Mapbox to MapLibre migration in enviroCar App

Google Summer of Code'24 Project Proposal

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Country: India

GSoC Full Time: Yes

Links: Github LinkedIn Website Skype

Short Bio:

I am a student of Mathematics and Computing at the Indian Institute of Technology, Patna (IIT Patna). It has been 2 years since I started working with Android, I gained my experience by working with the Android team of my college that creates apps for Inter-IIT competitions and apps for fests that take place in the college. In my first year, I participated in numerous hackathons emerging victorious in many of them. I am also an active undergraduate researcher at Metaverse Lab, CSE Dept. where I got the privilege to work on various research projects funded by the Department of Science and Technology, Government of India.

Achievements:

1. Got selected for Scholarship for **Wikimedia Hackathon** which will be held in **Tallinn, Estonia.**
2. Showcased research projects at **India Mobile Congress** held at Pragati Maidan, Delhi.
3. Headed a team of finalists at **Smart India Hackathon'23**, hosted by the Government of India.

Description:

My proposal is based on the above-titled idea from this link. The enviroCar Android app allows users to visualize tracks within a map and the Mapbox library is used to render the Maps in the App. The main goal of this project is to migrate from Mapbox to MapLibre library by reimplementing all the Mapbox functionality in MapLibre by also considering that the current look and feel of the App should remain the same.

Potential Mentors: Sebastian Drost

Objectives and Deliverables:

On going through the code of enviroCar available on GitHub. I have found that there total of 2 Activities and 1 Fragment utilizing the Mapbox Views. My main objective is to migrate the code from Mapbox to MapLibre keeping the current design.

Deliverables will include:

- Migrate MapExpandedActivity, TrackDetailsActivity, TrackMapFragment, AbstractTrackListCardAdapter, TrackListLocalCardAdapter, TrackListRemoteCardAdapter, and related files from Mapbox to MapLibre.
- Write/Fix test cases for the changes made.
- Remove the Mapbox Access token.
- Remove Mapbox-related imports from Java/Kotlin/Gradle.

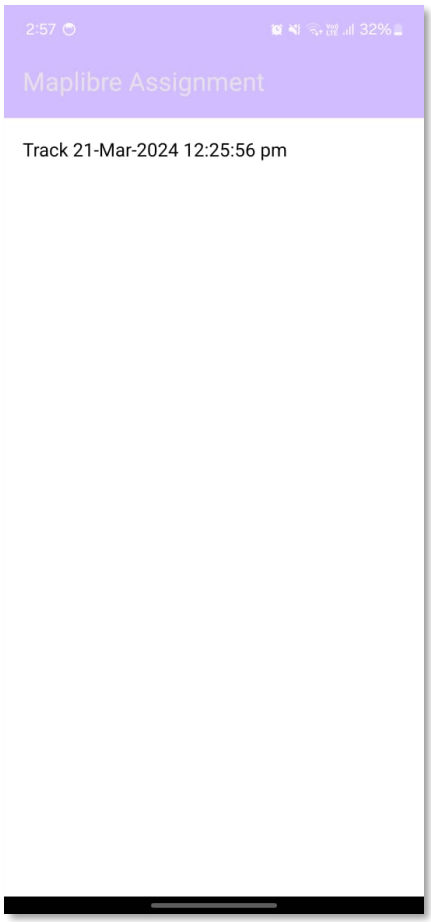
Report on Code Challenge:

I have successfully completed the code challenge which is available on Github (https://github.com/kanahia1/MaplibreAssignment).

I have utilized **Retrofit, and MVVM Architecture** to show all the tracks fetched using enviroCar api for a particular user. Then all the tracks are shown to the user in Recycler View, on clicking the particular item of Recycler View it takes the user to another activity where the track is rendered on the map using **MapLibre** Library. The path of the track is shown using a red line and the markers are used to illustrate starting and ending points. On clicking a particular marker, a pop-up is shown which displays the timestamp.

