California State University

Northridge

2012
SENIOR DESIGN
Projects Showcase

College of Engineering & Computer Science

USU Grand Salon, April 20, 2012, 1:00 to 5:00 p.m.

Civil Engineering & Applied Mechanics

Computer Science

Electrical & Computer Engineering

Manufacturing Systems
Engineering & Management

Mechanical Engineering

For detailed information, please visit our website at:
http://www.ecs.csun.edu/ecsdean/sdps/

California State University
Northridge

COLLEGE OF ENGINEERING & COMPUTER SCIENCE

S. K. Ramesh
Dean

Nagwa Bekir
Associate Dean

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APPLIED MECHANICS**

Nazaret Dermendjian
Chair

**CONSTRUCTION MANAGEMENT
TECHNOLOGY**

Amine Ghanem
Program Coordinator

COMPUTER SCIENCE

Steven Stepanek
Chair

**ELECTRICAL &
COMPUTER ENGINEERING**

Ali Amini
Chair

**MANUFACTURING SYSTEMS
ENGINEERING & MANAGEMENT**

Ileana Costea
Chair

MECHANICAL ENGINEERING

Hamid Johari
Chair

2012
SENIOR DESIGN
Projects Showcase
College of Engineering & Computer Science

You are invited...

Greetings,

I am writing to invite you to attend our third annual College Senior Project showcase event. The event is scheduled from 1:00 - 5:00 p.m. on April 20, 2012, in the USU Grand Salon at Cal State Northridge and will feature senior projects from all the undergraduate programs in the college. Also, breakout sessions have been planned where the top teams from each program as selected by the department/program have been invited to compete for prizes. The projects will be judged by a distinguished panel of industry experts. You can find detailed information about the event on the web at www.ecs.csun.edu/ecs/sdps.

By way of background, the College of Engineering and Computer Science is home to over 3,200 students and 60 full time faculty members- and was recognized in March 2010 by ASEE for having the fastest growing undergraduate engineering programs in the nation. We offer ABET accredited undergraduate programs (www.abet.org) in Civil Engineering, Computer Science, Electrical Engineering, Computer Engineering, Manufacturing Systems Engineering and Mechanical Engineering. Our Construction Management Technology program is accredited by the American Council for Construction Education. The college also offers several contemporary Master's Degree programs that are designed to meet emerging workforce needs. The college graduates approximately 500 students annually from these programs. Graduates from the college's programs serve in leadership positions in industry, government and academia.

This is an opportunity for you to see and hear firsthand from our outstanding students. Their projects are diverse and interesting and cover a wide range of areas. We look forward to seeing you on April 20th.

Best Regards,

S. K. Ramesh

S. K. Ramesh, Ph.D.
Dean

2012
SENIOR DESIGN
Projects Showcase
College of Engineering & Computer Science

Event Schedule - Friday, April 20, 2012

Display of Projects

1:00 - 5:00 p.m.   *Grand Salon, University Student Union*

Oral Presentations

12:45 - 1:55 p.m.   Civil Engineering & Applied Mechanics Projects (3 groups presenting)
USU Santa Susana Room

12:45 - 1:05 p.m.   Computer Science Project (1 group presenting)
USU Granada Room

12:45 - 2:20 p.m.   Mechanical Engineering Projects (4 groups presenting)
USU Balboa Room

1:10 - 1:30 p.m.   Electrical & Computer Engineering Project (1 group presenting)
USU Granada Room

1:35 - 1:55 p.m.   Manufacturing Systems Engineering & Management (1 group presenting)
USU Granada Room

4:45 p.m.   Announcement of Awards

Note: The schedule above is subject to change, please check back prior to the event to make sure you have the latest information.

For directions and meeting room locations, please see maps at the back of this booklet.

Senior Design Projects

CIVIL ENGINEERING & APPLIED MECHANICS

Dwelling in the Commons

Sami Maalouf
Faculty Advisor

Students
Robert Badmagharian, Carolin Klooth, Mark McCullick, Luis Rincon, Edwin Silva

This project started out as a simple exercise to get undergraduate civil engineering students acquainted with wood design and construction in seismically active areas on the West Coast. This is a sample small single family dwelling (SFD) that is proposed along the bank of a waterway, adjoining a bridge that was also designed by the same CSUN Civil Engineering Senior Design teams.

