

2016-2017 ANNUAL REPORT

Stanford University Student Chapter of the Earthquake Engineering Research Institute



Report Date: July 31, 2017

This report summarizes the membership and activities conducted by the Stanford University Student Chapter of the Earthquake Engineering Research Institute during the 2016-2017 academic year.

MISSION & GOALS

The purpose of the EERI Stanford Chapter is to advance Earthquake Engineering research, advance understanding of earthquakes and their consequences, and promote measures to mitigate their harmful effects.

We organize various academic and social events on campus. They include bringing speakers to campus to talk about interesting topics related to earthquakes, participating in outreach activities, or leading a hike along the San Andreas Fault.

MEMBERSHIP

The Stanford University Student Chapter had a total of 21 members in 2016-2017.

OFFICERS

The initial Board for the 2016-2017 Academic year was elected in May 2016. At the end of the Spring quarter the President stepped from the position and the new board was elected in June 2016 to lead the chapter for the following academic year. The Board consisted of the following members:

Spring 2016:

Role	Name	EERI Member Number	Email	Student Status
President	Cristian Acevedo	15786	cacevedo@stanford.edu	Graduate student
Vice-President	Hector Davalos	16641	hdavalos@stanford.edu	Graduate student
Treasurer	Pablo Heresi	17437	pheresi@stanford.edu	Graduate student
Secretary	Luis Ceferino	N/A	ceferino@stanford.edu	Graduate student
Activities Coordinator	Siddharth Awasthi	18271	sawasthi@stanford.edu	Graduate student
Geophysics Group Representative	Lucile Bruhat	17155	lbruhat@stanford.edu	Graduate student
SDC Graduate Mentor	Amory Martin	19206	amorym@stanford.edu	Graduate student

Board meetings were held on a regular basis to support chapter activities and track their progress throughout the academic year.

FACULTY & INDUSTRY ADVISORS

The chapter advisors are:

	Name	Email	Affiliation
Faculty Advisor	Gregory Deierlein	ggd@stanford.edu	Stanford University
Industry Advisor	John Osteraas	osteraas@exponent.com	Exponent

MEMBERS

A complete list of members is shown below.

	Name	EERI ID	Email	Student status
Cristian	Acevedo	15786	cacevedo@stanford.edu	Active
Santiago	Arrangoiz-Arriola	19024	sarrango@stanford.edu	Active
Mariano	Balbi	18242	mbalbi@stanford.edu	Active
Josiah	Cark	19328	josiahc@stanford.edu	Active
Nikhil	Chaudhuri	19203	nikhilc@stanford.edu	Active
Brandon	Cortez	19226	brandoncortez@outlook.com	Active
Ian	Dickeson	18990	dickeson@stanford.edu	Active
Kyle	Ellsworth	19017	kce94@stanford.edu	Active
Zhendong	Guo	19031	zdguo@stanford.edu	Active
Anne	Hulsey	16179	annehulsey@utexas.edu	Active
Darshit	Jasani	19033	jasanidarshit@gmail.com	Active
Aubrey	Kingston	19327	aubreyk1@stanford.edu	Active
Evelyn	Li	19212	evelynli@stanford.edu	Active
Sabine	Loos	18993	sloos@stanford.edu	Active
Amory	Martin	19206	amorym@stanford.edu	Active
Andrea	Mosqueda	18772	andrea44@stanford.edu	Active
Tim	Ngo	18768	ngotm@stanford.edu	Active
Samuel	Schreiber	17026	sschreib@stanford.edu	Active
Ayush	Singhania	19026	ayushs@stanford.edu	Active
Angela	Tarng	18989	ang.tarng@gmail.com	Active
Kuanshi	Zhong	18166	kuanshi@stanford.edu	Active

BUDGET & FINANCIALS

The initial balance for this period was \$2,207.50, while the total withdrawals were \$149.88 and there were no deposits. Therefore, the final balance of the period is \$2,057.62. The following table shows the events financed by the EERI Student Chapter. Note that for many events, the John A. Blume Earthquake Engineering Center also contributed with financial support, and this table only presents the events and amounts funded by the EERI Student Chapter.

Event	Amount paid by EERI	Observations
Meet a PhD student	\$97.61	A PhD student is paired up with a couple of incoming Masters students; they talk about academic life and research opportunities at Stanford over lunch
EERI Talent Show	\$52.27	Opportunity to showcase hidden talents and highlight EERI within the department student body
TOTAL	\$149.88	

CHAPTER ACTIVITIES

The EERI Stanford Student Chapter was involved in variety of activities over the year. Activities included organization of research forums, presentations and workshops as well as outreach events to other schools and industry professionals.

