

WOMEN'S SECURITY SURVEILLANCE SYSTEM USING WIRELESS SENSOR NETWORK

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Abstract : *The paranormal act of male violence over women is a global issue. Fear of violence is a significant factor in most of the women live. This is the factor which causes lack of participation of women in every subject of life. There are countless number of crimes done against women in this contemporary world these nuisance crimes are done at various stages of life (before birth, in adulthood, in old age). In our society testimony of a woman is always perceived to that in relation to man. World has just dumbly seen women subjected to discrimination, exploitation, degradation, aggression and humiliation. In each and every country particularly India a woman has a very significant role to play. In each and every ancient scripture women are looked upon as goddess, the mother, the creator and the one who civilizes the society. But these thoughts are just bound to the myths. The focus of the project is on development secured wristband based on the wireless sensor network technology. Testing the techno economic feasibility of manufacturing and sale of this product by a rural enterprise. By making use of GPS and phone's camera augmented Information can be displayed regarding location and direction arrows for navigation. When Smartphone camera points towards a specific location; Augmented Reality applications get the data on the internet to overlay it to the real image captured by the camera, to display the result on the phone screen.*

Keywords: *Wireless sensor networks (WSN), Women security, GPS, Augmented reality, Image Processing*

1. INTRODUCTION

Augmented Reality (AR) has rapidly become a global phenomenon by providing an interactive, flexible new way of visualizing the world. By superimposing physical views of the world

around you with up-to-date information, everybody from municipal authorities to business man and artists are finding new ways to engage with their customers and audiences. The context aware group communication system also includes location based services i.e. GPS to make application real time context or location aware and Google Maps to represent tracking paths and distance from current location of user. Also it collects individual women information and represents to user over smart phones camera via Mobile Augmented reality and provides a ticket to women for hanging out by knowing what's happening around in group via group communication system.

Augmented reality (AR) is a live, direct or indirect, view of a physical, real-world environment whose elements are *augmented* (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. Hardware components for augmented reality are: processor, display, sensors and input devices. Modern mobile computing devices like smartphones and tablet computers contain these elements which often include a camera and MEMS sensors such as accelerometer, GPS, and solid state compass, making them suitable AR platforms. Augmented reality is different from virtual reality. Virtual reality is actually what we see as virtual and we can only see virtual thing but in case of augmented reality we are seeing the real world. It just augments some virtual information on the top of the real world. So, it just give us the actual information but can't replace the real world we are experiencing.

2. RELATED WORK

Many future military operations are expected to occurring urban environments. These complex, 3D battlefields are extremely demanding and introduce many challenges to the dismounted warfighter. These include limited visibility, lack of familiarity with the environment, sniper threats, concealment of enemy

