

## An Android Overlay Based Safety System For Children

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**Abstract:** The crime rate against children has been exponentially increasing over the last few years. Despite the fact that numerous techniques have been deployed to assuage this, the prevailing technologies are found to be ineffective. This paper proposes an idea that enables us to monitor and track children about their whereabouts using overlay concept through mobile based application. Using Geocoding, we can determine the users who are within the defined location. This application will notify parents via NotificationManager whenever their children are not present in the registered safe proximity. The safe proximity and unsafe proximity can be added manually by the user through this application. In case of crisis, the child can communicate with emergency contacts through an inbuilt chat box. Thus, ensuring the parents to track the safety of the child's environment.

**Keywords**—child safety, overlay, Android

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### I. INTRODUCTION

Security of a child is a day to day concern of a parent. Keeping the child safe all the time is the biggest worry and responsibility of a parent. We worry about them when they are at school, playground, basically when they are out of our sights. Keeping the security concern in our mind, one should not coddle their child, refraining from exploring their environment independently. In the digital age, we have accepted major advancement in technology as part of our everyday activities. In a lot of cases, this has led to completely different approaches in how we deal with certain things such as parenting. The advancement in technologies has provided solution to lot of issues prevailing in the society. This paper analysis the utilization of technology for the security concern of people. This paper proposes a location based service application which allow the parents to monitor their child's location throughout and determine the safe proximities and unsafe proximities.

The Location Based Services typically provides information about the device's geographical location. The spatial patterns that location-related data and services can provide is one of its most powerful and useful aspect. Location Based Service includes parcel tracking and vehicle navigating services.

This paper primary function is to ensure the safety of the child until the child is reunited with the parents. This reduces risk and brings help when in need of assistance. When the child is out of the registered safe proximity or in unsafe proximity, the parents are notified through Alarming notification about the child's current coordinates therefore providing a secured communication link between them.

### II. LITERATURE SURVEY

The modernisation and advancement in technology has provided a lot of scope to improve safety and to be circumspect. A lot of ideas and paradigms are being proposed to facilitate safety of the child using location based services. The disadvantage of other ideas[5] is that it delivers the coordinates of the child only on request through SMS. Moreover, the registered parent user needs to remember the keyword phrase for the request message.

The drawback of the SCIWARS [2] (Application Proposed As All in One Intelligent System) Application is that it Provides SOS service only through the action of user and the user may not be able to access the application in case of crisis.

Certain proposed methodologies [3] augment exorbitant sensors and nanotechnologies at jewellerys or wearables to monitor the kids making it less affordable. These sensors augmented to jewellerys or wearable, on detection of crying noise, alert the parent through SMS. Sometimes the sensor sets false alarm when the child is in crowded place, creating an unnecessary panic.

Secure child tracking android application [1] focusses only on the parameter of safety between the school and house, and does not take into the consideration for the safety of the child in other frequent places that the child visits.

Our idea uses network location and we register the LocationListener with the LocationManager to receive high accuracy location updates without compromising on the battery life unlike GPS (used in other methodologies), which is a very slow data channel that is used to triangulate your position in 3D space, consuming a lot of power thereby decreasing the Battery Life.

**Table No 1 :Critical analysis**

S.NO	Features of the other ideas	Vulnerabilities
1	Sends the coordinates of child on request through SMS.	Parents needs to remember the keyword for every time a request needs to be sent
2	Augments noise sensor to detect the cry of the child	Costly and creates false alarm when the victim is on a crowded place
3	Uses GPS	Reduces the battery life drastically
4	Shaking the phone of the child to alert the parent user	The threshold of the shaking may not be recognized by the user .

### III. PROPOSED MODEL

Tracking one’s family member’s smartphone is done using their network location. In case of travelling, the additional check-in feature, enables other connected members of the family to be notified on the current location as updated, so that they can know whether the person has reached their destination safely. One can also communicate using the in-built chatbox feature of the app for free, provided that both the parties have a working internet connection.