From an architectural point of view, the one-story SFD includes a living space of 1,625 SF (approximately 150 square meter) that is comprised of a kitchen, dining area, living area two bedrooms and two bathrooms. Non-habitable space of 191 SF (about 18 square meter) includes a mechanical room and a laundry area. The openness, vegetation and the spaces for outdoor living are key constituents in this design. There are front and rear covered porches that satisfy these requirements. The roof provides dominance and subtlety while guaranteeing openness and privacy.

These architectural features allow for a structural design that is a balloon frame system utilizing economical wood sizes and taking advantage of the bearing perimeter walls. These features also eliminate the use of redundant beams and other intercepting flexural members that may disrupt the high ceiling feel that the SFD's architecture is seeking to achieve.

Bridge over Temperate Waters

Sami Maalouf
Faculty Advisor

Students
Markus Klooth, Donald Landis, Melissa Martinez, Gerson Segovia, Luke Tarr

A new bridge will be constructed over a waterway to carry a road from one side to another across the stream. The bridge structure will have an out-to-out length of 70 feet (22 m) and a clear roadway width of 35 feet (11 m).The new structure will be a two-span continuous one-way concrete slab bridge system. Each span length is approximately 35 feet (11 m). The structure is supported by two abutments at each end, and a pier at center span. The abutments are essentially structures that are conventionally built as cantilever retaining walls. The pier is a structure that is conventionally built as a continuous wall and is equipped with a pier nose to divert rushing floodwaters. The abutments and pier will be aligned with streamflow. The approach roads will smoothly join the new bridge structure's alignment.
During construction, a temporary construction access crossing will be placed within the right-of-way on the downstream (southwest) side of the proposed bridge. It will be completely removed from the floodway upon completion of the bridge. Plans, specifications and color photographs are enclosed hereon.

2012
SENIOR DESIGN
Projects Showcase

Construction Management Program

CSUN Science Building

Students

Joe Bachis, Anthony Cano, Mathew Cooke, Lonjuana Mitchell, N. Blake Oliver

Sami Maalouf
Faculty Advisor

This project started out as an estimating and scheduling exercise to get undergraduate construction management students acquainted with a facility that serves students at a university campus. This is a four-story, nearly 100,000-square-foot (approximately 9,300 square meter) building that serves students at CSUN in the science and mathematics disciplines. The building includes lecture halls and rooms and computer labs. In addition, this building includes 18 research labs, nine introductory teaching labs and a DNA sequencing lab and a microscopy suite. The building also supports fiber optic data transmission required by high-bandwidth instruments like the new confocal and electron microscopes.

The building was designed with interdisciplinary collaboration in mind. This will be fostered by its physical location at the heart of CSUN, and via common gathering areas for students and faculty alike.

COMPUTER SCIENCE

Gopher: A Virtual Reality Based Mobile App

Shan Barkataki
Faculty Advisor

Students
Display ONLY: Adam Brakel, Edgardo Campos, Christopher Cat, John David, Justin Molintawe, Chan Nguyen, Aleksandr Rozenman, Charitha Sathkumara, Tu Tran, Bradley Yoo

Design and implementation of a geo location based virtual reality game for Andriod mobile platforms. The project also focused on cloud technologies, compoment based design, and process engineering for online team collboration.

Gopher Design and Process

Shan Barkataki
Faculty Advisor

Students

Oral Presentation ONLY: Juan Castro, Zach Duvall, Vlad Kopman, Luis Reyes, Jeremy Tebangin

Describes the design and implementation of Gopher, a virtual reality app, and the Gopher process- an Agile software development process for engaging large teams. The Gopher process achives broad teamwork participation, effective team communication, and disciplined engineering practices. It was successfully applied in completing the Gopher project, consisting of a team of 15 students.

ELECTRICAL & COMPUTER ENGINEERING

Autonomous Quadcopter

Ronald Mehler
Faculty Advisor

Students

Jacob Aldridge, Abdullah Alsaygh, Carolyn Collins, Robert Dolan, Sergio Dominguez, Jorge Heredia, Branden Kahn, Huy Mai, Ernesto Marmol, Timothy Marquez

Quadcopter is designed to maneuver around indoors in an attempt to locate a USB flash drive, retrieve the flash drive, and return to its place of origin.

