

# 지오소셜 정보 기반 개인 맞춤형 경고 시스템 원형 구현

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## Prototype Implementation of a Personalized Warning Notification System based on Geosocial Information

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### 요 약

Nowadays a disaster event such as a building on fire, an earthquake or typhoon could occur any time, and any where. In such event, a warning notification system is a vital tool to send warning notifications to at-risk people in advance and provide them useful information to escape the dangerous area. Though some systems have been proposed such as emergency alert system using android, SMS or P2P overlay network, these works mainly focus on a reliable message distribution methods. In this work, we introduce a full prototype implementation of a personalized warning notification system based on geosocial information, which generates a personalized warning message for each user and delivers the messages through email or an android application. The system consists of four main modules: a web interface, database, a knowledge-based message generator, and message distributor. An android application is also created for user to receive warning messages on their smart phone. The prototype has been demonstrated successfully with a building-on-fire scenario.

### 1. Introduction

A warning notification system is a system that can quickly send out important emergency information targeted to specific area. The system is essential to warn the at-risk population about dangerous event in advance and provide them with survival information.

Recently, researchers have proposed several warning notification system. For example, in [1] and [2], Short Message Service (SMS) were proposed to be a reliable method to deliver emergency warning message. Similarly in [3] and [4], the authors take advantage of the Cell Broadcasting Service (CBS) to distribute warning messages over mobile network. Another work as in [5] has developed an emergency alert system using android, which aim to solve the problem of sending warning message to a wide range of people in bad network traffic by splitting bulk messages. With similar goal, a notification system called GSFord was proposed in [6]. The GSFord built a robust geo-aware P2P overlays to successfully deliver notification message in extreme situations. These works mainly focus on message distribution methods in emergency

case. However, only broadcast some general information about the emergency event is not enough. If the message was personalized specifically to an individual, it could be much more meaningful. In [7], a design of knowledge-based message generator for personalized warning notification system was proposed. The personalized warning message is generated based on geosocial information such as user current location, subscribed area and relationship as well as event information. So far a full prototype system has not yet been implemented. Therefore, in this work, we want to build a full prototype of a personalized warning notification system based on geosocial information.

There are several key requirements that a personalized warning notification system must satisfy. First, it must have an interface such as a web interface to collect geosocial information about user and emergency event. Through the interface, user can update their contact information, social relationship, current location, and subscribe areas while administrator can create, update and notify emergency event. A database is required to store the collected geosocial

data. Then, we need a knowledge based message generation engine to process the geocial data and generate personalized message for each individual involved in the event. Finally, a message distribution module is required to deliver the messages successfully.

## 2. Personalized Warning Notification System

The architecture of our prototype is illustrated in figure 1 with four main blocks: web interface, database, knowledge-based message generator and message distributor.

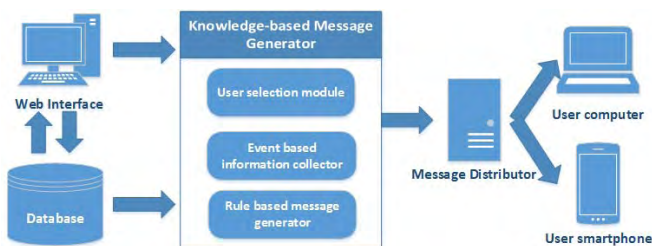


Figure 1: Architecture of our prototype.

The web interface is designed to resemble a social network where user can connect to their friend and family, update their current location and subscribe an interest area. As a warning notification system, it also has ability to create and manage emergency event.

The user information such as id, location, interested area, contact, relationships, etc. is stored in Userinfo database. Another schema is used to store disaster information such as preliminary caution, evacuation routes, emergency phone number, etc.

After an event is created and stored in disaster database, the web interface will trigger the knowledge based message generator to start working. The user selection module will find the users who are involved directly in the event by using their current location, subscribed area. Then, through their relationship, the module can find people who are indirectly related to the event such as their family member, colleague or nearby friend. Since these people might help the ones actually involved in the event to overcome it.