Members of the family can specify “safe zones” – the locations that are covered by the person on a daily basis. The app drops in alerts whenever the person being tracked moves out of the places specified as safe. One can always view the all the locations tracked till the given time through the Location History. The following features are also feasible: 1) View current location 2) Periodic location alerts 3) Alerts when the person is not in any of the specified safe zones 4) Chat with the person being tracked 5) Contact during emergency

It is necessary for the users to create an account. The users need to select the contacts whom they wish to monitor, using Contacts API or Broadcast Receivers. An automated verification message is sent to the contacts chosen, to ensure that authentic registered users alone monitor and track the chosen contact. After the authentication is approved by the person who is to be tracked by the user, the users gain access to that person’s location. The app user can now view a map which shows the user’s current location as well as the monitored person’s current location. The App will be running at the background irrespective of whether the app is closed or when the smartphone is locked. The user can obtain details of the vicinity, AdminArea, subAdminArea, locality, subLocality of the person being monitored, along with the Latitude and longitude.

When the user taps the marker, they get the details of the Name, Current Location, last location checked in and also, the location history of the person being monitored. The user can add “safe zones” and “unsafe zones” either by typing the locality or by placing a marker on the map. In the map, the safe zones are green in colour while the unsafe zones are red. An overlay is added to the map with the information collected from the user. The users are notified if: 1) There is a change in the tracked person's position 2) The tracked person moves out of a safe zone 3) The tracked person enters an unsafe zone

At any of these occasions, the user can send messages and get in touch with the tracked person using the built-in chat box, provided both the ends have a working internet connection. Emergency contacts can be set up by the user and these contacts can be notified in case of any emergency or if the person enters an unsafe region.

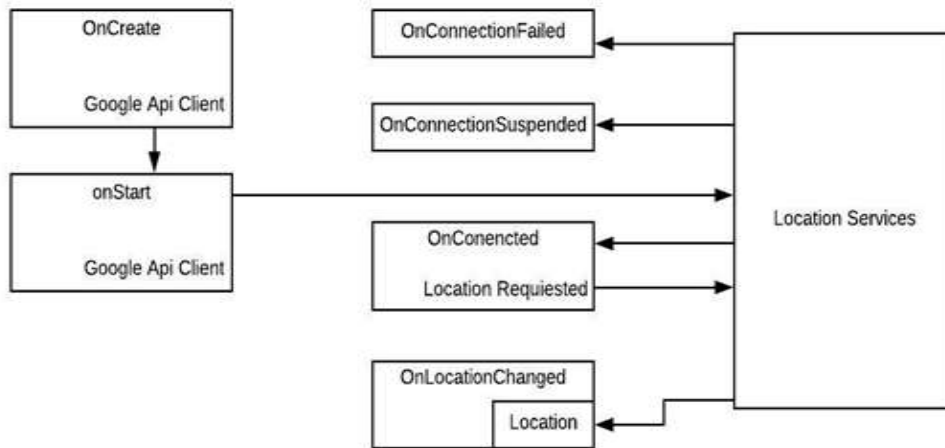


Fig. 1 :Location Based Services Working

#### IV. FEATURES

##### A.Register/Login

1)The first screen of the application is the Login Screen through which the already registered parent users can log in to their account. New users can register for a new account through sign-up process.Their Google Sign-In Credentials can also be used to create an account. Google Authentication is used for verification purpose.

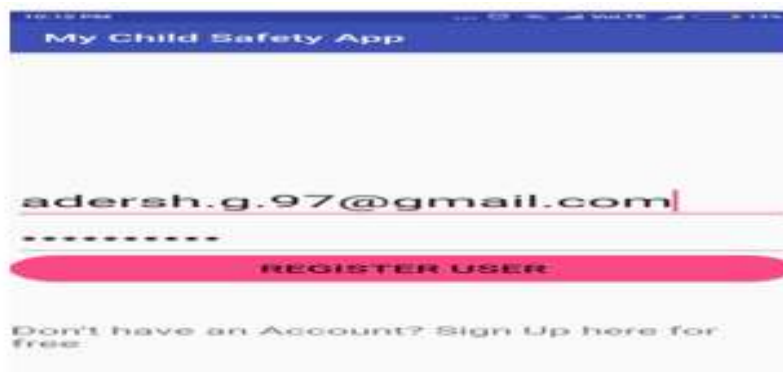


Fig. 2.: Login Page of the application

##### B.Adding child users

The child number who needs to be monitored must have the app and should be registered in this app in order to see their current location and the places they visit. They can be added by entering the number in the field or by adding through contacts. Contacts API is used for this purpose.

