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(71) Applicant: **TURKCELL TEKNOLOJI ARASTIRMA VE GELISTIRME ANONIM SIRKETI** [TR/TR]; Yeni Mahalle Pamukkale Sokak No:11, Soganlik, Kartal/Istanbul (TR).

(72) Inventors: **BEYAZ, Yusuf**; Aydinevler Mahallesi Inonu Caddesi No:36 Kucukyali Ofispark, Maltepe/Istanbul (TR). **DUMAN, Dogukan**; Yeni Mahalle Pamukkale Sokak No:11, Soganlik, Kartal/Istanbul (TR).

(74) Agent: **TRITECH PATENT TRADEMARK CONSULTANCY INC.**; Cankaya Mahallesi Mahmut Yesari Sokak No:8/5, 06690 Cankaya/Ankara (TR).

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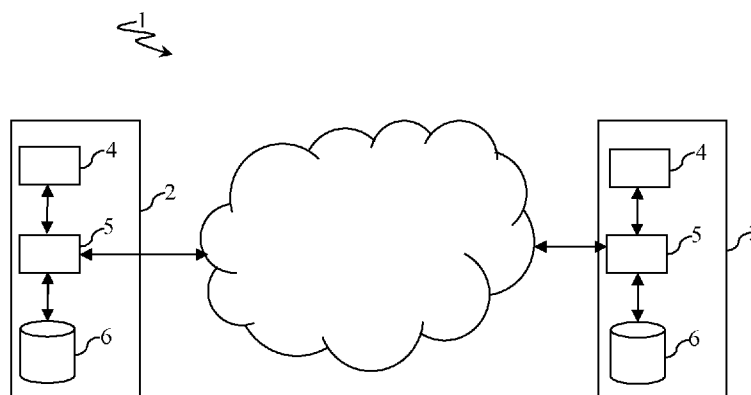


Figure 1

(57) Abstract: The present invention relates to a real-time location tracking system (1) for enabling parties to track each other's locations real -timely with high accuracy rate based on their permissions.

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## A REAL-TIME LOCATION TRACKING SYSTEM

### 5 **Technical Field**

The present invention relates to a real-time location tracking system for enabling parties to track each other's locations real-timely with high accuracy rate based on their permissions.

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### **Background of the Invention**

Today, mobile communication subscribers who take advantage of mobile communication upon rapid development of mobile communication can communicate with each other by means of mobile communication devices such as mobile phone, smart phone, portable computer. The said subscribers use different communication channels such as messaging, call establishing in order to communicate with each other. With the developing technology, service providers provide instant messaging programs enabling the users of mobile communication device to text each other real-timely, to their mobile communication subscribers.

20

In the state of the art, users can share their instant locations of their mobile communication devices –which are detected by means of location detection means such as GPS– with each other over the said instant messaging applications. Thereby, users can easily go to a place where their friends are located but they don't know, by means of the said location information. Recently, usage of systems whereby users can monitor locations of each other within a certain period of time is also included in the state of the art. However, these systems cannot create the route being followed by the users throughout the location tracking session and they do not also keep record of history-based location. In addition to this, location information of a detected mobile device are sent to the other party

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by a mobile device in systems which are included in the state of the art particularly by a location detection unit of the mobile device –for example a GPS receiver– without being passed through any filter together with an accuracy rate that is an indicator for example such as 50-100 meters. In the event that location data with low accuracy rate are sent to the other party, the other party cannot accurately determine the location of the user being tracked and this leads to user dissatisfaction.

The United States patent document no. **US9432810** discloses a time-limited real-time location sharing system and method by receiving approval. Users of the said system can perform duplex communication real-timely while they are sharing various information such as location, message, and metadata. The duplex communication is mentioned as session in the said system. The duplex communication preferably enables each user to see locations of all users in this communication.

### **Summary of the Invention**

An objective of the present invention is to realize a real-time location tracking system for enabling parties to track each other's locations real-timely with high accuracy rate based on their permissions.

