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Smart Safety Solution for Travelling Womens

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ABSTRACT –

With the rapid growth of technology, usage of smartphones has become higher among people for various purposes like marketing, business, social media, surfing, etc. This has also increased the threat for information sharing across various sites which is one of the major reasons for harassment cases and other security threats against women. Surveys reveal that, smartphone usage by women has risen upto 5 folds in the last 6 years which is an average increase by 27% per annum. The increase in usage means that, there are high chances for misuse of information which results in security threats for women. This paper aims to create awareness of smartphone usage among women to efficiently handle it by avoiding physical assaults and harassments against women. The project focuses to provide an GPS dependent, android based safety application exclusively designed for women who travel farther distances on daily basis.

Key Words: Mobile Computing, Dijkstra's shortest path algorithm, Breadth First Search (BFS), Shortest Path Tree (SPT), Global Positioning System (GPS) and android

1. INTRODUCTION

This project aims to create security awareness among women who travel a long distance daily. It facilitates self-protection among women during any critical situation by usage of smart phone with a GPS system. The application does not only provide safety actions but also focusses on alerting the police officials on time to arrive at the location and act on the critical situation. Usage of smartphones has rapidly increased among people across various domains like business, finance, marketing, and personal uses like texting, emailing, social media access, information searches, etc.

Sunita Patil[9], Nowadays, physical harassment is the one of the most common and frequently happening offenses against girls and women (all the kind of women) in India. It is also revealed that in 98% physical harassment cases, the culprit is someone close to the victim like neighbor or relative, where bureaucrats cannot do much to control as it is not possible to keep watch on each house every time.

Arooj [7], Srinivas[8] et al., High usage of smartphones has also increased the threat for information sharing across various sites which is one of the major reasons for harassment cases and other security threats against women. Surveys reveal that, smartphone usage by women has risen upto 5 folds in the last 6 years which is an average increase by 27% per annum. The increase in usage means that, there are high chances for misuse of information which results in security threats for women. This paper aims to create awareness of smartphone usage among women to efficiently handle it by avoiding physical assaults and harassments against women. The project focuses to provide an GPS dependent, android based safety application exclusively designed for women who travel farther distances on daily basis.

R. R. Khandoker[5], In continuously upgrading world, women belief in their self-worth. They have the same participation as men in almost every sector of life. But lives of women have become so vulnerable these days. Security of their lives is one of the burning questions.

The proposed system aims to focus on creating awareness and efficient usage of smartphones among travelling women with help of a safety application considering the traffic and transportation scenarios of metropolitan cities like Chennai, Bengaluru, Mumbai, Kolkata, and Delhi. The application focuses to be cost effective as it just uses the GPS system that is available in all basic models of smartphones so that it can fit into the needs of a common working women without investing on costly gadgets. With help of this application, travelling women can schedule her travel and alert the police department about it inorder to ensure safety.

2. Problem Definition

With a rapid increase in smartphone usage among women across the world, it is equally important to ensure safety of travelling women who commute from one place to another on a daily basis on account of work and business needs. Hence, a mobile based safety application has been proposed to ensure safety of travelling women.

3. RESEARCH METHODOLOGY AND RELATED WORK

Noraziahtulhidayu kamarudin[3], Late attention by officers in charge to high volumes of crimes and emergency cases can lead to an increase of unsolved cases nationwide. In this paper, we propose the use of Pull & Push Location Based Service model in experiments of the implementation of Location Based Service environment to lessen the problems faced by Police and Fire Fighters in retrieving accurate information while patrolling high risk area. The time taken and the accuracy of information are problems normally faced by Police and Fire Fighters in Emergency Case department. It is crucial for them to get the right information at the right time to their walkie talkie or mobile phones. We first proposed the usage of RSS as the web services to provide feeds for the smart phone application. Updates on crimes or emergency cases within the users' locations are sent upon users' retrieval or push based on the users' locations. The application is developed by using Eclipse IDE platform and tested using HTC Magic with Android OS. The application flow starts by retrieving the location position and information on emergency cases will then be displayed according to date listed. The conceptual design and architecture are designed for Pull and Push Location Based Services.

R. Pavithra[4], proposed an application that can be utilized to discover and help women in crisis circumstance. It demonstrates the correct area where the individual is found and send the point of interest through Short Message Service (SMS) to her relatives, guardian, and friends.

