DATA MINING BASED VISA TRACKING SYSTEM USING SMART CARD

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Abstract -- One of the most important needs for this modern world with increasing technology is development in all the products that we use in day today life. Everything on which our fingers play should be developed in every aspects so that it is helpful for our nation as well as for our self .One such proposal is the development of the visa in a better way that would help us to track the location of person traveling around the world using GPS tracker that is attached to the VISA card. A magnetic strip that is embedded on the card used for swiping that records the place where the person is using the card and traveling. EMV (Euro pay, Master Card, visa) for security purpose. And the card's entire performance is depended on a battery that has a capacity of 5v and is rechargeable depending on the motion sensor attached to it. The data is fed to the Visa Tracking System which uses data mining technique to detect the persons roaming around the city after visa expiry date and to detect suspicious activities.

I.INTRODUCTION

A tracking system is used for the monitoring of persons or objects on the move and supplying a timely ordered sequence of respective location data to a model [1]. One such method   GPS Fleet management [3] is applied to tracking application and can track from subsequent vehicle's positions. Each vehicle to be tracked is equipped with a GPS receiver and relays the obtained coordinates via cellular or satellite networks to a home station.

There are many tracking systems like Vehicle tracking system, mobile tracking system and so forth. The proposed VISA TRACKING SYSTEM is used for the persons traveling to abroad for observing their activities. This system is built using smart cards along with the position tracking [4] of the person using the card.

Smart cards currently exist for a vast area of applications. However, the expected growth in the industry will not be due merely to growth in these segments, but also to the addition of the Internet and electronic commerce with their myriad of uses. Smart cards improve the convenience and security of any transaction. Smart card systems have proven to be more reliable than other machine-readable cards, like magnetic stripe and bar code [2], with many studies showing card read life and reader life improvements demonstrating much lower cost of system maintenance. Multifunction cards can also be used to manage network system access and store value and other data. The applications for smart cards are pay phones, mobile communication, banking and retails, electronic purpose, health care, ID verification and access control [9].

The tracking system uses GLOBAL POSITIONING SYSTEM (GPS) also known as Navstar, is a Global Navigation Satellite System (GNSS) that provides information like location and time in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites [8][10]. The U.S. Department of defense (DOD) developed the system which originally used 24 satellites. As of February 2016, there are 32 satellites in the GPS constellation, out of these 31 satellites are in use. The additional satellites improve the precision of GPS receiver calculations by providing redundant measurements. The GPS concept is based on time and the known position of specialized satellites [8]. The satellites carry very stable atomic clocks that are synchronized to each other and to ground clocks. Any drift from true time maintained on the ground is corrected daily. Likewise, the satellite locations are known with great precision. GPS receivers have clocks as well; however, they are not synchronized with true time, and are less stable. GPS satellites continuously transmit their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time [10]. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities (three position coordinates and one clock deviation from satellite time).

II.LITERATURE SURVEY

A **vehicle tracking system** [3] combines the use of automatic vehicle location in individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations. Modern vehicle tracking systems use either GPS or GLONASS("GLObal NAvigation Satellite System", is a space-based satellite navigation system operating in the radio navigation-satellite service and used by the Russian Aerospace Defense Forces). technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via the Internet or specialized software [11]. Urban public transit authorities are an increasingly common user of vehicle tracking systems, particularly in large cities [3].

The vehicle tracking system is used to keep track of employees. This is useful to cut down on employees who are using vehicles excessively for personal use and skiving off when they are suppose to be working [9]. The tracking systems can keep an eye on staff driving habits. Managers can therefore clamp down on people who consistently speed or drive dangerously. The usage of GPS in vehicle tracking systems can also monitor the fuel consumption of a company's fleet so that managers can work towards a more economical and environmentally friendly fleet of vehicles [3]. For fleets working in London congestion zone alerts are very useful for cutting down on unwanted fines for not paying congestion zone fees. Tracking systems can also help people to map the shortest routes, which can help to save time, money and fuel [9]. Tracking systems can be an invasion of privacy. Managers can use the information about staff in order to fire them. These maybe the smallest of discrepancies, but taken out of context may make the staff look really bad [3].

