Name: Delhi Durai. **Student-ID:** 948639812

Name: Rajeswari. **Student-ID:** 916809371

RUST FINAL PROJECT – CS 510
GEO FENCING AND LOCATION TRACKING

Read Me document with information on how to execute the geo fence project.

Simulation 1:- Geo Location Simulation for In-Transit vehicle

Validate the coordinates of a moving vehicle to find if it is, in or out of the created fence at any given point in time.
To run this simulation, the coordinates both fence and moving objects should be listed in the data/*.json file. Please see the data section at the end of this document for more information on the data structure and location.

1. Run the simulator using below command
   cargo run --example geofence_simulator

```
APAAJGH684D54A:geofencing dmoha1$ cargo run --example geofence_simulator
   Compiling geofencing v0.1.0 (/Users/dmoha1/Documents/DD/Work/2020/custom_processor/HWX/geofencing)
    Finished dev [unoptimized + debuginfo] target(s) in 3.04s
     Running `target/debug/examples/geofence_simulator`
SIMULATION 1:-
GEO LOCATION SIMULATION FOR IN-TRANSIT OBJECTS.
SELECT THE SHAPE THAT YOU WANT YOUR FENCE TO BE
1. POLYGON
2. CIRCLE
3. TRIANGLE
```

2. Select the shape for which you wanted to create the fence, in this case it is Polygon, select 1.

```
APAAJGH684D54A:geofencing dmoha1$ cargo run --example geofence_simulator
   Compiling geofencing v0.1.0 (/Users/dmoha1/Documents/DD/Work/2020/custom_processor/HWX/geofencing)
    Finished dev [unoptimized + debuginfo] target(s) in 3.04s
     Running `target/debug/examples/geofence_simulator`
SIMULATION 1:-
GEO LOCATION SIMULATION FOR IN-TRANSIT OBJECTS.
SELECT THE SHAPE THAT YOU WANT YOUR FENCE TO BE
1. POLYGON
2. CIRCLE
3. TRIANGLE
1
```

3. You will see the below message

```
YOU HAVE SELECTED POLYGON
PLACE THE FILE IN geofencing/data FOLDER AND PROVIDE THE FILE NAME
REFER TO README FILE FOR FILE STRUCTURE
```

4. Enter the file name, for this scenario it is ***polygon_moving_tracker1.json***.
   Please refer to the data section at the end of this document for more information on the data. And Press Return.

```
1
YOU HAVE SELECTED POLYGON
PLACE THE FILE IN geofencing/data FOLDER AND PROVIDE THE FILE NAME
REFER TO README FILE FOR FILE STRUCTURE
polygon_moving_tracker1.json
```

5. You will be seeing the below results,
   a. It will create a Polygon fence with the given coordinates
   b. It will track the position of the moving object against the created fence.

```
Created Polygon Fence, with the below coordinates
[Coordinates { lat: -2.0, lon: 3.0 }, Coordinates { lat: 4.0, lon: 4.0 }, Coordinates { lat: 3.0, lon: -2.0 }, Coordinates { lat: -1.0, lon: -1.0 }]
Tracking and Verifying, if the below moving objects position is within or outside the fence
The car positioned at latitude 6, longitude -4, is out of the fence
The car positioned at latitude 5, longitude -3, is out of the fence
The car positioned at latitude 4, longitude -2, is out of the fence
The car positioned at latitude 3, longitude -1, is inside the fence
The car positioned at latitude 2, longitude 0, is inside the fence
The car positioned at latitude 1, longitude 1, is inside the fence
The car positioned at latitude 0, longitude 2, is inside the fence
The car positioned at latitude -1, longitude 3, is inside the fence
The car positioned at latitude -2, longitude 4, is out of the fence
The car positioned at latitude -3, longitude 5, is out of the fence
```

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Simulation 2:- Validate if a particular coordinate is within or outside the fence.

