

BioResource & Agricultural Engineering Department Magazine
Development and Design of the Annual Magazine Following Cal Poly Standards

A Senior Project
presented to
the Faculty of the Agricultural Education & Communication Department
California Polytechnic State University, San Luis Obispo

In Partial Fulfillment
of the Requirements for the Degree
Bachelor of Science

by
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June, 2015

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Abstract

The purpose of the annual BioResource and Agricultural Engineering (BRAE) magazine is to provide the BioResource & Agricultural Engineering Department with a magazine that reflects the department and relays information to alumni, students, industry partners, and the general public. Future student assistants for the BRAE Department will have a template and strategy behind what they will need to accomplish each year by looking and reading this senior project. This magazine includes; Department Head Message, Club Features, Alumni Highlights, Successful Students, Highlight on Past Department Head, Industry Sponsors, Class Feature, BRAE Banquet, Irrigation Training and Research Center, and New Staff Features. Current Brock Center Director and professor, Megan Silcott advised this Senior Project.

Table of Contents

Chapter One.....	1
Statement of Problem	1
Importance of Project	2
Purpose of the Project.....	2
Objectives of Project.....	3
Definition of Important Terms.....	3
Summary.....	4
Chapter Two.....	5
Development.....	5
Page layout.....	5
Writing.....	6
Printing methods	7
Design.....	7
Text Standards	7
Typography	8
Colors	9
Process.....	9
Summary.....	10
Chapter 3	11
Determination of Subject Matter.....	12
Write and photograph events.....	13
Approval from the Dean’s Office	14
Design and update	14
Approval from Cal Poly Advancement.....	14
Conclusion.....	14
Chapter 4	15
Chapter 5	32
Summary.....	32
Recommendations.....	32
Conclusion.....	33
Works Cited.....	34

Appendix A: Annual BRAE Magazine Summer 2014 & 2015	35
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Chapter One

Introduction

Communication is key in today's society. The medium of conveying a message is important and one of the latest methods is through publications. This includes handouts, magazines, and newsletters, to name a few. Photography and good journalism skills enhance the message to the reader. A magazine, for example, can be produced to capture different audiences attention and gain interest in the subject matter you are wishing to convey. A magazine publication is exactly what the BioResource & Agricultural Engineering (BRAE) Department needs to further communication to industry and potential supporters from the department to the alumni base, current students, and prospective students. Recruitment is essential for the department to flourish. Having an alumni base and building it stronger will strengthen the department as a whole.

Statement of Problem

Currently, the BioResource & Agricultural Engineering Department at California Polytechnic State University, San Luis Obispo (Cal Poly) lacks a means of communication to strengthen relationships with alumni, industry partners, and future students. Developing and designing an annual magazine will give the department the outreach that they are hoping to achieve.

Importance of Project

The annual BRAE magazine publication will benefit many different sectors within the BRAE Department. It will give the department a means of communication to alumni and future students. The current methods of social media and email outreach are not as beneficial because there is a generational gap between a social media movement and the industry.

With the help of this publication, alumni and future students will have a better idea of what is currently occurring in the department and what is being planned to happen in the future. Future students can learn more about the department and have a better understanding of what they will participate in at Cal Poly as a student before applying, visiting or attending Cal Poly.

Alumni will have insight on what is happening in the department and have a way to get the department their information for future events. Alumni will also have the chance to be featured in the magazine so that current and prospective students can see what some of the alumni have been doing. Alumni are very important feature of a department. Connections into the industry are huge. With the alumni having insight, they will still feel connected to the department.

Current students will be featured so those in the industry may get to know them better. They will have the opportunity to tell their story and show the industry what they have been up to in classes, clubs, and different events.

Purpose of the Project

The purpose of the annual BRAE magazine is to provide the BioResource & Agricultural Engineering Department with a magazine that reflects the department and relays information to alumni, students, industry partners, and the general public. Future student assistants for the

BRAE Department will have a template and strategy behind what they will need to accomplish by looking and reading this senior project.

Objectives of Project

The objective of this project is to develop and design an annual magazine for the BioResource & Agricultural Engineering Department at California Polytechnic State University, San Luis Obispo.

- Develop and design a template for current and future BRAE magazines
- Photograph department events to include in magazine
- Outline and form stories for magazine
- Identify an alumni base and industry partners

Definition of Important Terms

Cal Poly Standards: These are standards Cal Poly sets for instructors, departments, and students to follow so that publications remain similar and reflect the Cal Poly standards.

InDesign: A desktop publishing software applications produced by Adobe Systems.

Lightroom: A photo processor and image organizer developed by Adobe Systems.

Outreach: The act of reaching out and providing information to different sectors in the industry.

Recruitment: The process of adding new individuals to a population or subpopulation by growth, reproduction, immigration, and stocking (Webster).

Summary

The BioResource & Agricultural Engineering Department magazine will provide many benefits to the department. It will provide a means of communication between current students, alumni, prospective students, industry, and the general public.

Chapter Two

Review of Literature

The focus of this project is to provide the BioResource & Agricultural Engineering Department a means of communication to strengthen relationships with alumni, industry partners, and future students. It will reflect the department and relay information to current students. Chapter Two will focus on the methods to developing and designing the magazine.

Development

There are a lot of decisions that are made leading up to developing a magazine. According to California Polytechnic University Office of Public Affairs (2015), the Office of Public Affairs uses a primary reference of the Associated Press Stylebook. It follows the common Associated Press Stylebook guidelines. This is specific to the college's rule of development style. California Polytechnic University has specific rules regarding capitalization, commas, majors, titles and many other criteria (Cal Poly, 2015, p. 1). These guidelines are an example of how development is formed according to who the organization or company is.

Page layout

Page layout is one of the first steps in developing a magazine. Information Design, Volume 2 (2011) explains, "To achieve success in page layout you should avoid dull and uncommon graphical designs." The layout should be consistent throughout the whole document (Pettersson, 2011, p. 70). One of the most helpful tools with layout is using a grid. It provides a consistent framework for manipulations when using different elements on the page and will help

align objects (Honeywell). Layout is one of the first things the reader will see when opening the magazine so it is important for it to be consistent and readable.

Writing

The American Association of Law Libraries (2002) published a top ten tips on writing for professional journals. Writing is very important and can be the difference between having the magazine defined as being credible or not. Listed below are the ten tips the American Association of Law Libraries suggests to follow.

1. Write about a topic that you have something to say and something that you know about.
2. Write on a topic that you are passionate about.
3. Familiarize yourself with the journal you are writing for.
4. Know your audience.
5. Know specifically what it is you want to say before you begin.
6. Pay attention to the organization of your article.
7. Avoid using conclusive statement unless you provide adequate support.
8. Mind the fine line between adequately emphasizing important points and verbosity.
9. Write with clarity, creativity and imagination.
10. Leave yourself plenty of time to revise and edit your submission before meeting a publication deadline (Houdek, 2002, pg.1).

By following the tips mentioned above, the writing will make an impact on an audience.

Printing methods

Printing methods need to be considered in the development stage. Depending on who is hired to do the printing, they should be versed in current methods of magazine design. People who are involved with printing regularly will have agreements already set up with paper suppliers, reprographic houses and printers. They will work within set specifications to allow for final checks on the product. Technology has really helped in the printing process and helps streamline it (Honeywell, 2005). The book, Digital Magazine Design suggests that type of paper should be taken into account when printing the magazine. The type of paper will have an affect with which types are used and how they will lay on the paper (Lippy, 2007).

Design

The design process of a magazine is where creativity is allowed and imagination is put to use. It is important to realize that “white space” is not always bad. It allows learners to see there is a new section and a new type that is beginning (Pettersson, 2011, p.63). This next section will talk about the different design aspects that will address different key features that need to be considered before finalizing the magazine. They will be talked about in the following sections.

Text Standards

Text standards are more important than many people realize. Text is a critical part of the magazine and it needs to be considered highly before charging full steam ahead. Information Design, Volume 2 (2011) defines key points to avoid distracting the readers and to make sure an easily comprehensible text standard is used. They summarize the text standard should be

characterized by short sentences, short words, and a simple sentence structure. The text throughout the magazine should be consistent, precise and concise. With print media, the text standards should be very readable. It is important to use active voice throughout the text and too many details should be avoided to avoid confusion. People tend to not read any material they find to be long. It was found they prefer small text paragraphs to larger ones (Pettersson, 2011, p. 62). Readability of text is also very important. Spell check may be a simple thing but make sure to check the spelling and text elements in a consistent and similar way as you did before going to print (Pettersson, 2011, p. 65).

Typography

Today there are many different types that can be used when designing. Each type is also grouped into families (bold, italic, regular, etc.) and makes the decision process more in depth. Therefore, it is important to understand design fundamentals to be able to choose a font with so many choices out there (Honeywell, 2005).

As stated above choosing the right typeface is a huge decision when designing a magazine. Magazine Design (2013) published an article titled, “Choosing the Right Typeface” that conveyed the message when choosing a typeface, “less is more.” It is more useful to concentrate on only a couple of font families. The rule is to use only two families with one being serif and one sans serif. The article suggests to not overdo the typography in the magazine. Make sure to try the fonts out. The most important thing is to use a font that is readable (Nikola, 2013).

Colors

Colors used in designing have a lot of meaning. When a different color is used, it can be used to emphasize a key point and can be used to attract the eye. Listed below is what Color Wheel Pro (2015) defines what each color is associated with.