Mobile phone tracking is the ascertaining of the position or location of a mobile phone, whether stationary or moving. The localization may occur either via multilateral of radio signals between (several) cell towers of the network and the phone, or simply via GPS. To locate a mobile phone using multilateral of radio signals, it must emit at least the roaming signal to contact the next nearby antenna tower. By doing this the signal does not acquire

any active call. The Global System for Mobile Communications (GSM) is based on the phone's signal strength to nearby antenna masts [16].

Business management: when a business issues mobile phones to its employees, it can use the tracking information from the phones to see where the worker spends time while out on the job. Phone-tracking services for businesses can also offer additional features, like the ability to display a warning when an employee drives faster than the legal speed limit [16]. **Emergency services:** The emergency system work by using information gathered from a phone's GPS receiver and by working with the phone provider to determine the device's position relative to nearby mobile mast, it is possible for the police force and fire and ambulance services to be able to find lost and missing persons even when you don't know where you are or have been injured. **Colleague and friend tracking:** In colleague and friend tracking system some mobile phones have tracking features that may enhance both your business and social life. "Find My Friends" – a down loadable application for the I Phone, is an example of such a service that displays on a map dots that represent your friend's or colleague's location, allowing you to find each other even in crowded places. **Child safety:** In child safety system mobile phone-tracking makes it possible for parents to know where their children are at all times. Some vendors sell cell phones with embedded software that periodically sends data on the phone's current location to a central server via the mobile network. By logging in to the service on-line parents can view their child's current location and track where they have been previously. This might be especially important if you can track that they have been to potentially dangerous locations.

The mobile tracking system has forgotten to look into the privacy concerns: It has been argued that using geo-location information is an invasion of privacy [16]. Mobile phone companies have the ability to exploit the information and get an insight into the private lives of their mobile customers. This defect can be rectified to make this system work better.

III.PROPOSED SYSTEM

A.MOTIVATION

The trackers are used for a specific application as they are designed to perform the tasks in many fields such as automotives, mobile phones, farm fields, defense, hospitals, etc. The trackers are built using GPS devices. Only very few percentage of tracking technology has been developed in government sector and there are limited technology developed for tracking a person other than tracking their phone calls. To improvise and implement the technology further, this idea has been developed to safeguard the society by preventing the mankind from involving illegal activities.

B.OBJECTIVE

Objective is to procure the nation from the foeman, outlander and non-citizen of the country. Visa tracking system is proposed in order to track a person automatically using an energy efficient smart card. The people involving any illegal activities like illegal border crossing and residence of person after the expiry of visa are sensed and are reported.

C.WORKING

Every individual is given with a smart card performing multiple functionalities. The smart card is enabled with GPS. All information like movement of user will be sent to the database of the tracking system for every n unit of time (n can be 15 minutes to 1 hour based on the requirement). The current content of the database is archived for future use. To avoid the overwhelming of the database, dimensionality reduction is performed before archiving process. The system architecture is shown in the figure 1.
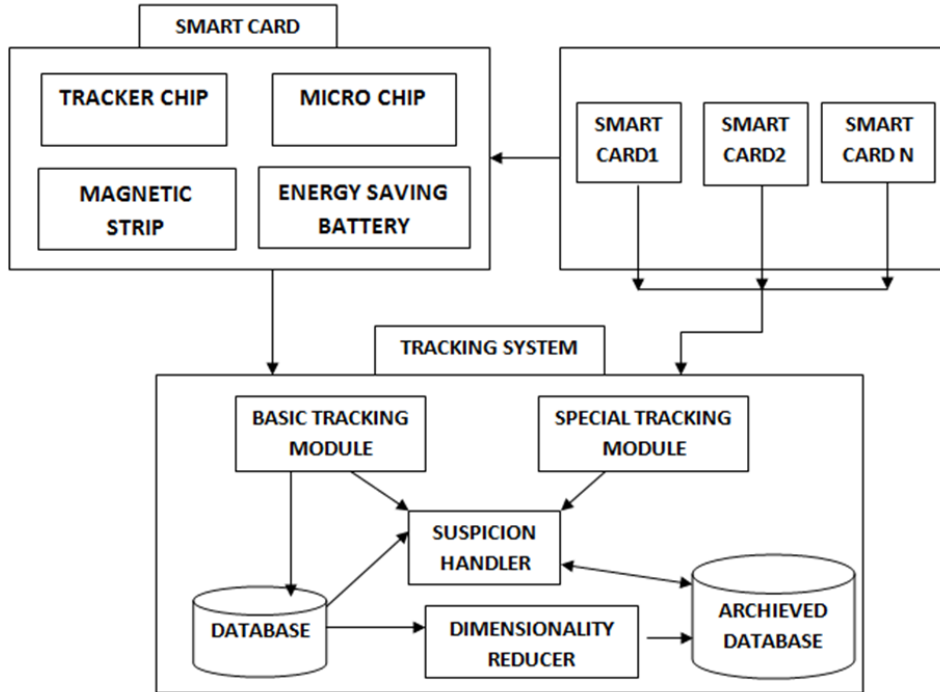
D.SYSTEM ARCHITECTURE