User will have the ability to input the search coordinate on the created fence and validate if it is within or outside the fence.

```
SIMULATION 2:-
GEO LOCATION SIMULATION FOR PARTICULAR COORDINATE.
SELECT THE SHAPE THAT YOU WANT YOUR FENCE TO BE
1. POLYGON
2. CIRCLE
3. TRIANGLE
```

Select the number for which you wanted to create the fence, in this case it is Circle, select 2.

```
SIMULATION 2:-
GEO LOCATION SIMULATION FOR PARTICULAR COORDINATE.
SELECT THE SHAPE THAT YOU WANT YOUR FENCE TO BE
1. POLYGON
2. CIRCLE
3. TRIANGLE
2
```

It will display the below message

```
YOU HAVE SELECTED CIRCLE
PLACE THE FILE IN geofencing/data FOLDER AND PROVIDE THE FILE NAME
REFER TO README FILE FOR FILE STRUCTURE
```

Enter the file name, for this scenario it is ***circle_geofence.json***. Please refer to the data section at the end of this document for more information on the data.

```
YOU HAVE SELECTED CIRCLE
PLACE THE FILE IN geofencing/data FOLDER AND PROVIDE THE FILE NAME
REFER TO README FILE FOR FILE STRUCTURE
circle_geofence.json
```

Enter the latitude and longitude for which you want to determine the position against the fence.

```
CIRCLE
Enter the Latitude
2.0
Enter the Longitude
3.0
CHECKING IF THE GIVEN COORDINATE IS WITHIN THE FENCE
Searching the vehicle in Circular Fence, which is built with coordinates
latitude 1, longitude 1, radius 6
The van positioned at latitude 2, longitude 3, is inside the fence
true
```

Enter “Y” (caps) if you want to continue. Any other key to discontinue.

```
Do you want to continue?. Y to continue or any other key to exit
```

```
Do you want to continue?. Y to continue or any other key to exit
Y
Enter the Latitude (defaulted to 0 if incorrect value)
9
Enter the Longitude (defaulted to 0 if incorrect value)
9
CHECKING IF THE GIVEN COORDINATE IS WITHIN THE FENCE
Searching the vehicle in Circular Fence, which is built with coordinates
latitude 1, longitude 1, radius 6
The van positioned at latitude 9, longitude 9, is out of the fence
Do you want to continue?. Y to continue or any other key to exit
N
APAAJGH684D54A:geofencing dmoha1$
```

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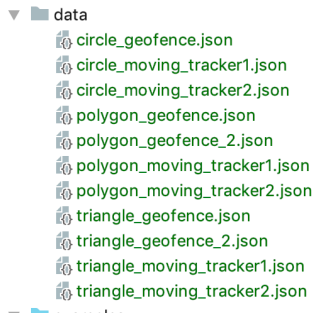
Data Files:-

The data files are located in geofencing/data



Real time tracking (Simulation 1) :- The data file should contain shape_coordinate and moving_coordinate. Example for Polygon, the structure of the file should be similar to ***polygon_moving_tracker1.json***.


```
{
  "shape": "Polygon",
  "_comment": "The json object for pol
  "vehicle": "car",
  "shape_coordinate": [
    {
      "lat": -2.0,
      "lon": 3.0
    },
    {
      "lat": 4.0,
      "lon": 4.0
    },
    {
      "lat": 3.0,
      "lon": -2.0
    },
    {
      "lat": -1.0,
      "lon": -1.0
    }
  ],
  "moving_coordinate": [
    {
      "lat": 6.0,
      "lon": -4.0
    },
    {
      "lat": 5.0,
      "lon": -3.0
    },
```


On Point tracking (Simulation 2):- The data file should contain shape_coordinate and empty moving_coordinate.
Example for Polygon, it should be ***polygon_geofence.json***.


```
{
  "_comment": "The json object for polygon fence. Need to pro
  "shape": "Polygon",
  "vehicle": "car",
  "shape_coordinate": [
    {
      "lat": -2.0,
      "lon": 3.0
    },
    {
      "lat": 4.0,
      "lon": 4.0
    },
    {
      "lat": 3.0,
      "lon": -2.0
    },
    {
      "lat": -1.0,
      "lon": -1.0
    }
  ],
  "moving_coordinate": [

  ]
}
```