Red: associated with energy, war, danger, strength, power and love

Orange: associated with creativity, attractions, success and encouragement

Yellow: associated with joy, happiness, intellect and energy

Green: associated with nature, growth, harmony, safety, and finance

Blue: associated with depth and stability, loyalty, confidence, and truth

Purple: associated with royalty, power, nobility, luxury, and ambition

White: associated with light, goodness, safety, and cleanliness

Black: associated with elegance, mystery, and unknown (Color Wheel Pro)

Process

Overall, the process of developing and designing a magazine takes time. To be able to succeed in this process, it will be beneficial to know background information of the company or organization with whom the design and development is for. By knowing a little about the background, there will be more understanding on what they are looking for and what the end goal is. It is important to know what this company thinks and wants to be able to adapt their ideas to the magazine. Questions need to be asked such as; How many people receive this

publication? How many pages needs to be included? Where will the printing be done? Analyze, synthesize and decide what is needed. Know who the main points of contact are and themes the company might want to follow. By following this process, a successful magazine will be the final end product.

Summary

This project provides the BioResource & Agricultural Engineering (BRAE) Department a means of communication to strengthen relationships. It will reflect the department and relay information. Chapter Two focused on the methods to develop and design the magazine.

Chapter 3

Methods and Materials

The ultimate goal for this project is to create a template for future student assistants of the BioResource & Agricultural Engineering Department (BRAE). In order to create an annual magazine for the BRAE Department, the first step is to sit down with the department head and line out what stories need to be covered in this year's edition. Once they have been determined, the magazine components need to be outlined and delegated as to who needs to be contacted for each page and article in the magazine. Next, contact the determined article features. Then write and take photos for each of the stories as needed. Some stories will need photos to be sent in and must be high enough quality to print with either 300 DPI or over 1 MB in file size.

Once the stories are written and compiled, the articles need to be sent to Cal Poly's College of Agricultural, Food & Environmental Sciences Dean's Office. More specifically, send them to AnnMarie Cornejo and Haley Marconett. They will edit the articles and send back the necessary changes.

The other main component of this magazine development is the design aspect. While all the editing is taking place, the magazine's design features need to be updated. The Cal Poly Standards must be followed but new design aspects are needed to make the magazine current. Now that both the design and written aspects done, the single PDF's of each page is sent back to the featured people for accuracy checks. Following that step, the whole PDF of the magazine must be sent to the Dean's office for approval. They will then critique the magazine's design aspects and make sure it follows Cal Poly Guidelines. When it is approved in the Dean's Office,

it will then go up to Cal Poly's Advancement Department and go through another approval process. From there it will go to the printers and be distributed accordingly.

Determination of Subject Matter

This is the most important stage in the process. The department head will have an idea of what they would like in the upcoming magazine. Each person featured, including the advisor or president of a club, will need to be contacted. Keep a good record of who has been contacted, when they were contacted and what information was exchanged. Listed below are the different sections that need story coverage.

- Page 1: Front Cover- find an appealing picture that will attract the eye to the magazine (Department Head will weigh in heavily on this decision.)
- Page 2: Department Head Message- ask the Department Head to write a welcome message
- Page 3: Table of Contents- design this page any way preferred to let the audience know what the magazine contents are.
- Page 4-5: Club Focus- focus on each club within the department, include photographs
- Page 6-7: Student Focus- Ask professors for names of three students whom are qualified to be featured in the annual magazine (cover either two Agricultural Systems Management students and one BioResource & Agricultural Engineering student or vice versa). Make sure the focus is balanced with male and female students.

- Page 8-9: Cover Story- find a cover story for the magazine. This is the most important article and two pages in the magazine due to the fact that they are the centerfold. The Department Head might have in mind what they will want. If not, ask around the department until a good angle to a story is found.
- Page 10-11: Alumni- use creativity to come with a good design and write about at least three alumni.
- Page 12: Faculty update- this is where retirements and new faculty members will need to be covered.
- Page 13: ITRC- this page is devoted to ITRC. Email them and let them know they have a page in the magazine to include anything they would like.
- Page 14: Class Feature- choose a class to write an article about. This class should feature something that will catch the reader's eye.
- Page 15: Industry Sponsors and IAC Member List- this will feature the industry sponsors and names of those on the IAC list.
- Page 16: Open Space- cover an event that is interesting. Leave space at the top for the printer to include addresses.

Write and photograph events

Interviews are a critical step in the process. Setting up personal interviews will help find an angle to the story. Have a large calendar where it is possible to pencil in the events needing to be covered. Make sure the camera is charged, has a clean memory card and the correct lens to shoot the events. Have someone else read the stories to make sure they make sense. Then always

follow up with the featured person to double check facts such as name spelling, correct job titles and other details are correct.

Approval from the Dean's Office

The Dean's Office will take the articles and make sure they follow correct AP style and Cal Poly style formatting. They will give suggestions on how to improve articles. Make sure to take into account all changes and let the Dean's Office know if further changes occurred in the written content. Once the articles have gotten approved, the next step is getting the design aspects approved. Send a PDF format of the whole magazine via email to the Dean's Office.

Design and update

Updating last year's design aspects needs to be completed next. This magazine will need to follow Cal Poly guidelines. The front page needs to stay in the same format so the reader can recognize the annual magazine. Depending on the article, feel free to play around with the style of design aspects. Personalize it so the finished project is a professional yet attractive magazine.

Approval from Cal Poly Advancement

The final step is to send the magazine to Cal Poly's Advancement. The Advancement Office will do the final edits and approvals. Once the magazine has passed this step, it will be approved to print. Congratulations, the magazine is complete!

Conclusion

The many steps involved in the making this magazine are essential in helping to create a high-quality product that will be professional yet attractive. It is important to remember to keep an organized schedule of events, contacts and stages occurring. Organization and communication are key.

Chapter 4

Results and Discussion

See Appendix A for the finished Cal Poly BioResource & Agricultural Engineering Department annual magazine 2014. The 2014 magazine was the look the department wanted and used as the design example for the 2015 magazine. The magazine was created using Adobe InDesign. The photos were edited in Adobe Lightroom. The finished product is a 16-page magazine spread measuring 8.5" x 11". A .25" bleed is set for printing requirements. All the elements of design from photos to document and logo links are packaged in a folder system to be utilized in the future by the BRAE Department.

BRAE

CAL POLY
SAN LUIS OBISPO

BIORESOURCE & AGRICULTURAL ENGINEERING DEPARTMENT | SUMMER 2015



MAKING A DIFFERENCE:
OUTSTANDING STUDENTS, PAGES 8-9



Hello again! For the second year, I am privileged to introduce the BioResource & Agricultural Engineering (BRAE) Department's annual newsletter, the "BRAE News."

So much has occurred since the last BRAE News that I will only mention a few of the highlights. Probably the most significant event this academic year was the BRAE Program Evaluation visit by the Accreditation Board for Engineering and Technology Programs (ABET) in October. The preliminary response was positive, although we were asked to provide additional copies of senior project reports to verify that the design criteria were adequately addressed. We are submitting these reports as they become available in June. The formal accreditation results will be released in July. We have come to appreciate the rigor of the accreditation process, as an ongoing reminder of our dedication to excellence in education.

We are embarking on a similar journey for the Agricultural Systems Management program, seeking accreditation as an Engineering Technology program for the first time. The process will involve six years of preparation during which we assess, review, and improve the curriculum, as well as the facilities and faculty capabilities. Accreditation not only increases the market value of future degrees, but the value of all previously awarded degrees as well.

In addition, we are pleased to announce that a new faculty member Professor Bo Liu, a mechanical engineering graduate from the University of Missouri, joined us in September. He has wasted no time in becoming a major contributor to the department, teaching the intro agricultural electrical course and founding the new Robotics Club, which will compete in the American Society of Agricultural and Biological Engineers (ASABE) National Unmanned Aerial Vehicle (UAV) Student Competition in Fall 2015.

Another new hire, Administration Support Coordinator and Office Manager Tina Pedersen, joined the department in February. Pedersen previously worked for the Rancho Mirage campus of Santa Barbara Business College, where she served as the registrar and financial aid officer.

In other news, the Agricultural Engineering Society again hosted the annual BRAE banquet on May 16, concurrent with our Spring Industry Advisory Council (IAC) meeting. This year, more than \$125,000 was raised at the banquet for student scholarships. Starting this year, the department began holding meetings of the IAC twice a year. The first meeting was held Oct. 23, 2014, just prior to the ABET accreditation visit. The IAC meeting provided a final opportunity to strengthen the department's internal program assessment with the most recent industry feedback. It also allowed some council members direct involvement in the accreditation activities. IAC Chair, John Schaap, was interviewed by the ABET evaluation team as part of the formal visit.

Department enrollment has remained steady since last academic year, with 189 BioResource and Agricultural Engineering (BRAE) majors and 105 Agricultural Systems Management (ASM) majors. In the fall, we anticipate the arrival of 58 new BRAE majors and 11 ASM majors.

This year has been a time of great change in the College of Agriculture, Food & Environmental Sciences. New leadership includes Dean Andrew Thulin, four new assistant deans, as well as new office staff and department heads throughout the college. Significant efforts by college staff has secured more than \$28 million in donations designated for new buildings and programs.

I wish you all a fantastic summer and great year ahead! And I urge all alumni to keep in touch... As former Cal Poly President Warren Baker used to say, "We'll leave the light on for you."

PH.D., P.E.

BRAE | SPRING 2015 - ISSUE 2

The BRAE newsletter is published annually by the BioResource & Agricultural Engineering Department at California Polytechnic State University, 1 Grand Avenue, San Luis Obispo, CA 93407-0250.

On the Cover: Outstanding students from left to right Arturo Barajas, Sarah Alford, and Cameron Dale all have bright futures ahead of them. Read the feature story on pages 8-9.