### **Detailed Description of the Invention**

“A Real-Time Location Tracking System” realized to fulfil the objective of the present invention is shown in the figure attached, in which:

**Figure 1** is a schematic view of the inventive system.

The components illustrated in the figure are individually numbered, where the numbers refer to the following:

1. System
2. First mobile device
3. Second mobile device
- 5 4. Location detection unit
5. Location tracking application
6. Memory unit

A real-time location tracking system (1) comprises:

- 10 at least one first mobile device (2) which is carried by a user who wants to demand location tracking;
- at least one second mobile device (3) which is carried by a user who will meet the demand for location tracking;
- 15 at least one location detection unit (4) which is run on the first mobile device (2) and the second mobile device (3) and enables to detect the instant location and the speed of the first mobile device (2) and the second mobile device (3);
- at least one location tracking application (5) which is run on the first mobile device (2) and the second mobile device (3) and configured:
- 20 to send a location tracking message by the user of the first mobile device (2) to the user of the second mobile device (3) for a certain period of time;
- to meet the demand for location tracking that is received from the first mobile device (2) and to send response message by the user of the second mobile device (3) to the user of the first mobile device
- 25 (2) about the demand for location tracking;
- if the demand for location tracking is accepted by the user of the second mobile device (3); to send the location data about the instant location and the speed of the first mobile device (2)
- 30 obtained from the location detection unit (4) being run on the first mobile device (2) for the above-mentioned certain period of time,

5 to the second mobile device (3) periodically; to meet the location data that are sent over the first mobile device (2), on the second mobile device (3); to send the location data about the instant location and the speed of the second mobile device (3) obtained from the location detection unit (4) being run on the second mobile device (3), to the first mobile device (2) periodically; and to meet the location data that are sent over the second mobile device (3) on the first mobile device (2);

10 to present the location data that are received from the second mobile device (3) to the user of the first mobile device (2) on a map, the location data that are received from the first mobile device (2) to the user of the second mobile device (3) on a map and to terminate the location data sharing between the first mobile device (2) and the second mobile device (3) at the end of the

15 above-mentioned certain period of time;

at least one memory unit (6) which is run on the first mobile device (2) and the second mobile device (3) and is in communication with the location tracking application (5); receives the location data that are received from the first mobile device (2) and/or the second mobile device

20 (3), from the location tracking application (5) and then keeps them under record on the basis of date and time.

The location tracking application (5) included in the inventive real-time location tracking system (1) is configured to create a route by processing the said location

25 data in the event that a plurality of location data is received from the first mobile device (2) and/or the second mobile device (3) during a location tracking session. The location tracking application (5) is also configured to present the created route to a user real-timely on a map.

30 The location tracking application (5) included in the inventive real-time location tracking system (1) is configured to realize the demand for location tracking sent

from the first mobile device (2) to the second mobile device (3), the response message about the demand for location tracking from the second mobile device (3) to the first mobile device (2) and the data transfer being carried out between the first mobile device (2) and the second mobile device (3) by means of XMPP  
5 (Extensible Messaging and Presence Protocol) packages.

The first mobile device (2) included in the real-time location tracking system (1) and used by a user who wants to perform location tracking is essentially an electronic device such as smartphone, tablet computer which can run at least one  
10 location tracking application (5) on itself and has at least one screen that enables to display the menu of the location tracking application (5) and at least one input unit such as touchscreen or keypad that enables to make a choice from the menu of the location tracking application (5).

15 The second mobile device (3) included in the real-time location tracking system (1) and used by at least one user who will meet the demand for location tracking received from the user of the first mobile device (2) is essentially an electronic device such as smartphone, tablet computer which can run at least one location tracking application (5) on itself and has at least one screen that enables to display  
20 the menu of the location tracking application (5) and at least one input unit such as touchscreen or keypad that enables to make a choice from the menu of the location tracking application (5).

The location detection unit (4) included in the real-time location tracking system  
25 (1) is run on the first mobile device (2) and the second mobile device (3). The location detection unit (4) is in communication with the location tracking application (5) being run on the first mobile device (2) and the second mobile device (3). The location detection unit (4) being run on the first mobile device (2) sends the location data about the first mobile device (2) to the location tracking  
30 application (5) being run on the first mobile device (2) so as to be sent to the second mobile device (3) upon detecting the instant location and the speed of the

first mobile device (2) when it is triggered by the location tracking application (5) during a location tracking session. Similarly, the location detection unit (4) being run on the second mobile device (3) sends the location data about the second mobile device (3) to the location tracking application (5) being run on the second mobile device (3) so as to be sent to the first mobile device (2) upon detecting the instant location and the speed of the second mobile device (3) when it is triggered by the location tracking application (5) during a location tracking session. In a preferred embodiment of the invention, the location detection unit (4) is a GPS receiver. In a preferred embodiment of the invention, the location detection unit (4) also sends the data about the accuracy of the location detection to the location tracking application (5) while it sends the location data –that comprises the location and speed data of the first mobile device (2) or the second mobile device (3) detected– to the location tracking application (5) as well.

