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DESIGN OF GNSS-BASED M2M EARLY WARNING SYSTEM FOR IMPROVEMENT OF REACHABILITY OF INFORMATION

Abstract

In this paper I aim to describe our design of a M2M GNSS-based early warning system, using sirens or public vehicles to improve reachability of disaster information, which should be delivered to people who do not have a GNSS receiver. When a large-scale disaster occurs, ground communication infrastructure may be damaged and disaster information may no longer be applicable. In such cases, satellites will remain unaffected by damage and can be used as a tool to provide important information. The augmentation signal of GNSS can be received using a GNSS receiver, which is widely used such as a smartphone, unlike a satellite mobile phone. Research on receiving information through smartphones applying the GNSS-System technology is being conducted, however the way of delivering the disaster information to people, who do not have a mobile phone needs our attention.

The purpose of this research is to develop a system, which delivers disaster information via GNSS to people who do not have a GNSS receiver. To realize this, we aim to design the fore-mentioned M2M Early Warning System. In our system, the various machines will receive the information from the GNSS-system and deliver it immediately, so the disaster prevention system using satellite and those using the service on ground, can be linked and arranged optimally.

In this paper, we consider the effect of applying sirens. There are areas so remote that the geographical distance complicates the usage of sirens as a means of warning. To be able to reach and deliver the disaster information to these remote areas, public vehicles, which are moving on the ground can receive the information from the GNSS-System and deliver it audibly through speakers attached to a vehicle. Through the usage of vehicles you will increase the chance of reaching those living in remote areas, where sirens cannot reach, thereby efficiently delivering disaster information.

Busses in the suburbs of Tokyo would be an ideal means of transportation to implement the GNSS-System in. Considering the reception of signal from the Quasi-Zenith Satellite System (QZSS), which depends on receiving environment, the rate of area and time zone is evaluated where and when the information form public vehicle will be reached. Then the M2M system is constructed and tested in the suburbs of Tokyo. The loud speakers receive the disaster information from the QZSS and alert it automatically. The sound reaches remote areas where sirens cannot be heard.