A SMART SAFETY NETWORK SYSTEM FOR TRACKING A MOBILE COMPUTING DEVICE IN AN EMERGENCY ENVIRONMENT AND A METHOD THEREOF

FIELD OF THE INVENTION

The present invention relates generally to tracking devices and more particularly, a smart safety network relates for determining location of a device in a crowd sourcing environment.

BACKGROUND OF THE INVENTION

Generally, every mobile device has a built-in GPS circuitry which tracks the user and updates the location of the user to the application server, periodically. Currently, it is possible to track the location of a mobile phone using means like triangulation, Global Positioning System (GPS) co-ordinates and so on. In triangulation, the position of a mobile phone is tracked by measuring the strength of the signal received by the mobile phone from at least three mobile base stations. In GPS, the location of the mobile phone is tracked using co-ordinates in terms of longitude and latitude received from a plurality of medium earth orbit satellites. The co-ordinates of the mobile phone, obtained using triangulation or GPS may be sent to a distant location and used to track the location of the mobile phone. However, for the above methods to work, mobile phone should be turned on. Only if the mobile phone is turned on, the GPS module present in the mobile phone work, and the mobile phone will be able to transmit its co-ordinates to a distant location. When location tracking is disabled or any location update is turned off due to accident, man-handling, crushing and other means, such user cannot be tracked by any means and location of the user becomes unknown.

Accordingly, a need exists for mechanism for tracking a mobile device when the onboard GPS module is not working or when location tracking is disabled or any location update is turned off.

SUMMARY OF THE INVENTION

In an embodiment, a smart safety network system for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment is provided. The smart safety network system includes a first mobile computing device communicatively coupled to an application server, wherein the first mobile computing device comprises a first proximity communicator configured to communicate with a plurality of proximity communicators installed within a plurality of nearby mobile computing devices

respectively. A location tracker is embedded within the first mobile computing device wherein the location tracker is configured to determine and track current location of the first mobile computing device through GPS during a normal mode of operation of the first mobile computing device, whereas the location tracker fails to determine the current location of the first mobile computing device during an emergency mode of operation of the first mobile computing device. The smart safety network system further includes a controller configured to generate a first set of information using the location tracker during the normal mode of operation and transmit the first set of information to the application server regularly at predetermined intervals. The application server includes a server controller configured to generate a second set of information using the first set of information when the first mobile computing device is in the emergency mode of operation, wherein the second set of information includes at least instructions for the plurality of nearby mobile computing devices to initiate scanning operations to detect present location of the first mobile computing device within respective communication range, a receiver to receive information from the plurality of nearby mobile computing devices regarding respective scanning operations; and an object locating unit configured to analyze the respective scanning operations and determine the present location of the first mobile computing device therefrom.

In another embodiment of the present invention, a method for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment is provided, the method comprising the steps of: establishing a communication between a first proximity communicator and a plurality of proximity communicators, wherein the first proximity communicator is installed within a first mobile computing device and the plurality of proximity communicators are installed within a plurality of nearby mobile computing devices respectively: determining and tracking, via a location tracker, a current location of the first mobile computing device through the GPS during a normal mode of operation of the first mobile computing device, wherein the location tracker fails to determine the current location of the first mobile computing device during an emergency mode of operation of the first mobile computing device; generating a first set of information using the current location during the normal mode of operation and transmit the first set of information to an application server regularly at predetermined intervals; generating a second set of information using the first set of information when the first mobile computing device is in the emergency mode of operation, wherein the second set of information includes at least instructions for the plurality of nearby mobile computing devices to initiate scanning

operations to detect the presence of the first mobile computing device within respective communication range; receiving information from the plurality of nearby mobile computing devices regarding respective scanning operations; and analyzing the respective scanning operations and determine the present location of the first mobile computing device therefrom.

It is an object of the present invention to track and locate a computing device based on location-based inputs received from one or more other devices connected to the smart safety network.

It is another object of the present invention to determine probability of an existence of a computing device based on the analysis of the respective scanning operations of one or more other devices connected to the smart safety network.

To further clarify advantages and features of the present invention, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which is illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail with the accompanying drawings.

