Mechanical Engineering Alumni Dinner Welcome

Drazen Fabris
Panthea Sepehrband
and the Mechanical Department
Welcome to the Alumni and the graduating senior class

SANTA CLARA UNIVERSITY

Remembering back

Santa Clara is a part of you, be proud

Moving ahead

SCHOOL OF ENGINEERING
Agenda

- Changes in the School of Engineering, University
- Mechanical Engineering Update
  - Audience participation component
- The STEM project
- Ideas for the future

Opportunity to catch up, network, and share your accomplishments
A New Chapter

Alfonso (Al) Ortega
Sobrato Professor and Dean

- PhD, MS Stanford, Mechanical Engineering
- BS Texas-El Paso, Mechanical Engineering
- 2005-2017 Villanova University
  - Associate VP Research & Graduate Programs
  - Associate Dean Graduate Programs
  - Director, NSF Center for Energy Smart Electronic Systems
- 2004-2006 National Science Foundation, Program Director
- 1988-2004 University of Arizona, Mechanical Engineering
  - Teacher and Scholar in Thermodynamics, Heat Transfer, Fluid Dynamics
  - Most recent Research Focus: Data Center Cooling and Energy Efficiency
STEM as a new step forward
https://www.scu.edu/engineering/stem-2020/

- New center for engineering and sciences, approximately 300,000 ft²
  - To promote innovation in teaching, research, and entrepreneurial thinking
2017 & 2018 First-years Admission Profile

- Acceptance rate 54%, 1404 enrollment (2017)

- Admitted students for the Fall 2017 had the following average scores:
  - ACT Composite (25th to 75th percentile) 31.3
  - SAT Composite 1407
  - GPA 3.9

- Expenses (2017-18)
  - Tuition $51,081
  - Room and board $14,312

- A record 16,233 applications for the Class of 2022

- Admitted students represent 49 states, D.C., Puerto Rico, Guam, and 55 countries.

- 48 percent are students of color

- 26 percent are from Catholic high schools

- 52 percent are from public schools.
Life after Santa Clara A Survey of 2016 Graduates

The median starting salary for the engineering graduate working full-time is $70,500.

Source: SCU Career Center 2016 annual report.
Mechanical Engineering Engineering Update
What do we do
Mechanical Engineering: Mission Statement

To develop successful Mechanical Engineers who:

• have broad grounding in engineering fundamentals;
• have strong communication skills;
• have the ability to adapt to changing work environments;
• have an appreciation for the impact of their work on society.
New Program Developments

- Growth in the program
- Diversity in senior design
- **NEW PEOPLE**
  - Tenure-track faculty
  - Full-time faculty
- Maker Lab
  - Additional 3-d printers and laser cutters
- Kern Engineering Entrepreneurship Network (KEEN)
  - External support
  - New Engr. classes
- Lab renovation
  - New equipment and capabilities
- Shop organization
  - Safety
  - Space
  - Instruction
- Aerospace Minor
- Godfrey Mungal as a new faculty member in the Department
Meeting the need of the increased enrollment

in 2013 we had 23 senior projects with 91 seniors
A day in the shop
Mechanical Engineering Faculty

- 330+ students
- 9 TS faculty (2 phased ret., 2 admin)
- 2 RTL, 2 AYAL
- 10 research active faculty
- 16-25 QPT, 8 TA
- 14 senior design projects
- 10 continuing tenure stream faculty, 4 teaching faculty, and 2 staff

Panthea Sepehrband, Calvin Tszeng, NSF Amount: $328,975 collaboration with K&S

Solid mechanics

Design, Mechatronics, Controls, Thermofluids, Materials
Newer Faculty, New Capabilities
+75 years, 65 teaching, manufacturing support

- Michael Taylor, computational solid mechanics with a focus on thin structures and parallel computing, Ph.D. UC Berkeley, 2008, Northrop Grumman, Harvard Postdoctoral Fellowship.

- Robert Marks, material science teaching and research in nanostructure, Ph.D. UC Berkeley, 2003.

- Calvin Tszeng, 24 years experience, Illinois Institute of Technology, Southwest Research Institute, Ohio State, and start-up company, 8 years teaching experience

- Tony Restivo: Mechanics, experiments, and design, Assistant Professor Temple University, Assistant/Visiting Professor, Michigan State, University of Palermo

- Walter Yuen: Heat transfer, computational methods for radiation, Professor of Mechanical Engineering UCSB, Vice President for Academic Development PolyU, Hong Kong U.C. Berkeley Ph.D.

+ 5 continuing tenure stream faculty, and 2 staff
Growing Faculty and New Developments

- KEEN program
- Greater teaching in Aerospace
- Materials Research
- Growth Interests:
  - Autonomous Vehicles (Controls/Dynamics/Aerodynamics),
  - Advanced Propulsion (Thermofluids/Design), or
  - Aeroelasticity (Vibrations/Structures/Design).
  - Advanced Manufacturing
  - Areas relating to Experimental Methods
Santa Clara University is a part of the Kern Engineering Entrepreneurship Network.

- Santa Clara University is only one of 20 universities in the U.S. to receive funding to promote an innovative and entrepreneurial mindset among its students.

- A $1M grant from the Kern Family Foundation is allowing the School to provide opportunities for students to become creative thinkers, to identify the needs of customers, to understand the financial and logistic aspects of creating products and services, and to be aware of the societal impacts of their work.