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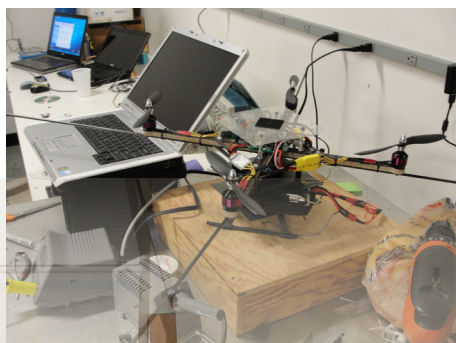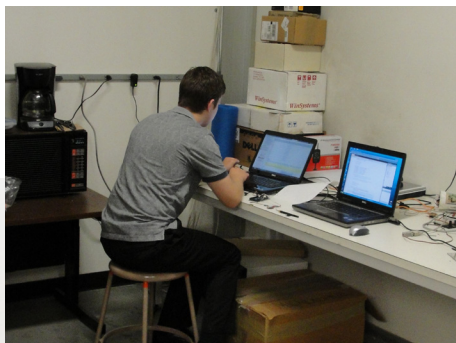
MANUFACTURING SYSTEMS ENGINEERING & MANAGEMENT

Automated Storage Unit

Students

Joseph Calderon, Hitesh Daggubati, Tigran Galstian, Josue Garcia, Jonathan Hopwood, David Pavell, Curtis Pedersen, Jasbir Sehmbey

Tarek Shraibati
Faculty Advisor

Our team conceptualized and developed an automated, rotating storage unit for small business and residential garage use. We manufactured all the necessary parts needed to complete our manufacturing project to develop our final product.

2012
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Projects Showcase
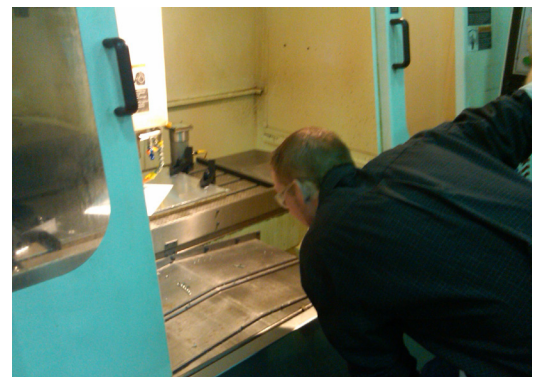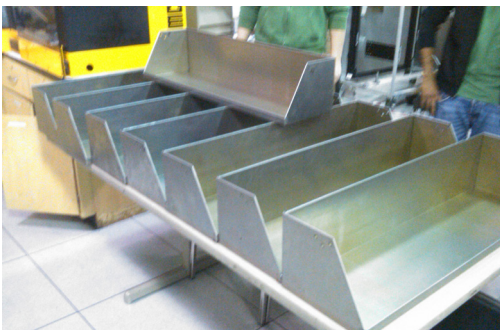
MECHANICAL ENGINEERING

Intelligent Ground Vehicle

**C. T. Lin**
Faculty Advisor

Students

Sultan Alkeebali, Omar Almahmood, Alex Anikstein, Sevana Avanessian, Robert Breyer, Siqin Cai, Carolina Chica, Raffi Dersarkissian, Alfie Gil, Amiel Hartman, Ya Li, Harout Markarian, Benjamin Mashian, Eric Mejia, Edder Rivera, Andrew Sudono, Harry Tamayo, Zi Teng, Kevin Thompson, Po-Jen Wang

