MICROADDRESS RECORDER FOR LOCATION TRACKING

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Abstract: Location is the first entity that comes in mind when we talk about Location based services. During this era, Location Intelligence with tracking has proliferated in mobile networks through the applications running on smart phones equipped with Global positioning system. This paper describes the Location Tracking Application called MicroAddress Recorder used to track a person at minute Locations in defined areas. This application is based on the integration of Location information of particular person with the distances from two nearby places to get the exact location. Further the paper shows the detailed analysis of the results in different areas and also identifies the future research.

Keywords : Global Positioning system,Geocoding engine,MyLocationListener,Location Intelligence,Google maps

INTRODUCTION

Location based Services are now become a part of everyday Life. Location based services are growing to support a larger user Society with various fundamental challenges, including the ability to get exact coordinates, to get exact Location on a map and the location updating when user is moving[4].Every person wants to know exact location in particular area. Some of the approaches were tested like Latitude [12], SMS Tracker [11] and SUPL Platform [10] for Location tracking and their results were published in previous paper. The limitations of these approaches are, they can only show the broad area for example you are in Sector 21C. But if user wants to know Location of a child in the Society, whether a child is present in park, or on roof, or at home and so on .These results can not be retrieved through these approaches. In order to remove this limitation and for getting expanded results, we developed a new application named MicroAddress Recorder. The application is used to retrieve and display expanded information related to the location. The application is easy and portable that can run on any android smart phone. An Android is an open source operating system that helps to provide API libraries for executing android applications [6]. An android phone is equipped with GPS as GPS helps to receive signals from a network of satellites and use these to triangulate the Mobile location[14].The further sections of the paper describes the class diagram and results of the application.

RELATED STUDIES

Various studies has been done in the field of Location Tracking by Researchers.Pardasani[7] describes an internet based prototype tool called Location trcaking of prefaricated construction assemblies. This tool is used for Locating the structural steel components at their fabricators site or construction site. These sites are equipped with wireless Ethernet.The approach used in this tool is based on the combination of location information with the component related information.This application helps in reducing the time spent in searching the asemblies.

Wlliam C.Stone[8] describe an application called Automated Part Tracking on the Construction Job Site developed by National institute of standards and technology.This application is used to develop a web based system for identifying, tracking and locating manufacturing components at the warehouse. This application uses RFID and Bar code indentification systems.The application used 3D technologies for coordinate measures.The application works on portabel computers,uses high speed networking,web based data analysis,user interface and wireless communication.

Todd Simcock[9] presents a Tourist Guide application for the Outdoor environment.This application is not only used for Location but also for things of user interest such as attractions,buildings,nearby place,monuments etc.The application is simple and user interface that provides information to tourist.

David McAdam[13] describes GIS project to produce Wilderness ontinuum Map showing areas designated as Wilderness in U.K.ha project gives the various areas of national parks,various fields and various landmarks.The application is helpfule for Landscape planing for touist. The project uses GPS to show various areas.A GPS is a space-based radio positioning system that uses with Mobile Network in oreder to provide three dimesional position anywhere on the surface of earth on device equipped with GPS[15].

MICROADDRESS RECORDER

This is an easy and portable application uses Service oriented Architecture (SOA), a Software design pattern based on collection of discrete software modules called services that allows easy cooperation of various devices used over network [2]. The architecture of application comprises of Localized Location engine, Android Location API and Database Server for storing data [5]. The Class diagram of

Application is shown in Figure 1.There are major six classes used in the application.

1. LBS Geocoding Activity Class: A main class in which all other classes are inherited.

2. Activity Class: The class is narrated from Android Class. Android Class is a base Class for those who want to instantiated their own created application for processing [3].

3. Class Geocoding engine: This class calculates the distance of different Locations from one center location. The formula used for calculating the distance is:

 public double getDist(double lat1,double long1,double lat2,double long2)
    {
    double R=6371;
    double dLat=Math.toRadians((lat2-lat1));
    double dLong=Math.toRadians(long2-long1);
    lat1=Math.toRadians(lat1);
    lat2=Math.toRadians(lat2);

A.   double
t=Math.sin(dLat/2)*Math.sin(dLat/2)+Math.sin(dLong/2)*Math.sin(dLong/2)*Math.cos(lat1)*Math.cos(lat 2);

    double c=2*Math.atan2(Math.sqrt(t), Math.sqrt(1-t));
    double d=R*c;
      return d;
    }

4. Location Manager Class: This class allows application to again and again take the coordinates (Longitude and Latitude) of different Locations.

