VISUALIZATION AND SIMULATION OF ENCOUNTERS AND MOBILITY OF WEALTHY AND POOR RESIDENTS IN THE CITY OF HYDERBAD, INDIA.

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ABSTRACT

This research stressed the need for a people centric model for smart cities and emphasizing the slums, Inequalities, Rich and poor gaps, Infrastructural issues in the city of Hyderabad together by ending social exclusion while developing smart cities using technology only as a tool. Smart cities should not widen the existing inequalities.

This research also attempts to address the unique Mosaic urban fabric of the rich neighborhoods and pockets of slums in the city of Hyderabad, unlike the most of the mega cities in the western countries where there is an ultimate separation between rich and poor. This is clear that even there is a big gap between rich and poor, there is no separation socially at least physically.

Applying this conditions as a prospect I inclined to find out the potential encounters of wealthy and poor residents of Hyderabad in their daily life by using GPS tracking devices for about 3 months as a sample test of 20 people (10 rich and 10 poor) and the projected results of the encountering test are visualized and simulated in a 2D and 3D virtual simulation software's of *ArcGIS* and *UCwinroad*, the results are not intended to be representative. Instead the research aims to demonstrate the data's potential to provide insight individual travel behavior to find out the potential encounters of wealthy and poor residents of Hyderabad in their daily life based on some logical analysis of encounters test of Space time cube and measuring the Duration of encounters, frequency of encounters and traffic composition of encounters and make the case that with a larger sample of data it could provide valuable insights into aggregate Potential encounters and travel behavior as well, by which the potentials of encounter location was discovered and further proposals of smart infrastructure at the potential location to promote the future encounters, economic leadership and exchanges between two parties as a future model for building the smart cities.

key words:

Visualization, 3D virtual Simulation, Smart city, slums, Inequalities, Urban Mobility, Encounters, Space time cube, Smart infrastructure.

1   INTRODUCTION

As we know that Indian Government is proposed to rebuilt some Mega cities, Mid raised towns and satellite towns in to 100 smart cities. This project was enhancing in 3 phases, Hyderabad is designated one of them in the first phase and the Government is boosting to create the smart cities in top down model with foreign direct investments and internationals business primarily focusing to bring the major physical infrastructure, ICT, bullet trains etc. but also forgetting the 1000 slums which are grass rooted across the city.

(Smart cities mission Ministry of urban development Government of India, June 2015)

The real challenge lies not in upgrading the favelas and slums with infrastructure such as sewage, water and electricity, but also in finding Smart solutions to integrate these settlements into the 'formal' urban structure and economy.

(UN-Habitat , State of the World Cities Report 2010/2011)

That's why Hyderabad is a special case, in order to create a healthy and sustainable smart city, first city needs to be slum free city as a minimum, the unique Mosaic urban fabric of the rich neighborhoods and pockets of slums in the City of Hyderabad, unlike the most of the mega cities in the western countries where there is ultimate separation between rich and poor. This is clear that even there is a big gap between rich and poor, there is no separation socially at least physically. Rich people doesn't mind to stay closer to poor and make use of them as maids, servants, Drivers and guard mans. At the same time poor enjoying the concept of living close to rich for the employment opportunities and gain the advantages of the infrastructural facilities and tax free service.

(self Observation and Interviews, Hyderabad, February 2015)

Then i choose to work on the special case like the Rich neighborhood sandwiched between pockets of slums and identified one rich residential area as same called Jubilee hills and the proximity slum areas of Indra nagar , Jawahar nagar and Rahmat nagar in the city Centre
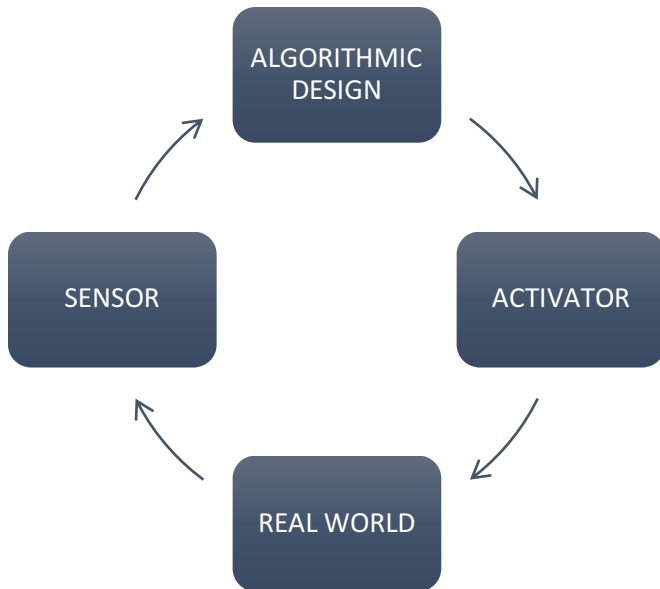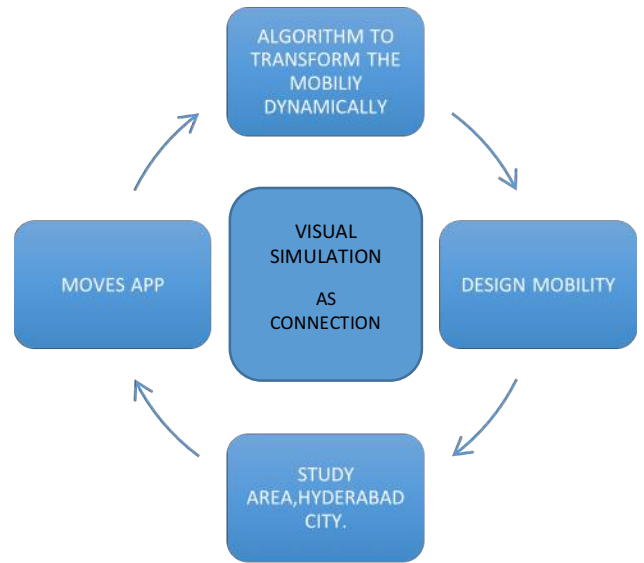
In my case