REGULAR CHAPTER MEETINGS

Board meetings were held on regular basis for a total of 11 meetings throughout the year. Meetings covered chapter logistics and planning of events. In addition, follow-ups and additional planning details were done via email. Following is the summary of the meetings:

Summer 2016:

Meeting #1 Date: 08/17/2016 Duration: 1h Attendance: 7

First meeting of the new leadership. Discussed status of the chapter and activity plans for the next quarters including: EERI student membership, EERI T-shirt, activities for the Autumn 2016, Winter 2017, and Spring 2017.

Meeting #2 Date: 08/29/2016 Duration: 1h Attendance: 7

Meeting with the School Earthquake Seismic Initiative Program (SESI) committee to begin planning pilot program for EERI Stanford Chapter to teach at local high schools.

Meeting #3 Date: 08/30/2016 Duration: 1h Attendance: 3

Additional SESI meeting with SESI Committee member. Meeting served to discuss how SESI can assist the EERI Stanford Chapter to achieve a successful pilot program and to meet with some of the current officers.

Autumn 2016:

Meeting #4 Date: 09/16/2016 Duration: 1h Attendance: 6

Meeting to plan the following activities:

- EERI participation in Incoming Students Orientation:
- EERI Info Session for incoming students
- Post-seismic Earthquake Survey training
- Meet a PhD Event: PhDs get together with incoming students to share PhD life experiences
- Social event: Happy hour: November 4th
- Arup Seminar
- School Earthquake Seismic Initiative Program (SESI)
- T-shirt
- EERI SLC (Leadership in Stanford)
- Talent show (Winter quarter)

Meeting #5 **Date: 10/31/2016** **Duration: 1h** **Attendance: 5**

Planning meeting for Splash Autumn 2016. Teaching 7th-12th graders about Earthquake Engineering.

Meeting #6 **Date: 11/11/2016** **Duration: 1h** **Attendance: 4**

Recruiting session for students interested in helping SESI initiative.

Winter 2017:

Meeting #7 **Date: 01/30/2017** **Duration: 1h** **Attendance: 8**

SESI follow-up meeting to select potential high schools. Volunteers were divided into groups of three and assigned a school to reach out to.

Spring 2017:

Meeting #8 **Date: 04/07/2017** **Duration: 1.5h** **Attendance: 8**

Election of new membership and transfer of office and brief update on status of the chapter. Elected officers:

- President: Amory Martin
- Treasurer: Anne Husley
- SLC Representative: Amory Martin
- Activity Coordinator: Sabine Loss
- Secretary: Daphne Basagwa

Meeting #10 **Date: 04/20/2017** **Duration: 1h** **Attendance: 3**

Planning meeting for Splash Spring 2017. Teaching 7th-12th graders about Earthquake Engineering.

Meeting #11 **Date: 05/10/2017** **Duration: 1h** **Attendance: 3**

Meeting with teacher from local high school to prepare final details for SESI lecture modules.

PHD SEMINARS – SUMMER QUARTER ON THURSDAYS

PhD and masters' students presented their research every Thursday afternoon of the Summer Quarter. The seminar gave the opportunity to students to present their current projects in a non-pressured environment. In addition, presenters were exposed to constructive feedback from their peers. The seminars involved refreshments and gave students the chance to interact.

Session	Date	Presenter	Title of the presentation
1	7/14/2016	Shabnam Semnani	Thermoplasticity and strain localization in anisotropic materials (15 min)
		Reagan Chandramohan	Robust and efficient estimation of structural collapse capacity using the central difference time integration scheme
2	7/21/2016	Emma Lejeune	Computational modeling of tumor cell growth and division
		Xiaoxuan Zhang	A Variational Framework to Model Diffusion Induced Large Plastic Deformation and Phase Field Fracture in Silicon Electrodes
3	7/28/2016	Scott Swensen	Exponent Informational Presentation

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4	8/4/2016	Cristian Cruz	The effects of soil-structure interaction in the overall damping of buildings subjected to earthquakes
		Amory Martin	Enhanced force prediction method for controlled steel rocking frames
5	8/11/2016	Mariano Balbi	Urban risk flood modeling
		Luis Ceferino	Framework for estimating regional health status demands following earthquakes
6	8/18/2016	Mary Mark	Principal component analysis for ground motion simulation
		Qing Yin	Macroscopic shear band in crystalline structures
7	8/25/2016	Seongwoon Jeong	Bridge information modeling for bridge monitoring and management
		Bo Peng	Cost optimization for steel frame
8	9/1/2016	4:30 p.m.	California Academy of Sciences

