Earthquake Warning System
EqWS

CSIR-CSIO

Earthquake Warning System is a technological intervention to avert colossal loss of human life and infrastructure as earthquake forecasting is not yet possible. An earthquake warning system is the solution provided herein to activate the appropriate actions for safety, during impending earthquake.

- Earthquake warning system (EqWS) is network of a number of seismic sensing nodes (SSN) consisting of seismic sensors, communication, processors.
- It is devised for regional notification of a substantial earthquake while it is in progress.
- SSNs communicate to the master server - EqWS Graphical User Interface for Central Control Unit (CCU) for generating alert signals.
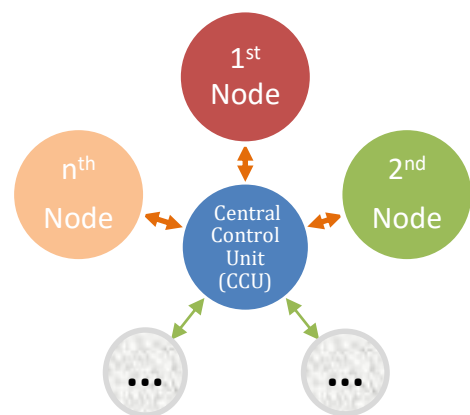
Seismic Sensing Node (SSN)

SSNs are installed at a number of identified field stations depending upon geographical coverage of vital installation

Front panel of the developed SSN

SSN installed at one of the field stations

Concept

The system is devised for regional notification of a substantial earthquake during impending by installing a plurality of seismic sensing nodes (SSN) consisting of seismic sensors, capable of detecting local and regional seismic events. The multiplicity of such nodes ensures elimination of man-made activities at local level. SSNs are strategically located to gather information about seismic activity and communicate to a Central Control Unit (CCU) regarding potential earthquake incidence. Central control provides a final decision based on the response of all the individual SSN and generates an audio visual alarm and sends the event details via email and SMS to the concerned.

Configuration of proposed network for Seismic warning

Features of EqWS

🔸 *EqWS-Seismic Sensing Node (SSN)*
SSN is equipped with accelerometer sensor, GPS, Processor, and IoT (Internet of Things) communication modules. SSNs are capable of sensing and distinguishing the cultural noise from actual seismic event.

🔸 *Graphical User Interface (EqWS-GUI)*
EqWS-GUI is the main user interface which provides information regarding latest event details, event log of all seismic activities and health status of all connected seismic sensing nodes.

🔸 *Health of Station*
Several operational parameters of all the SSNs connected to this network are displayed at EqWS-GUI to depict the health of the SSN.

🔸 *Current Triggered Station*
It displays details of all current triggered stations. A true event is declared on the basis of programming parameters and the Latest Event Information section is updated.

🔸 *Event Information*
It displays the latest true seismic event which is sensed by more SSNs along with the Peak Ground Acceleration (PGA) sensed by the triggered SSN along with earthquake signature from the first triggered stations.

🔸 *Report*
A report is generated for all the true events and the following programmable three levels have been defined for severity-based warning.

PGA Value (g)	Intensity of Seismic Activity	Colour Indication
PGA <= 0.039	Not Felt/Weak	Cyan
0.039 < PGA <= 0.18	Moderate	Amber
PGA > 0.18	Strong	Red

Applications

EqWS developed may be utilized to safeguard vital installations such as – Refineries, Nuclear establishments, Power Plants, Metro & High Speed Railway, Airports, Hospitals etc. by stopping/initiating the emergency facilities as per requirement.

These vital infrastructures are strategically placed at geographically distributed places posing natural threat due to seismic activities. The technological solutions to handle such situations are site-specific and need to be devised locally. Porting of available global solutions would not meet the requirement which largely need customization.

Designed and Developed at
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