LBS 2014

Development of Location API for Tracking Continuous Non-Response Calls

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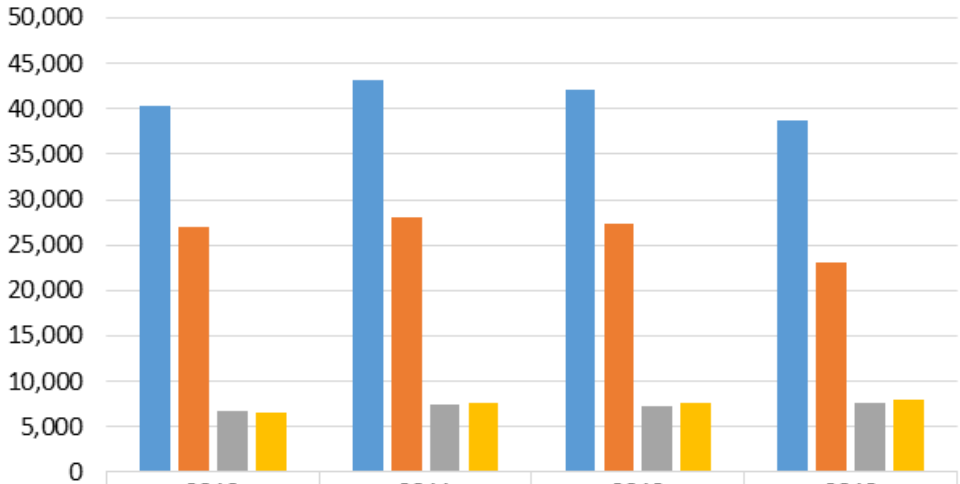
Contents

Background

The number of missing people in the South Korea, 2010–2013



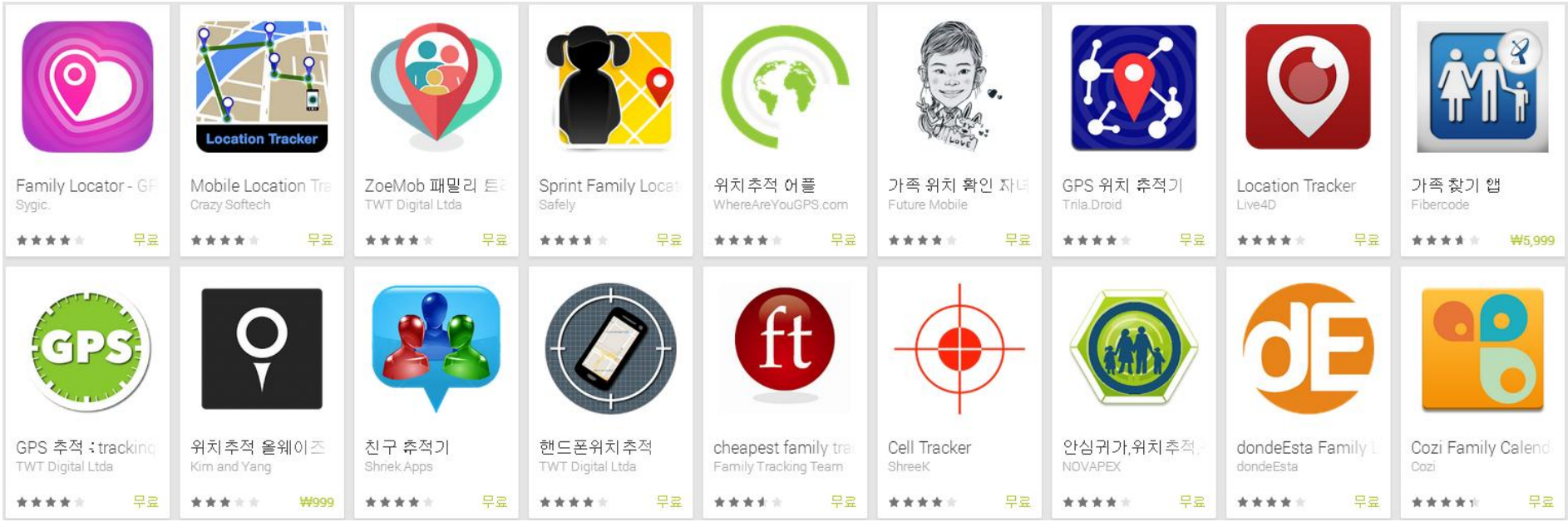
	2010	2011	2012	2013
All	40,261	43,080	42,169	38,695
Child (under 18 age)	26,984	28,099	27,295	23,089
Handicapped person	6,708	7,377	7,224	7,623
Dementia patient	6,569	7,604	7,650	7,983