Design and development of an intelligent ground vehicle.
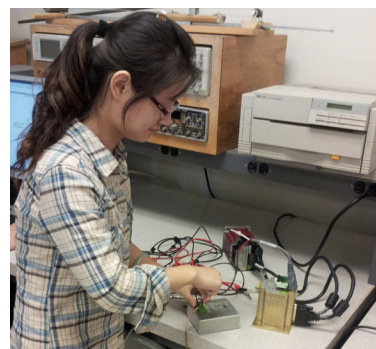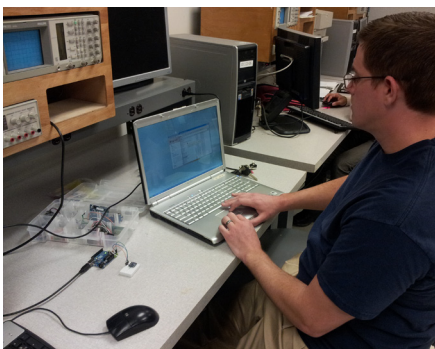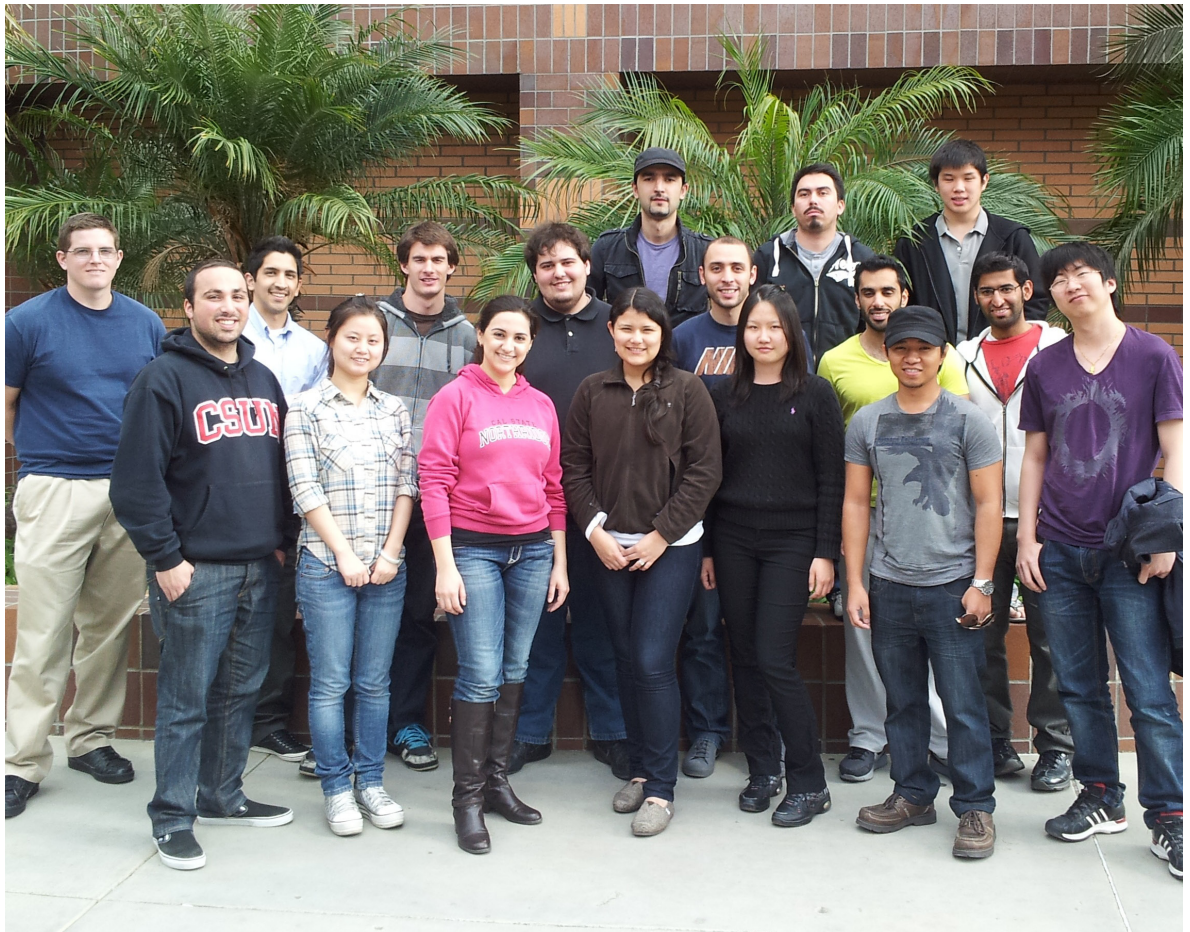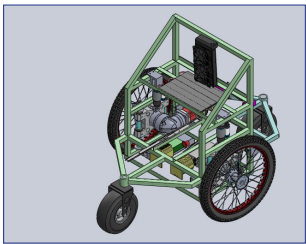
Human Powered Vehicle
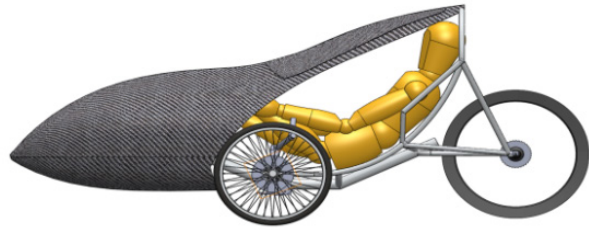
Robert G. Ryan
Faculty Advisor

Students

Essa Alessa, Rashed Almahrezy, Jassim Alrashaid, Micheal Brandt, David Brooks, Joel Canizalez, Chad Coiner, Mark Cruz, Eric Hester, Jad Karam, Hasan Khajah, Shant Maknissian, Alexander Nitescu, Christopher Quevedo, Dimitar Vassilev, Asad Yusufzai

The American Society of Mechanical Engineers (ASME) sponsors the annual Human Powered Vehicle Challenge (HPVC) to provide an opportunity for undergraduate engineering students to demonstrate the application of sound engineering design principles in the development of sustainable and practical transportation alternatives. In the HPVC, students work in teams to design and build efficient, highly engineered vehicles which are practical for everyday use. While top speed is an important factor, this competition assigns greater value to the elegance and ingenuity of the design, including presentation, practicality, safety, and functionality.