One Time Password(OTP) is generated and is sent to the child's number in order to provide a secure communication between them. This form of validation is very safe and secure and ensures the authenticity of the users. The location is updated every second and the location updates are obtained with this request. High Accuracy returns us the best and the most accurate results.



Fig. 3: Registering a child user on the application

### C. Markers and Marker Options

Using the MarkerOptions Class, a Customized marker is plotted in our current Location and the vicinity, latitude,longitude,AdminArea, subAdminArea are added as the snippet to the Marker Info Window. These currentLocation Details are uploaded to FireBase. Parents get the marker, location details of their wards using UID(user-ID) from the FireBase Database. On clicking the marker info, the details of latitude, longitude, vicinity, admin and subAdmin Area of their wards are obtained.

### D. Adding safe/unsafe places

The Parents Are allowed to mark safe vicinity and unsafe vicinity using marker on the map . the safe proximity is defined as the regions where the child visits on a daily basis. These regions include School , Playground , subsidiary classes etc. The unsafe proximity is defined as the region which are hazardous and are likely to constitute a miscarriage of justice . The safe region are marked green in colour (Fig. 4 ) and unsafe regions are marked red in colour (Fig 5.) . For a parent with more that one child user , disparte Child users can be identified using the Unique ID or UID deployed to every user on registration . The safe and unsafe proximities are plotted using GeoLocate and GeoCoding .

The overlay can also be customized by connecting different users who are inside the same proximity by using a line or an inner Polygon Overlay can be used to connect them. Based on our requirements, the app can be customized and child users can view the current location, location updates of other child users and also notify them if their fellow child users move out of the proximity.

The lat-lng end points of the created overlay are stored. If the marker Object of their ward moves away from the colored region and if the change in their lat-lng is not inside the proximity, it means that they aren't inside the safe overlay region. In such scenarios, parents receive a notification using Pending Intent and Notification Manager and they can contact their wards immediately.

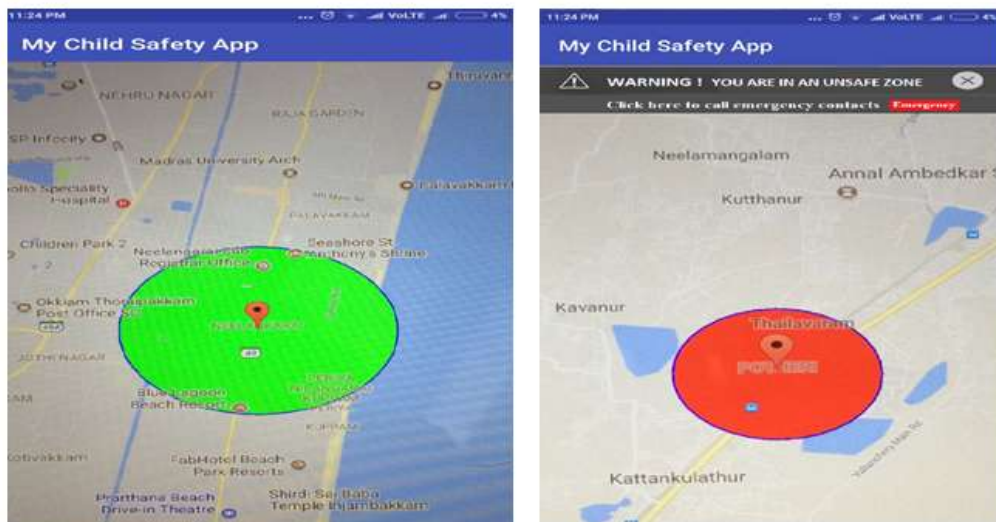
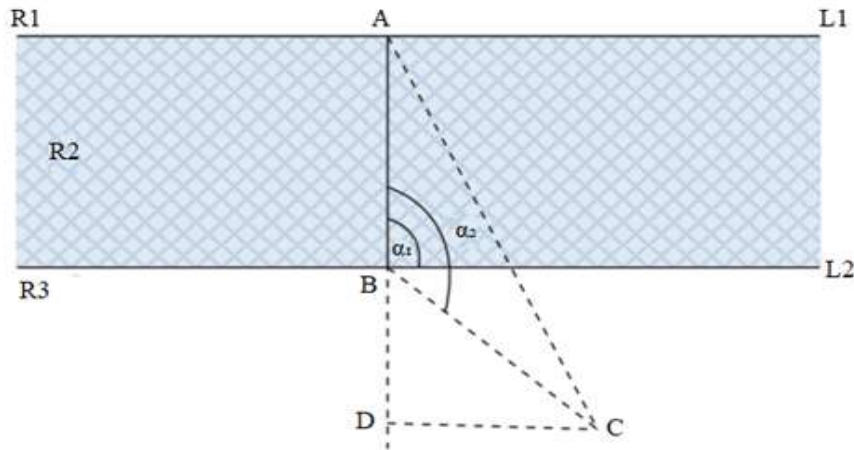