BRIEF DESCRIPTION OF FIGURES

These and other features, aspects, and advantages of the present invention will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

Figure 1 depicts a block diagram of a smart safety network system for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment in accordance with an embodiment of the present invention;

Figure 2 depicts an exemplary system diagram of system indicated in Figure 1 in accordance with an embodiment of the present invention.

Figure 3 illustrates an exemplary implementation of a communication between first user's mobile device and application server through a first communication network;

Figure 4 illustrates an exemplary implementation of a communication between the first user's mobile device, a plurality of nearby mobile computing devices and application server connected through a plurality of communication networks;

Figure 5 is a flow chart describing the process of a smart safety network system for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment in accordance with an embodiment of the present invention.

Further, skilled artisans will appreciate that elements in the drawings are illustrated for simplicity and may not have been necessarily been drawn to scale. For example, the flow charts/ flow diagrams illustrate the method in terms of the most prominent steps involved to help to improve understanding of aspects of the present invention. Furthermore, in terms of the construction of the device, one or more components of the device may have been represented in the drawings by conventional symbols, and the drawings may show only those specific details that are pertinent to understanding the embodiments of the present invention so as not to obscure the drawings with details that will be readily apparent to those of ordinary skill in the art having benefit of the description herein.

DETAILED DESCRIPTION:

For the purpose of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated system, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

It will be understood by those skilled in the art that the foregoing general description and the following detailed description are exemplary and explanatory of the invention and are not intended to be restrictive thereof.

Reference throughout this specification to “an aspect”, “another aspect” or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrase “in an embodiment”, “in another embodiment” and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

The terms "comprises", "comprising", or any other variations thereof, are intended to cover a non-exclusive inclusion, such that a process or method that comprises a list of steps does not include only those steps but may include other steps not expressly listed or inherent to such process or method. Similarly, one or more devices or sub-systems or elements or

structures or components proceeded by "comprises...a" does not, without more constraints, preclude the existence of other devices or other sub-systems or other elements or other structures or other components or additional devices or additional sub-systems or additional elements or additional structures or additional components.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The system, methods, and examples provided herein are illustrative only and not intended to be limiting.

Embodiments of the present invention will be described below in detail with reference to the accompanying drawings.

Figure 1 depicts a block diagram of a smart safety network system 100 for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment. The smart safety network system 100 includes a first mobile computing device 102 communicatively coupled to an application server 104, wherein the first mobile computing device 102 comprises a first proximity communicator 106 configured to communicate with a plurality of proximity communicators 108 installed within a plurality of nearby mobile computing devices 110 respectively. The first mobile computing device 102 may be considered to be the device which is to be tracked. The first mobile computing device 102 may include, but not limited to, PDAs, cellular phone, smart phone, a smart watch, smart fitness bands, smart wearable devices including smart shoes, smart glass, smart earphones/ headphones, smart clothing, smart jewelry, laptop, routers, to name a few which can be tracked. In an implementation, the plurality of nearby mobile computing devices 110 identities includes static identities or dynamic identities or both of the respective plurality of nearby mobile computing devices 110. The static identities include routers, computers, laptops (which are connected to a wired/wireless network), or any transmission devices. The dynamic identities may include, but not limited to, PDAs, cellular phone, smart phone, a smart watch, smart fitness bands, smart shoes, smart glass, smart earphones/ headphones, smart clothing, smart jewelry, laptop, etc. to name a few. The first proximity communicator 106 and plurality of proximity communicators 108 may be based on Internet or short or medium range wireless communication methods like WiFi, Bluetooth, ZigBee, or Infrared transmission, a serial connection or any means of wired or wireless connection. In an implementation, first mobile computing device 102 may be connected directly to the application server 104. In another implementation, a smart wearable device connected to the

first mobile computing device 102 and further connected to the application server 104 or a smart wearable device directly connected to the application server 104. A mobile application is configured in the first mobile computing device 102, which can receive inputs from smart wearable device, plurality of nearby mobile computing devices 110 and the application server 104. The application server 104 is configured to process the data received from the first mobile computing device 102, which can receive inputs from smart wearable device, plurality of nearby mobile computing devices 110. In an implementation, the application server 104 is configured to store the information corresponding to the plurality of nearby mobile computing devices 110 and associate the information with the first mobile computing device 102.

