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# ANNUAL REPORT



**EARTHQUAKE ENGINEERING RESEARCH INSTITUTE  
UNIVERSITY OF CALIFORNIA, DAVIS  
STUDENT CHAPTER**

*Submitted to:  
Earthquake Engineering Research Institute  
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Executive Message .....	3
Membership.....	4
Officers .....	4
Seminars.....	5
Field Trips.....	6
Outreach .....	10
Geotech lab facility .....	10

## EXECUTIVE MESSAGE

Earthquake engineering has always been a core interest of the structural and geotechnical engineering disciplines, especially those located in geographically earthquake prone regions. As such, graduate students, faculty, and other interested parties involved in the University of California, Davis civil engineering community to it upon themselves last year to reorganize and revitalize the affiliated, but less active, earthquake engineering research institute student chapter. Graduate students, motivated by their desire to promote and better understand the science and practice of seismic design, created a board and developed a strategy to establish an active student chapter pursuant to that goal.

Our chapter, in its first year out of a long period of inactivity, signed up two-dozen plus members from undergraduates to Ph. D. students of the civil engineering department. In its second year, not only we kept our original members, but we recruited about 8 new members also. Members participated in multiple seminars by professor and professionals from all across the nation and even internationally. They also participated in multiple field trips organized and supported by different organizations such as Earthquake Protection Systems (EPS) and Bay Bridge Seismic Safety group. We also reached out to our community by inviting an entire class of middle school children to view our centrifuge facility and participate in demonstrations of important earthquake engineering related conceptual activities. We were honored most by the comments that our members gave us regarding just how much they learned about earthquake engineering and how much enjoyment they had participating in our activities. This was our main goal in creating an EERI chapter and the most important measure of our success.

For the coming year and for many after, we hope to improve in several key areas of our chapter's function within the university and surrounding community and offer even more activities that facilitate an improved understanding of the field of earthquake engineering to our members. We will develop improved partnerships with companies and individuals whose work in industry relates to the practice of earthquake engineering to build on our resources and broaden our professional network. We will also expand within the university to other disciplines outside of structural and geotechnical engineering to provide a greater space for collaboration and exploration within our membership. As we grow and progress in the years to come we will always maintain an open and relationship with the Davis community, especially with younger students who may take an interest in pursuing earthquake engineering in their own future.

In our 2011-2012 annual report, we hope to illustrate both our pride in our success this previous year, as well as our commitment to continue that success in the years to come.

Sincerely,

Manny Hakhamaneshi, President 2011-2012

## MEMBERSHIP

Our membership this previous year was comprised of mostly graduate students in the structural and geotechnical engineering fields. Our membership grew consistently in the previous year, with our largest increase occurring in the opening of the fall quarter followed closely by an increase seen in the winter quarter. We hope to continue to grow in membership and hope to diversify our demographic by adding more undergraduates and students of different fields of study to our roster.

The officers for the previous year were tasked with reinvigorating a long inactive chapter and building a viable chapter from essentially scratch. The officers came together at the beginning of the 2011 fall semester discussed why and what they wanted to see in an EERI students chapter, organized themselves in a leadership capacity and set forth doing the work to construct the chapter. After an academic year their efforts have yielded a viable student chapter at the University of California, Davis.

## OFFICERS

Manny Hakhamaneshi, President  
Graduate Student of PhD in Geotechnical-Structural Engineering

Katerina Ziotopoulou, Secretary & Membership Coordinator  
Graduate Student of Ph. D. Program in Geotechnical Engineering

Carolina Magna, Treasurer  
Graduate Student of Masters Program in Structural Engineering

Bryce Lloyd, Sponsorship & Outreach Coordinator  
Graduate Student of Master Program in Structural Engineering

Chiara McKenney, Seminar Coordinator  
Graduate Student of Master Program in Structural Engineering

## SEMINARS

Several speakers covering a wide variety of topics visited our university this last academic year. Our speakers consisted mostly of professors currently performing research regarding particular aspects of earthquake engineering. Below are the list of seminar:

1. "Carbon Nanotube-based Thin Films as a Platform for Bio-inspired Sensor Development" by Kenneth J. Loh, Ph.D., Assistant Professor of Civil and Environmental Engineering, UC Davis on December 2, 2011. A presentation on the use of nanocomposite "sensing skins" to monitor spatial strain, pH, corrosion, and damage on structures.
2. "The Use of Macro-models Towards the Prediction of Damage in Shear Walls of Reinforced Concrete Buildings" by Carolina Magna-Verdugo, M.S. and PhD candidate at UC Davis on February 1, 2012. A seminar about the damage of reinforced concrete buildings after the 2010 Chile earthquake and the use of macro-models of isolated walls.
3. "Effective Use of Library Resources In Civil Engineering Research" by Carol La Russa, Librarian Subject Specialist in Civil Engineering on February 8th, 2012. Navigating the many materials accessible through the UC Library system can be overwhelming. At this seminar, Librarian Subject Specialist in Civil Engineering Carol La Russa provided guidance for those doing research in the civil engineering field.
4. "A Shelter Strategy for Haiti: Update on Post-Earthquake Shelter Recovery" with Charles A. Setchell, Senior Shelter, Settlements, and Hazard Mitigation Advisor, USAID Office of US Foreign Disaster Assistance (OFDA) on May 30, 2012. Mr. Setchell described the organization and implementation of shelter plans since the January 2010 earthquake and led a discussion on the difficulties faced in post-disaster situations.