4-5

Department
Clubs



12-13

Alumni



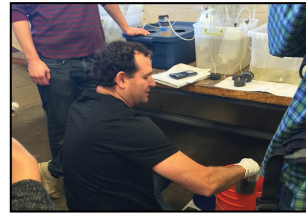
6-7

Ed Carnegie



14

Class Feature



8-9

Student
Features



15

Industry
Partners



10-11

Staff
Highlights and
ITRC



16

AES Banquet



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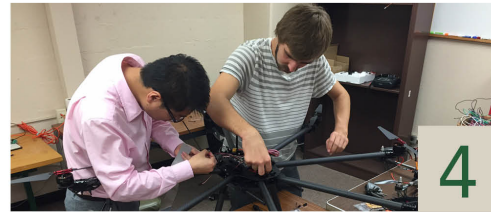
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CLUB ACTIVITIES



DEPARTMENT CLUBS THE TRUE LEARN BY DOING

1 Agricultural Engineering Society | CAFES Large Club of the Year for the Third Year in a Row

The Agricultural Engineering Society (AES), which was named the CAFES Large Club of the Year for the past three years, still finds time to add more events into their schedule every year. AES is a student run club with strong roots in professionalism, community service, personal growth, education and friendship. Those who join the club find themselves busy yet still asking for more. The AES club is constantly on the move and gets involved year round. The club holds monthly meetings offering industry-related presentations, networking opportunities, social gatherings and the BEST BBQ on campus. The club puts on over fifty barbeques each year! Members are invited to attend the annual BRAE career fair, field trips to events such as the World Ag Expo, and social outings including bowling, trapshooting, sports days and the Ag Olympics.

Members of the AES club find themselves involved in community outreach and service activities such as the Great AgVenture, Building an Engineer Day and the 26-Hour Program. Such activities not only benefit the community but also provide members a chance improve on their

communication, leadership and teamwork skills. This year the club donated over \$1,000 to non-profit organizations. Additionally, AES lent a helping hand to Sinsheimer Elementary School's Parent Teacher Association dinner and auction. With the club's help, they raised the auction amount from \$16,000 last year to over \$28,000 this year. Every May, the AES club holds its annual banquet. At the banquet, special recognition is given to members who went above and beyond.

AES President Alan Isaacson states, "The AES Club consists of dedicated and hardworking students, staff and faculty who are committed to the betterment of the club, college and community. Those involved truly embody the "Learn By Doing" motto in all they do."

Page 4 picture: AES Club members pose for a picture after being awarded 2014-2015 Large Club of the Year for the College of Agriculture, Food and Environmental Sciences

Page 5 picture: AES BBQ crew at one of the weekly Thursday BBQ's on the BRAE Ramp.

Tractor Pull Club & Team | Awarding over \$20,000 in Scholarships 2

Tractor Pulling continues to be one of the most competitive motorsports across the U.S.. Tractor pulling, on the West Coast, was started by students and faculty with big dreams in our very own shops of California Polytechnic State University's BioResource and Agricultural Engineering Department (BRAE). From there, one of the most hands-on and beloved clubs was integrated on campus.

Tractor Pull is comprised of the team and the club, both of which are made up of a lot of the same students. The team travels up and down California competing with Mustang Fever and Poly Thunder, their two tractors, throughout the season, almost every weekend from February to November. This past season they attended 20 different events.

The club is in charge of planning and executing all aspects of the Cal Poly Open House Tractor Pull. Students coordinate everything from advertising, sponsorships, apparel, BBQ, security, trackside equipment to stats and

tabs, and more.

Agricultural Systems Management (ASM) senior and 2014-2015 club president Jiggs Briggs said his favorite part of tractor pull is, "Advocating for the sport and making sure we put on a good show for spectators of all ages and backgrounds to keep them coming back."

The Cal Poly Open House Tractor Pull raised over \$25,000 dollars that was awarded last year at the AES Club Banquet in scholarships. The club would like to thank all the generous sponsors.

Page 4 picture: Past Tractor Pull Presidents from left to right-Myles Anderson 1999, Russ Angold 2000, Rob Brown 2012, Aaron Flores 2013, Arturo Barajas 2014, Jiggs Briggs 2015, New President Alan Isaacson 2016

Page 5 picture: 2015 President Jiggs Briggs drives Poly Thuder during the Open House pull.

Quarter Scale | Competing Nationally 3

The Polybuilt Quarter Scale Team at Cal Poly prides itself as one of the furthest traveling teams at the 2015 ASABE International 1/4 Scale Tractor Design Competition. The 2015 team was comprised mostly of first and second year students, however the few returning team members were active leaders in the design, fabrication, and management facets of the team. The team showed good unity at the competition, which was highlighted by an excellent run in the new "durability" competition, and an overall 9th place.

The majority of the fabrication process is done in-house, which embodies Cal Poly's Motto of Learn by Doing. This allows students to find out for themselves which processes in manufacturing are more efficient and accurate than others.

Paying attention to details of past tractors' successes and short comings, this year's tractor is built for a lifetime of value, strength and performance. PolyBuilt attributes a

large portion of its success with Poly Lite to the 2013 and 2014 years. The 2013 team integrated a centrifugal clutch to improve performance and robustness of the tractor. The 2014 team began using one 31 horsepower engine instead of two.

This year, the team added a dynamic ballast system to the tractor, giving greater traction in performance pulling applications. To sustain the ease of operation for the customer, PolyBuilt elected to use the student modified automatic transmission for the fourth year in a row. With one more year under its belt, the quarter scale team is very excited to implement fresh ideas for next year's competition.

Page 4 picture: MacKensiz Ward getting the tractor ready for competition.

Page 5 picture: Lucas Salem drives their tractor during the competition in Peoria, Illinois.

Robotics | Building Robots and Looking to the Future 4

We are excited to announce a new club that joined the BRAE Department this year: The American Society of Agricultural and Biological Engineers Robotics Club (ASABE Robotics Club).

As the world's population grows, farmers must address the issue of feeding and clothing more and more people. Technological advances in automation acts as a tool for farmers, allowing for more accurate analyses and confident decision-making. This new aspect to farming is what the ASABE Robotics Club strives to bring to Cal Poly students. The ASABE Robotics Club focuses on developing solutions to real life agricultural problems through design, construction, and automation.

Every year the American Society of Agricultural and Biological Engineers hosts an international robotics competition where schools from around the world compete

to address a specific agricultural problem.

This year Cal Poly's ASABE Robotics Club will make its maiden voyage to New Orleans, La. to compete against a variety of schools.

The club will face the challenge of constructing a fully-automated robotic system designed to simulate the assessment of soybean plants in a field. The parameters that will be assessed are plant color and height. A sample of each phenotype present in the field must be collected and delivered to the reporting station. For more information email CalPoly.ASABE.Robotics@gmail.com.

Page 4 picture: Advisor Dr. Bo Liu and student Charlie Ross work on their robot during a Robotics Club meeting.

Page 5 picture: Students learn how to program a robot in their weekly club meeting.



MR. ED CARNEGIE

PAST DEPARTMENT HEAD HIGHLIGHT



We are honored to highlight past Department Head, Ed Carnegie. Although he retired from the department in 1995, he has closely connected the Swanton Pacific Railroad to the department, including a list of projects for the BRAE department concrete classes and machine design classes to work on as class projects for Swanton.

Retired Professor Ed Carnegie was born and raised on a goat dairy in Orange County, Calif. In high school, he was active in 4H as a junior leader and was awarded the diamond star in Orange County for his involvement in 1953.

Carnegie attended Fullerton College but joined Navy before graduating. He spent a summer on a Landing

Ship Tank hauling supplies to help build the DEW Line Radar System in northern Alaska and Canada. He spent the next few years in Pearl Harbor, on a diesel submarine. Carnegie then left active Navy duty to go back to school, but remained in the naval reserves for the next twenty-four years. During that time, he served as local Commanding Officer of the local Naval Reserve Unit next to the San Luis Obispo Airport until it was disbanded.

When Carnegie returned to Fullerton College after the Navy, his advisor suggested he use his strong interests in engineering and agriculture to study agriculture engineering at Cal Poly. Carnegie was accepted at Cal Poly in 1959 and graduated three years later with a

“Enjoy the moments in life, share with others.
Listening is sometimes the best answer.”



bachelor's degree in agricultural engineering. He then received a master's degree from UC Davis in 1963.

Carnegie spent the next two years teaching at both Cal Poly and UC Davis until a tenure position opened up at Cal Poly, where he worked until he retired 31 years later in 1995 as the department head for the BioResource and Agricultural Engineering Department. Some of his proudest moments were watching students come to Cal Poly, grow academically and personally, graduate, and then excel professionally in their careers. Carnegie always told students, "Become and stay involved. Volunteer, stay engaged with family, friends, community, and other activities. Enjoy the moments in life, share with others. Listening is sometimes the best answer."

Carnegie will tell you how much he loves retirement and freedom and spontaneity each day brings, however,

he continues to be involved. He has been the director of Cal Poly Swanton Pacific Railroad since 1993. Swanton Pacific Railroad, in Santa Cruz County, is an operating railroad museum that features model steam locomotives from the 1915 San Francisco Panama-Pacific International Exposition. He also serves as the SPRR Treasurer, as well as helps organize and direct the volunteers with the organization's various projects.

Carnegie lives in Cayucos with his wife, Mary Ann, and their dog, Zorro. He is a member of the Cayucos Lions Club, the Cayucos Community Advisory Council and the Morro Bay Yacht Club. The couple travel as much as possible, enjoy family gatherings, leisure reading and working in the yard, maintaining his garden model railroad.

BRAE DEPARTMENT HEAD FROM 1982 TO 1995



Left: A crane car that was built at Cal Poly for Swanton

Right: Taken as a joke after switching hot seats from BRAE Department Head to Director of Swanton Pacific Railroad



OUTSTANDING

"BRAE students are those who go into the industry and excel."



From left to right: Arturo Barajas, Sarah Alford, and Cameron Dale



Sarah Alford
 "Being a part of my family's ranch has shown me the importance of agriculture and how much opportunity exists in the industry."

