

Development of the gathering and analyzing system for seismic response by use of the sensor cloud technology

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Strong motion seismometer network covering all over the country as typified by the K-NET, KiK-net, and the data center which accumulates seismic data recorded by these seismometers have been developed and maintained in Japan for approximately 20 years. Such valuable observation systems have been supported by a number of human resources and investments.

On the other hand, we have been developing the "Sensor Cloud" technology intended to be utilized for a rapidly damage detection of buildings or a real-time data transmission, taking an approach of sensing technology and IT technique such as the cloud computing.

Currently, we are mainly developing the "Sensor Cloud" system by utilizing MEMS (Micro Electro Mechanical Systems) acceleration meters inside mobile terminals. But, we intend to use other micro-sensors such as GPS, gyro, and video pictures. By utilizing these multi-sensors, we aim to capture the seismic response of the building in three dimensions, and then, archive the data on a cloud environment, finally, make benefits of seismic damage estimations.

Until now, we have been performed many monitoring experiments by utilizing plural sensors installed in different types of buildings. These records have been uploaded to the cloud server in a few minutes via internet. Then, we can easily download these data by clicking icons plotted on the map. Moreover, we can make easy analyses such as integral, FFT, orbit, or Seismic Intensity, only by the web browser.

By adding these new features, citizens who have no experiences of analyzing seismic data become available to install their own seismometers, and they can compare waves recorded by another areas from the standpoint of an amplitude or a predominant frequency.

However, these data are not always desirable for owners of each buildings. So, we have developed the hierarchic structure of an account and a limitation of access by the authentication.

As described above, we have produced the correcting and analyzing system working on the cloud recorded by MEMS acceleration sensors inside mobile terminals. In the future, we are going to develop archiving system recorded by multi-sensors, and also we are going to apply machine learning techniques to a large amount of these data.

Finally, it is important to regard not only with a view of the developer but also the user to develop these system as the social implementation. So, it is crucial to cooperate with experimental partners including governments, companies, and citizens.

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