2.APPROACH TO THE STUDY
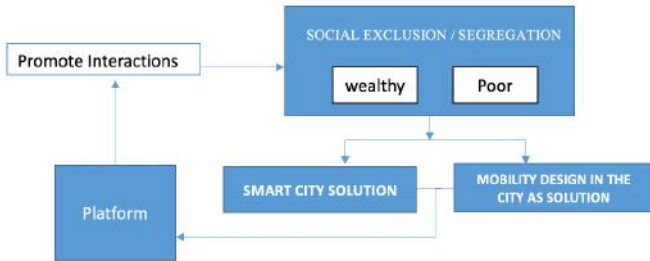
3.SMART CITY SOLUTION

Smart city is real time sensing of the big data or large scale of data to control the adoptability to the real city activities or Data driven design methodology.
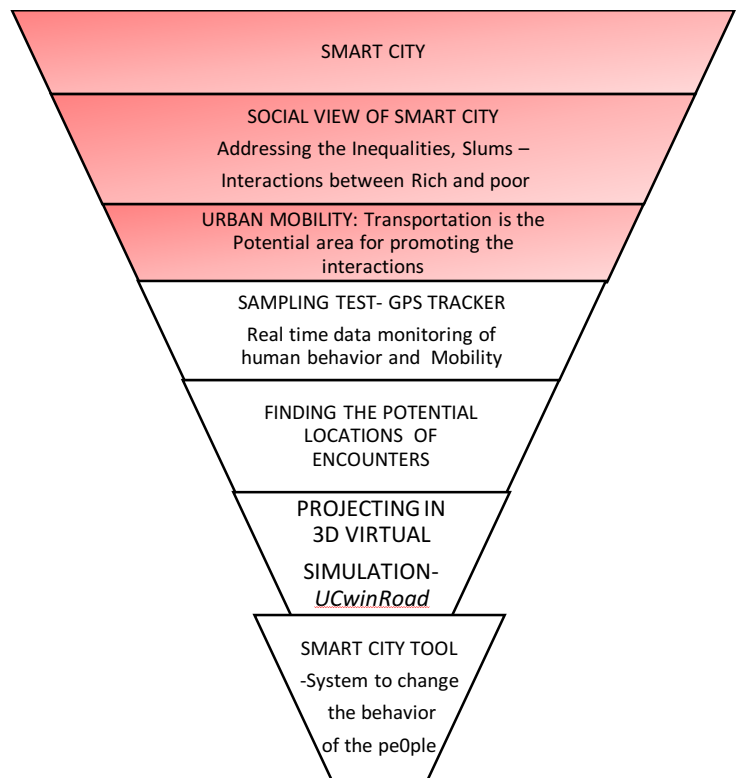
In General

4. RESEARCH SCOPE

This research inquires about the potentials to develop a tool for the smart city that includes inequalities, Rich and poor gaps and slums in india.

5.GOAL

Development of smart city tools to visualize the potential of encounters and mobility between wealthy and poor residents in the city of Hyderabad.

6.HYPOTHESIS:

Mapping the behavior of residents of Hyderabad using smart tools can uncover the potential encounters locations between rich and poor.

The Potential encounter locations can be used to develop the smart transportation infrastructure.

7.OBJECTIVES

1) To Understand the socio-economic characteristics of the study area in the city of Hyderabad and interaction of the people with the existing transportation system.
2) To understand the concept of slums in smart city, Inequalities, Rich and poor gaps
3) To develop the smart city tools for visualizing and Simulating the potential of encounters and mobility between extreme wealthy and poor residents in the city of Hyderabad.
4) To promote the future encounters, economic leadership and exchanges between the rich and poor

as a future model for building smart cities.