The first stage of the competition involves the preparation of a comprehensive design report. Next, there are a series of performance events (static display and safety check, sprint/drag race, utility endurance, and speed endurance), held over the course of a weekend. Competitions are held in two locations in the Unites States each year to accommodate university teams across the country. Similar to last year, CSUN's HPV design is based on a three wheel recumbent configuration, which offers a compromise between speed and stability. This year, the team will demonstrate their design at HPVC West, to be held at Miller Motorsports Park, at Tooele, Utah, on May 4-6.
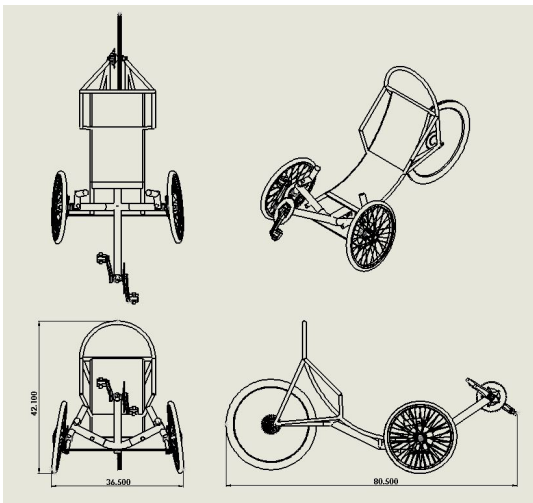
Formula SAE Vehicle

Stewart Prince
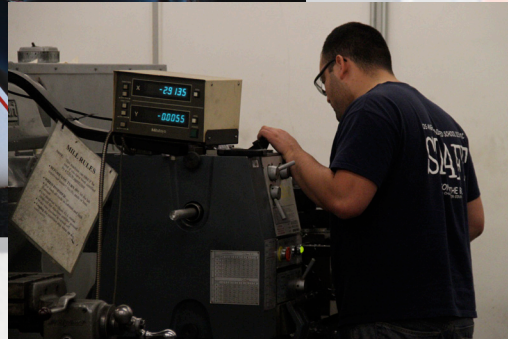Faculty Advisor

George Youssef
Faculty Advisor

Students
Andrea Agudelo, Abdulrahman Alrabah, Fernando Avila, Ashraf Awad, James Back, Theresa Bustamante, Udesh Gankewala, Ivan Hernandez, Miguel Hernandez, Priyantha Jayasooriya, Rola Mashtoub, Jumpei Nakayama, Danny Perez, David Price, Edward Robles, Ray Solorzano, Praneeth Suriyaarachchi, Dihan Telge, Nhan Tran

Formula SAE is an annual competition held by the Society of Automotive Engineers, co-sponsored by a consortium of companies including General Motors, Ford, Chrysler and Honda. The concept of the competition is to create a fictional manufacturing firm that has appointed a design team, Matador Motorsports, to produce a prototype racecar. The target market is the non-professional autocross racer. Students are required to conceive, design, and build a formula style racecar to compete each year against other universities from around the world.

This capstone project requires the skills and theory learned from the mechanical engineering cornerstones classes. Two parts of the curriculum are emphasized: theoretical and applied aspects. Students work with the state-of-art equipment that manufacture the components they have designed. This teaches them the benefits of simple practical designs and ease of manufacturing. Furthermore, the FSAE experience entails managing cost, fitting each individual's design into the overall assembly, and testing the components.

The design and fabrication of the FSAE racecar takes place over a period of nine months and is used as a training ground for young engineering students in preparation for the immensely competitive engineering industry. Restrictions are placed on the design of the car in order to test the student's ingenuity for maximizing the vehicles performance. This project develops essential skills used by engineering firms, from the design process to fabrication; each step of this project takes cost, ease of manufacturing, and vehicle performance into consideration. Once our racecar has been designed, manufactured, and tested, the team travels to the SAE competition in Lincoln, Nebraska to compete against engineering schools from all over the world in static and dynamic events.