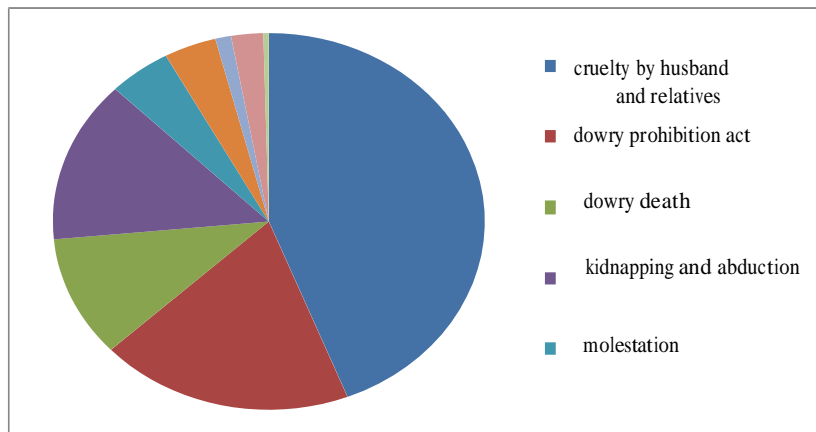


Fig 1: Different types of crimes

forces, ineffective communications, and a general problem of locating and identifying enemy and friendly forces. Better situational awareness is required for effective operation in the urban environment. The Battlefield Augmented Reality System (BARS) is a collaborative mobile augmented reality system designed to improve the situation awareness and the coordination between a team of mobile users. By situation awareness, we mean that each user obtains a better understanding of the environment. The types of data include the names of buildings, routes, objectives, and the locations of other users. While short-range radio communications can accomplish much of this, the passive and natural display paradigm of augmented reality (AR) makes distribution of this type of information important for mobile AR systems. In a survey carried in 2010 there were 22193 victims of rape out of which the cases reported in the country were 22172. Total victims of rape under 14 years of age were 1975 (8.9%), while teenage girls were 3570 (16.1%). 12749 (57.4%) women were in the age group of 18-30 years. The number of women in the age group of 30-50 years were 3763 (17.0%) while 136 (0.6%) were over 50 years of age. The data given above clearly indicates the sudden increase in crime rates from (8.2%) in 2006 to (9.6%) in 2010 in the past 5 years. This is a serious matter for the security and the safety of the women of India.

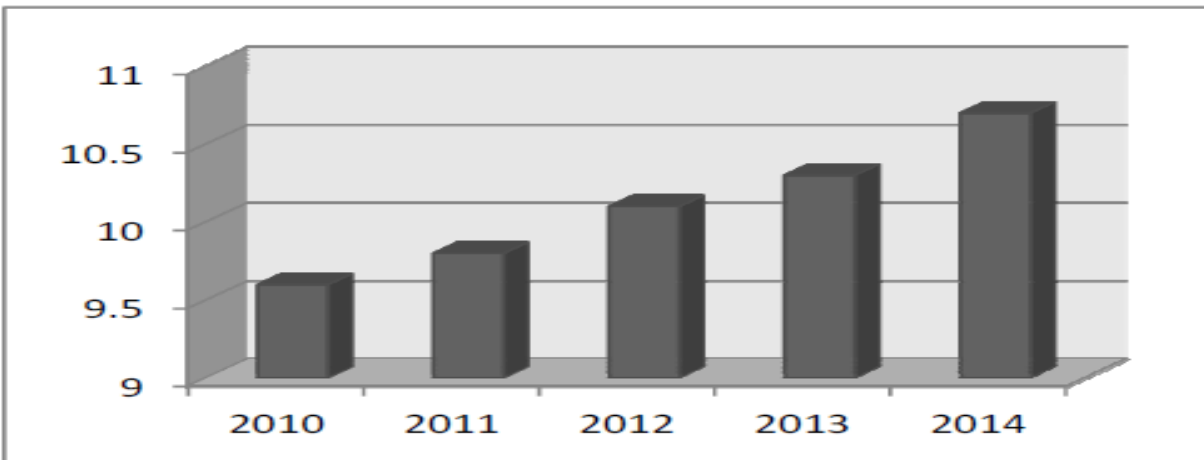


Fig 2 : Chart showing increase in crime rate

There are some of the bright ideas have been given but they are still remaining in the papers

28 th May 2009	Action be taken against stalkers of women like making them sign a bond pledging good behavior.
11 th June 2009	Patrolling by women constable /officers in slum and other congested areas should be intensified.
22 nd Oct 2009	Delhi Police commissioner should write to transport commissioner advising that antecedents of all drivers of public service vehicles must be verified by police. Drivers should also carry biometric photo ID.
22 nd Dec.2010	Constable should be posted at bus stops to instill a sense of security in women commuters.
28 th Oct 2011	All DTC bus stops in DU's North and South Campuses should be covered by police.