Fig. 4 : Safe and unsafe vicinity marker in the map

The App Doesnot provide any alarm or notification if the child is in the unsafe region but with parents . Consider that the child is in a unsafe region and his/her parents are around them , then in that case the child is not considered to be in any kind of danger or threat . For This purpose , The distance between the parent node and child node is calculated (Fig. 5) and the child is considered to be safe until the distance between then exceeds a certainly threshold value , say 10 Meter .



**Fig. 5: The Least Distance from a point line C to a line segment AB is CD. If C Lies Inside R2, Then the minimum point distance is Not CD but the perpendicular line from AB reaching the C. This can be found using the heron’s formula.**

When the child is present inside unsafe region and is distant from the parents , then the parents will be notified with location details of their child user .

**E. Child Profile**

The profile of the child can be viewed by clicking their names on the user dropdown. When the name of the child profile is selected, the current location, latitude,longitude of the child and also if the place where he/she is in is a safe place can be viewed by the parent. In addition to it , the recent place the child has visited and the time at which the child was present at the place can also be inferred for reference purpose .



**Fig. 6: Location Based Services Working**

They have the features of calling and contacting them. They can then view the profile in the map in which Markers, MarkerOptions are used to plot them.

**F. MCSA Chat**

a)When a parent user is required to contact the child user in times of emergency, No subsidiary Applications are required .With an internet connection, their wards can be contacted anytime through this feature and they can share their current location with them.





Fig 7: Inbuilt My child safety Chatbox

Firestore is used for this purpose and every parent can chat with their child using the unique UID which they have thereby saving them time..

### I. Feasibility

The feasibility of the proposed idea is to gain an insight on pragmatic implementation and to sustain its viability ensuring that the project is legally and technically feasible as well as economically justifiable. It is recommended to conduct feasibility study before the practical implementation of the proposal.

### A. Economic expedience

This Proposal reduces the expenditure spent on wearable devices and sensors. Moreover, the technological requisites of the proposal are already owned or available at very low cost ensuring its economic feasibility.

### B. Operational expedience

The user interface of the application is user friendly, requires no pre-requisite knowledge to operate, providing a hazard free environment ensuring its operational feasibility.

## V. FUTURE SCOPE

With the advancement of technology and increasing adaptation of location-based services in different and multiple sectors, they become a common thing for businesses of different sizes, shapes and priorities and it's no longer a luxury. With rapid proliferation of location technology, the prices of GPS enabled location trackers have come down and became now within affordable reach of small businesses and the individual professionals.

Today, as smart and connected cities are continuing to become a reality in many parts of the globe, advanced location tracking with sophisticated GPS technology is very likely to become commonplace. Accurate and efficient results are produced in a short span. If these are installed as devices in vehicles, we can get automated info about speed, trip, zone crossings and also to track and assist children. We can also use the GSM module to send the SMS to the parents about details as how much time the school bus will reach at their bus stop and also real time vehicle tracking can be done for the students

## VI. CONCLUSION

With the advancement of technology and increasing adaptation of location-based services in different and multiple sectors, they become a common thing for businesses of different sizes, shapes and priorities and it's no longer a luxury. With rapid proliferation of location technology, the prices of GPS enabled location trackers have come down and became now within affordable reach of small businesses and the individual professionals.

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