Rasooplura slum,Hyderabad

8.METHODOLOGY
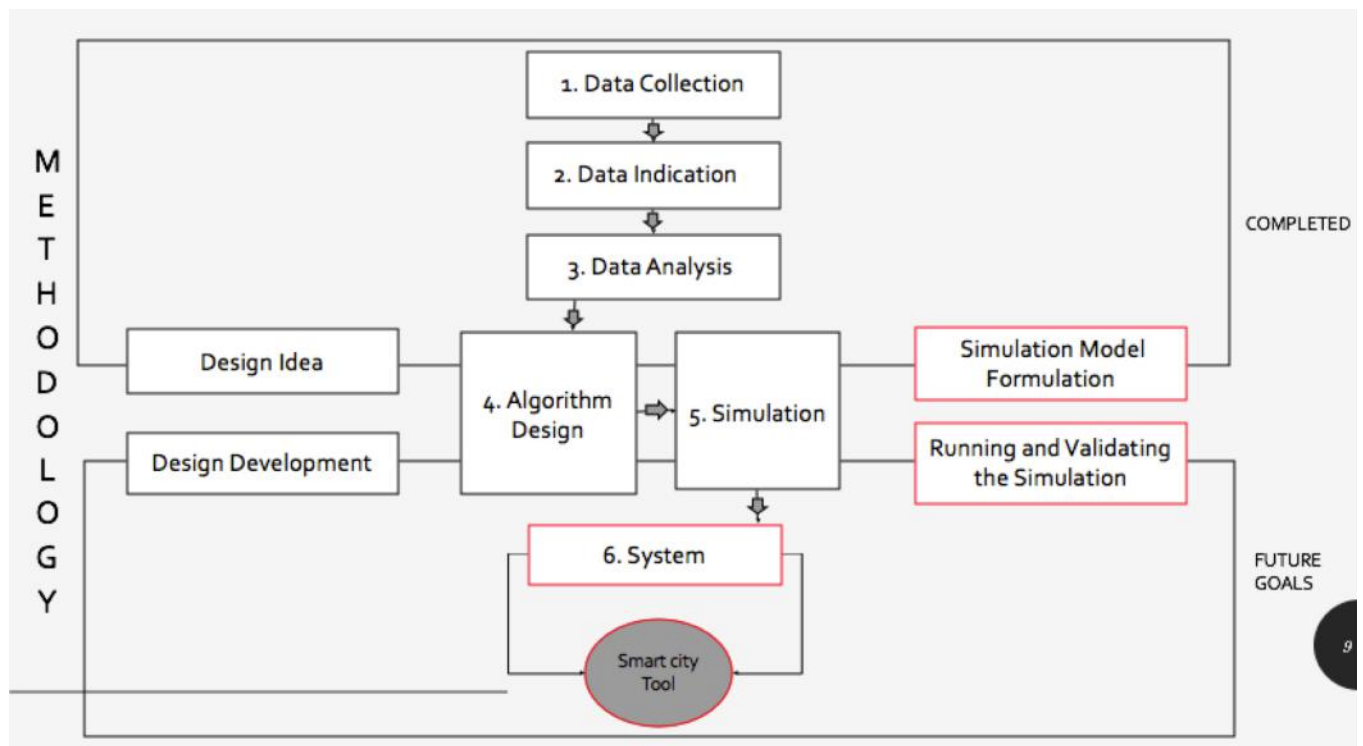
9.INTRODUCTION TO THE STUDY AREA

Hyderabad is the capital of Andhra Pradesh state in central South India. It grew from about one million inhabitants in 1951 to about 9 million in 2015, whereas the scenarios for the wider urban area project population size of 13 million in 2021 and 18 million in 2031 (HMDA, 2011).

The Greater Hyderabad Municipal Corporation (GHMC) covers an area of 650 square kilometers and has a population of 6,809,970. There are 1476 slums in Hyderabad out of which 1179 are notified & 297 are non-notified. The total slum area is 80.45 Km2, which is 12% of the total GHMC area. Total slum population is 19, 51,207, which accounts 28.65% of the total population of GHMC. The total number of households in the slums is 4.06 lakhs.