Priya Choudhari[6], discussed about Today's women who are empowered, and are independent too. But still, they are concerned about their safety against the violence and the harassment as they to travel late night through unknown areas. Women should be provided with some helping hand to relieve them in the risky situations. As there is a tremendous increase in several Android users, an android phone can be used to protect the women in risky situation. The user can send calls/messages to the police and the listed contact number using this app in case of emergency. The message contains details about the current location of the user. If the user wants to share his experience about the place, he can post his reviews through this app.

Multiple algorithms are studied and compared across various categories like their runtime, space occupied, their benefits and pitfalls as in below Table 3.1., to identify the best solution for implementing the proposed system.

Table. 3.1 Comparison of Shortest Path Algorithms:

Algorithm	Bellman- Ford Algorithm	Floyd-Warshall Algorithm	Dijkstra's Algorithm
Definition	It is a single-source shortest path algorithm works with negative edge graphs.	It is all-pairs shortest path algorithm.	It is a single-source shortest or algorithm.
Notation	$v[i].distance \leq v[i-1 \text{ (mod } k)].distance + v[i-1 \text{ (mod } k)].weight$	$distance[i][j] = \min(distance[i][j], distance[i][k] + distance[k][j])$	$dist[u] = dist[v] + Graph.Edges[v,u].dist[u]$
Time Complexity	$O(V.E)$	$O(V^3)$	$O(E \log V)$
Space Complexity	$O(E)$	$O(V^2)$	$O(E)$
Runtime	$O(V . E)O(V . E)$	$O(V ^3) O(V ^3)$	$O(V ^2)O(V ^2)$
Advantages	Supports negative edged graphs and is optimal.	Uses dynamic programming approach.	Uses BFS Search which improves runtime and easy to compute.
Disadvantages	Quality of obtaining shortest path is less. Slower due to changing topology.	Has static weight for each node. No path updates during flow and has complex computation.	It is not used in distributed systems.

4. IMPLEMENTATION

4.1 Techniques Used

This paper focusses on the usage of Java language model and android programming with Dijkstra's algorithm to implement the women's safety application. As women travel long distances on account of routine work needs, safety measures need to be taken care and concerned government officials needs to immediately be notified in case of emergency situations.

Dijkstra's Shortest path algorithm:

Dijkstra's is used to calculate the shortest path from single source node to all other nodes.

Steps:

- 1) Create a SPTset(shortest path tree set) that Keep track of node included in shortest path tree.

- 2) Assign a distance value to all nodes in the Network. Initialize all distance values as INFINITE. Assign distance value as 0 for the source node.
- 3) While SPT set doesn't include all vertices
 - a) Pick a vertex u which is not there in sptset and has a minimum distance value.
 - b) Include u to SPT set.
 - c) Update distance value of all adjacent vertices of u . to update the distance value, iterate through all adjacent vertices. For every adjacent vertex v , if sum of distance value of u and weight of edge $u-v$ less than the distance value of v , then update the distance value of v .

