TraceIt: Find & Reunite- Tracing Missing Persons & Pets

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Abstract

The primary objective of this proposal is to develop a system that utilizes GPS data and the Shortest Path Algorithm to optimize search efforts when tracing missing persons or pets. Combining GPS and shortest path to the moving people and pets is novel. If any end-user location is far away from missing persons'/pets' location they could locate the nearest police station and drop application for rescue the person/pet and they are able to find the missing person/pet using this application. By creating a digital platform that takes advantage of real-time location data and intelligent routing, we aim to significantly improve the success rate of locating missing individuals in various scenarios. '

Keywords : GPS, Shortest Path

I. INTRODUCTION

The efficient tracing of missing persons is a critical challenge that requires the integration of technology and effective algorithms. In this proposal, we present a solution that leverages GPS technology and the shortest path algorithm to optimize the process of locating missing individuals. This system aims to reduce response times, enhance search efforts, and increase the chances of successfully locating missing persons.

II. LITERATURE REVIEW

A.GPS Tracking System with Shortest Path

While they did not provide a solution for a real-time updated map, the researchers in [1] have created a method to locate locations such as ATMs, fuel stations, public parks, and other locations around a city using the quickest journey utilizing GPS and Map Service. Additionally, the built application supports Web Services and mobile devices running the Android OS. It has also been mentioned that techniques like the Optimum A* algorithm [2] have been utilized to discover the shortest path. A heuristic function has been added to A* algorithm. When compared to other optimization techniques, this algorithm is preferable since it uses a heuristic function. Additionally, it is comparable to BFS [2] in that it will visit in depth if the chosen node is thought to be the best. If the node that was visited did not provide a solution, it would return to the initial node in search of another, more promising node. If the destination node that leads to the answer cannot be found, the process will loop back to the first node. Data is sorted using the Merge Sort algorithm [3]. Divide and conquer is a data sorting strategy used by the merge sort algorithm [3]. Data sorting will be completed after all data has been separated and broken down until there is just one number left. Google offers services that can be used to calculate a location's position, distance from another location, and other information [1].

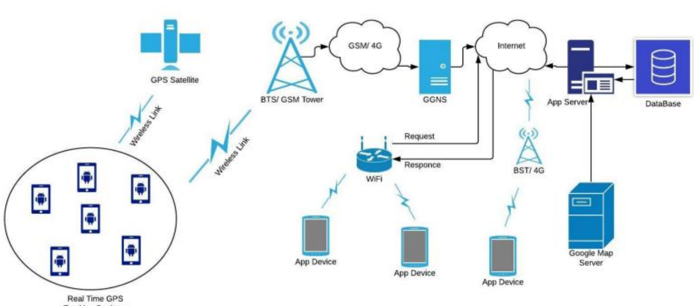
Web services and XML can be used to access the service. Web services are a way for two technological devices to communicate with one another online [4]. Web service description sent using SOAP messages, often over HTTP with XML serialization and other Web-related standards. The Google Directions service makes it simple to determine the distance between two locations. To find a location's latitude and longitude, a service called Google Geocoding [5] is used. A map can be created using the Google Static Maps service [6].

[7] states that they provide a solution by creating an Android software that uses GPS to determine the best route between two points. In this scenario, taxis are fitted with GPS devices to transmit their locations to a central server, which then analyzes the information to determine the best route in terms of real-time traffic updates based on the app user's query, allowing drivers to choose the shortest or fastest route to their client. When there is heavy traffic, the HMM (hidden Marko model) [8] is used to locate the alternate route in towns and cities. Additionally, the variance-entropy-based clustering approach [9] is utilized to determine the quickest route when Google Maps and Bing Maps are unable to provide the passenger with an energy-efficient driving route.

III. METHODOLOGY

The major objectives of the proposed garbage vehicle monitoring systems are;

1) real time monitoring of the route of the pets,



infants and old man/woman.

2) providing the shortest path of pets, infants and old man/woman.