2012 SENIOR DESIGN
Projects Showcase

Autonomous Aircraft for Aerial Observation

Tim Fox
Faculty Advisor

Students

Ivan Alvarez, Hakim Bachmid, Anton Bouckaert, Ammy Cardona, Andres Chavez, Ruben Cuellar, Curtis Darby, Hans Dela Cruz, Tomasz Dykier, Ramzey Elallamy, Hooman Fathinjed, Omar Flores, Mahdi Ghalami, Ben Hapipat, Pipat Jetawatana, Luis Josephs, Karam Kaoud, Phillip Malinoski, Ulysses Marquez, Nadine Menjuga, Thad Moody, Sandy Otero, David Penniman, Mustafa Qudsi, Ryan Schaafsma, Scott Schultz, Paulus Sunarli, Joseph Syed, Maaz Waheed, Jincun Wang, James Zimmerman

A light weight, electric-powered, autonomous Unmanned Aerial Vvehicle (UAV) has been developed to compete in an AUVSI (Association for Unmanned Vehicle Systems International) international design competition at the PAX River Naval Air Station in Eastern Maryland in June 2012. The fixed-wing UAV, with its on-board aerial imaging system, autonomously takes-off, climbs, demonstrates waypoint navigation, in-flight route re-scheduling, in-flight communication with a remote ground based computer system (extracting a pass-worded file), conducts an aerial search for objects on the ground and returns home, landing autonomously.

The 14 pound composite UAV has an electric propulsion system in a pusher configuration and incorporates LiPo batteries providing 60 minutes of flight time. Fabricated with composite materials, it has an 84 inch wingspan with a 56 inch overall length. A lifting canard configuration optimizes energy consumption by reducing UAV drag over a more conventional aft horizontal stabilizer.

A Kestral autopilot controls the pre-programmed flight from take-off through all mission phases and returns the aircraft home for an autonomous landing. While in flight, an Eagle Tree System monitors critical on-board functions and super-imposes flight parameters on an NTSC video stream, providing an "out-the-cockpit" view with a "heads-up" display at the Ground Control Station (GCS) in real time.

Two megapixel images are captured at a 1 Hz rate with a ground resolution of ~12 pix per linear foot with the computer-controlled imaging system. The camera is gimbaled with a vertically stabilized optical axis to minimize angular distortion and aid determination of object GPS coordinates. Objects found in flight are analyzed on-board for geometric shape, color, identification of an alpha-numeric character, orientation with respect to north and GPS coordinates. Images of objects found are tagged and sent to a ground-based control station for review, logging, and submission for judging while our UAV continues its mission.

Design, development, fabrication and flight demonstration was an interdisciplinary effort, incorporating students emphasizing Computer Science, Aerospace, Mechanical, Civil, Electrical and Computer Engineering. The project incorporated material from virtually every required course in the Mechanical Engineering program as well as several AE/ME senior/graduate electives.

Thank you!
Project Showcase Judges

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Founder and CEO
E-Contek
*Electrical and Computer Engineering
Liaison Council*

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Spacecraft Antenna Research Group
Caltech-JPL
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Liaison Council*

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Chief Engineer, Future Programs
Pratt & Whitney Rocketdyne
College Industry Advisory Board

Linda Friedman
Director, Software & Systems Engineering
Northrop Grumman Navigation Systems
Computer Science Liaison Council

Neal Gaborno
Senior Manager
SAS Systems Verification Center
Raytheon, Space and Airborne Systems
*College Industry Advisory Board
Computer Science Liaison Council*

Shahzain Husain
Sapphire Engineering Co. Inc.

Jonathan Incorvaia
Paul Bennett Partnership, Inc
Consulting Mechanical Engineers

Balaji Iyer
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Naval Air Warfare Center Point Mugu
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Managing Director
Avery James Inc.

Al Khella
TDD Process Engineer
3M Drug Delivery Systems Division

Tony Magee
Member of the Technical Staff
Materials Design Producibility
Pratt & Whitney Rocketdyne
*Manufacturing Systems Engineering &
Management Liaison Council*

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Management Liaison Council*

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Charles Volk
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Northrop Grumman Corporation
Navigation Systems
College Industry Advisory Board

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Mechanical Engineering

Sami Maalouf
Civil Engineering & Applied Mechanics

Ronald Mehler
Electrical & Computer Engineering

Mark Rajai
*Manufacturing Systems Engineering &
Management*

Diane Schwartz
Computer Science

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LN-25x Fiber Optic Gyro Programs
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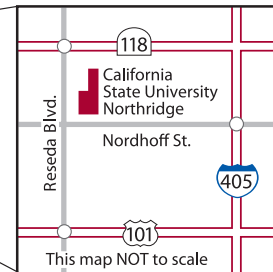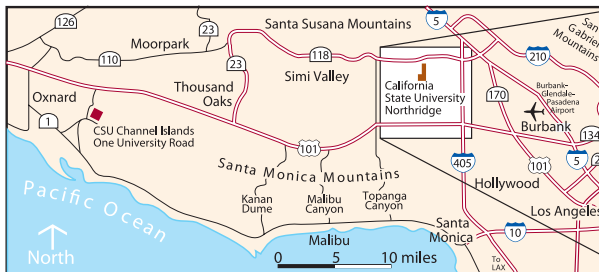Aleratec, Inc.