SPLASH – INTRODUCTION TO EARTHQUAKE ENGINEERING

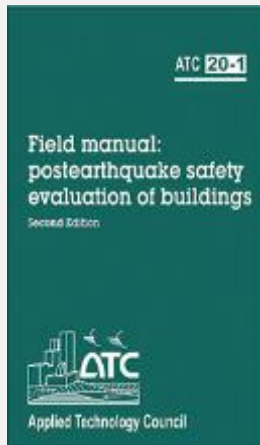
The EERI Stanford Student Chapter taught Intro to Earthquake Engineering to students from 7th – 12th grade on December 4th 2016 and again on April 23rd 2017. The lecture broken down into four main sections: 1) What is engineering?, 2) Structural Engineering, 3) Earthquake Basics, & 4) Designing for Earthquakes. These topics were complimented with hands-on activities and interactive questions; these included ductile vs. brittle material, period of a structure based on mass and stiffness, and lots of questions! In addition, the Seismic Design Competition tower was showcased. The classes were usually comprised of approximately 50 to 70 students.



POST-EARTHQUAKE BUILDING EVALUATION WORKSHOP – OCTOBER 22nd, 2016

This is one of our most popular workshop of the year. The workshop aims to train students on how to perform rapid evaluation of buildings for post-earthquake damage using the ATC-20 procedures. **Students from other colleges are also invited to participate in the workshop. This creates a great environment for networking and meeting future colleagues.** The workshop was conducted by industry professionals, John Osteraas and David Ojala, who went over the procedures for post-earthquake safety evaluation of buildings and provided excellent case studies. Each participating student received an ATC-20 Manual donated by ATC. The workshop was broken down into three parts: **1) Classroom training:** students were taught the rapid assessment procedures and which forms

to fill out **2) Field exercise:** students formed groups and assessed buildings around campus mocked with earthquake damage. During the field exercise, students not only interacted with one another to assess the damage, but they also filled out the required forms. **3) Final presentations:** Each group presented one of the buildings assessed, summarizing their assessments. During the presentations, the students received feedback from the instructors on their assessments. Finally, the students, faculty, and professionals enjoyed a happy hour.



ATC-20 Manual



Classroom training

SPECIAL TECHNICAL SEMINAR BY ARUP

Arup engineers, Armin Masroor and Kevin Chen, were invited to talk to our members about unreinforced masonry structures, from nonlinear finite element analysis to low cost base isolation retrofit. Research and Buildings-Structures groups at Arup discussed their recent work on nonlinear finite element analysis of existing unreinforced masonry (URM) structures subject to induced seismicity in Groningen, Netherlands. Induced seismicity due to gas extraction in the Groningen region of the Netherlands has affected a substantial number of buildings that were not designed or constructed with seismic considerations in mind. As for potential retrofit strategies for some of these buildings, the application of base isolation has been investigated.

WINTER STRUCTURAL ENGINEERING, SUSTAINABLE DESIGN, & CONSTRUCTION CAREER FAIR – FEBRUARY 1st, 2017

Stanford EERI Chapter helped BEAM, Stanford Career Education promote a successful career fair in the Winter quarter. The fair attracted a lot of students and companies (more than 30 companies!).



STUDENT RESEARCH FORUMS – WINTER 2017 and SPRING 2017

The EERI Stanford Student Chapter, in collaboration with the Stanford Geosciences Department, hosts a bi-weekly student research forum during lunch. Students had the opportunity to present their latest research to fellow students in a non-pressure environment with constructive feedback. It also served as a platform to discuss new developments in the field and topics of common interest. In addition, the forum gave the opportunity to new students to present their undergraduate research related to earthquake engineering. Each forum featured two 20-minute presentations and lunch for all attendees. As a novelty this year, we also had PhD students from UC Berkeley and Virginia Tech as guest speakers.