Source: National police agency

- On average, over 41,000 people went missing every year.
- Especially, the number of missing child is higher than handicapped person and dementia patient.

Background

- Many mobile Apps related with the location tracking for children and family’s safety



Source: Google Play, https://play.google.com/store

Background
: Features of existing applications

- Feature of existing applications; "Active" and "Passive"

Active part	Passive part
✓ To send user's location information to another party automatically ✓ To share their location information periodically	✓ To decide, whether users can send their own location information to their protectors

- The methods for location information notification
  - Social Network Service(SNS) ex) Facebook, twitter
  - Short Message Service(SMS)

- The method for obtaining location coordinates
  - GPS and WiFi

Background
: Problems & Considerations of existing apps

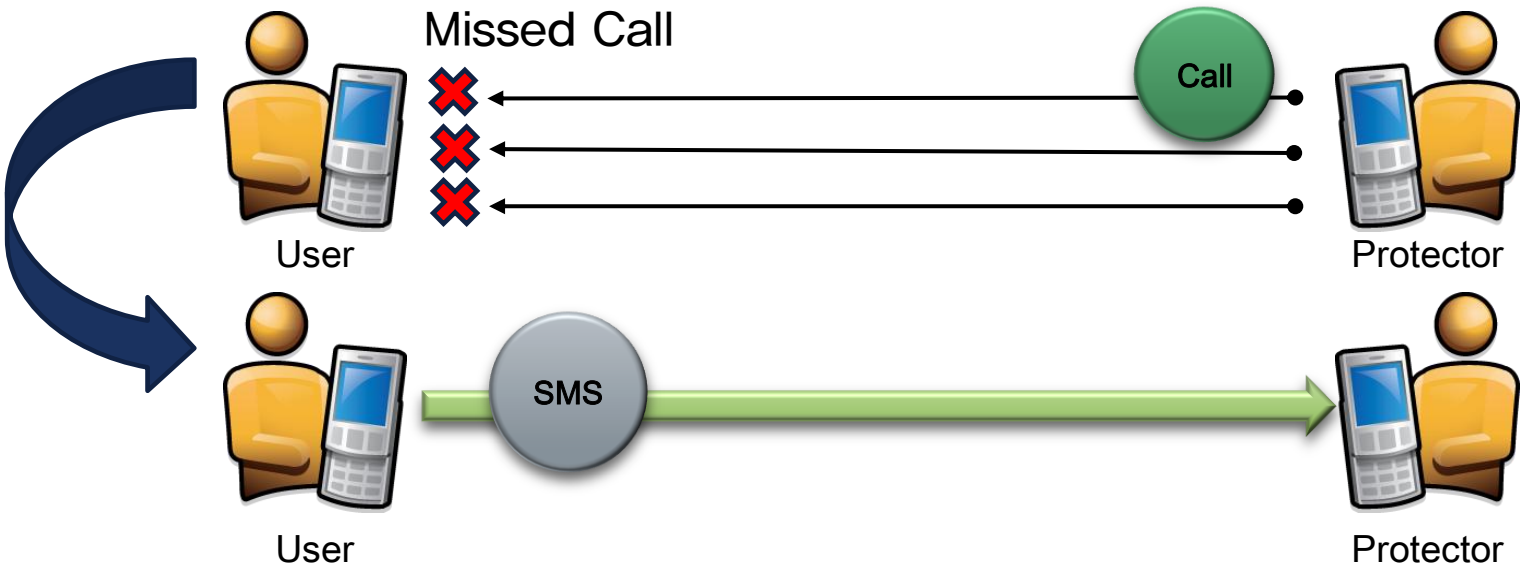
- In respects of hardware, the battery usage is a big concern

  → Because it is tracking location consistently, the GPS is operating all the time.