On the other hand, the event based information collector will collect all information about the emergency case from the database. The output the user selection module and event base information collector will be sent to rule based message generator. In here, a message for each individual will be generated based on our defined rules. We classify users into four types: target user - who are inside the dangerous event, subscribed user - who are interested in the event,

safety incharge of the event location, and friend or family of target user. Based on these types, different message contents are generated for each user.

After all warning messages are generated, they will be transferred to the message distribution modules. Here, each message will be sent the right receiver one by one through email and android application.

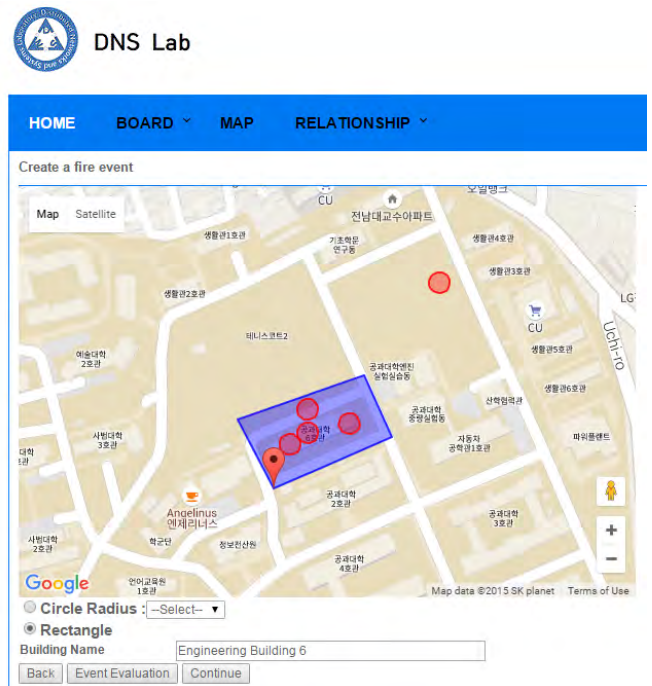


Figure 2: Creating a building on fire event.

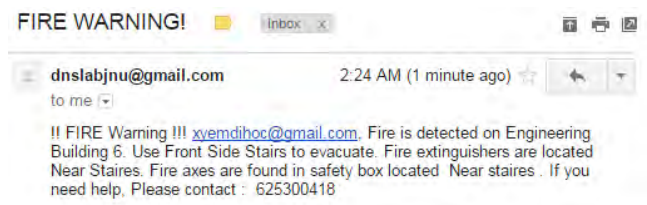


Figure 3: A received message of a target user.

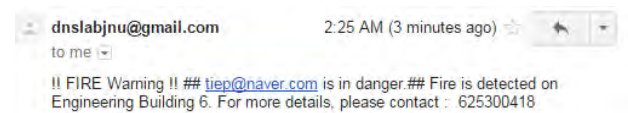


Figure 4: A received warning message of a family member of target user

We have implemented successfully a prototype of our system. Our demonstration uses this prototype to create a building-on-fire event and send personalized warning message to the people in danger. The event creation is illustrated in figure 2. The figure 3 and 4 show the received messages of a target user and his family member respectively.

### 3. Conclusion

Natural disasters such as a building on fire or an earthquake might occur unexpectedly and cause significant loss. Therefore, a disaster warning notification system is required to immediately provide people with useful information for dealing with emergency. To this end, we have presented a full prototype implementation of a personalized warning notification system based on geosocial information and demonstrate it successfully through a building-on-fire scenario.

For future work, we need to develop a highly reliable way to deliver warning message in a timely constraint where network failures exist due to a disaster. For that, we can build a P2P overlays based on geosocial data to distribute warning messages.

### Acknowledgements

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