CHARLES VOLK
Vice President and Chief Technologist
Northrop Grumman Corporation
Navigation Systems

MARILEE WHEATON
General Manager,
Systems Engineering Division
The Aerospace Corporation

California State University
Northridge

18111 Nordhoff St., Northridge, Ca. 91330
Information (818) 677-1200
Public Safety 677-2111 · www.csun.edu

Parking Information

1 Purchase parking permit at Information Booth ($6/permit, cash only).

You can also purchase a parking permit at a permit dispenser located at each level of the parking structure ($6 per permit, cash and credit cards are accepted).

2 Park in Lot G3.

3 Walk to the University Student Union (USU)

☐ Construction Zone
■ Americans with Disabilities Act (ADA) Parking

North

| 0 | 400 | 800 | 1320 feet |
| 0 | Scale | | 1/4 mile |
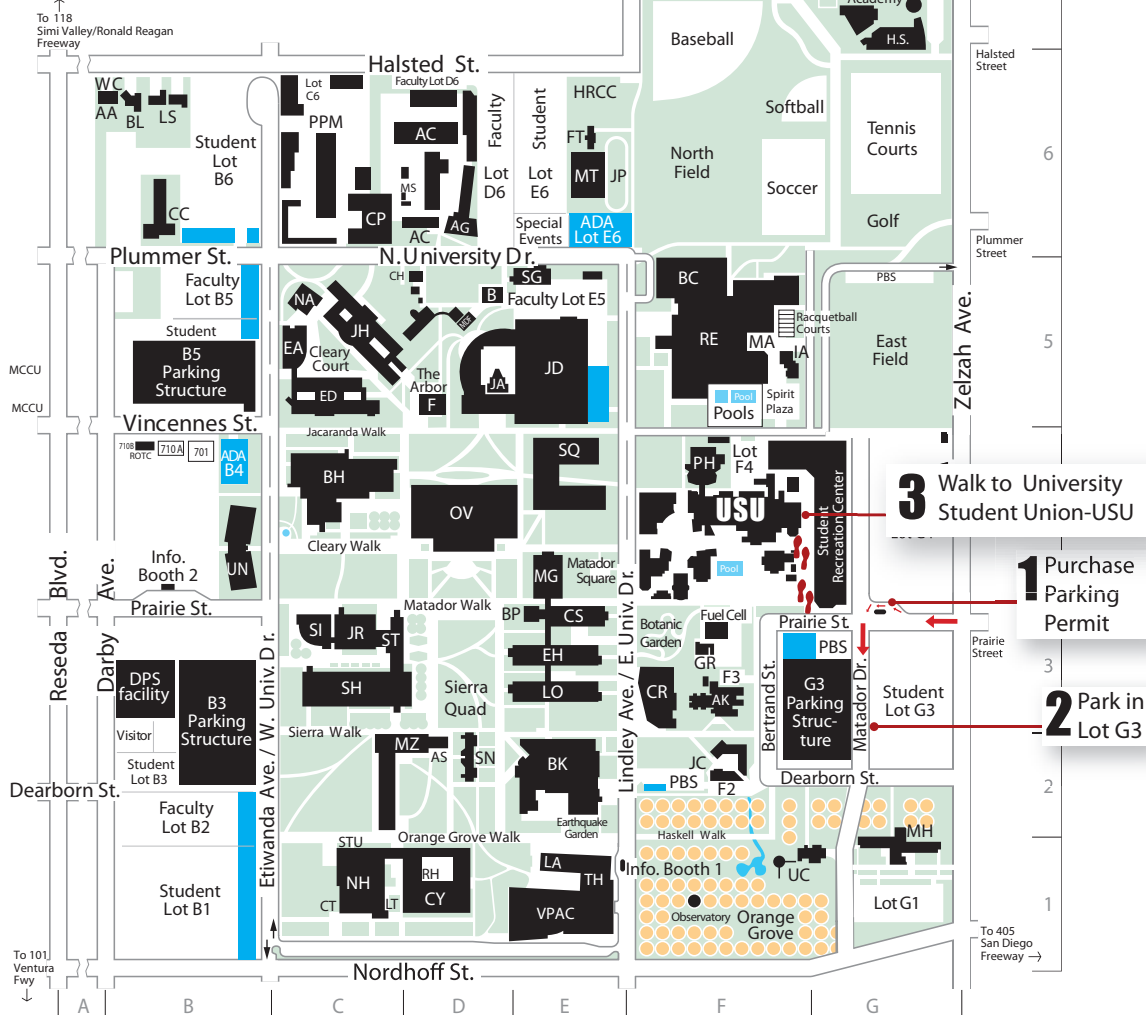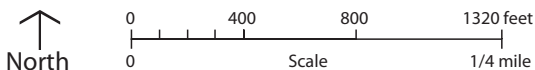
DIRECTIONS