Table 1: Idea for women’s Security

3. PROPOSED SOLUTION

WSN are considered as the next hype of the 21st century. Business domain such as healthcare, Military, Traffic Control has strong interest in WSN. But still some technical issues such as data routing , processing , heterogeneity are facing lot of problem. Public security life cycle is given in the figure.

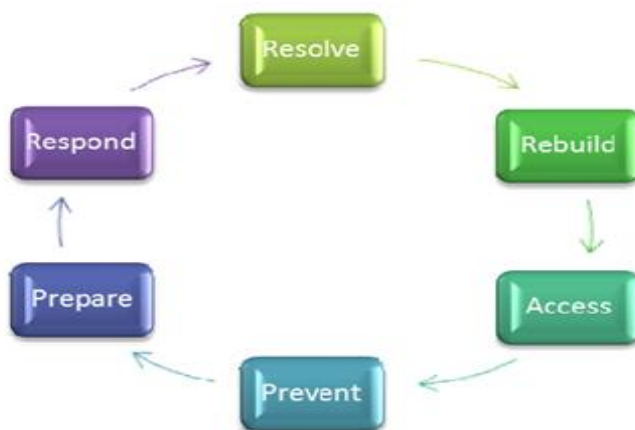


Fig 3: Public Security life cycle

The proposed solution can be positioned in the Prevent and Response phase. As early as possible prevention of any dangerous situation is handled in the prevent phase. WSN would support decision makers in early detection of catastrophic event. In the respond phase, the use of information given by sensors has major advantages. First it reduces the response time between incident detection and assignment of responder forces as such as Police, Ambulance in critical situation. Secondly parents or guardian may take decision in real time. To design and develop an interactive, real-time, context aware group communication system named based on "Mobile Augmented Reality" for individual use who is responsible to take care of each other including Parents, guardians, relatives, friends. This system collects real time geographic location, group member profile and binds them together via an interactive communication system on the top of Mobile Augmented Reality out of box in a single click. This system include a transparent mechanism to collect real time route navigation, milestones coming in the path, group member profile and represents each on the live camera preview overlay using an interactive technology so called "Mobile Augmented Reality". It also includes location based services i.e. GPS to make application real time context or location aware and Google Maps to represent tracking paths and distance from current location of user. This system is motivated by the intuition Traditional cycling services only provide off-line route information, cycling experiences, and sight views of bicycling paths for the biker grouping. Hence for developing a real time context aware system, it must not induce any extra cost in providing real time geographic location and user profile. Thus, there will be no external software components that collect geographic and user profile and makes system context aware and reduces extra cost. This system collects the running information from the very bottom on android service level, utilizing OS' Location manager, Google play services, Mobile Augmented Reality and network communication service routines as few as possible, bypassing the path which may provide extra cost on system.

- Development of sensor based wristband which sends alerts to parents.
- In the situation of crises recording can be explored and may be given to the Police.
- Surveillance provides a transparent mechanism for collecting current location and navigation on Google Map for reliable context awareness via Android System location provide framework, GPS, and Google play services.
- The chat system will enable group members to interact or communicate with each other and know what is happening in the group around.
- Mobile Augmented Reality technology provides a great help as transparent mile stone detector and group member's information provider as an out-of-box approach to the users.
- In context aware group communication system no user will be able to view the chat column of other user, such kind of privacy is maintained in the system.
- No user can make any changes on the profile of other user they can only view other user's

profile. This kind of facility is not provided to user, administrator consent is required.

- If a user wants to update any information about any entity or if user wants to make any changes about any entity then it will only be permitted if it has been verified by administrator. Without administrator's verification and assurance or permission no user can make modification about the information displayed about any entity.
- Only administrator has the authority to remove a user's profile if the user has quit the group or is not participating in the event due to some reason.

3.1 Context Awareness

Context awareness is a property of mobile device that is defined complementary to location awareness. Whereas location may determine how certain processes in a device operate, context may be applied more flexibly with mobile users, especially with users of smart phones.