The location tracking application (5) included in the real-time location tracking system (1) is run on the first mobile device (2) and the second mobile device (3) and it is in communication with the location detection unit (4) and the memory unit (6). The location tracking application (5) meets the demand message in order to perform reciprocal location tracking for a certain period of time that is sent to the user of the second mobile device (3) by the user of the first mobile device (2) on the second mobile device (3). The location tracking application (5) presents the demand for location tracking to the user of the second mobile device (3) over the screen of the second mobile device (3) and offers choices to this user whether to accept the demand or not. Depending on the message of the user of the second mobile device (3), the location tracking application (5) creates a response message for the demand for location tracking in return for the demand message received from the first mobile device (2) and sends this message to the first mobile device (2). The location tracking application (5) meets the response message for the location tracking that is received from the second mobile device (3), on the first mobile device (2). If the user of the second mobile device (3) refuses the demand for location tracking, the location tracking application (5) notifies this condition to

the user of the first mobile device (2) over the screen of the first mobile device (2) and it does not initiate any location tracking session. If the user of the second mobile device (3) accepts the demand for location tracking, the location tracking application (5) notifies this condition to the user of the first mobile device (2) over the screen of the first mobile device (2) and a location tracking session is initiated among the location tracking applications (5) which are run between the first mobile device (2) and the second mobile device (3). The location tracking applications (5) –which is run on the first mobile device (2) for the certain period of time stated in the demand for location tracking by the user of the first mobile device (2)– again sends the location data about the instant location and the speed of the first mobile device (2) obtained by the location detection unit (4), to the second mobile device (3) periodically by connecting to the location detection unit (4) being run on the first mobile device (2) at certain periods and similarly the location tracking applications (5) –which is run on the second mobile device (3)– again sends the location data about the instant location and the speed of the second mobile device (3) obtained from the location detection unit (4), to the first mobile device (2) periodically by connecting to the location detection unit (4) being run on the second mobile device (3) at certain periods. The location tracking applications (5), which is run on the first mobile device (2), meets the location data of the second mobile device (3) that are received from the location tracking applications (5) located on the second mobile device (3) and it keeps these location data under record on the basis of date and time by connecting to the memory unit (6) that is run on the first mobile device (2). The location tracking applications (5), which is run on the first mobile device (2), also processes the location data that are received from location tracking applications (5) being run on the second mobile device (3) and presents these data to the user of the first mobile device (2) by means of a map on the screen of the first mobile device (2). The location tracking applications (5), which is run on the second mobile device (3), meets the location data of the second mobile device (3) that are received from location tracking applications (5) being run on the first mobile device (2) and it keeps these location data under record on the basis of date and time by connecting

to the memory unit (6) that is run on the second mobile device (3). The location tracking applications (5), which is run on the second mobile device (3), also processes the location data that are received from location tracking applications (5) being run on the first mobile device (2) and presents these data to the user of the second mobile device (3) by means of a map on the screen of the second mobile device (3). In an embodiment of the invention wherein a plurality of location data are shared among the location tracking applications (5) being run on the first mobile device (2) and the second mobile device (3), the location tracking applications (5) processes the said location data and creates a route by interconnecting these data. The location tracking applications (5) presents the created route to the user of the first mobile device (2) and the user of the second mobile device (3) over the screen of the first mobile device (2) and the second mobile device (3). When the certain time stated in the demand for location tracking is completed by the user of the first mobile device (2), the connection between the first mobile device (2) and the second mobile device (3) finishes and thus the tracking session is terminated

In a preferred embodiment of the inventive real-time location tracking system (1), the location tracking applications (5) also receives a data about the accuracy value of the location data together with the location data from the location detection unit (4). The location tracking applications (5) is configured in order not to send the said location data to the location tracking applications (5) with which it is matched for the location tracking session if it determines that a location data with a lower accuracy value than a pre-determined accuracy value is detected by the location detection unit (4). Thereby, it is ensured that the location tracking applications (5) sends a location data with a certain accuracy rate to the location tracking applications (5) with which it is matched for the location tracking session and thus a high accuracy is achieved in terms of location tracking.