Sarah Alford, part of a fifth generation San Luis Obispo ranching and farming family, knew that one day she would work in the agriculture industry. "Being a part of my family's ranch has shown me the importance of agriculture and how much opportunity exists in the industry," Alford said.

In high school, Alford discovered mechanical engineering and became interested. She knew Cal Poly was nationally recognized for its engineering department and when she got admitted to Cal Poly as a mechanical engineer she immediately pushed the accept button. Eventually she transferred to the BRAE Department where she could combine her love of engineering with her passion for agriculture.

While attending Cal Poly, Alford became more familiar with the water industry and its challenges. She began taking internships and working on solving water problems. Last summer, she was part of the Irrigation Training and Research Center's Distribution Uniformity (DU) Evaluation Team. She spent the summer in the San Joaquin Valley evaluating drip systems and micro spray systems. Currently, Alford works part-time at the Coastal San Luis Resource Conservation

District helping with its mobile evaluation lab and other projects.

In addition to her internships, Alford excels in all of her classes. She has been recognized for being on the President's List the past two years in a row. The President's List recognizes undergraduate students who have demonstrated consistent achievement, such as being named on the Dean's Honors List for any three or four quarters of the university year. To be on the Dean's Honors List you must have a 3.5 GPA or above for the quarter.

In the future, Alford plans on making a difference in the agriculture industry. "Generally, I'm interested in conservation, management and policy. Water and conservation work interest me because innovation in these areas is going to be essential for farmers to continue their work and make agriculture sustainable as they face long-term droughts and harsh policies," Alford said.

Alford graduates in June with a bachelor's degree in bioresource and agricultural engineering.

STUDENTS



Arturo Barajas

"I truly value the BRAE Department for the family aspect that it has."

Senior Arturo Barajas's name is well known in the BRAE department because of his extraordinary involvement in clubs, classes and extracurricular activities.

Barajas attended a truck and tractor pull in his hometown of Modesto, Calif. when he was growing up. Little did he know, that day would set his college career on track for the BRAE Department at Cal Poly.

His club involvement began during his first quarter. As an incoming freshman he immediately joined Agricultural Engineering Society (AES) and the Tractor Pull Club. By his sophomore year, he was the Ag Council Rep for AES. Barajas has been extremely involved in the department club activities holding leadership positions as the 2013-14 Tractor Pull President, AES President in 2012-13 and a career fair organizer in 2014-15.

"I truly value the BRAE Department for the family aspect that it has," Barajas said.

"You are able to build relationships and make connections that are so valuable today."

One of his favorite classes so far was Internal Combustion Engines, taught by Professor Gary Weisenberger and the keystone project classes BRAE 418 and 419 taught by Professors Andrew Holtz and Mark Zohns.

"These classes have a hands-on aspect that is unique and an opportunity that not every student gets to have," Barajas said.

Outside of school, he worked in different aspects of the agricultural industry while doing internships throughout the state. His last internship was for a local vineyard management company.

In June Barajas will graduate with a bachelor's degree in agricultural systems management.

From a young age, Cameron Dale has always enjoyed being outside and fishing the days away. He could be found at the pond, involved in FFA, playing on the football field or jamming out to his favorite Eagles song. Having a strong leadership ability was a natural thing to him and it was no surprise Dale excelled through FFA, and came to pursue his career education at Cal Poly.

Dale quickly got involved in the College of Agriculture, Food & Environmental Sciences. He joined Tractor Pull, Agricultural Engineering Society (AES) and Alpha Gamma Rho as a freshman. His sophomore year, he got elected to the AES Ag Council Representative position and has been involved ever since, currently serving as the Vice President of Ag Council.

"I am honored to be apart of Ag Council because this council unites clubs together throughout the whole College of Ag. The impact and opportunity through this council is immense," Dale says.

Through Ag Council, Dale is able to further his leadership by working in groups, organizing people, networking and having fun. His classes in the BRAE Department

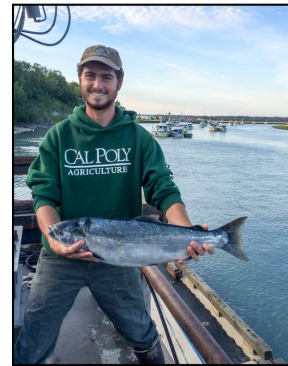
help him stand out in the organization and make a difference on the Cal Poly campus.

Dale is also involved in AES. He is the reporter this year and is often found behind the camera lense, documenting everything going on, or working with the crew for the weekly Thursday BBQ. Dale remarked that being a part of AES will help build you up and develop skills needed in the industry.

Dale continues to fish, and last summer he worked at an Alaska fishing dock. It was there he was able to apply his school experiences and knowledge to his hobby of fishing.

"I hope one day I can work in a mechanical engineering role where I am able to work with people and use the skills and knowledge I have gained through my BRAE studies and Ag Council experience," Dale said.

Dale continues to stand out amongst his colleagues and has been elected as the 2015 President of Ag Council.



Cameron Dale

"The impact and opportunity through this council is immense."

FACULTY UPDATE



Tina Pedersen

The BioResource & Agricultural Engineering Department welcomes new Administrative Support Coordinator, Tina Pedersen.

Pedersen was born and raised south of Odense, Denmark. She earned two master's degrees in international business and french at the University of Southern Denmark and the University of Savoy, France. She saw an opportunity in America and immigrated to the United States in 1992.

Pedersen and her family moved to Albuquerque, N.M. where she began her experience in the banking world. She continued to work for the bank after relocating to the Coachella Valley. For the last six years she worked for Santa Barbara Business College, a small private satellite college in Coachella Valley, prior to joining Cal Poly.

"My favorite part about the job is being part of the BRAE family supporting students and seeing them succeed," Pedersen said.

Off campus, Pedersen enjoys being outside, hiking, and reading. Her favorite vacation is visiting her family back home in Denmark and spending time catching up with them.

Articles written by: Cristina Kinslow, Megan O'Hearn and Charline Baum



Dr. Bo Liu

We are proud to welcome a new mustang to our department!

After completing his undergraduate work in China, Professor Bo Liu received a master's degree in mechanical engineering and a doctorate in biological engineering at the University of Missouri. He is also fluent in Mandarin and English.

Professor Liu joined Cal Poly right after he graduated. Liu said he was drawn to the university because of its Learn by Doing philosophy and he believes in the importance of applying knowledge to real world problems.

Professor Liu teaches the following courses: Fundamentals of Electricity, Principles of Agricultural Electrification, Measurements and Computer Interfacing and Computer Controls for Agriculture. His research interests include power ultrasonics, mechatronics, sensors and instrumentation, and agricultural safety.

Along with teaching, Liu remains active in the school community by being the lead adviser of the ASABE Robotics Club. This club, new to the department, is featured on page 5.

In his free time, Liu likes to travel with his family and to fish. He has a passion for rollercoasters and has even ridden some of the fastest in the world. He hopes to one day visit and tour all the national parks in the U.S. and also visit all 50 state capitals.



Internationally Recognized Irrigation Training & Research Center

Chairman of the Board: Dr. Charles Burt Director: Dr. Stuart Styles

The Irrigation Training & Research Center (ITRC) recently entered into two new long term contracts with the U.S. Bureau of Indian Affairs (BIA), Branch of Irrigation and Power, and the Los Angeles County Sanitation Districts (LACSD). These two multi-year contracts will bring nearly \$2 million to Cal Poly through the ITRC in the form of faculty, staff, and student employment hours, and provide excellent opportunities for ITRC student employees to enhance their irrigation training. The contract with the BIA, headed by Professor Dan Howes of ITRC, is a five-year cooperative agreement that is intended to produce two full modernization plans for large irrigation projects. The BIA oversees 16 irrigation projects throughout the western U.S. ranging in size from a couple thousand acres up to nearly 150,000 acres. Much of the infrastructure in the BIA projects is in substantial need of maintenance.

ITRC brings expertise in modernization as opposed to simple rehabilitation to improve irrigation delivery service to farmers in the project and project operation. A major goal of the modernization in these projects will be to allow farmers and project operators to maximize the beneficial use of tribal water rights. This will result in improved water quality through reduced runoff and deep percolation, which will positively impact many of the environmental concerns shared by tribal members. A major part of this project is to provide on-site operator training at four or five projects each year. The training includes improved flow measurement, system operation, and recommendations for improved operation.

Additional tasks include creating an irrigation safety manual and investigating the possibility of recruiting tribal members to attend Cal Poly as BioResource & Agricultural Engineering and Agricultural Systems Management majors to enhance the irrigation expertise throughout the BIA irrigation projects. ITRC student employees are working on the irrigation safety manual. In addition, information gathered and learned from the BIA irrigation projects is used in BRAE irrigation courses. ITRC is also assisting LACSD conform to regulatory compliance with agronomic requirements for irrigation crops with recycled water at two sites: the Lancaster eastern agricultural site and the Palmdale agricultural site.

Led by Dr. Franklin Gaudi, ITRC's activities include utilizing an irrigation scheduling program at both sites to supply farm operators with the correct amounts of water to apply to their fields on a weekly basis to help ensure that just enough water is applied to meet plant needs without overwatering. Knowing how much water is applied also allows irrigators to track the amount of nitrogen being used in the fields.

Both irrigation scheduling programs are set up with the goal of using as much of the recycled water as practicable for the irrigation of crops in a manner that meets crop requirements and complies with the Lahontan Regional Water Quality Control Board's permit requirements. ITRC is also assisting LACSD with maintenance tasks such as soil moisture monitoring and distribution uniformity evaluations on center pivots.

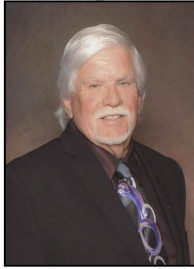
Photos and Article submitted by ITRC

BRAE | SPRING 2015 11

SUCCESS THROUGHOUT

1960's

1970's



1965
Don Mayo

Don Mayo graduated from the Agriculture Engineering Department in 1965 and went to work for Deere and Company as a Waterloo Factory Specialist. He then joined Orchard Machinery Corporation (OMC) in 1970, where he continues to work 45 years later serving as the President and CEO of Orchard Machinery Corporation/ Wesco Trailer Manufacturing.