A context-aware service is a computing technology which incorporates information about the current location of a mobile user to provide more relevant services to the user. An example of a context-aware service could be a real-time traffic update or even a live video feed of a planned route for a motor vehicle user. Context can refer to real-world characteristics, such as temperature, time or location. This information can be updated by the user (manually) or from communication with other devices and applications or sensors on the mobile device. LBS include services to identify a location of a person or object, such as discovering the nearest banking cash machine (a.k.a. ATM) or the whereabouts of a friend or employee. LBS include parcel tracking and vehicle tracking services. LBS can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location

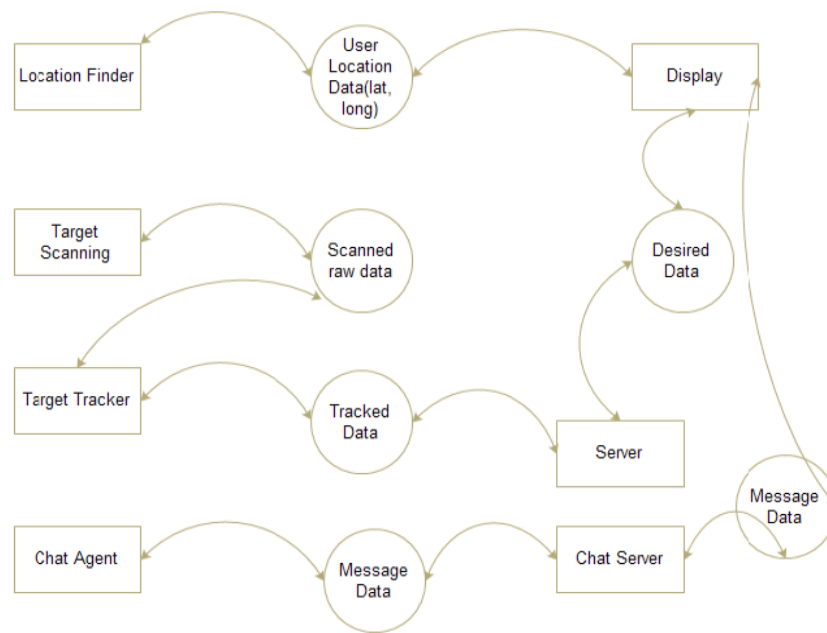


Fig 4 : Location Information detection

Exploiting Mobile Augmented Reality technology for better visualization of the things around is the trend in mobile application development. LBS are raising a new dimension with the help of AR. Mobile AR can augment the effectiveness of navigation devices. By making use of GPS and phone’s camera augmented Information can be displayed regarding location and direction arrows for navigation. When Smartphone camera points towards a specific location; Augmented Reality applications get the data on the internet to overlay it to the real image captured by the camera, to display the result on the phone screen. It also displays on automobile's windshield indicating destination directions and meter, weather, terrain, road conditions and traffic information as well as alerts to potential hazards in their path. Interactive chatting system provides a new dimensions to users to come closer in a group and know about each other’s without going in physical contact.