Figure 1.System Architecture

SMART CARD

Every citizen in the smart city and new outlander to the city must possess the smart card. The card holds the VISA details like starting date, expiry date, passport number, VISA number and expiry date and so forth. Other information like bank details, identification details are also incorporated with this card thus making a smart multipurpose card, the unique id (like Aadhar No)in the card uniquely identifies the person and acts as primary key in the database of the tracking system.

The individual will be denied access outside the border and centralized public places without this card so the person cannot long survey without this card since all his basic activities related to life is attached with this card.

If the card holder loses or misplaces their card, the card is tracked using the GPS tracker and handed over to the respected person. The user can immediately report a complaint regarding their missing of card. And if the card is damaged the person has to report or make a complaint, so that person will get the new card replacing the damaged one. In Addition to the basic requisites, the multipurpose card encompasses of energy battery, microchip, tracker chip and magnetic strip.

A.MICROCHIP

The microchips made of silicon are used to store the data of the individual. The chips are called as EMV (Europay, MasterCard, Visa) chips as they are used to protect the data from other unauthorized access of the card. The chip contains the details of an individual along with the PIN number, the ID number and VISA details.

B.MAGNTIC STRIP

In order to improve the efficiency, magnetic strips or magstripe as they are sometimes called carries loads of information are used. Each stripe is made up of iron based magnetic particles that are in a plastic film with each one being a very small bar magnetic of about 20 millionths of an inch. Each magstripe has three tracks that is one-tenth of an inch wide and each track contains unique data.

C.TRACKER CHIP

The card is built with the GPS technology which uses the tracker chip. The tracker chip plays a significant role. The details tracked using this tracker chip is passed to the visa tracking system for processing. The tracker chip will send the location of an individual by using the cell-towers. The locations are tracked with the help of the satellites. The chip is manufactured and they are inserted into a card and are given to an individual for further processing of data.

D.ENERGY SUPPLY UNIT

In order to activate the GPS tracker the energy unit is attached inside the card. This energy unit used here looks like a coin sized battery were it will generate a sufficient energy to activate the tracker and transmit the signal. The technology of motion charging is introduced where the battery gets charged due to the vibrations made by the body of the person while changing their positions and if in case of any damage or fault occurs the whole unit will be replaced. Hence the energy supply unit plays an important part in functioning this system.