A location tracker 112 is embedded within the first mobile computing device 102 wherein the location tracker 112 is configured to determine and track current location of the first mobile computing device 102 through GPS during a normal mode of operation of the first mobile computing device 102, and wherein the location tracker 112 fails to determine the current location of the first mobile computing device 102 during an emergency mode of operation of the first mobile computing device 102. The emergency mode of operation may be manually selected by user of the first mobile computing device 102 or may be automatically selected due to improper connectivity signals, battery issues or any other hardware or software problem. Further, in the emergency mode of operation, the location tracker 112 is unable to transmit the location signal indicating the location coordinates to the application server 104.

The location tracker 112 in operational interconnection with a controller 114 is configured to generate a first set of information using the current location during the normal mode of operation. The first set of information is transmitted to the application server 104 regularly at predetermined intervals. The first set of information includes the current location, a plurality of identity attributes of the first mobile computing device 102, attributes of a first user of the first mobile computing device 102, device identities of the plurality of nearby mobile communicating devices 110 and their respective locations. The term location used herein in the description may be used interchangeably with GPS coordinates, location coordinates.

The application server 104 includes a server controller 116 configured to generate a second set of information using the first set of information when the first mobile computing device 102 is in the emergency mode of operation, wherein the second set of information

includes at least instructions for the plurality of nearby mobile computing devices 110 to initiate scanning operations to detect present location of the first mobile computing device 102 within their respective communication range. The application server 104 further includes a receiver 118 to receive information from the plurality of nearby mobile computing devices 110 regarding respective scanning operations; and an object locating unit 120 configured to analyze the respective scanning operations and determine the present location of the first mobile computing device 102 there from.

In an implementation, the object locating unit 120 is configured to firstly determine probability of an existence of the first mobile computing device 102 based on the analysis of the respective scanning operations and thereafter, based on the probability of the existence and determine the current location of the first mobile computing device 102.

In an implementation, the first mobile computing device 102 is communicatively synchronized with a second mobile computing device; wherein the object locating unit 120 is configured to analyze the respective scanning operations to determine present location of the second mobile computing device there from and determine probability of present location of a first user in accordance with the present locations of the first mobile computing device 102 and the second mobile computing device. In one example, the second mobile computing device includes, but not limited to, smart watch, smart band or any smart wearable devices.

In an implementation, the first proximity communicator 106 is configured to communicate with the other proximity communicators 108 using at least one of near and far-field communication technology to receive information regarding current locations of the respective plurality of nearby mobile communicating devices 110 and the controller 114 is configured to transmit the current locations of the respective plurality of nearby mobile communicating devices 110 to the application server 104.

In an implementation, the application server 104 is configured to place the first mobile computing device 102 under observation when the user inputs last known location of the first mobile computing device 102 from another computing device (plurality of nearby mobile communicating devices 110) and request to place the first mobile computing device 102 under the observation, wherein the application server 104 is configured to track the location of the first mobile computing device 102 using additional plurality of nearby communication devices 110 and transmitting the tracked location to the user.

In an implementation, the application server 104 further comprises a monitoring unit 122 configured to regularly analyze the first set of information from the first mobile

computing device 102. In absence of availability of the first set of information, the monitoring unit 122 is configured to label an existing mode of operation of the first mobile computing device 102 as the emergency mode of operation.

In an implementation, the server controller 116 is configured to label the first mobile computing device 102 as a non-trackable device when the server controller 116 does not receive the first set of information for a predetermined amount of time. The predetermined amount of time may be changed as per the requirements.

In an implementation, the mobile computing device 102 comprises: an emergency detecting unit 124 configured to detect at least one emergency operational mode of the first mobile computing device 102. During the at least one emergency mode, the location tracker 112 fails to determine the current location of the first mobile computing device through GPS; wherein the controller is configured to transmit the information pertaining to the emergency operational mode of the first mobile computing device 102 to the application server 104.

In an implementation, the emergency detecting unit 124 is configured to display a user interface for facilitating the user to manually activate the emergency operational mode of the first mobile computing device 102.