5. Data Class: This Class is used to store the data of various Locations.

6. MyLocationListener Class: The Class is inherited from Location Listener Class to order to maintain the updates as the Location of Mobile phone is changed.

 The Application uses integration of android based work and web service, where android application is used to display textual results on mobile and Web Service is used to display Locations on map on any Browser.
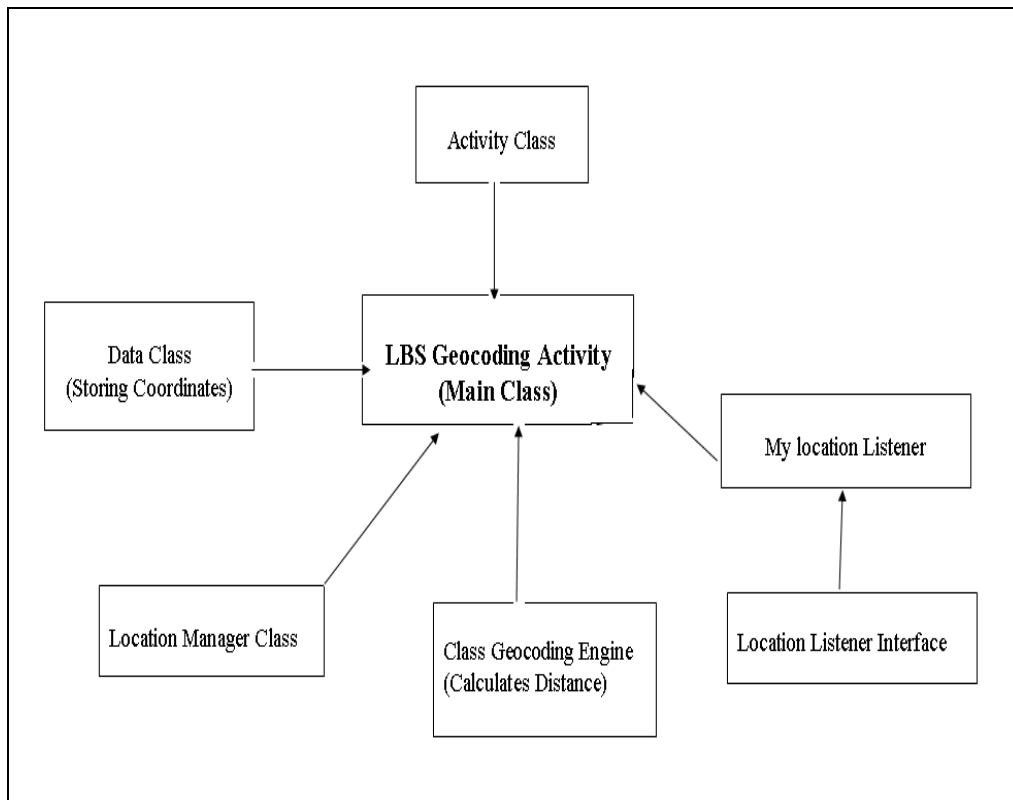

Figure 1.   Class Diagram of Microaddress Recorder

TESTING AND RESULTS

The Extensive testing has been carried out around the city of Faridabad to check the efficiency and accuracy of Micro Address Recorder. The Application is tested on Samsung Galaxy Trend Duos GT-S7562 smartphone.The Results are shown below.