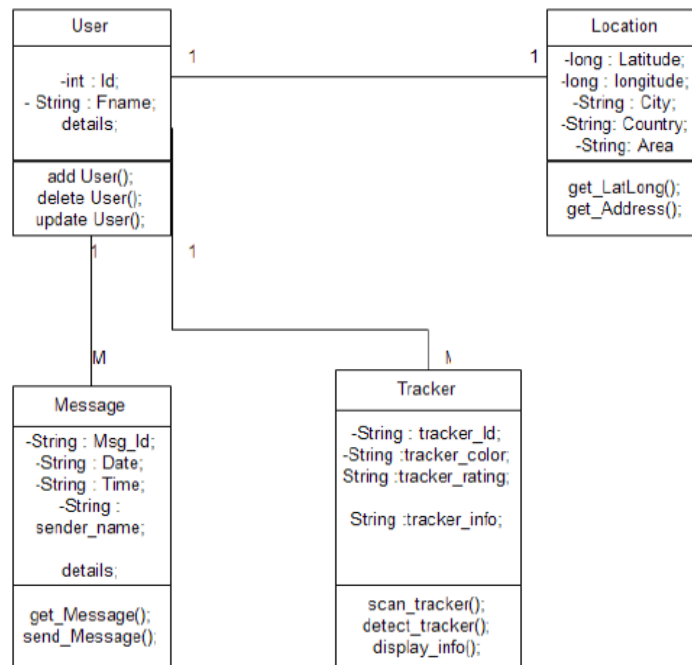


Fig 5: Class diagram

4. SYSTEM ARCHITECTURE

4.1 Mobile Augmented Reality

Augmented Reality (AR) is a technology that overlays a computer-generated virtual data on a user's view of the real world and provides a composite view of both real world and generated virtual data, so called augmented data. It allows the real time blending of augmented digital information on the real world scene viewed by user. Augmented reality is different from virtual reality that provides a user a complete virtual world and user cannot see the real world while in augmented reality virtual objects are overlays upon physical world hence creating a composite scene. Augmented Reality is a supplement of virtual reality that aims to duplicates the real world environment in real time by computer-generated augmented data such as sound, video, graphics or GPS data. An augmented reality system generates a composite view that is the combination of the real scene viewed by the User and a virtual view generated by the computer that augments the scene with additional virtual digital information. The goal of Augmented Reality is to create a system in which the user cannot tell the difference between the real world and the virtual augmentations of it. Augmented Reality allows the user to access information directly relevant to their context of use, overlaying layers of digital information to the physical space while at the same time allowing the interaction with those digital elements as if they actually belonged to the real scene.

4.2 Location Based Services and Google Map Navigation

Location based services are elevating new dimension with the help of Google Map Navigation technology. It will be a pioneering approach bringing these two technologies together and create a new momentum and seamless experience that can be incorporated in various mobile location tracking activities and campaigns, named Location Based Tracking experience via fully interactive Google Map discovery experience. AR and LBS on mobile phones create a significant new opportunity for both advertisers and brands through Ad displaying and hosting respectively. Marketers are able to combine the visual impact of **Augmented Reality** and **location based services** to deliver any type of promotional virtual information. So in the field of Location Based Services the limits of Mobile Augmented Reality will be endless with a tremendously exciting potential for exponential growth.

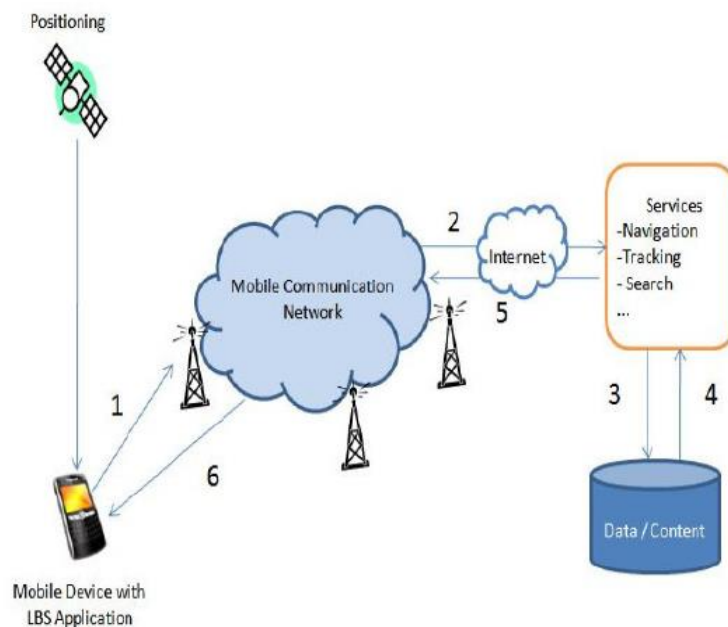


Fig 6: System Architecture

4.3 Database

For the working of the developed application databases are required for carrying out the chat services, for storing the trackable (images), and the information about the users. For maintaining such a database, a dedicated server is required with business logics to interact with the client side application. Due to the lack

of resources no such dedicated serve has been established, instead servers offering free backend support for research work applications are used. Following are the servers used for maintaining the databases.

