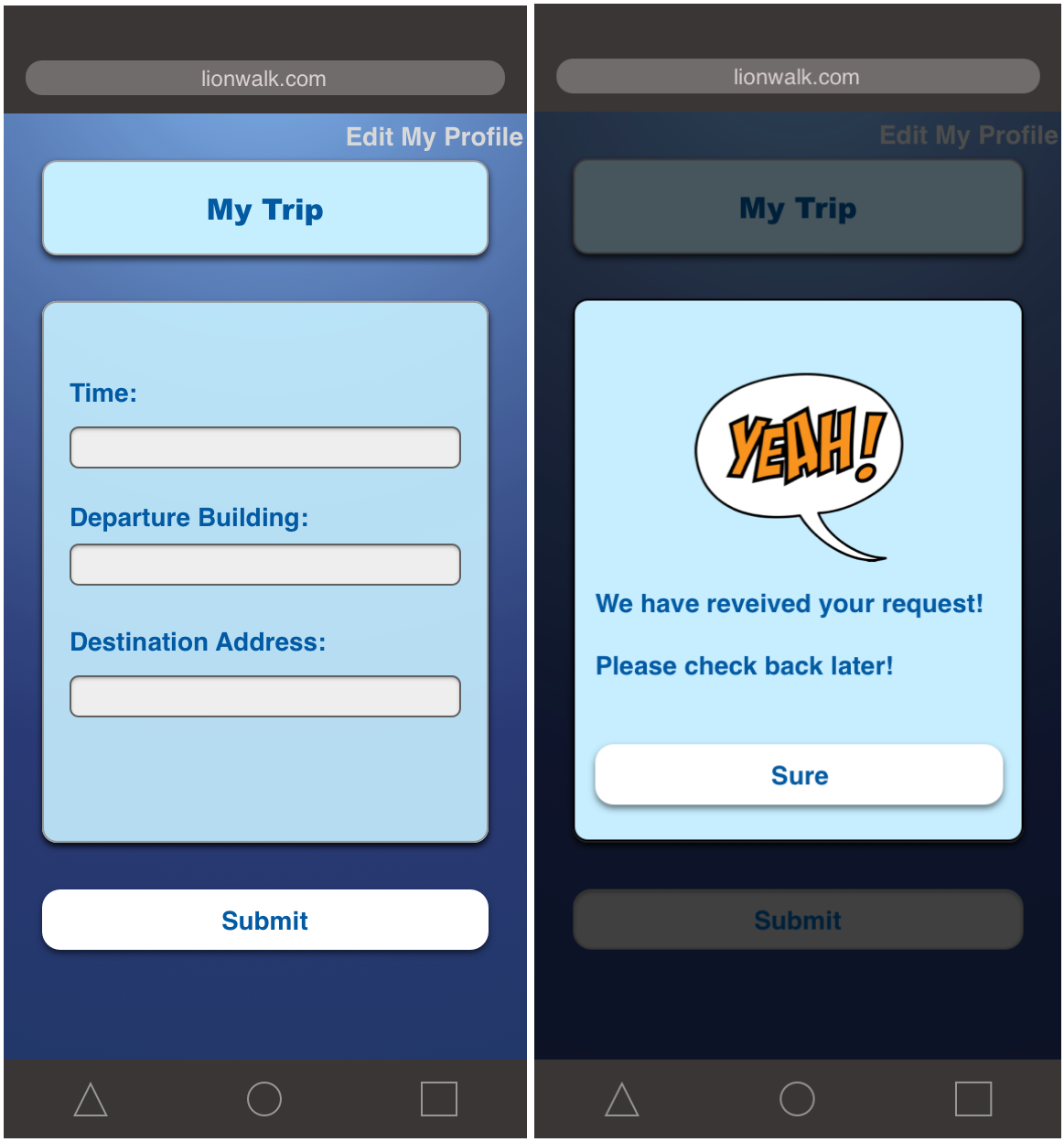
My Trip

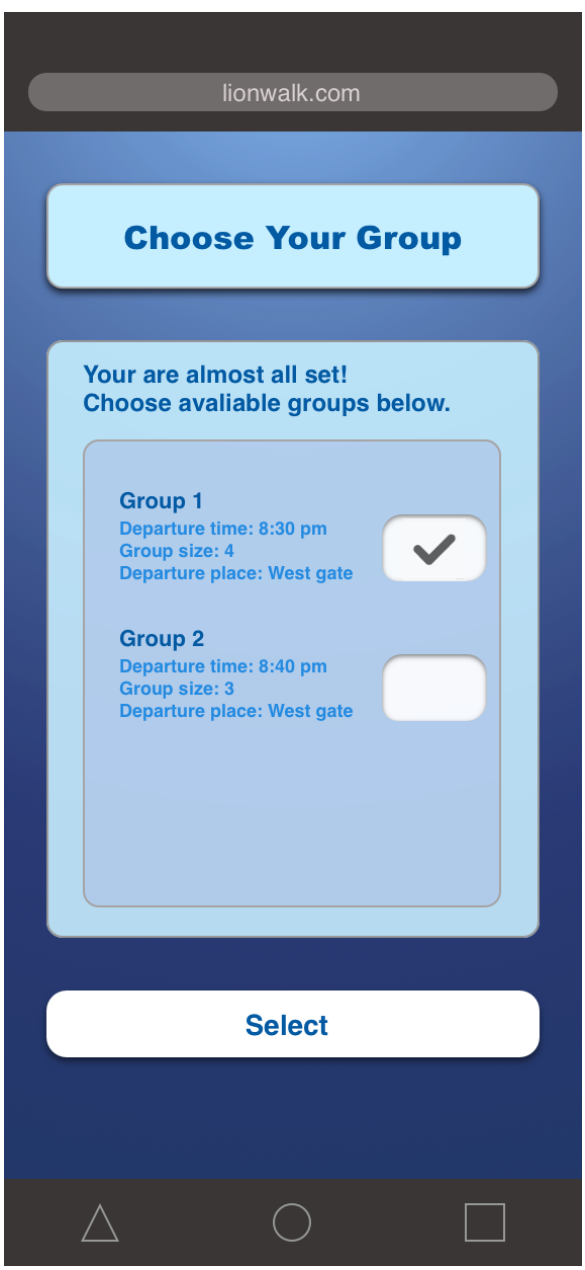