 A. Area around Home place

Figure 2 below shows first screen of our application. After clicking the Fetch Fresh Location button, the Second
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Screen will be displayed showing the Latitude and Longitude of User's Home and it also shows the distance of Home from the College shown in figure 3. This screen shows the Longitude and Latitude of Location where you are. Secondly it shows the Location of person at home. The results clearly show that at this time, you are at your home
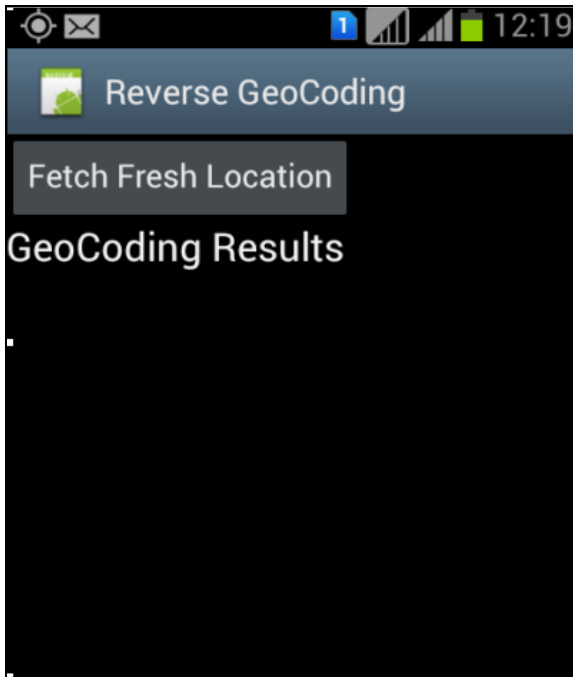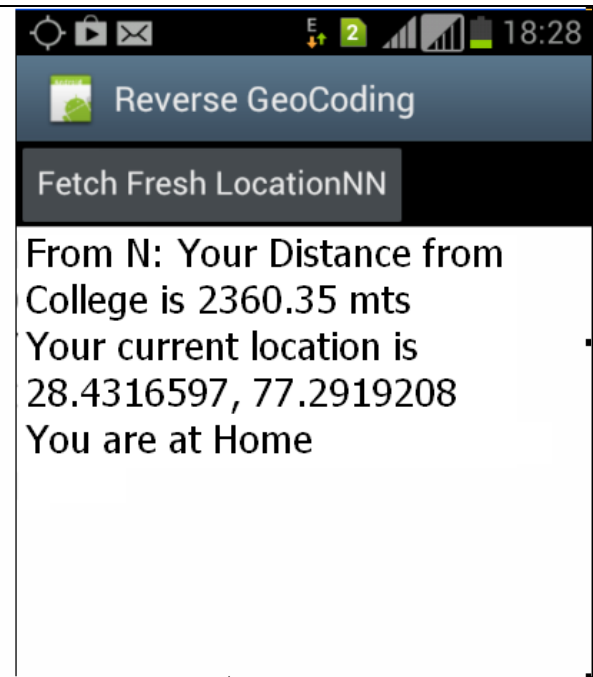

Figure 2.   First Screen of application

Figure 3.   Screen showing Longitude and latitude of Home

B. Location on a Map

The above result is shown on the textual Mode. Now, when a person run the link http://geocoding.hostei.com/showmap.php at the browser . The Location is also shown on the Map. Figure 4 shows the Location of Home on the map.
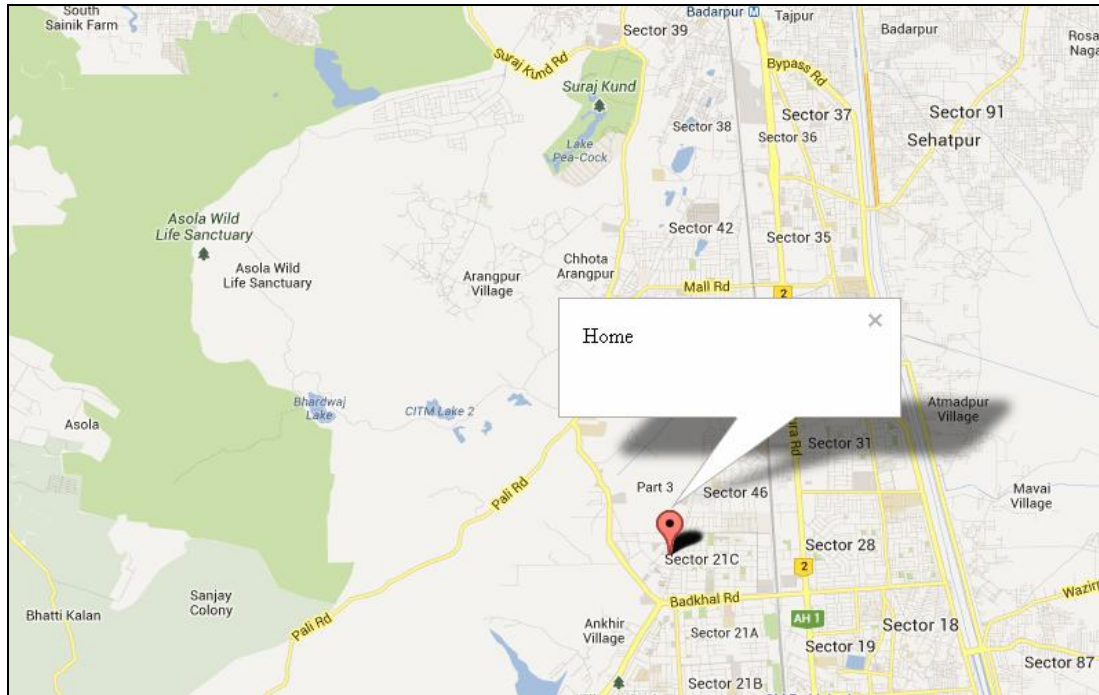
Figure 3.   Location when Person is at Home using Google Maps [1]