Fig. 1. System Architecture of missing person/pet Tracking System

A. System Architecture

Fig 1 shows the architecture of the system how a pet or person being tracked. Figure 1 shows the system architecture of pet or person tracking system. Here GPS Satellite transfers Location (GPS Points) information to GPS Tracking system/ GPS enabled Smart phone attached with Vehicles and these locations are transferred to GGNS Server through BTS/ GSM Tower via GSM/ 4G network. GGNS server stores all the Locations of GPS devices in the meantime same information are stored in database. App Device makes requests to GGNS Server and App Server to get GPS points and relevant Google Map respectively. Further, App Server directs this request to Google Map Server and the responses are combined with GPS Points received from GGNS server and send to the End-Users (System Users). In the case of missing pet or person, the user of the system could find the shortest path from app (digital map with GPS points) to get them, to do so Dijkstra’s shortest path algorithm has been adopted with the application.

B. System Components

App Server: An apps server is a server that is used to install, run, and host programs for the system's end-user to use effectively [18]. This server serves as an intermediary between the system's user and the database [19]. It operates in accordance with the client-server model (request-response). This system responds to user requests by sending a request to the Google Maps server, which acts as an intermediary device to gather user requirements and store them in a database.

GGNS: Gateway GPRS Support Node is a standard for this term. In order to establish and maintain subscriber Internet Protocol (IP) and route data traffic between a subscriber's mobile station or base transceiver station and the internet, it is used with Serving GPRS Support Nodes (SGSNs) on the same network. As a result, data could pass from BTS to internet quickly. It is a key element of the GPRS network [20]. Internetworking between GPRS or 4G networking and external devices is GGNS's primary duty [21].

Google Map: Using web services, Google Map offers comprehensive information about every region of the world. In the majority of places throughout the world, the Google map offers street, location, street view, real-time traffic, automobile, bicycle, and satellite views [22][23]. In smart device applications or other pertinent applications. we work with, this map is utilized to track the location of vehicles in real time. The Google map displays position and place on the map and automatically manages access to the Google Maps servers [24].

Base Transceiver Station: Based on network traffic, a BTS can dynamically choose and switch between active and sleep modes. Each BTS determines its own traffic load predictions, compiles those of the surrounding BTSs, and then makes a decision regarding its operational status dynamically. As a result, a BTS's decision on its operational state is entirely dependent on information about its own traffic load and one-hop neighborhood traffic load [27].

Database: A database used to store data (such as GPS coordinates and user login information) received from the application server.

Relational databases have typically been employed for modest amounts of data, however when dealing with large and frequently changing volumes of data (such as GPS point data), we must switch to NoSQL databases [28]. Additionally, this system needs to be kept up with a NoSQL database.