In 2003, Mayo purchased the company and expanded it to one of the largest nut equipment manufacturers in the industry. OMC now has over 14 different models in their product line up.

The BRAE department taught Mayo that failure is not an option. "If I failed, I would continue until I succeeded," said Mayo.

He offered some advice to current and graduating students: "Enjoy your college career. Take some time off after graduating, go travel or do something fun; enjoy life a little bit before jumping into a fast paced and often stressful work environment," he said.



1975
Johnny Starling

Johnny Starling graduated from the department in the spring of 1975, with a bachelor's degree in mechanized agriculture. Some graduates say that they use nothing in their working careers from what they learned in college but Starling used what he had learned right from the start.

Starling attended Cal Poly on an Army ROTC Scholarship. His first job out of college was as a combat engineer platoon leader at Fort Sill, in Lawton, Okla.. After the Army, Starling returned to farming. He is now the vice president of farming operations for Nichols Farms, in Hanford, Calif.. Nichols Farms grows pistachios, almonds and some row crops, in addition to hulling and processing pistachios and almonds.

"Try to get as much experience as possible," Starling advises. "Don't be afraid to take hard or less glamorous internships to get the experience necessary for the future. Become proficient in public speaking and take as many business classes as you can."



John Schaap | Chair of the Industry Advisory Council Highlight

John Schaap is a 1995 Agricultural Engineering graduate and is a Vice President at Provost & Pritchard Consulting Group. He is a registered agricultural and civil engineer and has worked extensively with dairy and other animal facilities. Since 2011, he has been very involved with nonpoint source regulatory issues, working on behalf of irrigated agriculture in Kern County, California.

THE DECADES

1980's

1990's

1995

Yvonne Sams



2000

Traeger Cotten



Yvonne Sams, a 1995 BRAE graduate, said that one of her favorite memories of the department is that she was the first woman to major and graduate in agriculture engineering technology at Cal Poly.

Sams said, "BRAE taught me when learning something new, not to be afraid of getting my hands dirty, dig in and learn by doing!"

Sams started her career at Frito Lay, Inc responsible for production in Cheetos, Sun Chips and potato chips. She then ran a pre-cut produce warehouse, worked at Tyson Foods in human resources and at the E&J Gallo Winery she ran their warehouse special services department. She started at G3 in a business development role selling warehousing and transportation services. Sams, who continues to work for G3 Enterprises as a senior manager of ag logistics, is responsible for the largest wine grape transportation in the state.

Sams recommends getting involved in campus clubs and organizations. "Don't stop there, be a leader in at least one of them," she said. "Companies want to hire those individuals who can lead projects and people."

Traeger Cotten graduated from the department in 2000. It wasn't until his senior year that he zeroed-in on the career path that he later pursued (automation, controls, sensors and instrumentation).

Cotten has now worked for Southern California Edison for more than 10 years, focused primarily on energy efficiency. Many of the projects he oversees are tied to agriculture and food science.

Cotten remains involved with the BRAE department through the American Society of Agricultural and Biological Engineers Society and helps to plan the annual meeting each year.

His advice to current and prospective students is, "Find a balance between hard work and hard play. Don't let your college years pass you by with your head in a book. Get your hands dirty. Sweat. Make mistakes. Volunteer. Find your passion. Live life. Do things that are out of your comfort zone. Oh and try to find the joy in whatever you are doing."

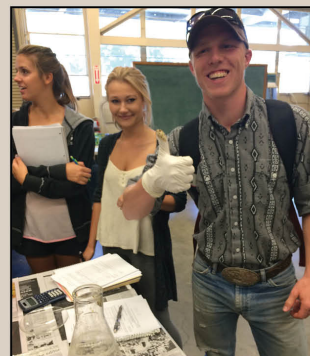


The BRAE Department wants to hear from alumni and friends.

Stay connected by "liking" us at [facebook.com](https://www.facebook.com/calpolybrae)
Search: Cal Poly BioResource and Agricultural Engineering Department.

BRAE 348

EXPERIMENTING WITH DR. GREG SCHWARTZ



Left: Students grind up waste food for anaerobic digestion experiment.

Above: Tim Ditrich pauses for a photo while working on the recipe development section of the lab.

Energy for a Sustainable Society is a class that you don't want to miss. This class is definitely worth taking because the coursework and the knowledge students gain throughout the quarter is applicable to life beyond Cal Poly.

Dr. Greg Schwartz, BRAE 348 Professor, notes that there is an extensive amount of material to cover in just 10 weeks. Schwartz continuously encourages discussion throughout lectures and encourages students to reflect on American society's use of energy. He mixes videos into lectures and uses props to help explain some of the more complicated concepts.

Some of the numerous hands-on activities that the class engages in include: a survey of manure and other organic wastes for the production of energy through anaerobic digestion, working with commercial scale solar panels, and examining the students personal energy consumption and per capita energy consumption globally through observation of habits.

Students rave about BRAE 348 not only because they think Schwartz is such an engaging and passionate professor, but because they walk away from the class with a better understanding of the amount of energy they use on a daily basis and the amount of energy required to lead their personal lives.

Schwartz said his favorite part of teaching this class is the variety of students he is able to interact with. The class is open to any major on campus. He recognizes the fact that BRAE 348 is a general education course, and strives to make his students experience fun, stimulating and useful.

"It makes my day when students pass by a solar or wind farms, take a picture, and send it to me," he said. "It shows that they have learned something and they are genuinely excited about it."

Written By: Charline Baum

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CAL POLY

SAN LUIS OBISPO

**BioResource & Agricultural
Engineering Department**

California Polytechnic University
1 Grand Avenue

San Luis Obispo, California 93407-0250

AES BANQUET Awarding over \$125,000 to Students

The Agricultural Engineering Society holds an end of the year banquet in May. It is a time when the students, faculty, and industry come together to celebrate the success of the club, the department and its students. Every year, thousands of dollars in scholarships are awarded to students. The department's faculty is also recognized for their yearlong efforts. It is a fun night full of recognition and memories of the past year!



Left: Students receive scholarships from Dr. Stuart Styles.

Top Right: Sarah Alford receives the Presidents Award from Department Head, Dr. Art MacCarley.



Bottom Right: Lecturer Tom Mastin hands out an award during the banquet.

Chapter 5

Summary, Recommendations and Conclusions

Summary

The purpose of the annual BRAE magazine is to provide the BioResource & Agricultural Engineering Department with a magazine and layout template that reflects the department and relays information to alumni, students, industry partners, and the general public. Future student assistants for the BRAE Department will have a template and strategy behind what they will need to accomplish by looking and reading this senior project. The author believes each of these objectives will be obtained.

Recommendations

Having knowledge of Adobe InDesign was very helpful throughout this experience. Becoming familiar with the Adobe software programs before trying to use highly recommended. Research into clean and professional design aspects will help progress the magazine design process.

The hardest part of this senior project was meeting deadlines and being strict with the timeline. Start early on any components possible. Make sure to write down what has been completed and what still needs work. Make a list of contacts and get to know those people really well so that they can help along the way. These contacts will include clubs presidents, club advisors, faculty and staff, and industry members. They will help make sure all facts are correct when writing the articles.

One of the biggest recommendations is, contact those in the industry first. Industry professionals are so busy they might not have much time to talk. Be prepared with questions to send them and know that extra time to write an article about them will be needed. Double check

facts and articles with featured people a third time to make sure things are still accurate. Updates will be needed near the end of the editing and designing process.

Conclusion

The BRAE magazine should prove to be a viable template for future student assistants to follow. It will save the department valuable funds to design and develop internally. This is a true Learn by Doing process and the author learned in great depth about design aspects and photography. The process will take time so it is important to start the magazine early enough to hit all the tight deadlines. This is a great recruiting tool to the public and will let alumni know what is occurring in the department.

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Appendix A: Annual BRAE Magazine Summer 2014 & 2015

BRAE

CAL POLY
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BIORESOURCE & AGRICULTURAL ENGINEERING DEPARTMENT | SUMMER 2014



STUDENTS KNOW THE DRILL:
Learn by Doing

BRAE: ENGINEERED TO EVOLVE WITH INDUSTRY NEEDS



Hello to all! I am privileged to reintroduce the BioResource & Agricultural Engineering (BRAE) Department's annual newsletter after a six-year absence. In it you'll find a sampling of department news and student, faculty and alumni activities and accomplishments.

I'm serving as interim department head in 2013-14 while BRAE recruits a permanent head. As a former Electrical Engineering Department chair, with specializations in control systems and renewable fuels, I've found the transition smooth, thanks to the extraordinary faculty, staff and students whose achievements exemplify BRAE's can-do culture.

The growing importance of California's agricultural industry and the challenges of drought conditions and global competition underscore the importance of agricultural productivity, which usually involves advanced technologies. At the nexus of agriculture and technology, our BRAE and Agricultural Systems Management (ASM) programs are continuously evolving to meet current and future educational needs.

The department continues to grow, as our increasing enrollment reflects. We currently have 165 BRAE majors and 115 ASM majors, and come fall, we anticipate the arrival of 59 new students in BRAE and 23 in ASM.

As the following pages report, there's so much to say about our incredible students. Six are currently on the President's Honor List — an academic accomplishment requiring achievement of the Dean's List every quarter of the academic year.

BRAE's faculty are also boast-worthy, especially during a year that has presented challenges and opportunities. At the department level, we bid farewell to retiring faculty, welcomed new members, expanded youth outreach efforts, hosted more special events and prepared for our accreditation visit in October 2014.