SESI High School Lectures – May 22nd, 24th, & 26th, 2017

EERI Stanford Chapter volunteers went to Sequoia High School to teach earthquake engineering to students enrolled in AP Physics. The lessons were condensed to one week due to the time slot availability. The first lesson was 40 minutes long, and introduced the basic concepts to the students. Students were also given handouts and a project. The second lesson discussed more advanced topics involving the design of earthquake-resistant structures. During this lecture, students were broken down into groups of five and given the materials (e.g., balsa wood, glue, cutting materials, etc.) for the project. The project consisted of building a two-story balsa wood structure using the earthquake-design methods (e.g., shear walls, braces, etc.) learned earlier. On the last day of lecture, the class was divided into two parts: a) for the first part of the class, more examples of earthquake-resistant structures were given and how researchers do experiments to understand behavior, a path on how to pursue a career in structural/earthquake engineering was laid out, and what cool competitions undergraduate students partake in college (i.e., Undergraduate Seismic Design Competition) b) for the second part of the class, students were given additional time finish putting their structures together and then the structures were tested on a small portable shake table. The small shake table was great at reproducing real earthquake records within its capacity. This was an exciting hands-on experience for the students and the instructors. The students learned a lot from these lectures.



SEISMIC DESIGN COMPETITION TEAM

The Stanford Seismic Design team is a student organized group dedicated to promoting interest in structural and earthquake engineering on campus. We are a small team that designs, builds and tests full scale balsa wood towers. Stanford students have been participating in the annual Seismic Design Competition for the past 7 years.

The 14th annual EERI Undergraduate Seismic Design Competition took place March 7-10, 2017 in Portland, Oregon, held in conjunction with the EERI Annual Meeting. Thirty-four teams, both national and international, were invited to participate.

The design prompt was to create a proposal for a multi-use high rise in Portland's rapidly developing Pearl District, featuring an atrium and a green roof and capable of withstanding earthquakes as strong as those that the

nearby Cascadia Subduction Zone can produce. The teams constructed 5-ft tall model towers out of balsa wood, seeking to produce the most efficient, seismically sound, and architecturally appealing designs. During the competition, teams gave presentations describing their towers' key structural features and contribution to the Portland cityscape, displayed posters promoting the tower, and--the main event--tested the structures. After being loaded with about 25 lbs of dead load, the towers were put on a shake table and subjected to three simulated earthquakes of increasing intensity, prepared by the EERI SLC. Tower performance during the ground motions was judged based on peak roof acceleration and drift.



SDC Team Members

A complete list of members is shown below.

Name	EERI Member Number	Email	Role
Evelyn Li	19212	evelynli@stanford.edu	Captain
Sam Schreiber	17026	sschreib@stanford.edu	Member
Brandon Cortez	18761	bccortez@stanford.edu	Member
Nikhil Chaudhuri	19203	nikhilc@stanford.edu	Member
Curtis Fong	16032	ckfong@stanford.edu	Member
Natalie Ferante	18773	natalie9@stanford.edu	Member
Andrea Mosqueda	18772	andrea44@stanford.edu	Member
Tim Ngo	18768	ngotm@stanford.edu	Member
Aubrey Kingston	19327	Aubreyk1@stanford.edu	Member
Josiah Clark	19328	josiahc@stanford.edu	Member

Other members: Chloe Wiggins, Erick Blankenberg, Kutay Serova, and Sarah Tieu

SDC Team Financial Sponsors

A list of financial sponsors for the SDC team:

Name	Email	Amount	Note
John A. Blume Earthquake Engineering Center	ggd@stanford.edu	5000,00	

Team results and lessons learned

Stanford's Arcs.V Tower survived all three ground motions with the seventh-lowest seismic cost among all the towers. The team also placed second in design proposal and first in presentation. With all scoring elements considered, Stanford placed second in the final rankings after Cornell University. The team hopes to even improve next year, since the competition will take place in June allowing more time for preparation and testing.



SDC Team members at the competition

ELECTION & ELECTION RESULTS

An election for officers for the 2017-2018 academic year was held in May 2017. The table below shows the new officers appointed to the Chapter board who will take office in June 2017.

Role	Name	EERI Member Number	Email	Student Status
President	Amory Martin	19206	amorym@stanford.edu	Graduate student
Vice-President	Bo Peng	N/A	bpeng@stanford.edu	Graduate student
Treasurer	Anne Hulseley	16179	annehulseley@utexas.edu	Graduate student
Secretary	Sabine Loos	18993	sloos@stanford.edu	Graduate student
Activities Coordinator	Daphne Basangwa	N/A	daphneb@stanford.edu	Graduate student
Geophysics Group Representative	Lucile Bruhat	17155	lbruhat@stanford.edu	Graduate student

ACKNOWLEDGMENTS

The EERI Stanford Student Chapter would like to thank its advisers, the John A. Blume Earthquake Engineering Center, Exponent, and its undergraduate and graduate members for their support and dedication to the chapter.