Location

Alarm

Design Prototype

By Archan for Trimble Interview.

**Technologies Used:**

Firebase Realtime Database

**Tools Used:**

Android Studio

Git (Version Control System)

Algorithms Used (Expected):

Quadtree

Binary Tree. (My Custom Algorithm).

**Expected Outcomes:**

A Location Alarm Application is expected to send notification to user if user created an alarm.

Should contain below UI’s:

1. Login Page (Not Necessary for this scope)
2. Adding Alarm form
3. Showing alarms as listview from Database

Database: Firebase for storing 2D LatLng data.

Algorithm should be perfect.

**Testcase Verification:**

UNIT TEST (Need to be done on Algorithm)

**Functionality Provided:**

Add Alarm Details

Remove Alarm

Algorithm for finding nearest point (Not Implemented) (I have developed the remaining part of app with my own algorithms whose feasibility is minimum.)

**Algorithm Analysis:**

I have done research on algorithm that best suite for finding nearest point from given set of points.

Since it is 2D and latitude and longitude are in double pression is difficult.

Best Suite for finding nearest point is using Quadtree Data structure. Constructing the quadtree is very difficult using latlang where there no reference found to implement.

Also implementing Quadtree in Android application would be inefficient as compared to various Android api which provide this feature at its ease.

There is one such Android Api called Geofencing. In reference I have attached the documentation for implementing this feature in more efficient way.

Apart from the above algorithm, I thought about including these points in binary tree as mentioned in below steps.  
  
1.Initialize the binary tree with current location as the root with distance of 50KM/100KM range.

2. when new node comes, I will add these points based in distance between root node and this node if that is less than half of 50 I will traverse left else right. Each time it halves.

3. Also has a nerbylist for each node.when new distance from this node which is less than 500m will be added.

Likewise, I am thinking and implementing. Code is the GitHub under algorithms.   
  
Thanks for this opportunity That motivates me explore many areas which I never dreamt of.

**Learning:**

Gone through many Android Architecture and learnt Firebase

Learnt various map api’s for finding difference.

QuadTree algo was very good, will keep on learning.

**Result:**

Done Implementing Adding Alarm List View

Showing alarms from Database.

Data from Adding Alarm is successfully added to firebase.

Reading data from database is done.

Used latest development of View Model Concepts with Firebase.

Have provide the Apk in GitHub.

For the finding nearest algorithm, please provide any suggestions.

I have tried my level best to bring up this application and also done various kind of search for implementing this feature on my own.

All the codes I have done are in below GitHub link.

<https://github.com/archanrr/LocationAlarm>

**References:**

<https://developer.android.com/training/location/geofencing>

<https://en.wikipedia.org/wiki/Quadtree>