- In ethical aspect, Continuously monitoring location can cause issues related to privacy

- In the case of applications which can provide current location such as SNS, the disconnection of internet network can be considerable problem in emergency situation

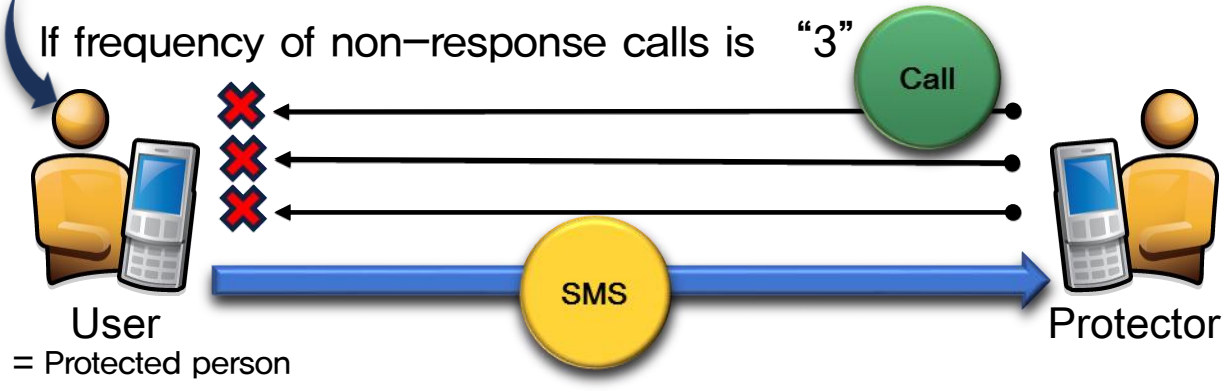
Objective



- This study considers emergency situation in which people can't receive a call from a protector.
- This study's goal is to develop location-tracking API and give location information to the protector through SMS after calculating the continuous non-response calls.

Overall Process

- Registration of Specific Protector's Information
: Protector's name, Phone number, Frequency of non-response calls



1) If a user defined that frequency of non-response is "3" and the protected person didn't respond to protector's call at the same frequency, message will be sent to a protector through SMS, which also includes the location information.

2) The message includes some sentences and a URL that can be connected to a map-webpage as well.

3) If the protector that received the SMS clicks on the URL, the location information parameters are then marked on the map service and the protector can confirm location of protected person.