4.2 Application Design

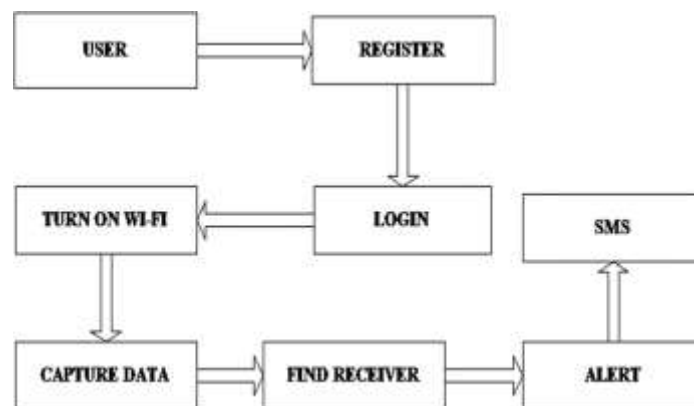


Fig -4.1: Architecture Diagram

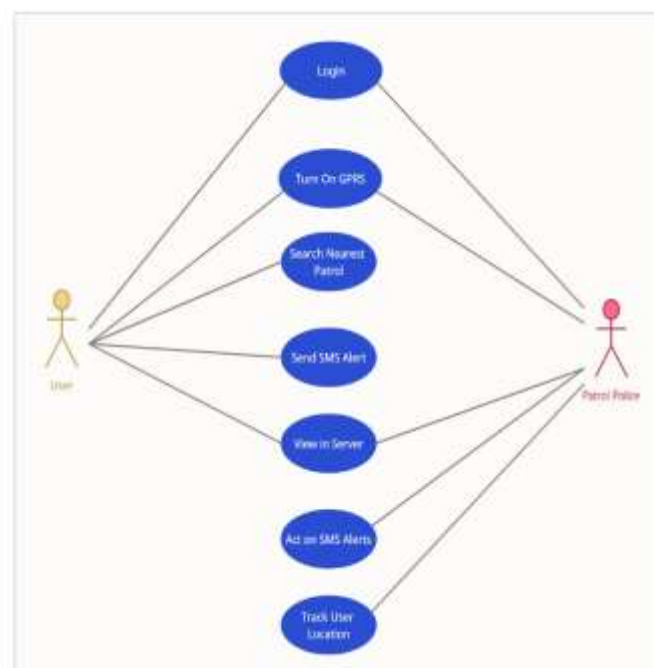


Fig -4.2: UML Design

4.3 Modules

- User/Police Patrol Registration module
 - After installation, provide the personal mobile number, home address, and alternate mobile number for registration.
 - Post registration , provide mandatory details like email address ,city ,state and pin code. Provide contact details of any 2 relatives or close friends as emergency contact.

- Patrol module
 - Initially the patrol vehicle will have a GPS enabled mobile to transmit the location of the moving vehicle and stored in the cloud server. The patrol police will get an alert message in mobile phone and then he can login to the application and track the vehicle location and find out the person.
- Tracking and Notification of alerts
 - The application will get started in the boot startup and continue running in the background notification bar. This help the user not to turn on the application when the person is in trouble, just might give a gentle shake in anticlockwise direction and rest will take care by application itself.
 - The application will check whether the IMEI number of the particular mobile is registered in the cloud server. If it is present the server will respond with all security details. The GPS turned on and it will collect the current location (i. e), latitude and longitude. Then it passed to the geo location to find the exact location.
 - When the SMS get triggered the content of the SMS will contain the mobile number, current address, etc Using IMEI number the patrol trace the location even if the phone got deactivated.

4.4 Sample Screenshots from Mobile Application

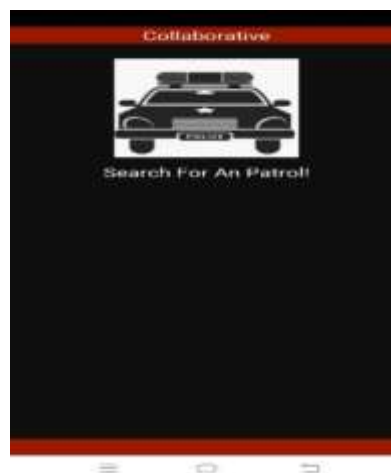


Fig -4.3: Mobile view of application

Fig -4.4: User Registration form



Fig -4.5: User interface for patrol search

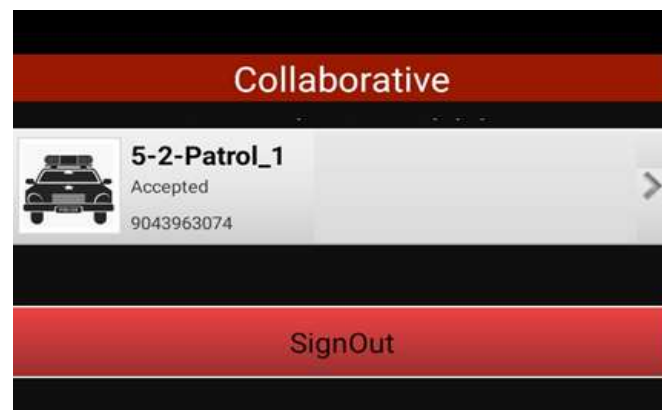


Fig -4.6: Patrol Availability Window

5. CONCLUSIONS

In this project, the awareness of smartphone usage among women has been focused and with help of GPS system, women who are trapped in a critical situation are identified with help of this application. This is very much helpful for the police department to quickly identify harassment cases and other physical assaults happening for women as their location details are transparent and shared to police with help of GPS connectivity. Hence, with help of this application, women can travel safely to any location irrespective of time and if encountered a critical situation or any dangerous scenario, with just a shake of the smartphone, the application can sense the location and identify the nearest patrol police to alert them and act on the incident happening around.

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