As the only engineering program in the College of Agriculture, Food & Environmental Sciences, BRAE is accredited along with programs in the College of Engineering over a six-year cycle. Our preparation involves extensive data collection that we submit to the Accreditation Board for Engineering and Technology (ABET), the national standard for engineering programs. We recognize this process as an important obligation to assure the value and relevance of the degree. Thanks to ABET's recently expanded scope, we have also begun the six-year process toward obtaining ABET accreditation for ASM.

Looking onward to 2015 and beyond, my colleagues and I are confident and excited as we continue to do what we do best — offer quality, hands-on education — while we grow and evolve with the needs of the agricultural and industrial constituencies that we serve.

ART MACCARLEY | PH.D., P.E.

ON THE COVER

Agricultural Systems Management (ASM) student Blair Baker acquires technical and team skills working on a "real-world" project in BioResource & Agricultural Engineering (BRAE) classes 419 and 422. Read more about the innovative projects students are producing in these classes on pages 8-9.

BRAE | SUMMER 2014 – ISSUE 1

The BRAE newsletter is published annually by the BioResource & Agricultural Engineering Department at California Polytechnic State University, 1 Grand Ave., San Luis Obispo, CA 93407-0250. BRAE Department office: 805-756-2378.

Writing & photography: Alyssa Moore

Editorial assistant: Elizabeth Patton

Graphic design & rewrites: Shirley Howell

Copy editing: Cal Poly Marketing & Communications

Open House

BRAE SHOWS VISITORS A 'WHEELIE' GOOD TIME



BRAE junior Carissah Cruz (left) shares program information with prospective students.

All eyes are on Mustang Fever, driven by newly elected Tractor Pull President Jiggs Briggs, at the Cal Poly Tractor Pull Club's annual campus event (below).

Prospective students, their parents, alumni and friends had one destination in mind in April 2014: Cal Poly's annual Open House.

The BioResource & Agricultural Engineering (BRAE) Department got a jump on the weekend's festivities with a tractor display on Thursday, April 10, at San Luis Obispo's downtown Farmers Market. Professor Mark Zohns' tractor, Bail Out, was wheeled in with Mustang Fever, a tractor owned by the Agricultural Engineering Society (AES) and Cal Poly's Tractor Pull Club.

Open House kicked into gear on Friday, April 11, as admitted students and their families attended a university welcome, toured campus and visited displays touting Cal Poly programs.

Visitors to the BRAE Department had an opportunity to meet current students, visit the Farm Shop, and eat tasty barbecue. They learned about BRAE in a presentation by Interim Department Head Art MacCarley, met faculty members, heard about student clubs, and toured the lab facilities.

BRAE activities hit full throttle on Saturday, April 12, as the Tractor Pull Club captivated crowds with its annual Tractor Pull. Proceeds from the event funded scholarships that were awarded to students at the recent AES Club banquet. (Read more about the clubs on pages 4-5).



Club Fun & Fulfillment

STUDENTS HAVE A BLAST when they join one or more of Cal Poly's countless clubs. Sure, they're attracted to the fun and socializing, but they also welcome activities that prove as enriching as their coursework. Here, we profile three clubs that are popular with students in the BioResource & Agricultural Engineering Department.

AGRICULTURAL ENGINEERING SOCIETY (AES)

An itinerary brimming with fun and educational activities awaits those who join the student chapter of the Agricultural Engineering Society (AES).

Activities such as the Great AgVenture, Building an Engineer Day, and the 26-Hour Program are among the club's youth outreach and community service programs. Area nonprofit organizations such as the San Luis Obispo County Food Bank and the Family Care Network benefit from AES donations.

Monthly general meetings offer networking opportunities and industry-related presentations by guest speakers. Members also benefit from résumé workshops, an annual Career Fair (see back cover) and field trips to events such as the World Ag Expo in Tulare, Calif.

On a social note, AES hosts weekly barbecues and activities such as bowling, trapshooting, movie nights and contests that include log-rolling at the Ag Olympics.

Students, faculty, family members and alumni recently joined club members at the annual AES Club banquet, held on May 16 at the Madonna Inn in San Luis Obispo. Scholarships funded by the Tractor Pull Club's Open House Tractor Pull were awarded to students for their achievements during 2013-14.

AES members welcome Cal Poly President Jeffrey D. Armstrong (left) and alumnus Charles Harrington with his wife, Diane (center), to a monthly meeting. Back row (from left) are: President Armstrong, Gian Ghiglieri, Preston Way, Diane and Chuck Harrington, Sam Terpstra, Dylan Soares, Wes Soto and Arturo Barajas. Front row (from left) are: Michael Burlingame, Hilary Olsen, Mari Herrera, Kerilyn Ambrosini, Jenny Hulak and Ed Caminata.





POLYBUILT TEAM

The student-run PolyBuilt Quarter Scale Tractor Design Team annually designs and builds a powerful one-quarter-scale tractor to compete against other universities in the Quarter Scale Student Tractor Design Competition in Peoria, Ill.

The annual competition is sponsored by the American Society of Agricultural and Biological Engineers (ASABE). This year's event was May 29-June 1.

All teams start with a 31-horsepower Briggs & Stratton engine and a set of Titan tires to design an industry-ready tractor. A panel of industry professionals judges each design for innovation, manufacturability, serviceability, maneuverability, safety, sound level and ergonomics. Teams also include design documentation in their formal presentations to industry experts.

Finally, the quarter-scale tractors are put to the test in four tractor pull events.

Students get experience in tractor performance, 3-D modeling, drive-train systems, materials and manufacturing processes. They also develop leadership,

communication, marketing and team skills. The team appreciates the donations that make participating possible.

TRACTOR PULL CLUB

Arturo Barajas was 18 when he saw Cal Poly's Tractor Pull Team perform at the Stanislaus County Fair in Turlock, Calif.

"I saw Mustang Fever and thought, 'Cool; I want to drive that!'" he said.

Now an Agricultural Systems Management (ASM) senior and 2013-14 club president, Barajas said the experience inspired his decision to attend Cal Poly.

Tractor Pull Club operations are divided among several committees. "There are committees for designing T-shirts, advertising, sponsorships and more," said Barajas. "All work together to put on this huge event, which raises money for scholarships that are awarded to students at the annual AES Club banquet."

The club appreciates the generous donations that make participating in the events possible, said Barajas.



Building a quarter-scale tractor keeps members of the PolyBuilt Team busy (above).

2013-14 Tractor Pull Club members and volunteer helpers gather at the tractor pull grounds on campus during Cal Poly Open House (top).

THREE STUDENTS SHARE THEIR PASSIONS AND

Career Dreams

CLAYTON BROWN'S PASSION FOR RODEO

Agricultural Systems Management (ASM) senior Clayton Brown started his rodeo career as soon as he could pick up a rope. Growing up on a cow-calf operation in McArthur, Calif., he learned the traditional ways of managing cattle.

By the time he was 12, Brown had competed in junior rodeos statewide. During his high school years, he qualified twice for state finals in calf roping and once in steer wrestling.

"When it came time to go to college, Cal Poly was my obvious choice," said Brown. "Both of my parents attended Cal Poly. In fact, that's where they met. My father, Tim Brown, a 1989 mechanized agriculture grad (now ASM), credits Cal Poly for teaching him how to rope and about rodeo and Western life. And my mom, Kim (McLoed) Brown, graduated from animal science in 1989."

After visiting Cal Poly and meeting former rodeo coach Tony Branquino, Brown had no doubt the fit was perfect for him.

A fourth-year member on the men's rodeo team, Brown qualified in 2011 to compete at the College National Finals Rodeo (CNFR) in Casper, Wyo. He has served as the team's student facilities management officer for two years.

Rodeo inspired Brown's senior project — utilizing tractor horsepower



more effectively by modifying harrows and enhancing performance.

After graduating in fall 2014, Brown hopes to work as a cattle ranch manager, and he will continue his rodeo career.

"I have been very blessed to attend this amazing institution, which has one of the best rodeo programs in the state, and to receive this level of education — one of the highest levels in the nation, in my opinion," said Brown.

JENNY HULAK'S EXPERIENCES ABROAD

BRAE junior Jenny Hulak embarked on an exciting adventure last summer when she landed an internship in Potsdam, Germany, a small agricultural town about 25 miles from Berlin.

She applied to DAAD RISE, a program that offers internships in the fields of

Jenny Hulak's Cal Poly experiences helped her land an internship in Germany.



Marisela Herrera (right) hopes to work as a licensed pest control advisor.

Clayton Brown (opposite page) has pursued his interest in rodeo since childhood.

biology, chemistry, physics, earth sciences and engineering fields to undergraduate students from the U.S., Canada and the United Kingdom. DAAD is an abbreviation that translates to German academic exchange service, and RISE stands for Research Internships in Science and Engineering.

"It led me to this opportunity and an experience I will never forget," Hulak said.

RISE interns work with research groups at German universities and research institutions for two to three months, assisting doctoral student mentors.