INDIA   **HYDERABAD**

STUDY AREA
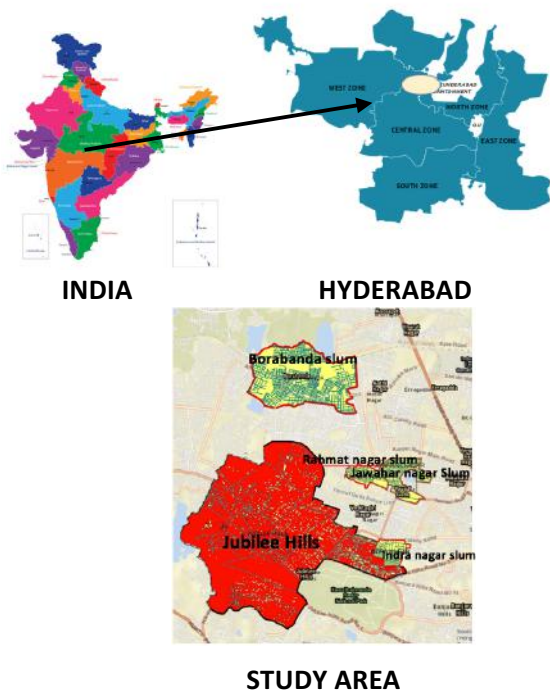
Automatically identified slums of Hyderabad in 2010
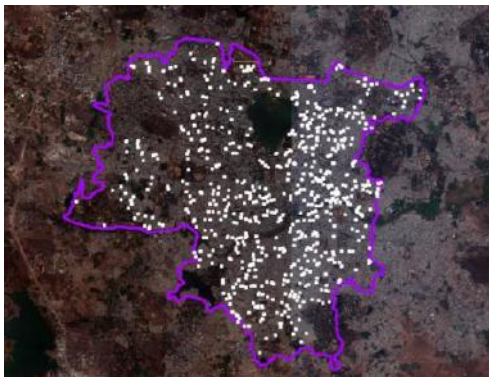
Souce : O. Kit, M. Lüdeke / ISPRS Journal of Photogrammetry and Remote Sensing 83 (2013) 130–137

10.DATA MONITORING

I worked with the Moves app . Moves app is an activity-tracking app that records how much physical activity(walking, cycling, transport and Mode of transportation) we do, and where we go.

With the help of this app , I Monitor the Real time human mobility of 20 people (10 wealthy and 10 poor) in the study area of Jubilee hills Rich neighbourhood where top 10% of wealthy people live and slums of Borabanda, Indra nagar, Rahmatnagar and Jawaharnagar to detect where extreme wealthy and poor people encounter in their daily life's for over a period of 3 months and mapped the Data.

Figure Real time function of Moves App

Source: Moves App

Details of Application

There are a wide variety of mobile activity apps, both in terms of intended use and resulting data. After reviewing apps on the basis of 1) modes captured 2) accuracy of data 3) battery drain 4) privacy concerns 5) accessibility of data and 6) privacy.
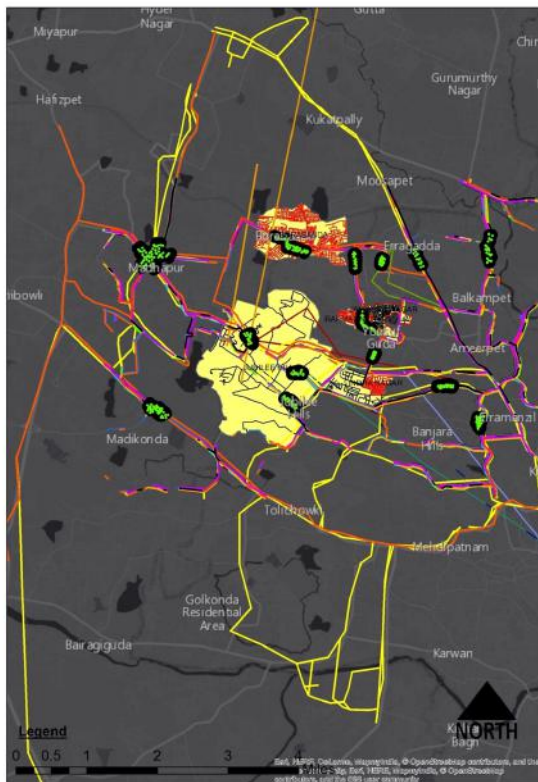
This research focused on Moves - a free application for both iOS and Android developed by ProtoGeo .Moves creates an automatic trip diary that includes information on trip mode (walking, cycling, running, transport), route information, and start and end location and time. This data provides a much more detailed, granular depiction of travel behavior. And most importantly, it provides information on modes beyond public transit. Furthermore, since the app is running in the background, it is easy to collect many days of data with low effort, in contrast with a manual survey which often only includes one or two days. Therefore, automatic activity tracking data provides the potential to obtain a detailed picture of individual travel behavior over time in a way that AFC and survey cannot.
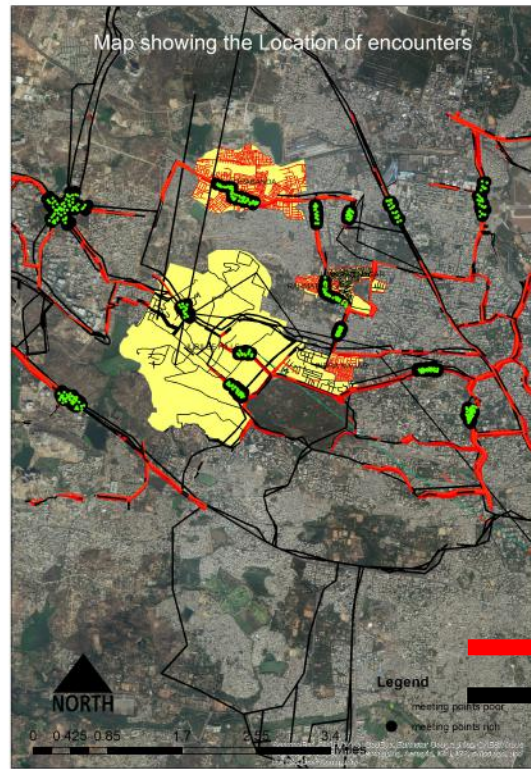
11. RESULTS OF THE ENCOUNTERING TEST