## FIELD TRIPS

### Field Trip 1

Location: Earthquake Protection Systems, Inc. (EPS)

Date: March 2<sup>nd</sup>, 2012

#### Summary:

The student chapter of Earthquake Engineering Research Institute at the University of California, Davis organized a field trip to the Earthquake Protection Systems, Inc. (EPS) in March 2<sup>nd</sup> 2012. Attendees included 30 civil & environmental engineering students. The trip was consisted of a 30 minutes introduction and a 1 hour manufacturing space visit.

EPS field trip gave UCD students an opportunity to find out what is engineers doing to protect structures from earthquakes by seismic isolation bearings. Also, it allow students to explore their interest in earthquake engineering by learning more about the science, exploring career options and seeing the practical applicant of earthquake engineering.



Victor Zayas

EPS is the world's leading earthquake protection company. They focus on produce seismic isolation bearings. In field trip part I, Dr. Victor, who is the President and the main founder of EPS, introduced EPS to us in a conference room. He first presented catastrophes caused by earthquake in the past; all of them are led to seriously loss both in life and economy. Then he showed us the task of EPS is to prevent buildings collapse in earthquakes by apply seismic isolation bearings. Later, he introduced their first generation and second generation seismic isolation bearings; included how these bearings works during earthquakes.

In the following part II, we had the opportunity to visit the production factory also led by Dr. Victor. Because photograph was not allowed in the factory, the following figures are got from EPS's website. In the factory, there are bearings from pizza size to huge size as in the right photo. Although we are with earthquake from book and class, most have never seen these earthquake protection bearings before. Another impressive thing is the world's largest testing machine, which testing capabilities those of any other facility. We didn't see machine work, but Dr. Victor told us the manufacture plant will shake when the run for testing.



20 million lbs bearing

lots of shown familiar of us

bearing exceed how this 12 acres machine



Giant testing machine

A big thank you to Dr. Victor and his EPS for providing such a memorial trip to EERI-UCD, and hence help educate future engineers as well as providing valuable field experience in earthquake protection system.

## Field Trip 2

Location: San Francisco – Oakland Bay Bridge

Date: May 25<sup>th</sup>, 2012

### Summary:

On May 25<sup>th</sup> 2012, Earthquake Engineering Research Institute at University of California, Davis conducted a student field trip to the new east span of the San Francisco - Oakland Bay Bridge. The exclusive tour was on a boat, due to the capacity is 25 people on each tour, about 20 Civil & Environmental Engineering students attend this trip to visit the Self-Anchored Suspension Bridge.

Following is the photos of the two bridges. Left is the old bridge opened for traffic in 1936, during the 1989 Loma Prieta earthquake, an upper deck collapsed onto the lower deck and the bridge closed for a month. The new \$6 billion self-anchored suspension bridge begin construction in 2002 and scheduled to open in 2013, which has been designed to withstand a 1,500 year rare seismic event.



New Bay Bridge Old Bay Bridge

Led by Steve Padilla, who is the Bay Bridge Seismic

### Safety Projects Educational Outreach Program

Manager, the field trip consisted of introduction part in conference room and the bridge visiting on a boat. In the presentation part, students learned the political, economic and engineering decisions behind the new bridge's construction. Many countries participate in this project on different parts of the bridge, like the road-deck, tower, main cable and suspension cable, etc. Compared to several workers lost their lives in the old bridge construction; only a worker got minor injury by careless, that is a much progress and a good new for our future engineers.

The bridge visiting was on a boat. All the students have to equip helmet, life jacket, goggle and boots like a true civil engineer. Although students cannot enter the construction site, we were able to reach close enough to see the entire bridge. We saw the self-anchored suspension span, falsework, superstructure, cables, and tower for the new San Francisco Oakland Bay Bridge. From the bridge exterior, you may think there are two cables on each side of the bridge. Actually, only one cable with two ends both anchored on the island. At the other end of the bridge, cable was anchored to the decks. After the tour on the boat, we came back to the bridge factory on land to see the bridge parts. Right photo shows the main cable of the bridge, it consisted of 114 cable bands.



The EERI student chapter at University of California, Davis would like to thank Steve Padilla, boat driver, life guard and other people whose contributions made the trip extraordinary. Bay Bridge field trip was a great educational, social and unique experience.



# OUTREACH

## GEOTECH LAB FACILITY

The Center for Geotechnical Modeling (CGM) at UC Davis hosts one of the large-scale experimental facilities in the George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES) funded by the National Science Foundation. NEES is NSF's fourteen-year investment in the earthquake engineering research community. This visionary project aims to reduce the vulnerability of our civil infrastructure to the damaging effects of earthquakes by accelerating the rate at which research discoveries are made and integrated into technologies and products for engineering practice. The centerpiece of the University of California, Davis NEES site is a 9-m, 75 g geotechnical centrifuge that is used for static and dynamic testing of soil and soil-structure models. Geotechnical centrifuges enable realistic physical modeling of the nonlinear static and dynamic responses of soil and soil-structure.

Last year, about eighty eighth-graders from Berrendos Middle School, Antelope School District in Red Bluff, California, visited the NEES at UC Davis Center for Geotechnical Modeling. Their visit to the centrifuge facility was a part of a pilot program exposing eight-graders to several Northern California universities. The tour of the centrifuge facility included interactive demonstrations led by geotechnical graduate students with technical support from the NEES at UC Davis staff. The eight-graders first watched an introductory video to demonstrate the centrifuge in use and the real life reasons for using the centrifuge in geotechnical research, such as studying the earthquake induced liquefaction.

The EERI officers lead a shake table demonstration, using two identical structures, one with cross bracing and one without, The eighth graders were then asked to guess which structure would perform better in an earthquake. The structures were subjected to a series of sine wave motions so that the eighth-graders could see the difference in performance of the structures depending on frequency and amplitude of the sine waves. The students were able to take away a glimpse of the work engineers do and what types of projects graduate students are involved in.