In an implementation, the application server 104 further includes a device identifying unit 126 configured to determine additional plurality of mobile computing devices 110 found within a predetermined range of a last detected location (current location or last known location) of the first mobile computing device 102, wherein the server controller 116 is configured to send identity related information of the first mobile computing device to the additional plurality of mobile computing devices 110. The controller 114, monitoring unit 122, emergency detecting unit 124, device identifying unit 126 are embedded with suitable processors to perform their respective functions. In an implementation, one or more functions may be performed by the same standalone device having suitable processing capabilities.

Figure 2 depicts an exemplary system diagram 200 of system indicated in Figure 1 in accordance with an embodiment of the present invention. The system 200 includes a mobile computing device 202 (mobile device in the present Figure), an application server 204, a plurality of devices 206_1, 206_2, 206_3, 206_4, 206_5, 206_6, 206_7, 206_8, 206_9, 206_{10}, 206_{11} (collectively referred to as 206) and a communication network 210. In the present exemplary system, the mobile device 202 may be considered to be the device which is to be tracked. The information accessed using the plurality of devices and the smart watch connected to the mobile device 202 may be used to track the lost the mobile device 202. The application

server 204, the plurality of devices 206, the mobile device 202 and the smart watch 208 are connected to each other through the communication network 210. The communication network 210 may include, but not limited to radio network or Internet or short-range wireless communication methods like WiFi, Bluetooth, ZigBee, or Infrared transmission, a serial connection or any means of wired or wireless connection. The type of the plurality of devices 206, the mobile device 202 that form part of the invention have been listed in reference to Figure 1 and may be incorporated herein in Figure 2. Each of the devices including the mobile device 202, a smart watch 208, plurality of devices 206 are configured to scan and send real time information of themselves and of their nearby devices respectively to the application server 204. The real time information primarily includes information pertaining to location coordinates along with their time stamp and unique ids. The location coordinates are determined using GPS circuitry embedded in each of the mobile device 202, smart watch 208, plurality of devices 206. The application server 202 is further connected to a database (not shown), and the database is configured to store location information, name, unique ID of the mobile device 202, smart watch 208 and other plurality of devices 206, address, gender, age, last location, phone no, group name, health data, past travel route data, pertaining to the first users of the aforesaid devices etc. In an embodiment, the unique ID may be one of MAC Id, SSID, device id etc. The mobile device 202 is configured with a mobile application to track one or more first user activities and send information to the application server 204 along with its current location or geographical co-ordinates. The safety network system 200 uses each of connected/ paired device scans to identify and track the location of the mobile device 202 which is lost or not getting connected. The scan may be performed to identify current location of the mobile computing device 202, or last known location of the mobile computing device 202 or any paired device such as a smart watch 208 in the present case.

Figure 3 illustrates an exemplary implementation of a communication between the first user's mobile device and application the server through a first communication network. The references used in figure 2 may be used herein for the purposes of explanation of Figure 2. The first user has a mobile device 202 and a smart watch 208. The smart watch 208 is worn by the first user and paired with the mobile device 202. The mobile device 202 is connected to the application server 204. The mobile device 202 is configured with a mobile application to track one or more first user activities and send information to the application server 204 along with first user's current location or geographical co-ordinates. When the first user of mobile device 202 is in emergency situation, the first user through its mobile

device 202 or paired smart watch 208 initiates an SOS, wherein, a signal is transmitted to the application server 204, and the application server 204 in turn sends details of such emergency situation and transmits the location of first user to a group of one or more first users (not shown), known to first user. The group of one or more first users having those devices 206 which were in communication or in proximal tracking distance or nearby of the mobile device 202 in emergency situation. Prior to sending the emergency information to the application server 202, the mobile device 202 continuously scans location of the first user for the nearby devices. The scan may be a Bluetooth, BLE, WiFi, or NFC or scanning for a GSM signal or any other known scan in the art. The mobile device 202 collects the device ids of one or more nearby devices 206 (that may be static or dynamic or both) in the vicinity and location of the first user of the mobile device 202 and transmits such information as a first set of data to the application server 204, along with the location co-ordinates of the first user.

Generally, the mobile device 202 is configured to send current location information of the first user to the application server at periodic predetermined time period. The time period may be changed as per the requirements. And, when the application server 204 does not receive any communication from the first user's mobile device 202, then the application server 204 presumes that the first user is in emergency situation and could not able to generate a SOS due to damage of mobile device or some other hardware or software issue. During such situation, the application server 204 retrieves the very recent communication data (first set of data) received from the first user's mobile device 202 which has both last known location of the subject first user along with the devices which were near to the first user's mobile device 202. In case where the mobile device 202 of first user is destroyed or crashed, the application server 204 invariably assumes that the first user cannot be tracked, when no update is received from the first user for at least 20 minutes or a preconfigured duration (set by first user or server itself).