Via the San Diego Freeway (405):

Heading north: Exit at Nordhoff St.
Left on Nordhoff to Zelzah Ave.
Right on Zelzah to Prairie St.
Left on Prairie St. to Lot G3

Heading south: Exit at Nordhoff St.
Right on Nordhoff to Zelzah Ave.
Right on Zelzah to Prairie St.
Left on Prairie St. to Lot G3

Via the Ventura Freeway (101):

Heading west: Exit at Reseda Blvd.
Right on Reseda to Nordhoff St.
Right on Nordhoff to Zelzah Ave.
Left on Zelzah to Prairie St.
Left on Prairie St. to Lot G3

Heading east: Exit at Reseda Blvd.
Left on Reseda to Nordhoff St.
Right on Nordhoff to Zelzah Ave.
Left on Zelzah to Prairie St.
Left on Prairie St. to Lot G3

Via Ronald Reagan Freeway (118):

Heading west: Exit at Reseda Blvd.
Right on Rinaldi St. to Reseda.
Right on Reseda to Nordhoff St.
Left on Nordhoff to Zelzah Ave.
Left on Zelzah to Prairie St.
Left on Prairie St. to Lot G3

Heading east: Exit at Reseda Blvd.
Right on Reseda to Nordhoff St.
Left on Nordhoff to Zelzah Ave.
Left on Zelzah to Prairie St.
Left on Prairie St. to Lot G3

3 Walk to University Student Union-USU

1 Purchase Parking Permit

2 Park in Lot G3

This map NOT to scale

UNIVERSITY STUDENT UNION

ZELZAH AVE.

LEGEND

- Disabled Access
- Telephone
- Restroom
- Stairs
- Elevators
- Meeting Rooms
- Other Services
- Open Pathways

Student Recreation Center

Coming from Parking Lot G3

BERTRAND AVE.

Information Booth
Greekbar
Virtual Wireless

Lake View Terrace A, B, C, and D

Flintridge Room

FLOOR 2

Burbank Room Glendale Room Pasadena Room

Fitness Centre

Games Room

Design Factory

LOWER LEVEL Sunny Days Camp

Activities Rooms 1 and 2

Meeting Services Office

Digital ET Floor Plaza

Pool

Northridge Center

FLOOR 2

USU Theatre

South Valley Room

North Valley Room

West Valley Room

Locker Rooms (on lower levels)

Subway

PUB Sports Grill

South Patio

2012 Projects Showcase

Oral Presentations
Granada, Balboa
and Santa Susana

Plaza del Sol Performance Hall

Canoga Room

Reseda Room

Balboa Room

R.S. Jackson OPEN

Performance Stage

Granada Meeting Room

Santa Clarita Theatre

Acacia Terrace Room

Ballroom

Executive Board Room

Grand Salon

Project Displays here

Flagstaff Hall Room

San Marcos Alpine Room

Alumni Meeting Room

Ventura Room

FLOOR 2

FLOOR 2

Computer Lab

Training Lab

USU Conference Room

C. Richard Scott TV Lounge

Sol Center

USU Administration and Business Services

ELEVATORS
Santa Susana Room 3rd Floor

Freudian Sip

Mercantile Exchange

Sam's Clothing

Student Development and International Programs

Associated Students

Plaza del Sol

Calabasas Room

Interfaith Council

Agoura Room

Thousand Oaks Room

FLOOR 2

LINDLEY AVE.

California State University
Northridge

College of Engineering & Computer Science
18111 Nordhoff Street
Northridge, CA 91330-8295
http://www.csun.edu/ecs