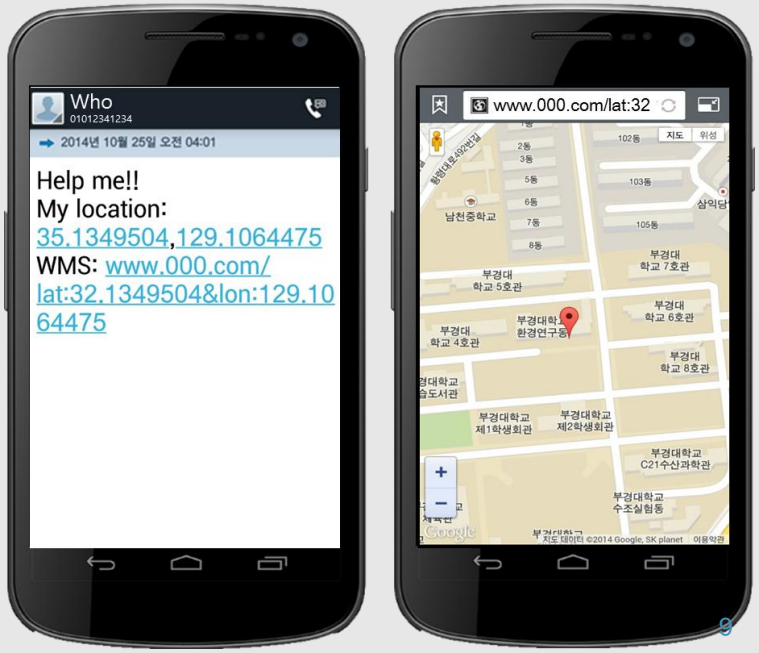
System Architecture

Part of user's mobile application

- **Registration of Specific Protector's Information**
  - ✓ Name
  - ✓ Phone number
  - ✓ Frequency of non-response calls
- **Tracking Call Record**
  - ✓ Android CallLog API / Uri API
  - ✓ Checking phone number, frequency of non-response calls and time of final message that is sent
- **Getting Coordinates of Location**
  - ✓ Android Location API
  - ✓ GPS (GPS_PROVIDER)
  - ✓ WiFi (NETWORK_PROVIDER)
- **Sending Massage**
  - ✓ Android SmsManager
  - ✓ Content ex) Help me/ My location: ...
  - ✓ URL that is connected map web service

Part of web map service

- JSP(Java Server Page)
- Google Maps API



System Architecture
: Registration of Specific Protector’ s attributes

Part of user’ s mobile application

- **Registration of Specific Protector’ s attriibutes**
  - ✓ Name
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  - ✓ Android CallLog API / Uri API
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  - ✓ URL that is connected map web service

- Users can set a specific protector, phone number and frequency of missed call themselves.
- This attributes can be used when compare with call-logs and when deliver the location information to protectors.

System Architecture
: Call-Log data vs Registration data

Part of user's mobile application

- **Registration of Specific Protector's Information**
  - ✓ Name
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  - ✓ Frequency of non-response calls
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  - ✓ URL that is connected map web service

- This part is to compare between call-logs and the protector's information that the user already registered
- The call-logs can be received through android call-log API
- If the number of missed-calls from the protector exceeds the frequency that user set in advance, the process then continues to the third part

System Architecture
: Obtaining the Coordinates of Location

Part of user's mobile application

- **Registration of Specific Protector's Information**
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  - ✓ Checking phone number, frequency of non-response calls and time of final message that is sent
- **Getting Coordinates of Location**
  - ✓ Android Location API
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- **Sending Massage**
  - ✓ Android SmsManager
  - ✓ Content ex) Help me/ My location: ...
  - ✓ URL that is connected map web service

- To obtain the coordinates, the android location API is used.
- After measuring the accuracy of GPS or WiFi respectively, the coordinates are obtained from a sensor which has a high accuracy rate.

System Architecture
: Sending Massage

Part of user's mobile application

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  - ✓ Android SmsManager
  - ✓ Content ex) Help me/ My location: ...
  - ✓ URL that is connected map web service

- Message will include some sentence and a URL that can be connected to map webpage as well, same as this figure.

Help me!!
My location:
35.1349504,129.1064475
WMS: www.000.com/
lat:32.1349504&lon:129.10
64475

System Architecture : Web map service

Part of web map service

- JSP(Java Server Page)
- Google Maps API

- It consists of the Java Service Page(JSP) and google maps.
- It can get location information such as latitude and longitude from parameters and mark this locations on the google maps.

Conclusion and Future Work

1. Conclusion

- This study is still ongoing project for developing location-tracking API through counting missed calls coming from a protector.
- This API is available when a user is in a situation when they don't receive a phone call or have no internet connection.
- This API can obtain location information in an indoor or outdoor environment because it is using GPS and WiFi.
- This API can minimize battery efficiency and privacy problem because It doesn't track location consistently.

2. Future Work

- To Investigate of specific method for development

  : minimization of the battery consumption / conversion to short URL….

- To further research the algorithm of this system

Thank you so much for your time!