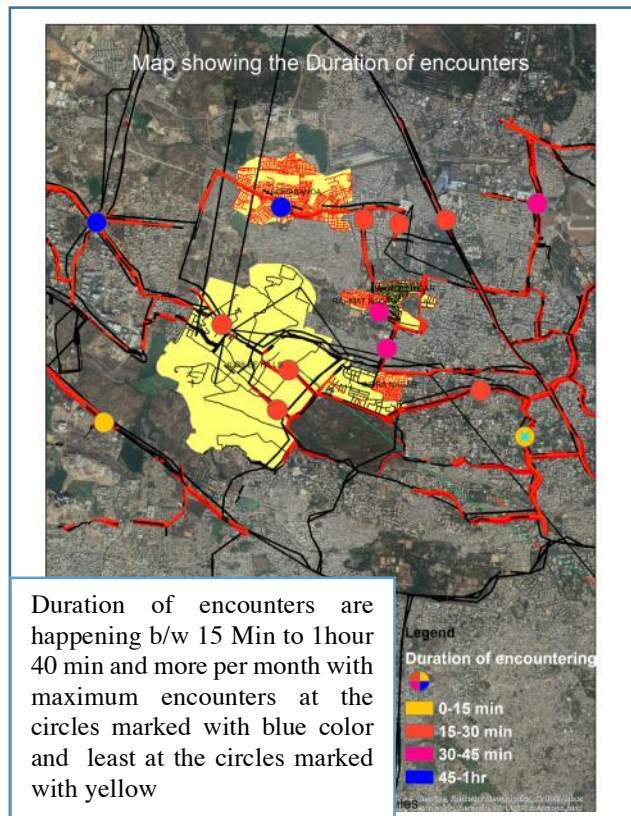Map showing the location of distributed devices for sample test

Map showing the location of the encounters of wealthy and poor residents in the study area
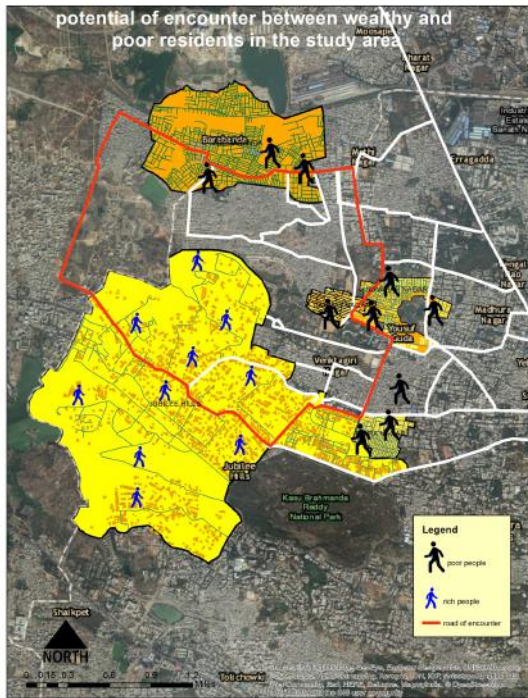
Map Showing the Individual Human Behavior and Encounters of 20 agents (10 rich and 10 poor)

Map showing the Duration of encounters for a month

Duration of encounters are happening b/w 15 Min to 1hour 40 min and more per month with maximum encounters at the circles marked with blue color and least at the circles marked with yellow