In a preferred embodiment of the invention, the location tracking applications (5) is configured to receive the location address information such that it will comprise

at least the latitude and longitude information of the location chosen by the user and the detail information about the chosen location –namely the estimated speed of the user at that location and accuracy rate of the said detected location of the user– from the memory unit (6) and to present them to the user over the screen, in  
5 the event that the user chooses one of the locations indicated on the map.

The memory unit (6) included in the real-time location tracking system (1) is run on the first mobile device (2) and the second mobile device (3) and it is in communication with the location tracking application (5) being run on the first  
10 mobile device (2) and the second mobile device (3). The message about the demand for location tracking sent from the location tracking application (5) being run on the first mobile device (2) to the location tracking application (5) being run on the second mobile device (3) is kept under record inside the memory unit (6) on the basis of date and time. Also, the response of the message about the demand  
15 for location tracking sent from the location tracking application (5) being run on second mobile device (3) to the location tracking application (5) being run on the first mobile device (2) is kept under record inside the memory unit (6) on the basis of date and time. The location data about the first mobile device (2) sent from the location tracking application (5) being run on the first mobile device (2) to the  
20 location tracking application (5) being run on the second mobile device (3) and the location data about the second mobile device (3) sent from the location tracking application (5) being run on the second mobile device (3) to the location tracking application (5) being run on the first mobile device (2) are also kept under record inside the memory unit (6) on the basis of date and time. Thereby,  
25 the users of the first mobile device (2) and the second mobile device (3) can see the locations that they have tracked real-timely previously over the screen of the first mobile device (2) and the second mobile device (3) even after the location tracking session is over.

Within these basic concepts; it is possible to develop various embodiments of inventive “Real-Time Location Tracking System (1)”, the invention cannot be limited to examples disclosed herein and it is essentially according to claims.

## CLAIMS

1. A real-time location tracking system (1) for enabling users to track each other's locations real-timely with high accuracy rate based on their permissions; **comprising**
- 5 at least one first mobile device (2) which is carried by a user who wants to demand location tracking;
- at least one second mobile device (3) which is carried by a user who will meet the demand for location tracking;
- 10 at least one location detection unit (4) which is run on the first mobile device (2) and the second mobile device (3) and enables to detect the instant location and the speed of the first mobile device (2) and the second mobile device (3);
- at least one location tracking application (5) which is run on the first mobile device (2) and the second mobile device (3) and configured to send the location data of the first mobile device (2), that is detected during the location tracking between the first mobile device (2) and the second mobile device (3), to the second mobile device (3) and to send the detected location data of the second mobile device (3) to the first mobile device (2);
- 15 and
- 20 at least one memory unit (6) which is run on the first mobile device (2) and the second mobile device (3) and is in communication with the location tracking application (5); receives the location data that are received from the first mobile device (2) and/or the second mobile device (3), from the location tracking application (5) and then keeps them under record on the basis of date and time;
- 25 **and characterized by**
- at least one location tracking application (5) which is configured to create a route by processing the said location data in the event that a plurality of location data is received from the first mobile device (2) and/or the second mobile device (3) during a location tracking session. The location tracking
- 30

application (5) is also configured to present the created route to a user real-time on a map.

2. A real-time location tracking system (1) according to Claim 1;  
5 **characterized by** the location tracking application (5) which is configured to send a location tracking message by the user of the first mobile device (2) to the user of the second mobile device (3) for a certain period of time; to meet the demand for location tracking that is received from the first mobile device (2) and to send response message by the user of the second  
10 mobile device (3) to the user of the first mobile device (2) about the demand for location tracking;  
if the demand for location tracking is accepted by the user of the second mobile device (3); to send the location data about the instant location and the speed of the first mobile device (2) obtained from the location  
15 detection unit (4) being run on the first mobile device (2) for the above-mentioned certain period of time, to the second mobile device (3) periodically; to meet the location data that are sent over the first mobile device (2), on the second mobile device (3); to send the location data about the instant location and the speed of the second mobile device (3) obtained  
20 from the location detection unit (4) being run on the second mobile device (3), to the first mobile device (2) periodically; and to meet the location data that are sent over the second mobile device (3) on the first mobile device (2);  
to present the location data that are received from the second mobile  
25 device (3) to the user of the first mobile device (2) on a map, the location data that are received from the first mobile device (2) to the user of the second mobile device (3) on a map and  
to terminate the location data sharing between the first mobile device (2) and the second mobile device (3) at the end of the above-mentioned certain  
30 period of time.