In one embodiment, the application server 204 prepares a second set of data which has the details of first set of data along with the first user's device IDs that include, but not limited to, mobile device ID, smart watch ID, apparel ID or any other device or smart device (smart watch 208 in the present case) connected and associated to the first user to the one or more network of first users (or users) or groups, which are known or unknown to the first user.

Figure 4 illustrates an exemplary implementation of a communication between the first user's mobile device, plurality of nearby mobile computing devices and application

server connected through a plurality of communication networks. In this figure, the application server 204 is connected to more than one communication networks of a group of first users. In the present case, the application server is connected to the mobile device 202 to be tracked through a first communication network, to a first group of first users G1 through a second communication network, to a second group of first users G2 through a third communication network. The first, second and third communication networks may or may not be the same. In the present case, the first communication network between mobile device 202 and the application server 204 is disconnected. The groups of first users are associated to the first user or near to the first user's mobile device 202. The first users in one or more groups which are near to the last known location of the first user may start the scan for the device IDs which shared by the first user. For example, there were four devices which were identified by the first user's mobile device 202, and device IDs of those four devices were transmitted to the application server 204, which is the last known information of the first user. The device IDs may include first user's devices such as watch, smart watch, mobile device, or any apparel, or IoT enabled devices in the vicinity of user's mobile device 202. The exemplary cases of detecting and tracking location of the first user are illustrated below:

Case: 1: During such scan, if any one of the users (of a group) for example, a second user reports any one of the device ID, then there is a possibility that, the second user is currently present at the location of the user. Further, the probability of user in that location is considered 'low'.

Case: 2: During such scan, if any two users (of a same or different group) for example, a second and third user reports any two of the device IDs, then there is a possibility that, the second and third user are currently present at the location of the first user. Further, the probability of first user in that location is considered 'medium.

Case: 3: During such scan, if any two or more users (of a same or different group) for example, a second, third and fourth user reports all four device IDs, then there is a possibility that, the second, third and four users are currently present at the location of the first user. Further, the probability of first user in that location is considered 'high'.

Case: 4: During such scan, if any one or more users (of a same or different group) for example, a second, and third user reports any one of the device IDs from two different location, then there is a possibility that, the first user is either present at second or third user's location, or user is being moved from one location to another. Further, the probability of first user in either of the location is considered 'medium'. In an embodiment, the mobile device 202 transmits the report data automatically, when there is at least one of device IDs is being identified through the scan. In another embodiment, the users of one or more groups may initiate the search and report the application server 204 with the details of their nearby devices in their respective locations, which is the first user's location or near to last known location of the first user. The application server 204 receives all device IDs reported by the users of one or more groups. In embodiment, the application server search for only those four device IDs in the pool of reported IDs in that area.

Case: 5: During such scan, if any one of the users (of a same or connected group) for example, a second user reports any one of the device ID and when such ID is the first user's smart watch device id, (or any other device of first user himself) then there is a possibility that, the second user, is currently present at the location of the first user. Further, the probability of first user in that location is considered 'very high'.

The smart watch 208 and mobile device 202 of first user are always in sync and whenever any disconnection happens, meaning, the smart watch 208 is disconnected from mobile device 206 and such incident is immediately reported to the application server 204 either by the user himself or automatically within a preset time, to the application server 204. In an embodiment, no action is taken by the application server 204, unless user initiates the SOS either in mobile application or touch or press of smart watch (long pressing the primary crown of watch) or any other gesture configured to initiate SOS. As long as the mobile device 202 of first user is functional or alive, it can keep scanning the nearby devices 206 and sending the information of latest devices with their IDs to the application server 204, along with location co-ordinates.

Case: 6: The mobile device ID of first user is found in location A, by one or more users and watch ID of first user is found in location B, so any one of these locations can be user's potential location. In an embodiment, the time of identification of such first user's

devices are analyzed to track, whether the user is present in that location or may be moved to another location.