C.   Updating Locationwhen person is moving

When a person is moving nearby Home place, the application updates the Change of Location and continues change in distances. The updating of Location

with a change in distance is shown in Figure 5 and Figure 6.There is change of 1 metre of distance while moving as shown in Table 1.
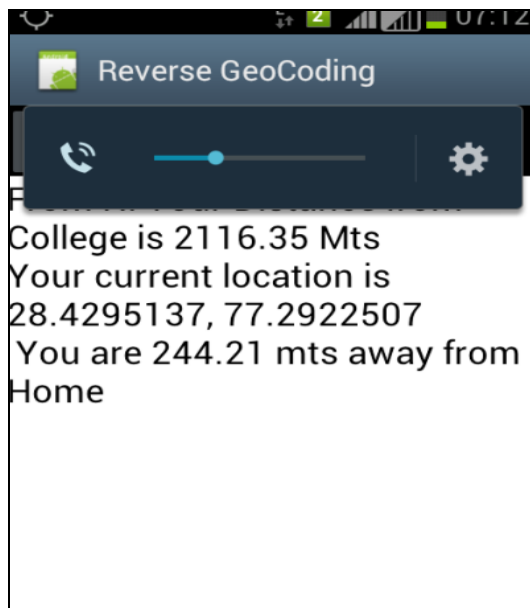

Figure 5. Change in distance and coordinates nearby Home
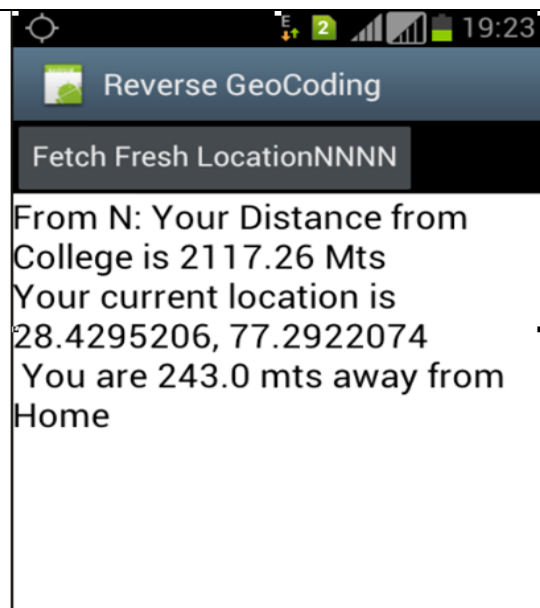
Figure 6. Change in distance and coordinates in moving position

Table I.   RESULTS AT VARIOUS LOCATIONS

Sno.	Longitude	Latitude	Place	Distance from College(mts)	Distance From Home(mts)
1	28.4316597	77.2919208	Home	2360.35	--------------------
2	28.4295137	77.2922507	Nearby Home	2116.35	244.21
3	28.4295206	77.2922074	Nearby home	2117.26	243.0

D. Results in Roaming Area

The Application will also work in the roaming area. The Application is tested on Micromax Canvas 2 smart phone.