3. A real-time location tracking system (1) according to Claim 1; **characterized by** the location tracking application (5) which is configured to present the created route to a user real-timely on a map.
- 5 4. A real-time location tracking system (1) according to Claim 1 or 2; **characterized by** the location tracking application (5) which is configured to realize the demand for location tracking sent from the first mobile device (2) to the second mobile device (3), the response message about the demand for location tracking from the second mobile device (3) to the first  
10 mobile device (2) and the data transfer being carried out between the first mobile device (2) and the second mobile device (3) by means of XMPP packages.
- 15 5. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the first mobile device (2) which is an electronic device such as smartphone, tablet computer that can run at least one location tracking application (5) on itself and has at least one screen enabling to display the menu of the location tracking application (5) and at least one input unit such as touchscreen or keypad enabling to make a  
20 choice from the menu of the location tracking application (5).
- 25 6. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the second mobile device (3) which is an electronic device such as smartphone, tablet computer that can run at least one location tracking application (5) on itself and has at least one screen enabling to display the menu of the location tracking application (5) and at least one input unit such as touchscreen or keypad enabling to make a choice from the menu of the location tracking application (5).

- 5 7. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the location detection unit (4) which is run on the first mobile device (2) and the second mobile device (3) and is in communication with the location tracking application (5) being run on the first mobile device (2) and the second mobile device (3); and is configured to send the location data about the first mobile device (2) to the location tracking application (5) being run on the first mobile device (2) so as to be sent to the second mobile device (3) upon detecting the instant location and the speed of the first mobile device (2) when it is triggered by the location tracking application (5) during a location tracking session and to send the location data about the second mobile device (3) to the location tracking application (5) being run on the second mobile device (3) so as to be sent to the first mobile device (2) upon detecting the instant location and the speed of the second mobile device (3) when it is triggered by the location tracking application (5) during a location tracking session.
- 10 8. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the location detection unit (4) which is a GPS receiver.
- 15 9. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the location detection unit (4) which is configured to send the data about the accuracy of the location detection to the location tracking application (5) while it sends the location data –that comprises the location and speed data of the first mobile device (2) or the second mobile device (3) detected– to the location tracking application (5) as well.
- 20 25 30 10. A real-time location tracking system (1) according to Claim 9; **characterized by** the location tracking application (5) which is also

configured to receive a data about the accuracy value of the location data together with the location data from the location detection unit (4).

- 5
11. A real-time location tracking system (1) according to Claim 10;  
**characterized by** the location tracking application (5) which is configured in order not to send the said location data to the location tracking applications (5) with which it is matched for the location tracking session if it determines that a location data with a lower accuracy value than a pre-determined accuracy value is detected by the location detection unit (4).
- 10
12. A real-time location tracking system (1) according to any of Claim 2 to 11;  
**characterized by** the location tracking application (5) which is configured to receive the location address information such that it will comprise at least the latitude and longitude information of the location chosen by the user and the detail information about the chosen location –namely the estimated speed of the user at that location and accuracy rate of the said detected location of the user– from the memory unit (6) and to present them to the user over the screen, in the event that the user chooses one of the locations indicated on the map.
- 15
- 20
13. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the memory unit (6) which is run on the first mobile device (2) and the second mobile device (3) and is in communication with the location tracking application (5) being run on the first mobile device (2) and the second mobile device (3).
- 25
- 30
14. A real-time location tracking system (1) according to any of the preceding claims; **characterized by** the memory unit (6) which keeps the message about the demand for location tracking sent from the location tracking application (5) being run on the first mobile device (2) to the location

tracking application (5) being run on the second mobile device (3); the  
response of the message about the demand for location tracking sent from  
the location tracking application (5) being run on second mobile device (3)  
to the location tracking application (5) being run on the first mobile device  
5 (2); the location data about the first mobile device (2) sent from the  
location tracking application (5) being run on the first mobile device (2) to  
the location tracking application (5) being run on the second mobile device  
(3) and the location data about the second mobile device (3) sent from the  
location tracking application (5) being run on the second mobile device (3)  
10 to the location tracking application (5) being run on the first mobile device  
(2) under record on the basis of date and time.

Figure 1

