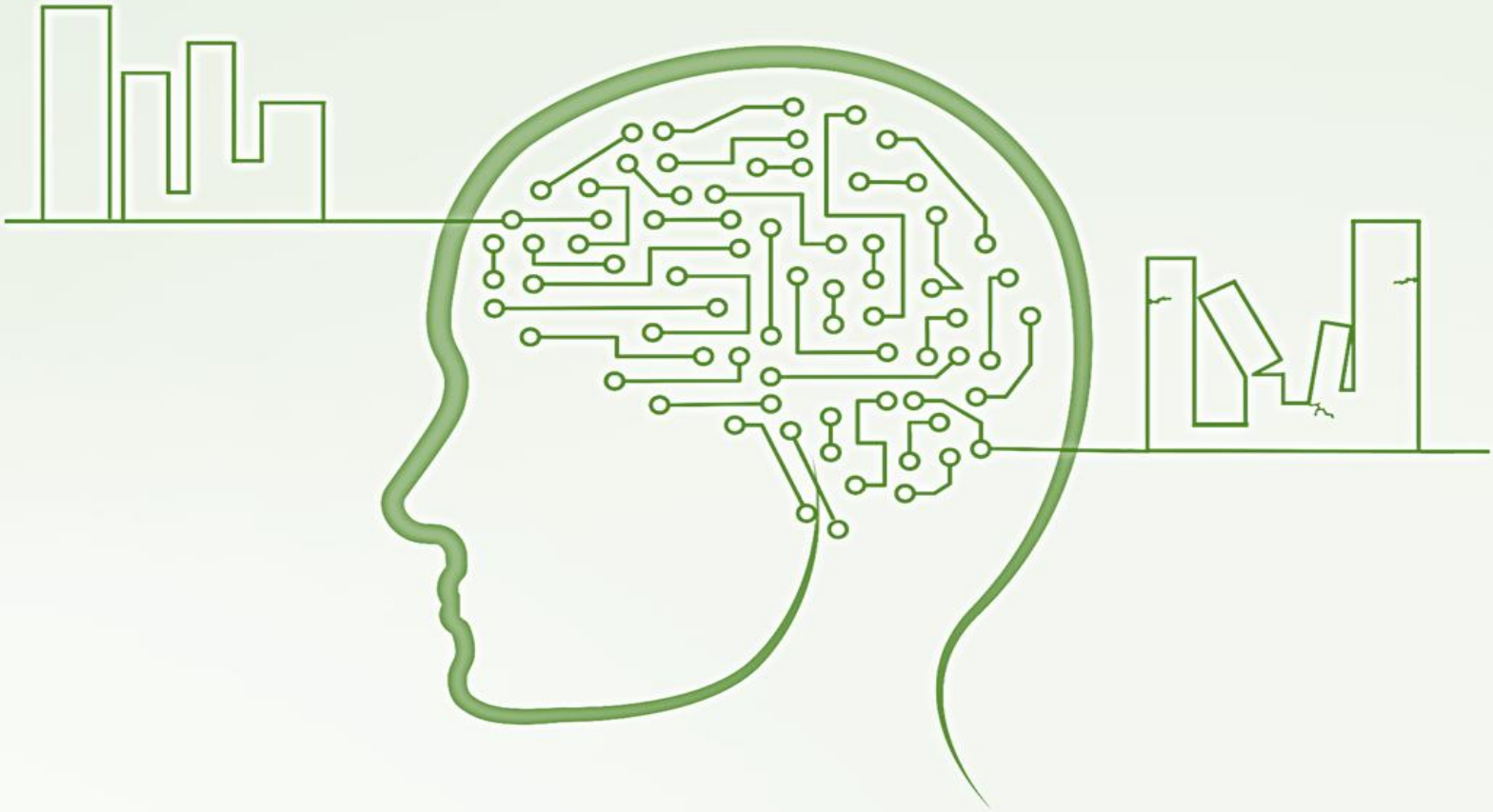
# QUAKE ZONE

Newsletter of EERI IIT Bombay Student Chapter



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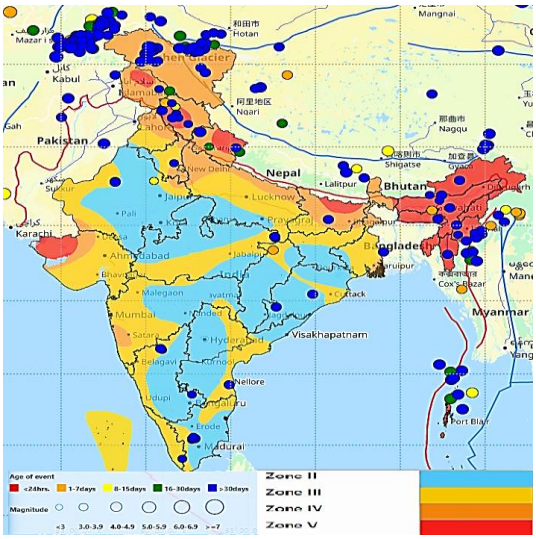
## IN THIS ISSUE

## MACHINE LEARNING IN EARTHQUAKE ENGINEERING?

Machine Leaning (ML) is a field of study that allows computers ability to learn without being explicitly programmed for a particular task. It was mainly started as a part of computer science which in subsequent time became a part of global research and development encompassing applications in different fields of engineering and science. Earthquake engineering field encompasses site effects and structural response, assesses seismic risk and vulnerability, and evaluates seismic protective options. Within each sub field of earthquake engineering ML has found its application. ML algorithms have been used in seismic hazard analysis, seismic fragility assessment, seismic response and damage estimation, seismic response control etc. Typical examples are development of ground motion prediction models, prediction of deterministic seismic response and damage, development of probabilistic seismic response models and active seismic response control of various structures. *(Know more)*