4.4 Vuforia AR Server

We are using the server space provided by Vuforia Corporation for storing the trackable images, and the metadata associated with the images for the retrieval of the member info. For tracking purpose the information of image rendered is sent to the server and it is matched with the images stored on the server. If the server finds any image matching with the information sent, it send the associated metadata to the client side application. We are storing the member's vehicle no. as the metadata. It is further used to retrieve the member info or the info about the image tracked.

4.5 Kinvey Backend Server

We are using the server of kinvey.com for storing the information corresponding to the members, building, milestones and the landmarks. Kinvey.com provides free space up to a limit for storing text information and images. It also gives the flexibility to have business logics for retrieving, modifying and updating the database after the authentication process. This gives security to the database. The user IDs and their passwords are also stored on this server which is required to at the startup of the application for the login purpose.

4.6 Quick Blox Chat Server

Quickblox.com provides services to store the user ids and passwords of the registered members. It also provides services to establish chat rooms for the messaging between a group of people or only between two registered users. Quick Blox also stores the chat history of the conversations. Which is updated to the application's chat room when the next time it is started? The only limitation with the chat service of this application is that, it can only transfer the messages at the rate of 20 messages/second. This is because for free service this limit has been set by the server. It can even be increased if a paid service is used at the server. This charge has to be beard by the management who looking after the maintenance of the application's services and not by the users.