Figure 7 and Figure 8 shows the change of Location and distances in Punjab

Figure 7. When person is at Jullundhar Station
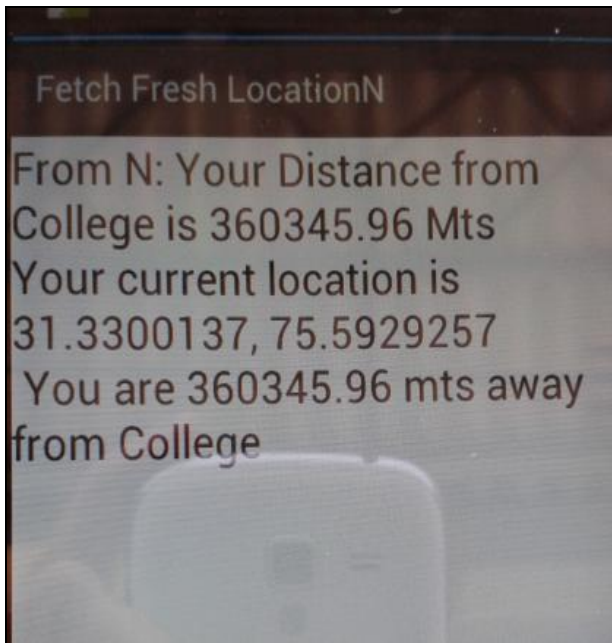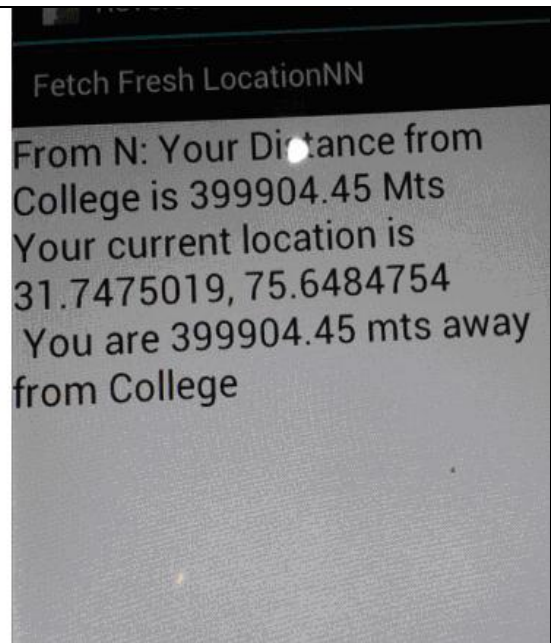

Figure 8. When person is at Havelli nearby Jullundhar

Table II.   LOCATIONS and DISTANCES IN ROAMING AREA

Sno.	Longitude	Latitude	Place	Distance from College(mts)
1	31.3300137	75.5929257	Jullundar Station	360345.96
2	31.7475019	75.6484754	Havelli nearby Jullundar	3999904.45

E. *Different Locations shown on map while person is moving*

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The application shows last five Locations which the person has retrieved. Figure 9 shows map having last five locations retrieved by the application.
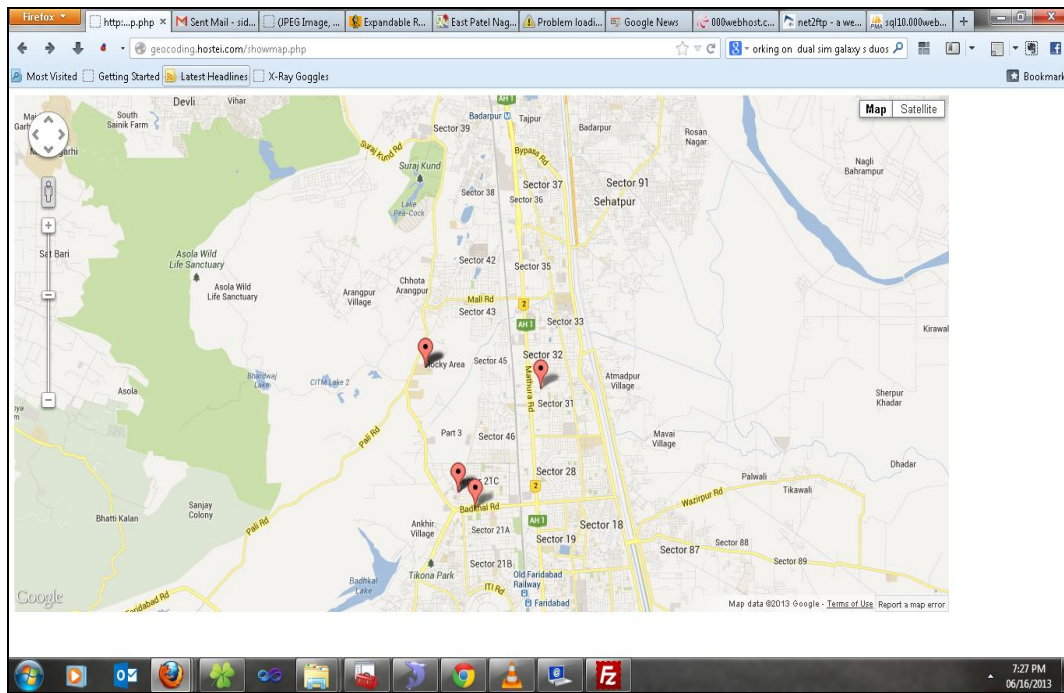

Figure 9. Locations retrieved by the application using Google Maps[1]

F. *Longitude,Latitude and Place of different Locations witin a city retrieved by application*

The Testing is done around a city of Faridabad.