Map showing the frequency of encounters for 90 Days

Frequency of encounters are happening between 25 to 100 and more for whole monitoring period of 90 days with maximum encounters at the circles with Red color and least at the circles marked with blue color marked
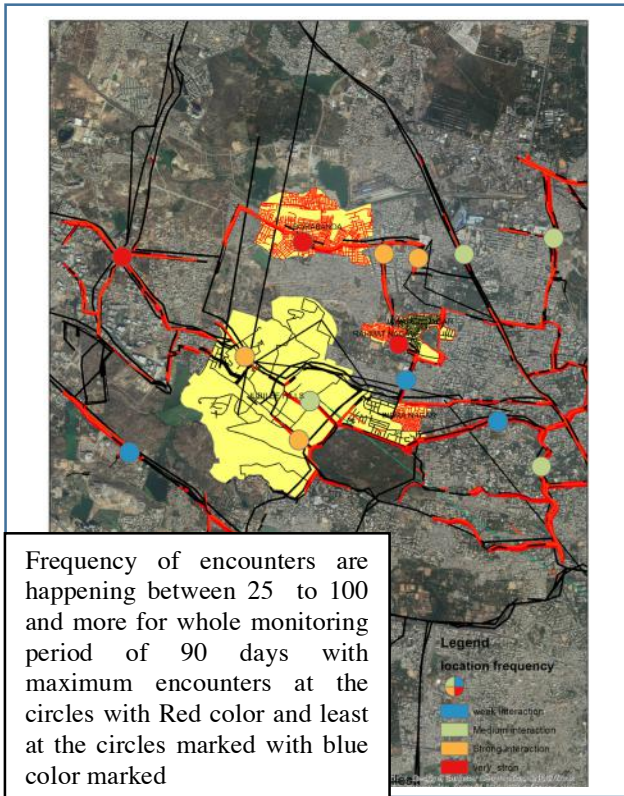
Map showing the time classification of encounters for 90 days at the same time and same space.
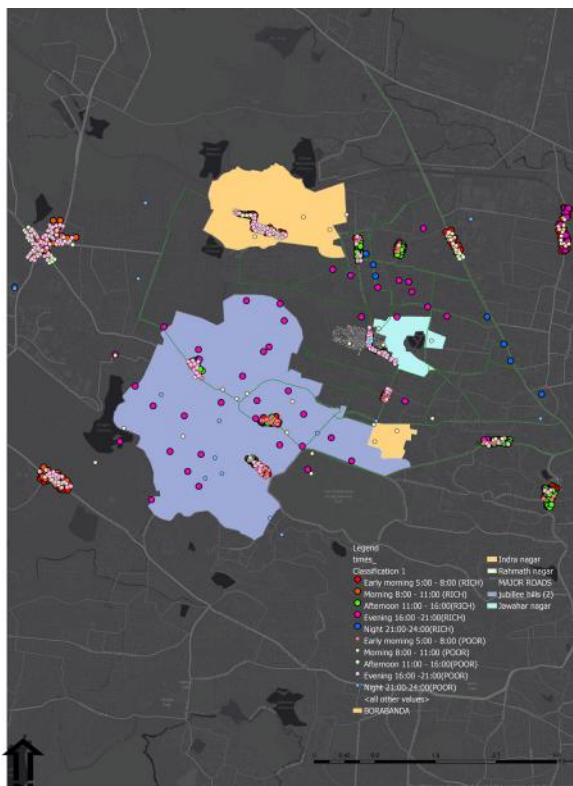
Map showing the traffic composition of encounters
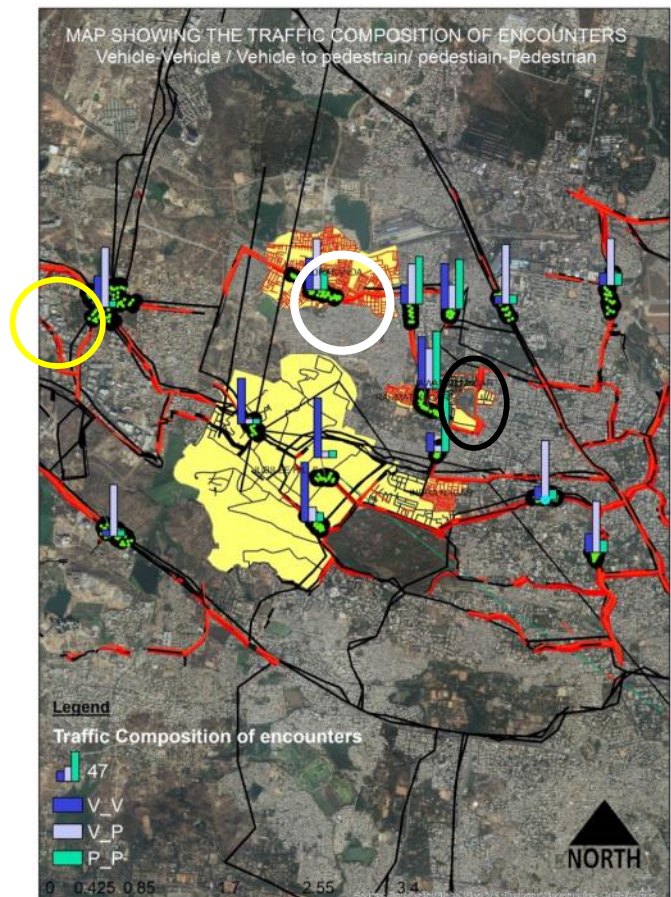
From the analysis of Time, Location and Frequency of encounters test , It was found that 3 major potential encountering locations are identified marked with circles Yellow , White and Black colors.