## RECENT EARTHQUAKES

Seismic activity in the Indian subcontinent from Mar 1 2022, to May 15 2022




*Source: https://seismo.gov.in/MIS/riseq/earthquake*

### LEARNING FROM EARTHQUAKES
## 2009 THE L'AQUILA EARTHQUAKE, ITALY


*Source: http://en.wikipedia.org/wiki/2009_L'Aquila_earthquake*

An earthquake with magnitude 6.3 Mw hit the capital of Abruzzi region, on the hill above Aterno river in Central Italy on April 6, 2009 having focal depth at 9.46 km. The devastation killed approximately 308 people and left 1500+ injured and whereas 65000+ became homeless. This earthquake served as a great laboratory to the world in understanding the behavior of non-engineering structures during seismic events. Major damages were concentrated in, poorly constructed masonry, heritage buildings with badly connected crossing walls in addition to poorly detailed/ constructed junctions of reinforced concrete structures. The key learning from the earthquake were development of disaster management plan, detailing as per modern code provisions and periodic monitoring of older structures. *(Know more)*

## TUNED MASS DAMPER

'Tuned Mass Damper (TMD)' is one of the innovative devices used is reduction of seismic/ wind effect to a structure with the idea of using damping from secondary device in case the primary structure fails to meet the desired vibration criteria developed in response to seismic loading. Reduction in vibration consequently reduces discomfort, damage and structural failure caused by ground motion. This particular system consists of mass, spring and damper which absorbs the kinetic energy and hence reduces the response. It is more effective for long duration earthquake and specially when the structural frequency comes close to central frequency of the ground motion. Some of the applications of Tuned mass damper are:

- Taipei, Japan has been fitted with 662 metric tons of steel pendulum TMD
- Burj-Al-Arab, Dubai.
- Emirates Towers Spires in Dubai *(Know more)*

SEISMOTECH

## OpenSees

OpenSees - Open System for Earthquake Engineering Simulation is the comprehensive open source software dedicated for simulating the response of structural and geotechnical systems subjected to earthquakes and other hazards. It was developed by prominent reseachers Frank McKenna and Gregory L. Fenves with significant contributions from Michael H. Scott, Terje Haukaas, Armen Der Kiureghian, Remo M. de Souza, Filip C. Filippou, Silvia Mazzoni, and Boris Jeremic funded by Pacific Earthquake Engineering (PEER) Center. Opensees is getting widespread attention by the community owing to its capability to implement variety of matrial models and powerful solvers. Scripting can be done using either Python or Tcl programming languages. *(Know more)*

*Source: https://en.wikipedia.org/wiki/OpenSees*
*Download: https://opensees.berkeley.edu/*

## EARTHQUAKE ENGINEERING CONFERENCES AND EVENTS

- The 6th International Conference on Structural and Civil Engineering (ICSCE 2022) Barcelona, Spain, Sept 15-17, 2022. Check out for more at http://www.icsce.org/
- The 3rd European Conference on Earthquake Engineering and Seismology. Bucharest, Sept 4-9 2022. Check out for more at https://3ecees.ro/conference/
- The 17th Symposium on Earthquake Engineering, IIT Roorkee, Nov 14-17 2022. Check out for more at https://iitr.ac.in/17see/

EERI IIT BOMBAY NEWS

## SDC 2022

The undergraduate Seismic Design Competition (SDC) is conducted every year by Student Leadership Council (SLC). The 2022 undergraduate SDC will be held in Salt Lake City, Utah, United States, June 27nd – July 1st, 2022. About 22 undergraduate civil engineering students from IIT Bombay are participating in the SDC competition this year. Participants will construct a cost-effective building model that appropriately addresses environmental, geotechnical, and architectural aspects to resist seismic loading. We are happy to announce that team IITB's proposal is accepted and the model is shipped to USA. The team will be participating in the further rounds.



EERI IIT Bombay Student Chapter

## ALL ABOUT EERI

The Earthquake Engineering Research Institute (EERI) is the leading non-profit membership organization dedicated to understanding earthquake risk and increasing earthquake resilience in communities worldwide. EERI membership includes researchers, practitioners, and students in engineering, geoscience, social science, architecture, planning, government, emergency management, public health, and policymaking. For more info https://www.eeri.org/

## EERI IIT BOMBAY STUDENT CHAPTER

The EERI IIT Bombay student chapter aims to learn about earthquakes and their social, economic, and environmental impact and practices to reduce earthquake risk.This Chapter motivates students to pursue a career in the field of earthquake engineering and related fields. EERI Student Chapter at IIT Bombay provides a platform to participate in several EERI competitions and activities.

## SUPPORT US

Sponsors from a variety of industries and academic areas are invited to support the EERI IIT Bombay Students Chapter. Our alliance will be built on teamwork, with reciprocal benefits for both parties.

## BECOME EERI MEMBER

EERI membership will help you stay current with the latest scientific and engineering advances, better understand the social and economic impacts of earthquakes and serve as an advocate for seismic safety. Follow the link: join-eeri-today

## CONTACT US

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## NEWSLETTER TEAM

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