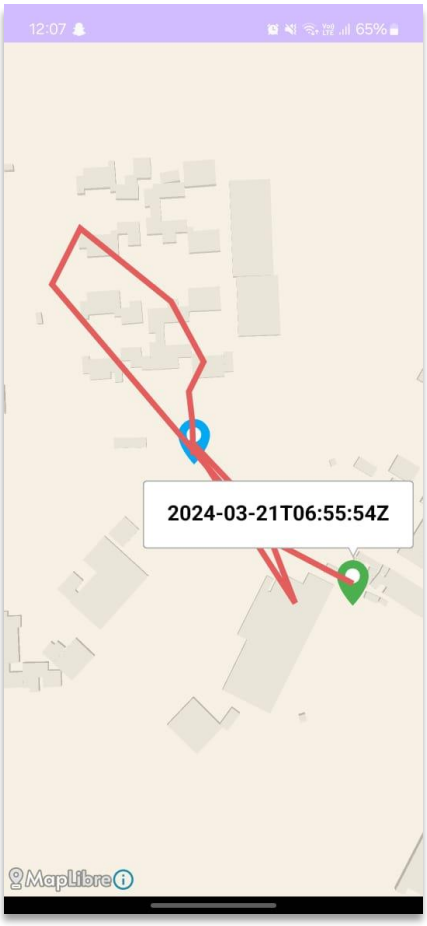
Main Activity

(Shows all the tracks of the User)



Map Activity

(Renders track information using MapLibre Library)



Timeline & Implementation Strategy

Officially, Google Summer of Code, 2024 will start on May 1, 2024. It will span about 17 weeks till August 26, 2024. The following is how I plan to utilize these 17 weeks systematically to implement all the tasks described in the above section.

Period	Task
May 4 to May 26	**Community bonding period**
May 4 to May 8	This time I will utilize for **Wikimedia Hackathon'24**
May 9 to May 26	• Introduce myself to mentors and other contributors. • Write code for the Maplibre to make it look similar to Mapbox • Work on the tile server that will be used for Maplibre
May 27 to June 9	• Migrate MapExpandedActivity and related files from Mapbox to Maplibre • Write test cases for newly added functionality.
June 10 to June 23	• Migrate TrackDetailsActivity and related files from Mapbox to Maplibre • Write test cases for newly added functionality.
June 24 to July 7	• Migrate TrackMapFragment and related files from Mapbox to Maplibre • Write test cases for newly added functionality.
July 8 to July 12	**Mid Term Evaluations**
July 13 to July 26	• Migrate AbstractTrackListCardAdapter and related files from Mapbox to Maplibre • Write test cases for newly added functionality.
July 27 to Aug 11	• Migrate TrackListLocalCardAdapter, TrackListRemoteCardAdapter, and related files from Mapbox to Maplibre • Write test cases for newly added functionality.
Aug 12 to Aug 15	• Remove Mapbox-related imports from Java/Kotin/Gradle • Remove the Mapbox access token • Fix the test cases that may impacted due to functionality
August 16 to August 28	• Write documentation and update appropriate guides for implemented functionalities. • Complete if there is any backlog.
August 26 to September 2	Mentors submit final GSoC contributor evaluations.
September 3	**Initial results of Google Summer of Code 2024 announced.**

My research on MapLibre and OSMDroid

Since OSMDroid does not support vector tiles (Add support for Vector Tiles · Issue #246 · osmdroid/osmdroid · GitHub). Also, vector tiles out-performs as per this study (IJGI | Free Full-Text | Performance Testing on Vector vs. Raster Map Tiles—Comparative Study on Load Metrics (mdpi.com)), One thing we can look at is the performance which will be more in the MapLibre. Since I have contributed before at the Wikimedia Commons App where I migrated from Mapbox to OSMDroid, the zoom in/out feature does not seem to work great in OSMDroid here is an issue related to it
(Maps tiles load slowly · Issue #5529 · commons-app/apps-android-commons (github.com))

Here is the analysis of OSMDroid vs MapLibre

Feature	OSMDroid	MapLibre
Offline Support	✓	✓
Raster Tiles	✓	✗
Vector Tiles	✗	✓
UI/Design	Needs some work	Great!
Documentation	Great!	Not so good!
Open-Source Community	Great!	Not so good!
Features	Provides features such as geocoding, routing and location tracking.	Provides features such as popups and layering.

My Contributions to other open-source projects:

Wikimedia Commons App:

Pull Requests

S. No.	PR No.	Description	Status
1.	#5475	Replace Mapbox with OSMDroid (Explore Activity)	Merged
2.	#5403	Replaced Mapbox with osmdroid (Nearby activity)	Merged
3.	#5443	Replaced mapbox to osmdroid (Upload Activity)	Merged
4.	#5553	Made Nearby show all pins that could be presented on the screen, rather than a circle	Merged
5.	#5631	Removed Mapbox related imports	Merged
6.	#5555	Removed MAPBOX Access token	Merged
7.	#5415	Added voice input for caption and description	Merged
8.	#5356	Fixed Grey empty screen at Upload wizard	Merged