Traffic Composition at the the circle marked with yellow color

- o Vehicle to vehicle: 40%
- o Vehicle to Pedestrian: 90%
- o Pedestrian to Pedestrian:10 %

Traffic Composition at the the circle marked with white color

- o Vehicle to vehicle: 60%
- o Vehicle to Pedestrian: 80%
- o Pedestrian to Pedestrian:30%

Traffic Composition at the the circle marked with Black color

- o Vehicle to vehicle: 75%
- o Vehicle to Pedestrian:55%
- o Pedestrian to Pedestrian :80%

The maximum encounters are happening between VEHICLE TO PEDESTRIAN and least by PEDESTRIAN TO PEDESTRAIN.

SPACE TIME CUBE INTERRETATION OF ENCOUNTERS
BETWEEN WEALTHY AND POOR

Location of Encounters

Duration of encounters
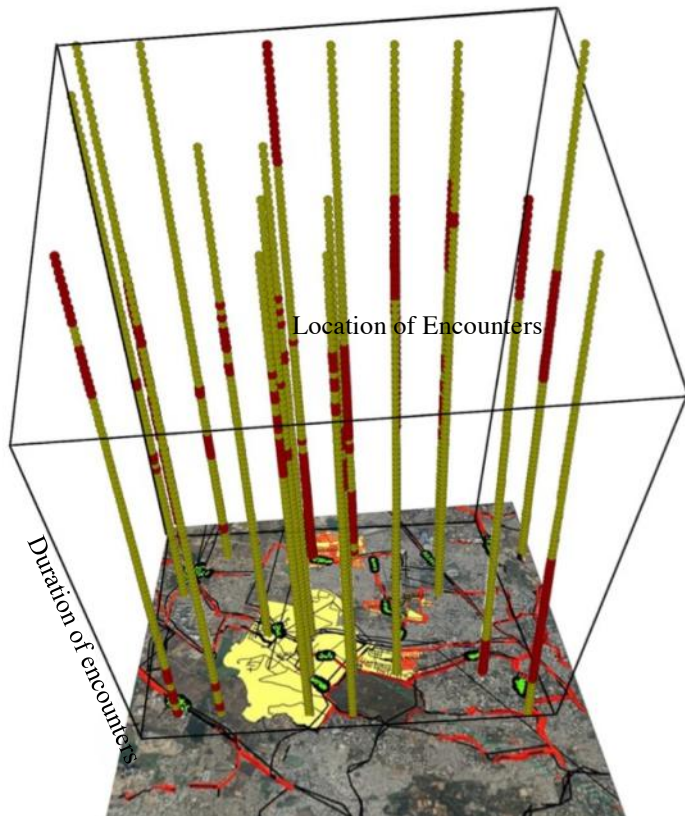
Day Without encounter

Day with Encounter

12. Findings:

1. Most of the encounters are happening at the road Traffic junctions.
2. From the Location of Encounters test , the location sharing of wealthy and poor residents are observed at the 14 location in and around the study areas.
3. From the frequency of encounters test , It was found that maximum number of encounters are taking place at 3 main locations Borabonda , Jawahar nagar and Hitech city road Junctions with in the radius of 1.5 to 2 kms
4. From the Duration of Encounters test , It was also observed that duration of encounters are occurring for about 1 Hr to 1 hr 40 min for month at 2 major locations of Borabonda and Hitech city road Junctions.

5. 70% of the encountering's are happening in the peak hours of morning 8AM to 11AM and evening 4pm to 9pm
6. The maximum encounters are happening between VEHICLE TO PEDESTRIAN and least by PEDESTRIAN TO PEDESTRAIN.

13. TYPES OF ENCOUNTERS OBSERVED
At public places like Railway stations and religious places

At the Physical Location of Accommodation

Jubilee hills ,Hyderabad , 2015 February

Begging at the traffic jams , Jubille hills signal

Begumpet signal, Hyderabad, At manual traffic signals ,70% of Encounters observed at traffic signals.

At public places like Railway stations and religious places

Secunderabad Railway station,Hyderabad

Birla mandir Temple Hyderabad

14. Expected encounters Example.

Columbia Medellin slum - Infrastructure as Change

o   Medellín is a hill side slum in Columbia .The slum, once shorthand for high crime rate, drugs and violence, huge segregation between rich and poor

o   But all these things changed when the architect Giancarlo Mazzanti's designed the Posh Library for rich people in the Centre of the slum and connected with gandola.

o   This attracted people and other formal services (education, banks, etc...) The crime rate has been fallen down, the people in slum started interacting with visitors to the library and establish there own employment opportunities

o   Now it is a thriving business hub, an up coming tourist destination.