If you are interested contact Chris Kitts
Dynamics and control of small unmanned aerial vehicles (UAVs)


New Minor in Aerospace

**Requirements:**
MECH 145, Intro to Aerospace
two courses from four *Fundamental Courses*,
one course from *Aerospace Courses*,
and at least four units from the *Elective Courses*

**Aerospace Courses:**
- MECH 153-Aerospace Structures (4 units). *Prerequisite: CENG 43 and CENG 43L.*
- MECH 155-Astrodynamics (4 units). *Prerequisite: MECH 140.*
- MECH 132-Aerodynamics (4 units). *Prerequisite: MECH 121, 122 & 122L.*
- MECH 158-Aerospace Propulsion Systems (4 units) *Prerequisite: MECH 121, 122 & 122L.*
- MECH 205/206-Aircraft Flight Dynamics I, II (4 units) *Prerequisite: MECH 140.*
Labs and Development

Some new lab layouts
New controls equipment
New wind tunnel coming

- MTS testing apparatus, 100 kN, up to 100 Hz.
- Solar Decathlon 2013, finished 11th
- Tiny House, Finished first in 2016
- Increasing research components
• 100 kN capacity (tension and compression).

• Programmable with any sequence of load and/or displacement control steps, including cyclic variation at up to 10 Hz.

• Potentially configurable to operate with control.

• Used to measure fatigue-crack propagation rates in aluminum and currently testing 3D printed polymer specimens.

*Undergraduates*

• Jared Sheehy (class of 2016) (Dean and Dept. Support)

• Angel Barranco (LEAD Summer Stipend 2016)

• Rosemary Cole (volunteer)
Industry Supported Senior Project

- 3D Printed Carbon Fiber (Arevo Labs, Santa Clara, CA)
  - Electric Mountain Bike
  - Motorcycle Helmet

Fatigue Testing with 100kN MTS Servo-Hydraulic Test Machine
(Managed by Dr. Marks)
Materials Research

- Macroscale
- Microstructure
- Atomistic
- Electronic

Length Scale: nm μm mm m
Mechanical Engineering: Audience Participation

SCU ME

Students
Faculty
Alumni
Industry
Program Educational Objectives

- Demonstrate their knowledge and depth of understanding of mechanical engineering in engineering practice and principles through professional success or attainment of advanced degrees.

- Design and development components, systems, tests, or services that meet specifications in the context of economic, environmental, and societal requirements.

- Develop engineering solutions based on fundamental principles using modern analysis techniques, testing, and validation.

- Work in a team environment, share their knowledge and expertise, and exercise leadership as appropriate.

- Communicate effectively with colleagues, customers, subordinates, and managers.

- Act ethically and professionally in their careers.

- Continue to learn and grow professionally.
STEM program
STEM (Science Technology Engineering and Math) as a new step forward

- New center for engineering and sciences, approximately 300,000 ft²
  - To promote innovation in teaching, research, and entrepreneurial thinking

- 3 year transition starting summer 2018
  - The Mechanical Department is committed to ensuring that we have the strongest program in Engineering.
STEM

https://www.scu.edu/engineering/stem-2020/

- Mech., Civil, Elen, BioE and Sciences
- New spaces for mechanical projects and shops
  - Enable better senior projects
  - Better contributions from the new faculty
- In Heafey-Bergin Coen and Maths
STEM connected to Mechanical

Mechanical is moving to:

- The Garage: Mechanical and Physics shops, project space, fluids lab, materials lab, vehicle lab.
- Saint Clare Commons: two research labs, instrumentation lab
- Daly Science: research labs and the Center for Nanostructers
- Heafey-Bergin: Dept. Office, faculty offices, two research labs
- Guadalupe Hall: two faculty offices, some graduate student space, and robotics lab.
- https://www.scu.edu/engineering/stem/
Moving Forward

We would like to support better engagement with the alumni
- Networking among alumni, help you help one another
  - Invite you back for seminars, open house, graduation
- Involvement with Santa Clara, Alumni, School of Engineering
  - Senior Design Judging
  - Industrial Advisory Board
  - Feedback on growth opportunities
- **CARRY ON WITH EVENTS LIKE THIS ~ mechanical alumni liaisons**

We would like to know how you are doing
- Please fill out a survey
- We would like to know what aspects of our program you found valuable, less-valuable, you can contact Peta or myself directly
Thank you

Special thanks to Peta Henderson, Andrea Tai.

https://www.scu.edu/engineering/me
https://www.scu.edu/stem


Achievements and awards, sample

- **Passive Unitized Regenerative Fuel Cell (PUReFC) for Energy Storage in Off-grid Locations** one of top 14 teams US Environmental Protection Agency's P3 Award. Michael Sizemore, Sandeep Lele, Sutyen Zalawadia, Ross Pimentel and Jeff Schwartz

- **Air Brake Equalizing Distribution Device for Trains** second Place ($7,000 award) ASME iShow, Charles Franz, Greg Method, Keegan Wada

- **Chris Kitts**, elected ASME fellow (2015)
- **Kim Parnell**, elected ASME fellow (2013)
- **Terry Shoup**, President's Special Recognition Award (SCU) (2012)
- **Mohammad Ayoubi**, Researcher of the Year Award (SoE) (2013), Summer Research Award (SCU)
- **Drazen Fabris**, Award for Teaching Excellence (SoE) (2013)
- **Hohyun Lee**, Researcher of the Year Award (SoE) (2014)
- **Chris Kitts**, Outstanding Faculty Member for the KEEN network of universities (2012)

$847k in research funding

ASEE profiles in engineering, 2013
Meeting the need of the increased enrollment

ASME HPVC contest at SCU

Undergraduate growth as a percentage

Graduate unit growth as a percentage
7 new Adjunct lecturers

23 senior projects with 91 seniors

Lab work

Experience