Time:

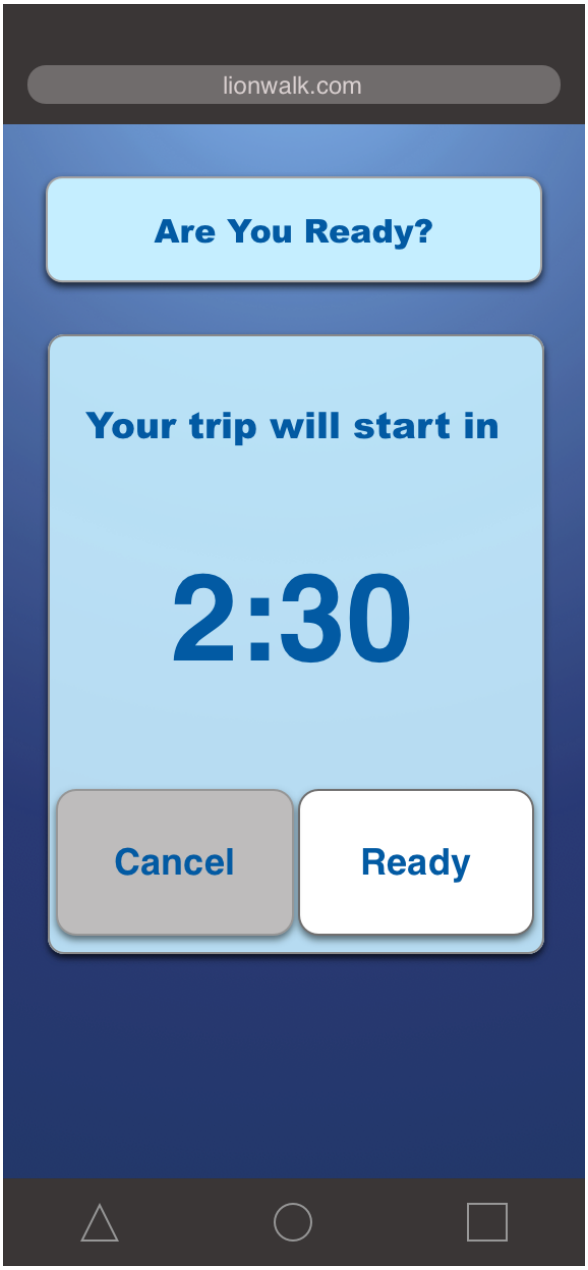
Departure Building:

Destination Address:

Submit




lionwalk.com
Choose Your Group
Your are almost all set!
Choose avaliable groups below.
Group 1
Departure time: 8:30 pm
Group size: 4
Departure place: West gate
Group 2
Departure time: 8:40 pm
Group size: 3
Departure place: West gate
Select


lionwalk.com
Are You Ready?
Your trip will start in
2:30
Cancel
Ready


lionwalk.com
Columbia University
Alfred Lerner Hall
Butler Library
Mt Sinai Morningside
Cathedral Parkway 110 Street
The Cathedral Ch of St. John the D
26 min
1.3 miles
26 min
1.3 miles
Calle Ocho
103 St
BLOOMINGDALE
HI New York City Hostel
MANHATTAN VALLEY
103 St
Riverside Dr
Columbus Ave
West End Ave
Manhattan Ave
Emergency
Arrived

API List

1. Index:
    a) POST: Verify the Columbia University Email name.
        i. Connect to Cognito/Google Email verification
        ii. Return validation result
2. Profile:
    a) POST: Send the new user's profile information to backend and store
        i. Parameters:
            1. nickname
            2. phone_num
            3. emergency_contact
            4. address
    b) PUT: Edit the profile information. For existing users only.
        i. Parameters:
            1. nickname
            2. phone_num
            3. emergency_contact
            4. address
    c) GET: View the current profile before editing. For existing users only
        i. Return values:
            1. nickname
            2. phone_num
            3. emergency_contact
            4. address
3. Trip:
    a) POST: Add new trip information. Store a database in the database.
        i. Parameters:
            1. time (slot, per every 30 mins)
            2. departure (slot, fixed departure places around the campus)
            3. destination
    b) GET: Get the current trip info:
        i. Return values:
            1. time (slot, per every 30 mins)
            2. departure (slot, fixed departure places around the campus)
            3. destination
    c) DELETE: Cancel the trip/Automatically delete the trip info from DB when the user arrives
4. Group:
    a) POST: Request to create a walk group.
        i. Parameter:
            1. uid (backend use this ID to retrieve trip info)
    b) PUT: Modify Group table
        i. Add/remove destinations.
        ii. Change the "ready to departure" status
        iii. Parameters:
            1. operation: (ready/add/remove)
            2. destination (str)
            3. ready_status (boolean)
    c) GET: Get the group information from the group table
        i. Return values:
            1. destinations (list)

        2. ready_status (list)
    d) DELETE: Delete group information by request
        i. Parameters:
            1. uid
5. Emergency:
    a) POST: Send an emergency message to emergency contact.
        i. Parameters:
            1. uid
6. Google:
    a) GET: Get the group member positions in the form of google map coordinations
        i. Parameters:
            1. uid (use uid to find the group info from DB)

Description:

1. The user can sign in to the website by verifying their Columbia University email. The Index API will return the validation result.
2. If the user is new to the website, he can set up his profile. If the user has already signed up, he can also edit his profile. This will be handled by Profile API and the data will be stored in DynamoDB.
3. The user can add trip information (time, departure, destination) and submit it. This is handled by Trip API and the trip will be stored in DynamoDB.
4. Then, the website will use ElasticSearch to return a list of available walking groups that match with the user's trip. Or, if there's no available group, the user can start a new group. When the departure time approaches, if the user has arrived at the departure place and is ready to go, he can hit the "Ready" button to indicate that he's ready, or he can cancel the trip. These are handled by Group API and the data is stored in DynamoDB.
5. After the trip starts, the Google API will guide the users to walk to their destinations.
6. If the user is in an emergency situation, he can click the "Emergency" button and the Emergency API will be triggered to send an emergency message to the emergency contact.