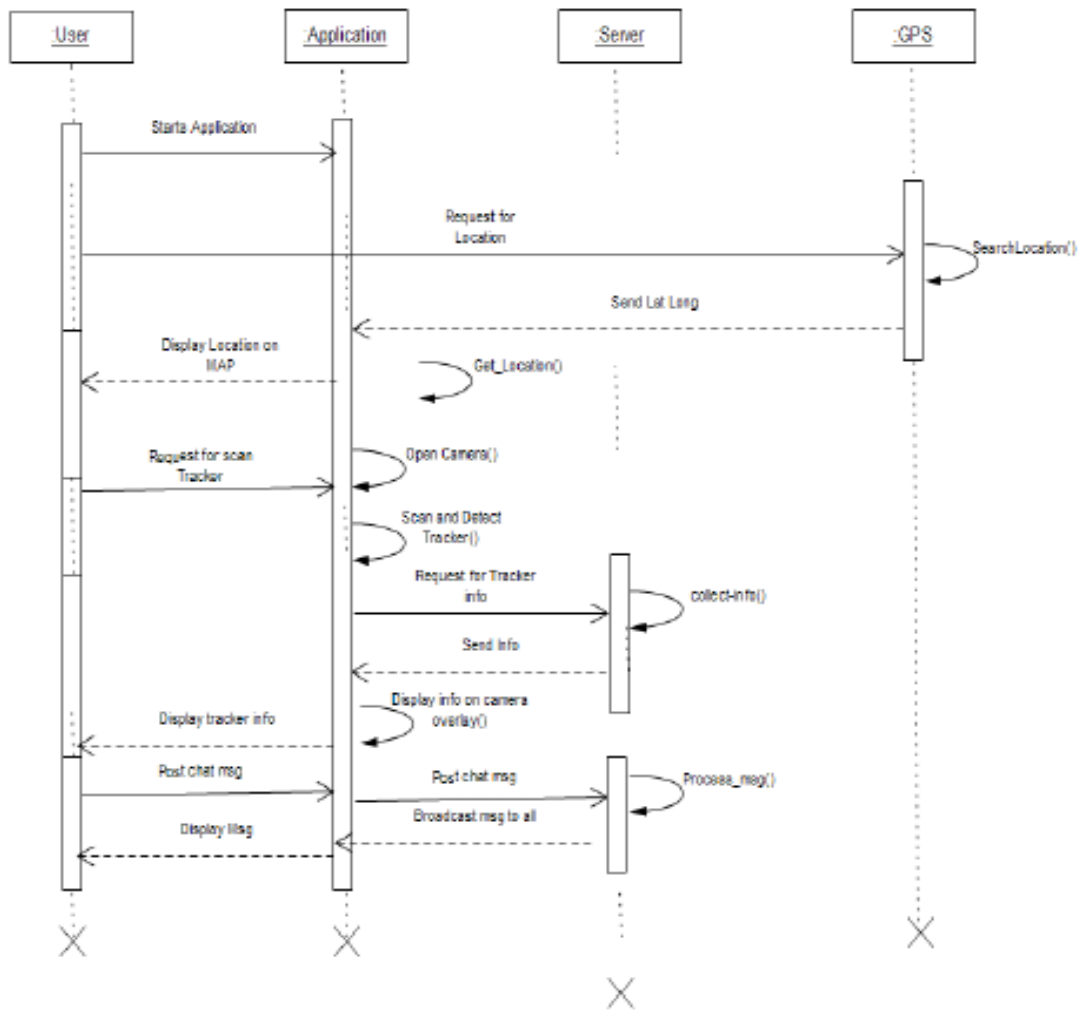


Fig 7: Sequence diagram

5. MATHEMATICAL MODEL

We model a program’s execution at the system service level. Since a framework level service can access System core services directly, we consider a system state as the collection of the contents of core system services. Let M be the set of all possible services and C be the set of all core frameworks. We use I to denote all possible services.

We define a service access function

$$\delta_E : I \times M \times C \rightarrow I \times M \times C$$

to formally represent the semantics of executing a service.

Proposed system is composed of following modules which briefly define the overall system:

- [1] GPS Module,
- [2] Google Map Module,
- [3] Connection Module
- [4] Augmented Reality Module,
- [5] Chatting Module.

5.1 Transparent Information Gathering

Assume E is a runtime environment, and A is E with other application or user P_A running. P_A is transparent if for any other user or application P containing any collection logic d_P ,

$$d_P(A) = d_P(E) = 0$$

That is, at the point of detection k,

$$\delta_{E,ip}(i_k, m_k, c_k) = (i'_{k+1}, m'_{k+1}, c'_{k+1}) \text{ if } d_P(E) = 1,$$

i.e., P collects i'_{k+1} instead of the information collected i_{k+1} that would have executed without the presence of other application. Ultimately, the goal of a transparent information provider isto extract the same amount of information from system as if the other application is not present. Thus, we have the following information collection theorem, which inherently guarantees the above definition of transparency:

Theorem: If E is a runtime environment and A is the same environment with the addition of a third party application P_A , then P_A is transparent if and only if $T(P,E) = T(P,A)$ for any other application program $P = (I_P, D_P)$.

5.2 Business Logic

5.2.1 For Login

At the startup the application asks for the username and the password allotted to the user for entering the home screen of the application through which all the services are obtained and controlled. The matching the username and password the application interacts with the server where they are stored. User can only enter to the home screen after the authentication process.

5.2.2 For Information Retrieval

A user can retrieve the information of any other user only when his or her information is also there in the same database maintained for that particular event. Any user from a different event cannot have the information of a user from other event.

5.3.3 For Updating Or Changing

Any user can update or change his information in the database. But it can read information of other. For this purpose before any modification the server matches the member id (which has been kept as the primary key), and do care it only changes the information related to that member id. This gives the data protection.