Case: 7: In an embodiment, the first user is usually connected with the application server 204 through a mobile network or WIFI. When, the user disconnects the mobile computing device 202 from the application server 204 by switching off the mobile network (Mobile data is OFF or wifi is OFF), then the application server 204 is not able to receive the location of the user. In such a case, the application server 204 identifies the last known location of the user and sends instructions to the nearby devices 206 in and around the user's last known location of the user. When, the nearby devices 206 of second users or application server 204 or plurality of one or more users, perform scanning operation, there is a probability of finding the same MAC ID of the mobile device 202. In other words, during the scanning operation, when the application server 204 finds the MAC ID of mobile device 202, then the probability is 'very high' and user is present in the current location of second user. Also, in other use case, any one of first or second mobile computing device is identified during the scanning operation, then the probability is 'very high' and user is present in the current location of second user.

In an embodiment, the application server 204 may create a map of devices which were nearer to the first mobile computing device 102 along with the location of other users. The map shows the probability of first user's location based on the search results. The application server 204 tries to decode the travel path of first mobile computing device 102. The one or more users of group can view the map, on request. A ticket is raised by the application server 204, while the scanning operation starts. The ticket may contain the details of first user's details, details of first computing mobile computing device, device IDs of nearby devices of first computing mobile computing device.

When the one or more users in the different group finds the location of first user, the second users are requested by the application server 204 to check the location co-ordinates for the availability of first user or if any evidence and report back to the application server 204. If the first user is found, then the application server updates the data and send the message to all user in the group reporting the 'first user is found' and closes the ticket. If the first user is not found, then the application server updates with the probability data with respect to the user and location to all the users of the group.

In an embodiment, the application server 204 is configured to initiate dynamic searching of the first user wherein the dynamic searching is dependent on a plurality of routes that may be followed or generally followed by the first user. The application server 204 updates the other users found within the plurality of routes that may be followed or generally followed by the first user. For example, the application server 204 based on the real time information about presence or absence of the first user at a specific location of a route may perform different actions. If the real time information indicates that first user was found at the specific location of the route, the application server 204 may request the nearby users found at the specific location to terminate the search for the first user. Alternatively, if the real time information indicates that the first user was not found at the specific location, the application server 204 is configured to determine a plurality of exit travel routes available from the specific location. Accordingly, depending on the factors such as past travel history of the first user or other traffic related factors, the application server 204 is configured to update the other users of each of the exit travel routes to continue search for the first user. The dynamic and route dependent searching for the first user substantially improves tracking efficiency of the system.

Figure 5 is a flow chart describing the method 500 for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment. The method includes step 502 of establishing a communication between a first proximity communicator and a plurality of proximity communicators, wherein the first proximity communicator is installed within a first mobile computing device and the plurality of proximity communicators are installed within a plurality of nearby mobile computing devices respectively, step 504 of determining and tracking, via a location tracker, a current location of the first mobile computing device through the GPS during a normal mode of operation of the first mobile computing device, wherein the location tracker fails to determine the current location of the first mobile computing device during an emergency mode of operation of the first mobile computing device. Thereafter, a first set of information is generated in step 506 using the current location during the normal mode of operation and transmit the first set of information to an application server regularly at predetermined intervals and a second set of information is generated in step 508 using the first set of information when the first mobile computing device is in the emergency mode of operation, wherein the second set of information includes at least instructions for the plurality of nearby mobile computing devices to initiate scanning operations to detect the presence of the first mobile computing

device within their respective communication range. The method 500 further includes step 510 of receiving information from the plurality of nearby mobile computing devices regarding respective scanning operations; and step 512 of analyzing the respective scanning operations and determine the present location of the first mobile computing device therefrom.

In an implementation, the method 500 further includes determining probability of an existence of the first mobile computing device based on the analysis of the respective scanning operations; and ascertaining the current location based on the probability of the existence of the first mobile computing device.

In an implementation, the method 500 further includes establishing a synchronous communication between the first mobile computing device and the second mobile computing device; analyzing the respective scanning operations to determine present location of the second mobile computing device therefrom; and determining probability of present location of a first user in accordance with the present locations of the first mobile computing device and the second mobile computing device.