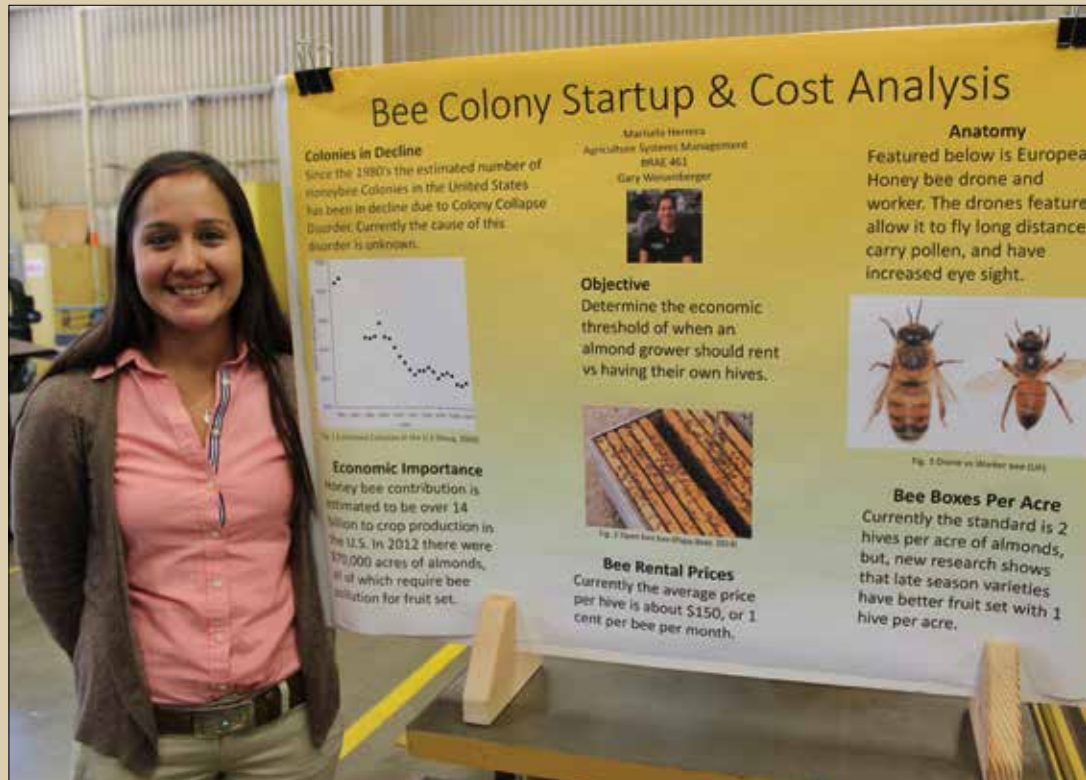
Hulak called Potsdam her home from June through August, enjoying the pastoral setting and friendly residents. She was on a first-name basis with her bus driver, who dropped her at work's doorstep.

Believing that her tractor experience on the PolyBuilt Quarter Scale Tractor Design Team helped to get her the internship, Hulak encourages others to join the team.

"My internship's research involved tractor production, and since the Quarter Scale Team exposed me to design and fabrication, I was familiar with the components and processes necessary to produce a tractor," she said.

Hulak isn't ready to join the workforce just yet as she continues with her studies, concentrating in agricultural geographic information systems (GIS). But she acknowledged feeling better prepared, with a specific career direction in mind.

"I look forward to incorporating my degree and passion for technological advances in an international engineering career," she said.



MARISELA HERRERA'S PCA AMBITION

Every summer since high school, Marisela Herrera has been active in the agricultural world around her. She grew up on a farm in Robbins, Calif., where her parents managed a walnut orchard, and she participated in FFA project competitions.

Those early experiences inspired Herrera to attend Cal Poly and major in agricultural systems management (ASM), concentrating in plant protection.

Herrera has averaged 16 units per quarter and worked three summers for agriculture advisors, scouting agricultural pests and assisting consultants who recommend pesticides.

Now a senior, her plans include studying for a pest control advisor (PCA) license.

"A PCA is a licensed advisor who has the ability to make application recommendations and sell any kind of

pesticide to California farmers," Herrera explained. "They must also keep in mind any environmental impacts or concerns regarding anything on the endangered and protected lists."

In regard to pest control, Herrera noted the importance of gaining trust and building relationships. One of her goals is to "change the public's misconceptions about pesticide use."

"You have to know how to keep people safe and have the expertise, communication skills, equipment knowledge, and the ability to sell and buy," said Herrera. "I want to do good for the farmers, not just for the sale."

Herrera recently landed a job at J.G Boswell that involves employee training, machine safety and design. But that hasn't diminished her interest in becoming a PCA in the future.

"They are very open to the idea of me being a registered PCA and are willing to help me in any way they can," she said.

BIG IDEAS

ASM & BRAE STUDENTS' COLLABORATION BUILDS USEFUL MACHINES AND VALUABLE TEAM SKILLS

By Camille Cordisco

Students apply for a project much like applying for a job, proposing why they want to work on the assignment and the skills they can present to a group. Students spend 20 hours or more each week on their projects, working with their teammates. The students are fully involved in all aspects, not just the parts pertinent to their area of expertise. They depend on each other, so it is important that communication and teamwork are always in motion.

One project, the algae pond cleaning device, was designed and built to improve the efficiency of cleaning an algae runway, a gigantic pool used to grow algae. The pool takes up to 10 hours to clean by hand with a push-broom type brush. ASM major Steve Bauer and his group constructed an apparatus that will be able to clean the pond in one or two hours, greatly reducing the client's labor cost.

The project is one of numerous student innovations developed in back-to-back BRAE courses 419 and 422.

"We give students real-world problems, and they have to come up with real-world solutions," said Professor Andrew Holtz. "They not only learn by doing while they build these projects, but they also build working relationships and communication skills."

Added Professor Mark Zohns, "It's where the rubber meets the road!"

ASM and BRAE students team up to work on projects of their choice, with guidance from Holtz and Zohns, both state-licensed mechanical engineers. The students research their projects, draft outlines for design, determine



BRAE seniors Dakari Barksdale (above, left) and Nicholas Heredia work on the Algae Raceway Cleaning System.

On hand to assist ASM and BRAE students with their projects are professors Andrew Holtz (right, foreground) and Mark Zohns.





and request the materials needed, schedule work time, assign tasks, and build the products.

A key objective in product design is making job functions easier for clients, as with the algae pond cleaning device and a walnut bin dump system, log lathe, marigold seed harvesting machine, and a gladiola harvest aid, to name a few. Most of the projects are contracted by industry partners.

During the second quarter, the teams build the final products and test them for operation. The smell of oil and welding steel fills the agricultural engineering labs as students create and test parts during the six-hour labs.

Students present their projects at quarter's end, demonstrating all aspects, from the early stages of planning to the finished product. Projects are often part of a larger venture that will be passed on to a new group to work on in the next class. Others, like the walnut bin dump system, will be ready for use by crop science students during the next walnut harvest. And there will be some that won't work perfectly, as planned, but that doesn't spell failure, according to Holtz.

The gladiola harvest aid team (above, from left): Michael Burlingame, Kerilyn Ambrosini, Jeremy Mahrt, Andrew Varga, Gian Ghiglieri, Wes Soto, Cody Singley, Sam Terpstra and Matt Moore.

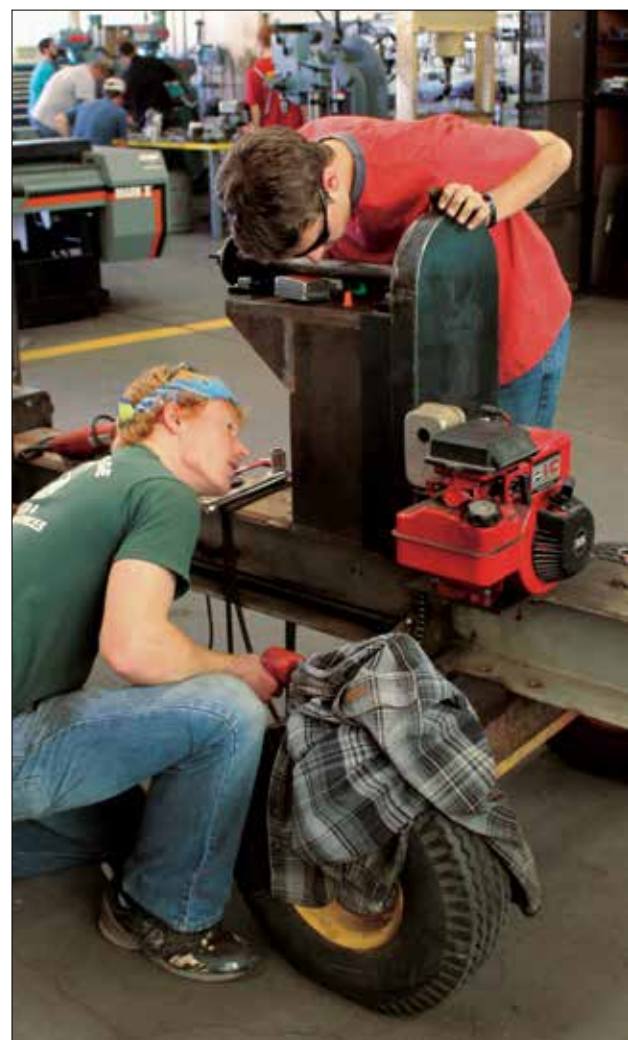
BRAE seniors Jacob Hymas (right, foreground) and Nathan Sperling work in Lab 7 on the log lathe project team.

"The teamwork and leadership skills the students will have developed by the end of the classes will go with them in their careers," he said.

MISSION ACCOMPLISHED

The mission of the BRAE Department is the study, teaching and practice of engineering and systems management support for agriculture.

"Our mission states that students Learn by Doing in laboratory-intensive courses, and through practical design and problem-solving experiences, they receive the skills, the tools and the opportunity to build what they design," noted Interim Department Head Art MacCarley. "Courses 419 and 422 certainly exemplify this mission, as do all of our offerings."



OPERATION SOLAR

INDUSTRY PARTNERS HELP POWER NEW BRAE COURSE

Although it has long been a part of the BioResource & Agricultural Engineering (BRAE) curriculum, solar energy has not been demonstrated on a highly visible scale on campus, nor has it incorporated project-based learning, according to BRAE Interim Department Head Art MacCarley.

But that changed this spring quarter, thanks to a new course offering, cooperation from campus facilities, and help from BRAE's industry partners. With donations of high-efficiency photovoltaic panels from SunPower Inc. and a mounting system from REC Solar, an installation on campus is being integrated with practical engineering lessons in Solar Photovoltaic System Engineering (BRAE 240-5).