5.4.4 For Chat Services

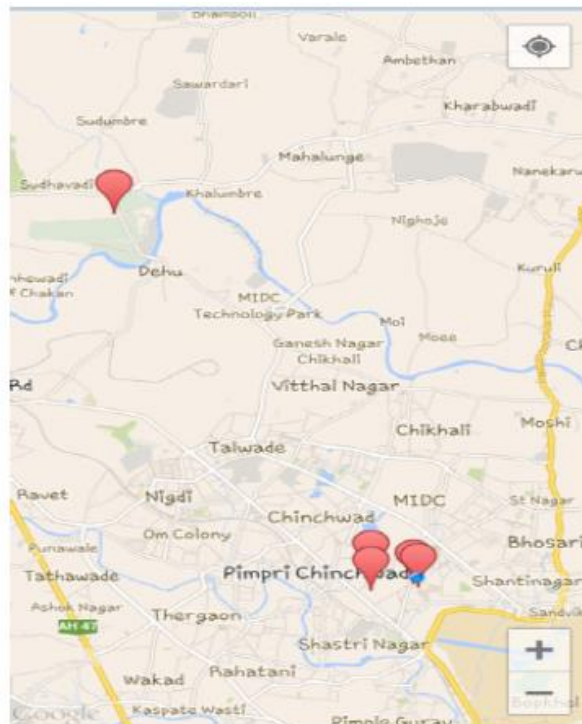
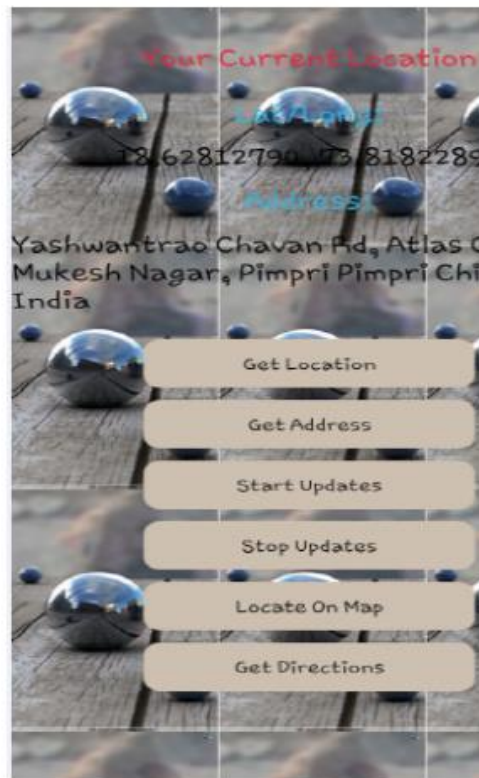
Before starting the chat services the application once again asks for the username and the password for registered user or to register in not registered. This username can be different from the username asked at the startup. As we are using a separate server for the chat services, this two time authentication process is used.

6. RESULTS

- Login screen for user



- Current location



7. CONCLUSION

Security System provides a transparent mechanism for collecting current location and navigation on Google Map for reliable context awareness via Android System location provide framework, GPS, and Google play services. The chat system will enable group

members to interact or communicate with each other and know what is happening in the group around and to take care of each other. Augmented reality is a very young technology; we have just seen the inception of it. The possibilities are immense. Augmented Reality brings a new dimension to the mobile. Experience not only for personal use, but for professional use as well. AR is a technology that is building tomorrow's enterprise in mobile marketing industry. The implications are massive and it can prove to be one of the most important and emerging technologies in the next few decades. Future of Augmented Reality is very bright. It has been around for years, and continues to grow rapidly. Augmented Reality brings revolution in technology. Now we have left the Information Age and entered in the Shift Age, a period in human history where change has become the new prototype of life. Looking towards the technological revolution it is clear that augmented reality will be one of the major new technologies of this Age. According to scientists 2018 will be the year of Augmented Reality. Researchers are delivering the technology that will take to build the Augmented City and bring AR to every Smartphone.

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