TRACKING SYSTEM

Tracking system involves basic tracking module, database and achieved database. The information of every individual is stored in the database of tracking system with unique id that is attached with smart card.
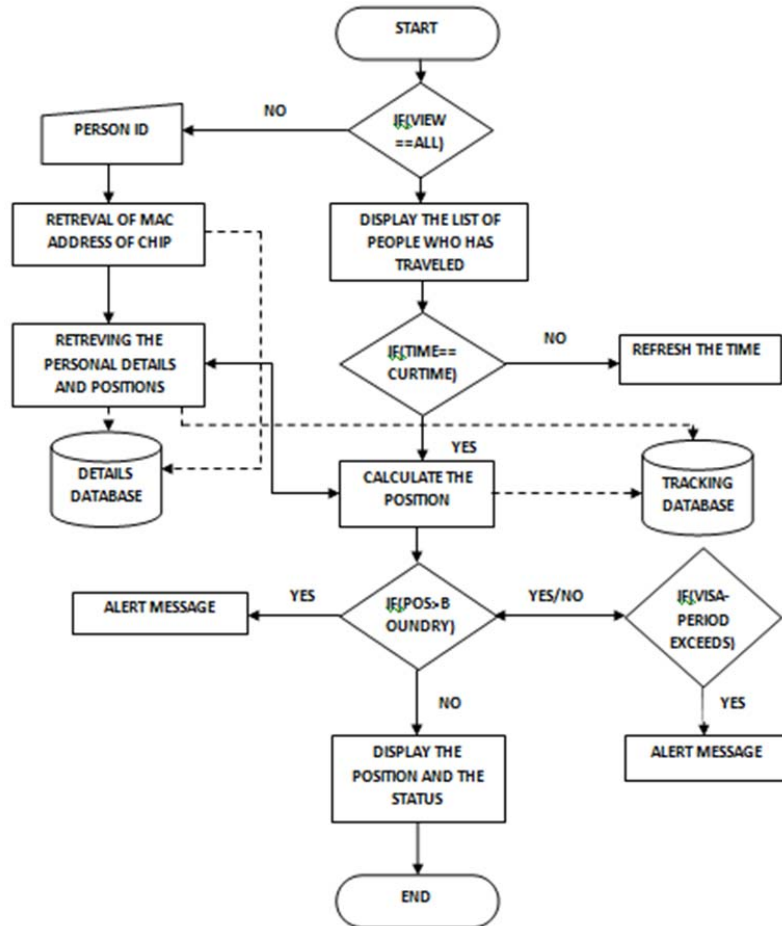
A.WORK FLOW ARCHITECTURE

Figure 2.Work flowchart Architecture

B.BASIC TRACKING MODULE

The basic tracking module performs two major tasks. Initially, it collects the major information of the person and first it checks whether the movement is abnormal. It is identified by the predefined threshold (latitude and longitude). If the information goes beyond boundary value of the specified country, alert will be generated by the system. Second it checks for the person's resident after the expiry date of the visa. If the person resides after the expiry alert will be generated.

C.SPECIAL TRACKING MODULE AND SUSPICION HANDLER

There are instances where the movement of particular suspected persons has to be monitored for security purposes. This requirement is well suited for Departments like Police, Vigilance and so forth. Such cases can be

given as input to special tracking module. It keeps on tracking those persons continuously and passes the information to suspicion handler. In suspicion handler set of rules/information are given. If those rules are met, an alert message will be produced.

D.DATABASE AND ARCHIVED DATABASE

The observed data from this system contains many rows of information if the tracking interval is minimal (say every 15 minutes). For future use, it is sufficient to have data of each person in day basis or month basis. The database is reduced and archived for future use and stored in archived database.

E.DIMENSIONALITY REDUCER

Reduction of database is done by a technique called Dimensionality Reduction. This system helps us in reducing (compressing) many rows of information into a considerable memory space which helps us in maintaining large amount of records. The records are compressed based on the selection and extraction of processes. The selection of process includes the process such as the data based on expiry and illegal activities. The process of illegal entry data is included under extraction of process which includes the initial set of measured values such as boundary values [18]. The data are classified into linear (starting date, expiry date, passport number, visa number and GPS id) and nonlinear (cell phone tower id) data based on their importance of their use in the system.

Many high dimensional data sets have nonlinear nature. In this case many data lie on or near a nonlinear manifold (not a linear subspace) and therefore one of the algorithms designed to address the problem of nonlinear dimensionality reduction is Kernel PCA [17]. In Kernel PCA, through the use of kernels, principle components can be computed efficiently in high-dimensional feature spaces that are related to the input space by some nonlinear mapping. Even the data that are nonlinear can also be retrieved [17]. This helps in linking data and so the large amount of linear and nonlinear data are mapped and processed in a feasible way. The content of the database is completely reduced and this compact content is stored in archived database for future use.

CONCLUSION AND FUTURE WORK

The VISA tracking system will helps us to increase the employment, increase in security of the person traveling to abroad. It prevents the people involving in illegal activities and improves the technology (accuracy of positioning is increased) and efficient use of GPS makes this card as a multifunctional card. As the card is used for multi-purposes the security of the details of an individual is properly maintained. The proposed work can be simulated using NS2 Simulator with C++ patch file attached to it. This can be implemented in real time also.

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