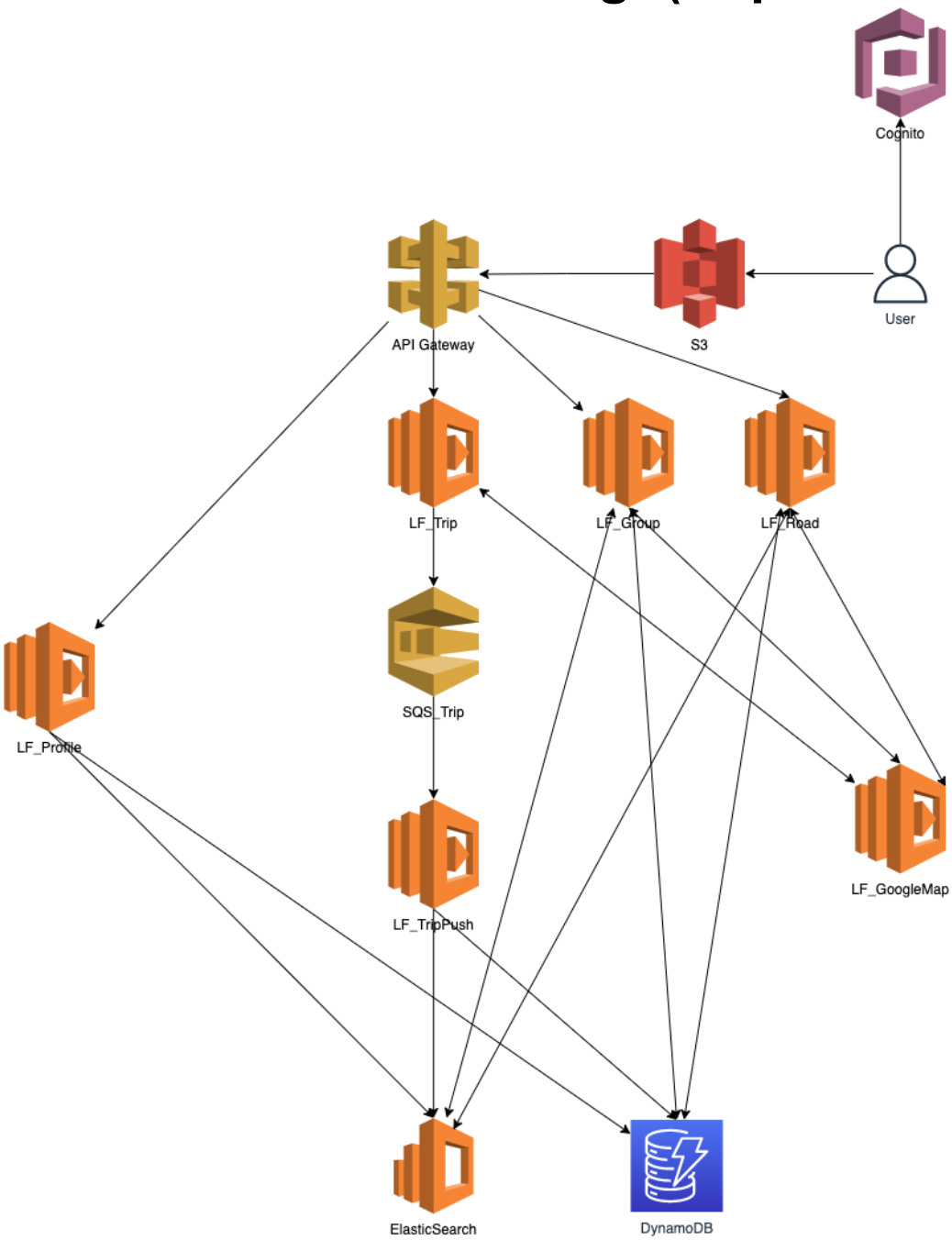
Table List

1. Profile Table:
    a) uid: int (primary key)
    b) nickname: str
    c) gender: str
    d) cellphone: str
    e) emergency_contact: str

2. Trip Table:
    a) uid: int (primary key)
    b) trip_id: int
    c) departure: str
    d) destination: str
    e) time: str, in the format of HH/MM, 0<=HH<24, 0<=MM<=60

3. Group Table:
    a) gid: int (primary key)
    b) tid: list, a list of trip IDs
    c) ready_status: list, a list of dict of ready status of all group users
        i. Format: list(uid: boolean)
        ii. Format example: [1291: True, 9381:False, 6661: True]

Architecture Design(Deprecated)



Description:

Users login to the app using cognito, and then access the frontend in S3. If this is the first time that users log in to the platform, firstly they need to call Profile API to modify their profile in order to get recommendation of groups.

To form a group, users need to call Trip API to create a “trip” first(including time, departure, destination, etc. Managed by LF_Trip). After registering for a trip, their information will be pushed through SQS into ElasticSearch and DynamoDB for grouping. Then users will be redirected to the

group selection page where a list of recommended group information is generated by LF_Group. Users can now select a group to join in their team and wait for enough people to start.

After the trip starts, users will be redirected to a new page(handled by LF_Road), where every member's position can be monitored in google maps(LF_GoogleMap).

Midway Demo

https://youtu.be/zEUlrtMZEAw

Final Demo Youtube Video:

https://www.youtube.com/watch?v=S8zG7kNJjHU

Final Presentation:

CU Walk

Github Submission:

https://github.com/lyz9518/cu_walk

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