In an implementation, the method 500 further includes receiving information regarding current locations of the respective plurality of nearby mobile communicating devices; transmitting the current locations of the respective plurality of nearby mobile communicating devices to the application server.

In an implementation, the method 500 further includes the first set of information includes the current location, a plurality of identity attributes of the first mobile computing device, attributes of a first user of the first mobile computing device, device identities of the plurality of nearby mobile communicating devices and their respective locations.

In an implementation, the method 500 further includes regularly analyzing the first set of information from the first mobile computing device; and in absence of availability of the first set of information, labelling an existing mode of operation of the first mobile computing device as the emergency mode of operation.

In an implementation, the method 500 further includes detecting at least one emergency operational mode of the first mobile computing device wherein during the at least one emergency mode the location tracker fails to determine the current location of the first mobile computing device through GPS; and transmitting the information pertaining to the emergency operational mode of the first mobile computing device to the application server.

The drawings and the forgoing description give examples of embodiments. Those skilled in the art will appreciate that one or more of the described elements may well be

combined into a single functional element. Alternatively, certain elements may be split into multiple functional elements. Elements from one embodiment may be added to another embodiment. For example, orders of processes described herein may be changed and are not limited to the manner described herein. Moreover, the actions of any flow diagram need not be implemented in the order shown; nor do all of the acts necessarily need to be performed. Also, those acts that are not dependent on other acts may be performed in parallel with the other acts. The scope of embodiments is by no means limited by these specific examples. Numerous variations, whether explicitly given in the specification or not, such as differences in structure, dimension, and use of material, are possible. The scope of embodiments is at least as broad as given by the following claims.

Benefits, other advantages, and solutions to problems have been described above with regard to specific embodiments. However, the benefits, advantages, solutions to problems, and any component(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential feature or component of any or all the claims.

CLAIMS

We Claim:

1. A smart safety network system for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment, the smart safety network system comprising:

a first mobile computing device communicatively coupled to an application server, wherein the first mobile computing device comprises a first proximity communicator configured to communicate with a plurality of proximity communicators installed within a plurality of nearby mobile computing devices respectively;

a location tracker embedded within the first mobile computing device wherein the location tracker is configured to determine and track current location of the first mobile computing device through GPS during a normal mode of operation of the first mobile computing device, whereas the location tracker fails to determine the current location of the first mobile computing device during an emergency mode of operation of the first mobile computing device;

a controller configured to generate a first set of information using the current location during the normal mode of operation and transmit the first set of information to the application server regularly at predetermined intervals;

the application server comprising:

a server controller configured to generate a second set of information using the first set of information when the first mobile computing device is in the emergency mode of operation, wherein the second set of information includes at least instructions for the plurality of nearby mobile computing devices to initiate scanning operations to detect present location of the first mobile computing device within their respective communication range;

a receiver to receive information from the plurality of nearby mobile computing devices regarding respective scanning operations; and

an object locating unit configured to analyze the respective scanning operations and determine the present location of the first mobile computing device therefrom.

2. The system as claimed in claim 1, wherein the object locating unit is configured to firstly determine probability of an existence of the first mobile computing device based on the

analysis of the respective scanning operations and thereafter, determine the current location based on the probability of the existence of the first mobile computing device.

3. The system as claimed in claim 2, wherein the first mobile computing device is communicatively synchronized with a second mobile computing device; wherein the object locating unit is configured to analyze the respective scanning operations to determine present location of the second mobile computing device therefrom and determine probability of present location of a first user in accordance with the present locations of the first mobile computing device and the second mobile computing device.

4. The system as claimed in claim 1, wherein the first proximity communicator is configured to communicate with the other proximity communicators using at least one near or far-field communication technology to receive information regarding current locations of the respective plurality of nearby mobile communicating devices and the controller is configured to transmit the current locations of the respective plurality of nearby mobile communicating devices to the application server.

5. The system as claimed in claim 4, wherein the application server is configured to place the first mobile computing device under observation when the user inputs last known location of the first mobile computing device from another computing device and request to place the first computing device under the observation, wherein the application server is configured to track the location of the first mobile computing device using additional plurality of nearby communication devices and transmitting the tracked location to the user.

6. The system as claimed in claim 4, wherein the first set of information includes the current location, a plurality of identity attributes of the first mobile computing device, attributes of a first user of the first mobile computing device, device identities of the plurality of nearby mobile communicating devices and their respective locations.