9.	#5464	Fixes on Edit button, there is + sign overlayed over letter E	Merged
10.	#5450	Fixes #5439 by capitalizing first letter of voice input	Merged
11.	#5481	Fixed javadoc issue	Merged
12.	#5635	Fixed reproducible crash when marking last pictures as "not for upload"	Merged
13.	#5616	Fixed Blue square appears at end of description of image uploaded	Merged
14.	#5645	Added functionality to export location of nearby missing pictures to GPX file and KML file	Merged
15.	#5575	Fixed Clicking on edit photo shows default rotation	Opened

Past projects:

- **Boolian – Course-based App to help people learn about NFTs**
  https://github.com/kanahia1/Boolian

This is a project that I created as part of a hackathon held at the IIT the main idea of this app is help users to learn NFTs with the help of Images, Articles, and Videos. The course in the app is created to help users learn perfectly. In this project, I created custom UI components that are not available in Android itself. In this project, I used Firebase Auth for authenticating with Google, and course-related data is stored over Firebase.

- **Med.io – Electronic Health Record Management App**
  https://github.com/kanahia1/Med.io-Android

This project uses a decentralized database to enhance transparency in the healthcare sector using blockchain. It was a team project, My input in this project was to develop an Android Application where users can see their medical reports and users can also talk with an AI Chatbot that predicts diseases based upon the symptoms.

- **License Plate Blurring using OpenCV**
  https://github.com/kanahia1/OpenCV-Android-Demo

This project focuses on using OpenCV and a Haar Cascade classifier for License plate number detection and blur license plates in images on Android devices. I developed this Android app to demonstrate a practical application of computer vision techniques in mobile development.

Why Open-Source?

I have always been obsessed with the Open-Source Projects (which can be easily seen from the pull requests that I have made). I really like the concept of open source as it allows people from different places to work together on projects that empower the world. Also, one more fact that made me contribute is that I daily use many apps/libraries that are based upon open-source and sometimes I feel there should be some change, So I go to the repository and make some changes to it (as Open-Source allows anyone to come and contribute).

Why 52°North?

As I am an undergraduate researcher at my college I really like to work on research projects. Lat year, I was working as a research intern at Metaverse Lab, where I came across Geospatial Data through LiDAR-based mapping which we did using drones to map the ruins of Nalanda University which is one of the world's first universities. We are utilizing the Data for Spatial Analysis to examine the relationships between geographic features and their attributes to uncover patterns. It was an amazing experience and created interest in Mapping, Navigation Systems, Satellite systems, and Remote sensing systems. So, Stepping into the community such as 52°North will be a great opportunity for me to polish my skills and have a good experience.

Why the enviroCar Android Application Project?

The enviroCar project is an open source project used by thousands of people around the globe which is itself an impactful project. Working on such a project that interfaces with OBD2 Bluetooth adapters and GPS technology will provide me with valuable hands-on experience in mobile app development, IoT integration, and data collection. Which in turn becomes a great opportunity for me to contribute to the open-source.

Why this project?

I came across this project through GSoC's page and I felt that I could be a good candidate for this project as it focuses on replacing Mapbox with Maplibre I have already contributed to a similar project in Wikimedia where I replaced Mapbox with OSMDroid. Through that project, I became quite familiar with map functionalities, which made me choose this project.

Do you understand this as a serious commitment equivalent to a full-time paid job?

I understand that it is a serious commitment which is why I have no other commitments other than GSoC in this period. I will be available for at least 40 hours a week through online platforms and am ready to extend whenever needed. I would be working full-time for GSoC.

Do you have any known time conflicts in the coding period?

I will have to leave for Wikimedia Hackathon on 3-5 May which will be held in **Tallinn, Estonia** but I will be back in India on 8 May so I will continue the work thereafter. All of it will be compensated on Weekends.

After GSoC:

I would like to keep contributing to 52°North after GSoC and will be available to resolve issues and manage pull requests. Even if I am not selected this year, I would like to help this project by resolving issues, suggesting new ideas, and participating in discussions. I usually help out people with code. I would like to keep contributing to the 52°North organization and do whatever I can to help.

References:

How to display offline maps using Maplibre/Mapbox on Android | by Abhi | Medium

Add support for Vector Tiles · Issue #246 · osmdroid/osmdroid · GitHub

IJGI | Free Full-Text | Performance Testing on Vector vs. Raster Map Tiles—Comparative Study on Load Metrics (mdpi.com)

Maps tiles load slowly · Issue #5529 · commons-app/apps-android-commons (github.com)