Dijkstra algorithm: The Dijkstra algorithm is typically employed in graphs to determine the shortest route between two nodes. This was created in order to solve the single source shortest path problem. By directing the pathways, it determines the shortest path for the lowest possible cost [29]. This algorithm selects a single node, referred to as the "source" node, and determines the shortest path by routing all other nodes through the source node. Once the short path has been found, the routing process and algorithm are completed.

```
dist[s]←0                                  //distance to source vertex is zero
for all v ∈ V–{s}
do dist[v]←∞                               //set all other distances to infinity
S←∅                                        //S, the set of visited vertices is initially empty
Q←V                                        //Q, the queue initially contains all vertices
While Q ≠∅                                 //while the queue is not empty
do u← mindistance(Q, dist)                 //select the element of Q with the min distance
        S←S U {u}                          //add u to list of visited vertices
        For all v ∈ neighbors[u]
        do if dist[v] > dist[u] + w(u,v)   //if new shortest path found
        then d[v] ←d[u] + w(u,v)           //set new value of shortest path
return dist                                //if desired, add traceback code
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C. Practical example of proposed algorithm

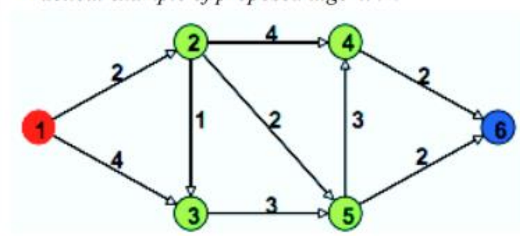

Fig. 2. Example of shortest path

Fig 2 shows the practical mechanism of Dijkstra algorithm. In this graph;

Red - source node	1,2,3,4 – weights
Blue - destination node	Circle numbers – vertex
Green – Other nodes	Arrows – Edge of the

Pseudo code for proposed algorithm:

The possibility of the routing path and distance of the path as bellow.

TABLE I. ROUTING TABLE FIG 2

Possible path	Distance
1-2-4-6	8
1-2-5-6	6
1-2-3-5-6	8
1-2-5-4-6	9
1-3-5-6	9
1-3-5-4-6	12

Here the algorithm routing the path using all possible ways and it will select the optimum short path (In this case 1-2-5-6) and provide the output to digital map with the help of GPS points.

IV. RESULT AND DISCUSSION

This section provides features of Android GPS tracking application and its operation.

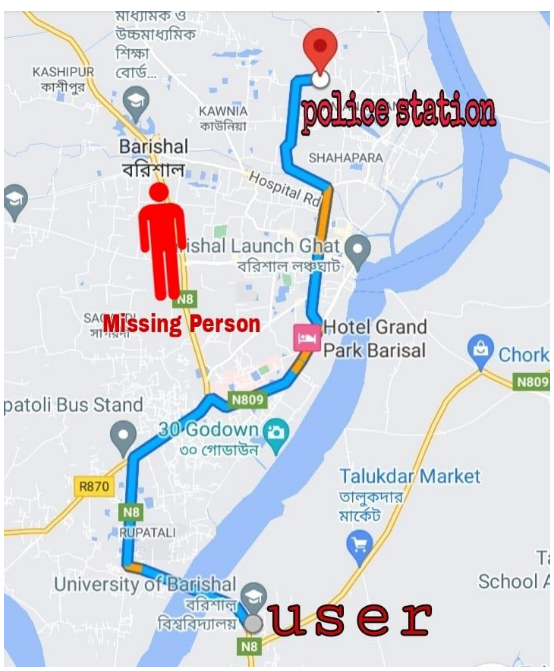

Fig. 3. Missing person attached in this map

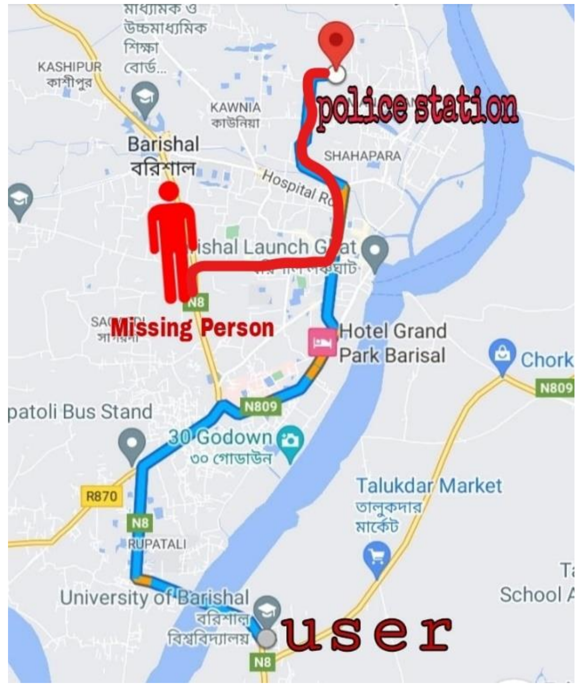

Fig. 4. Google map with shortest path

Fig 4 shows the shortest path with missing person/pet. If any end-users' location is far away from missing persons'/pets' location they could locate the nearest police station and drop application for rescue the person/pet and they are able to find the missing person/pet using this application. The algorithm provides the facility that giving short path by routing all possible routes and eventually it will find the nearby collector. Figure 4 is the output of nearby police station of GPS tracking application.

V. CONCLUSION

Through this paper, a handy, economically low cost, efficient way has been proposed and developed. In fact, it is a better solution to find missing person/pets in a particular path. Since this application is showing the exact location of the missing person/pet, the public can appear to the exact location and can rescue them. Shortest path is proposed using Dijkstra ‘s algorithm. This algorithm made blue path for shortest distance of missing person/pet. This application only works in online and GPS points of the user, identify by GPS satellites using IEMI number of real time GPS tracking device. In contemporary rapid world GPS tracking is common and old technology but in the case of rescue missing favorite pet/person, it is new and inevitable. It can be concluded, that the end-user of this applications will get higher advantages with cheaper cost.

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