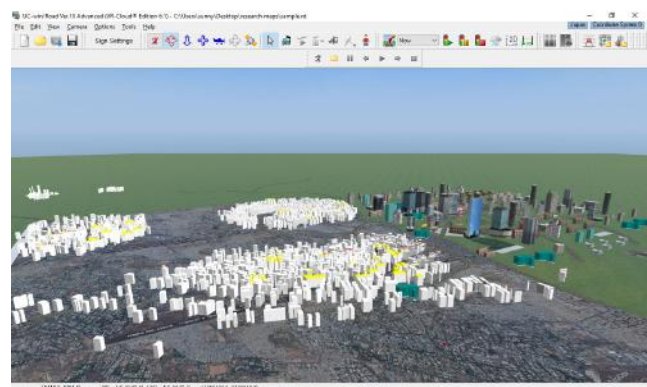## 15.Algorithmic Design Idea
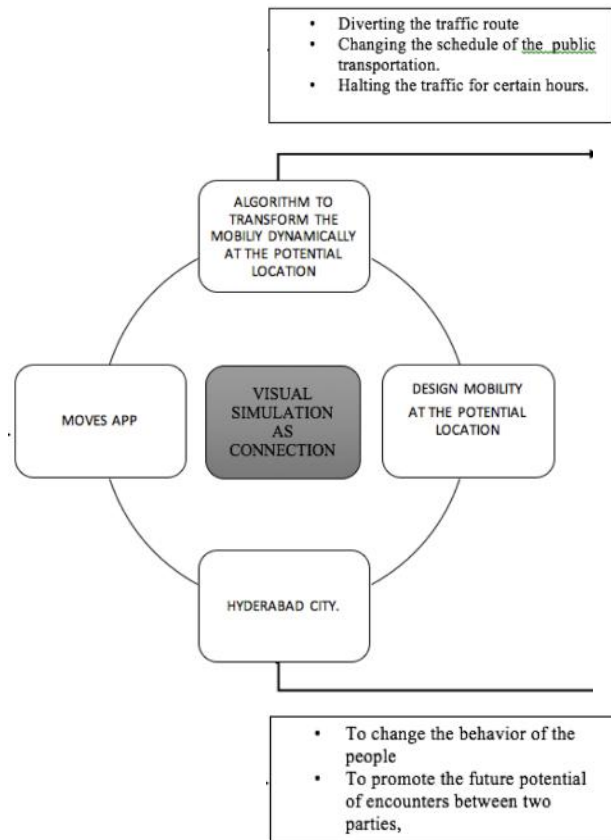
16.VIRTUAL SIMULATION OF ENCOUNTERS IN THE UC WIN ROAD SOFTWARE
Simulation Model Formulation

Simulation Model Formulation used as a platform to project the sample test of 20 human (10 wealthy + 10 poor)encounters in to the city scale of 1000s of people and vehicles using UCwinroad software.
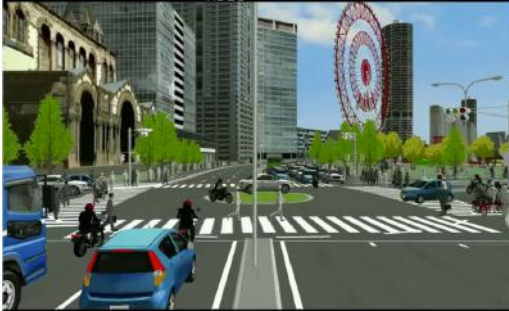
Paranomic view of the simulation model

Legend for the following model

Location 1 : Maximum encounters are found in terms of frequency and duration of encounters test

Location 2: Only encounters of wealthy people are observed in terms of frequency and duration of encounters test

Location 3: Only encounters of poor people are found interms of frequency and duration of encounters test

17.CONCLUSION

From the results of the Encounter test for about 3 months it was concluded that expected amount of Space sharing is happening between the wealthy and poor in their daily movements.

This research is proposing the Algorithm design idea to change the behavior of the people , to promote the future potential of encounters between two parties and also Contributing the Potential locations to built the smart infrastructure if public or private enterprise/Organizations interested to built in. Believing that this Smart infrastructure could promote economic interactions and exchanges between the rich and poor as in case of medellin slum.

This time, the real time sensing was only done for the 20 individuals (10 rich and 10 poor) and data is projected to the city scale in UC winroad ,but if I accessible to the more data , I can able to produce large amount of data at the city scale more precisely. This system will be good reference to the other futuristic smart cities in India which the issue social exclusion and slums.

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