7. The system as claimed in claim 6, wherein the device identities include static identities or dynamic identities of the respective plurality of nearby mobile computing devices.

8. The system as claimed in claim 1, wherein the application server further comprises a monitoring unit configured to:

regularly analyze the first set of information from the first mobile computing device; and

in absence of availability of the first set of information, the monitoring unit is configured to label an existing mode of operation of the first mobile computing device as the emergency mode of operation.

9. The system as claimed in claim 8, wherein the server controller is configured to label the first mobile computing device as a non-trackable device when the server controller does not receive the first set of information for a predetermined amount of time.

10. The system as claimed in claim 1, wherein the mobile computing device comprises:

an emergency detecting unit configured to detect at least one emergency operational mode of the first mobile computing device wherein during the at least one emergency mode the location tracker fails to determine the current location of the first mobile computing device through GPS; wherein the controller is configured to transmit the information pertaining to the emergency operational mode of the first mobile computing device to the application server.

11. The system as claimed in claim 10, wherein the emergency detecting unit is configured to display a user interface for facilitating the user to manually activate the emergency operational mode of the first mobile computing device.

12. The system as claimed in claim 1, wherein the application server further comprising:

a device identifying unit configured to determine additional plurality of mobile computing devices found within a predetermined range of a last detected current location of the first mobile computing device, wherein the server controller is configured to send identity related information of the first mobile computing device to the additional plurality of mobile computing devices.

13. The system as claimed in claim 1, wherein the application server is configured to store the information corresponding to the plurality of nearby mobile computing devices and associate the information with the first mobile computing device.

14. A method for tracking a mobile computing device having no access to a global positioning system (GPS) in an emergency environment, the method comprising:

establishing a communication between a first proximity communicator and a plurality of proximity communicators, wherein the first proximity communicator installed within a first mobile computing device and the plurality of proximity communicators installed within a plurality of nearby mobile computing devices respectively;

determining and tracking, via a location tracker, a current location of the first mobile computing device through the GPS during a normal mode of operation of the first mobile computing device, wherein the location tracker fails to determine the current location of the first mobile computing device during an emergency mode of operation of the first mobile computing device;

generating a first set of information using the current location during the normal mode of operation and transmitting the first set of information to an application server regularly at predetermined intervals;

generating a second set of information using the first set of information when the first mobile computing device is in the emergency mode of operation, wherein the second set of information includes at least instructions for the plurality of nearby mobile computing devices to initiate scanning operations to detect the presence of the first mobile computing device within respective communication range;

receiving information from the plurality of nearby mobile computing devices regarding respective scanning operations; and

analyzing the respective scanning operations and determine the present location of the first mobile computing device therefrom.

15. The method as claimed in claim 14, comprising:

determining probability of an existence of the first mobile computing device based on the analysis of the respective scanning operations; and

ascertaining the current location based on the probability of the existence of the first mobile computing device.

16. The method as claimed in claim 14, comprising:

establishing a synchronous communication between the first mobile computing device and the second mobile computing device;

analyzing the respective scanning operations to determine present location of the second mobile computing device therefrom; and

determining probability of present location of a first user in accordance with the present locations of the first mobile computing device and the second mobile computing device.

17. The method as claimed in claim 14, comprising:

receiving information regarding current locations of the respective plurality of nearby mobile communicating devices; and

transmitting the current locations of the respective plurality of nearby mobile communicating devices to the application server.

18. The system as claimed in claim 17, wherein the first set of information includes the current location, a plurality of identity attributes of the first mobile computing device, attributes of a first user of the first mobile computing device, device identities of the plurality of nearby mobile communicating devices and their respective locations.

19. The method as claimed in claim 14, further comprising:

regularly analyzing the first set of information from the first mobile computing device; and

in absence of availability of the first set of information, labelling an existing mode of operation of the first mobile computing device as the emergency mode of operation.

20. The method as claimed in claim 14, comprising:

detecting at least one emergency operational mode of the first mobile computing device wherein during the at least one emergency mode the location tracker fails to determine the current location of the first mobile computing device through GPS; and

transmitting the information pertaining to the emergency operational mode of the first mobile computing device to the application server.