Table III shows the longitude, Latitude and the name of various locations retrieved by the application

Table III.   LONGITUDe,LATITUDE AND PLACE RETRIVED AROUND A CITY

Sno	Latitude	Longitude	Provider	Place
1	28.449644	77.286285	GPS	You are in FCA,T Block,MRIU
2	28.44924	77.286285	GPS	You are at FCA,T Block Gate,MRIU
3	28.45091	77.28412	GPS	You are at E Block MRIU
4	28.449602	77.285446	GPS	You are in MRCE
5	28.438368	77.28504	GPS	You are at Siddanta Ashram
6	28.433428	77.29897	GPS	You are atSector-21C Vardaan
7	28.433428	77.29897	GPS	You are in area of Sector 46 Market

8	28.437704	77.2989911	GPS	You are in Sec-46,Community Centre
9	28.4406	77.29788	GPS	You are at Eicher school
10	28.434477	77.294174	GPS	You are nearby Sec 45-46 dividing road
11	28.433638	77.293	GPS	You are at Vasundhra Enclave
12	28.431696	77.29197	GPS	You are at your Home
13	28.428425	77.289215	GPS	You are at Maharaja Agresen Society's 21C
14	28.426252	77.2933	GPS	You are nearby Mandir towards going Sec 21D
15	28.419912	77.29377	GPS	You are nearby aashiana apartments Sec 21D
16	28.415192	77.29411	GPS	You are nearby Jiva public School
17	28.413387	77.2978	GPS	You are nearby Kodi Ashram
18	28.413532	77.29924	GPS	You are at Gurudwara(Kodi Gali)
19	28.40431	77.29969	GPS	You are at ESI,dispensar no. 3,NH-5
20	28.40431	77.29969	GPS	You are nearby Virmani photo Lab NH5
21	28.40128	77.298256	GPS	You are nearby YX palace,NH5
22	28.4013364	77.29893	GPS	You are nearby Bhavishaya Medical store
23	28.40483	77.29992	GPS	You are at Juice Corner,NH-5
24	28.406786	77.302475	GPS	You are at NH 4-5 Chownk
25	28.409077	77.293594	GPS	You are at hanuman mandir
26	28.412466	77.29449	GPS	You are at Residence welfare association
27	28.41531	77.2932	GPS	You are at Mangla Diagnostic centre,Sec 21C
28	28.399632	77.2927	GPS	You are at Puneet Home,NH3
29	28.418856	77.29012	GPS	You are at Krishna Village,898,sec 21D
30	28.418856	77.29005	GPS	You are nearby Apeejay international school,sec 21D
31	28.42054	77.29805	GPS	You are nearby kaveri apartment,Sec 21D
32	28.430182	77.29805	GPS	You are at Grace Assembly of god,sec 21C
33	28.4329	77.30294	GPS	You are at Nalanda Apartments.sec 21C
34	28.434383	77.28507	GPS	You are at Dividing road from Sec 21c to MR
35	28.446436	77.280785	GPS	You are nearby Aravali International School

36	28.451286	77.280785	GPS	You are nearby CITM Gate
37	28.461155	77.28546	GPS	You are at Green field residential welfare society
38	28.470806	77.29548	GPS	You are nearby Green valley market
39	28.47072	77.29695	GPS	You are at Anupama Home
40	28.447504	77.28412	GPS	You are at MVN School

CONCLUSION AND FUTURE WORK

The current work includes the implementation and testing evaluation of MicroAddress Recorder.The application clearly shows the Longitude,Latitude of a Mobile user and it shows distance of a user from central location in a textual mode on mobile phone .The application also retrieves the locations on the map through browser.The results shows the minimum change of 1 metre of distance while moving therefore a person can tracked in very concise area..The application works indoor and outdoor and also retrived locations in roaming area. Also the Location also updated as soon as the Mobile user changes its position.Further in a Future work,we will try to get the distances from nearby locations rather than a central location in order to get more accuracy of Location.Secondly the recorded locations will also be updated on the webpage.

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