Cal Poly faculty and students team up with industry partners for an off-campus project (below). The campus project was completed during spring quarter. | PHOTO BY KEN BOLYARD

BRAE senior Ning Jeng (left, foreground) and BRAE sophomore Casey Matalone install solar panels. | PHOTO BY ART MACCARLEY

Open to upper-division students in almost any engineering major, the course offers hands-on experience in the design, fabrication, installation and testing of a 24-panel, 10-kilowatt system on the roof of the BRAE office/classroom building.

"The exceptional practical skills students have developed from BRAE and Agricultural Systems Management (ASM) classes makes possible their direct involvement in the solar panel installation and most of the electrical system design

and installation," said MacCarley. "This will be the first student-built grid-tie solar system on campus, and one of the first student-engineered/built projects to become part of the campus infrastructure."

MacCarley is teaching the course with the support of two solar installation companies — Grid Alternatives, a nonprofit organization, and the REC Solar Division of SunRun, a for-profit national company started by Cal Poly graduates.

The quarter-long engineering schedule and completion deadline will be similar to that of most commercial installations — less than three months, from filing building permits to bringing the system online.

"There are many lessons to be learned with a fully permitted grid-tie power generation system," said MacCarley. "Engineering, regulatory requirements, economic planning and payback analysis, solar power electronics and compliant electrical systems are all learning objectives of this course."

Not to mention the environmental and monetary benefits. "The system will supply more than enough power to meet the average needs of the building," he noted.



ALUMNUS GREG SCHWARTZ JOINS BRAE FACULTY

Greg Schwartz has returned to Cal Poly, this time as a faculty member.

Schwartz earned his bachelor's degree in agricultural engineering in 1995 and attended graduate school at Clemson University in South Carolina, where he studied biosystems engineering.

He worked at Kent SeaTech in San Diego, Calif., assisting with fish production and research and development of green water-based treatment applications.

At Cal Poly, Schwartz is teaching Ag Systems Analysis, Principles of BioResource Engineering, Energy for a Sustainable Society and Bioconversion.

Campus projects are also keeping him busy. Schwartz is co-investigator of a group that is evaluating algae production from dairy wastewater for animal feed. He is also assisting students with the design and construction of research-scale anaerobic digesters and the quantification of organic waste produced at Cal Poly for potential use as a feedstock for anaerobic digesters producing renewable natural gas.

Off campus, Schwartz enjoys spending time with his family. He reserves Friday nights for computer "gaming" with his dad, two brothers and brother-in-law.



Greg and Missy Schwartz with their daughters Lolita (left) and Kyla | COURTESY PHOTO



BRAE lecturer Keith Crowe passes the time with a bronze likeness of Albert Einstein.

Changing Course

RETIRING LECTURER KEITH CROWE'S SMILE SAYS IT ALL

When BioResource & Agricultural Engineering (BRAE) Department lecturer Keith Crowe retires in June, he'll bid farewell to a rewarding 12-year teaching career at his alma mater and pursue a few off-campus adventures.

First on his list is a trip to Peru with his wife, Laurie. After that, he hopes to spend more time with family, playing his guitar and sailing. And while he plans to continue his consulting business, focusing on flood control and flood damage litigation, he'll limit work to three days per week.

That's quite a change of pace for the 1977 mechanical engineering alumnus, nuclear engineering concentration, who has kept a full campus schedule.

Crowe worked in BRAE's Irrigation Training and Research Institute (ITRC) for seven years and began teaching a few classes in the BRAE Department. Eventually he became a full-time instructor, teaching Pumps and Wells, Surveying Engineering, Introduction to Surveying, Drafting and Careers in BioResource and Agriculture Engineering.

He also served as advisor to the PolyBuilt Quarter Scale Tractor Design Team, which travels annually to a competition in Peoria, Ill.

"Being part of Quarter Scale was one of the highlights of my Cal Poly experience," said Crowe, expressing admiration for the team's knowledge and capabilities.

"We congratulate you, Keith, on a career well done and wish you well in your retirement," said Interim Department Head Art MacCarley. "We'll look forward to seeing you at BRAE events!"

BRAE'S INDUSTRIAL ADVISORY COUNCIL

In 2013-14, Interim Department Head Art MacCarley welcomed nine new members to the BioResource & Agricultural Engineering (BRAE) Department's Industrial Advisory Council (IAC). "BRAE is grateful for the council's guidance and its role in our advancement efforts," he said.

2013-14 BRAE IAC MEMBERS

* = new members

Russ Angold

Co-founder & VP, business development
Ekso Bionics

Noelle Arredondo*

Project engineer | GAF Shafter

Paul Burkner

Vice president | Ag Industrial
Manufacturing, Inc.

Bruce Enyeart

Instructor, Butte Community College

Mike Flora

Engineering manager | Flory Industries

Lisa Howard

Project engineer | George Cairo
Engineering, Inc.

Tim Hutcheson

Director of engineering | Roll Global LLC

Sarah Isbell*

Program manager | CH2M Hill

Jeffrey McGuire*

Project engineer | Papich Construction

Ron Nydam*

President | Waterford Irrigation

Tim O'Halloran

General manager | Yolo Co. Flood Control
& Water Conservation District

Garth Pecchenino

Principal engineer | Quad Knopf, Inc.

Darrin Polhemus*

Deputy director | State Water Resources
Control Board

Will Pruitt*

Sales | IDC Supply

Yvonne Sams*

Senior manager | G-3 Enterprises

John Schaap (IAC president)

Vice president | Provost & Pritchard

Johnny Starling

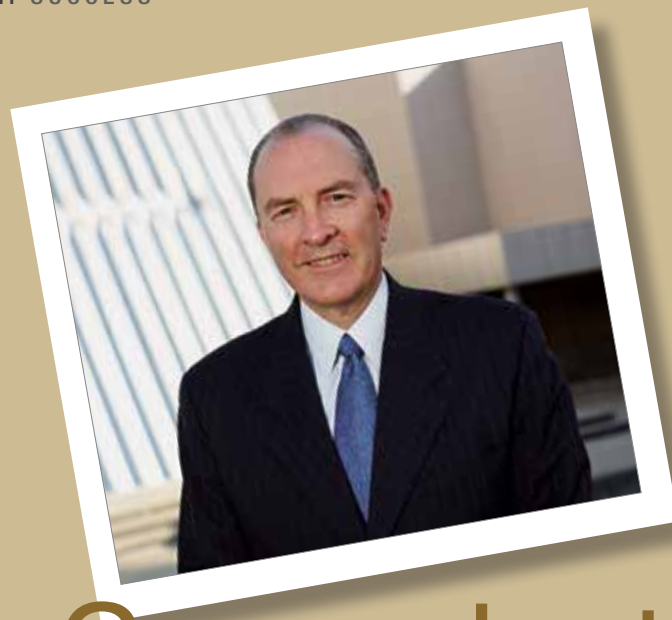
Manager | Nichols Farms

Mark Unruh*

Engineer | JG Boswell Company

Amy Wolfe*

President & CEO | Ag Safe



Snapshots of Success

The BioResource & Agricultural Engineering (BRAE) Department enjoys celebrating the successes of its alumni. Here, we share updates from three of them — Charles "Chuck" Harrington (1981), John Post (1984) and Russ Angold (2000) — in the order of their graduation.

CHARLES HARRINGTON

Charles "Chuck" Harrington still vividly remembers his senior project at Cal Poly, assisting with the design of an inter-tie between the Tehema-Colusa Canal and the Glenn-Colusa Irrigation District.

"After graduation, others were learning the challenges of building in the field," he said. "Between my background growing up on the farm and my Learn by Doing education from Cal Poly, I was quickly offered the opportunity to move from a learning role to a doing role in the workplace."

Now chairman, chief executive officer and president of Parsons Corp., Harrington runs a company with more than 13,000 employees and revenues of more than \$3 billion.

He was one of eight recipients of the 2013 Honored Alumni Award, presented by the Cal Poly Alumni Association during Homecoming Weekend last November. Honorees were recognized for their professional achievements and global impact.

Above: Chuck Harrington

Right: John Post
COURTESY PHOTOS

Harrington graduated magna cum laude in 1981 with a bachelor's degree in agricultural engineering. He has an MBA from UCLA's Anderson School of Management and graduated from the Duke University Advanced Management Program.

In addition to his senior project, Harrington recalled Learn by Doing lessons "in the numerous laboratory classes I had where theory was put into action. These experiences worked to take theory out of the book and into real life."

He noted two professors in particular who influenced him greatly. "First was my professor and advisor, Dr. Charles Burt who, through his tireless energy and global experience, was able to put life, school and work into a balanced perspective for me," he said. "Second was Dr. Ed Carnegie, whose quest for innovation and pushing the limits of possibility is still an inspiration to me today."

— *From Cal Poly Magazine, Winter 2013*

JOHN POST

Looking back on his college days with amusement, John Post recalls being out at night with classmate Louis Dawang, dragging the tractor pull sled around a field with an instrumented Steiger as a part of a fuel efficiency research project. "I still have a picture of that rig hanging in my office," he said.

Cal Poly holds a lot of fond memories for Post, who earned a bachelor's degree in mechanized agriculture in 1984 and an MBA in 1986. There were the picnics,

Thursday barbecues, the AES Club banquet and even study sessions, all infused with "a strong sense of community."

"I remember always being able to get help when I needed it, encouragement to try something new, and never-ending, amused patience from the faculty," he said.

After graduation, Post spent a few years working in agricultural finance and on the family farm in the Central Valley until, at a friend's suggestion, he pursued a job at Lawrence Livermore National Laboratory.

"I've been working on the same project there for about 23 years now," he said. "We built the world's largest laser system, designed to create tiny stars on Earth and demonstrate controlled fusion energy with gain in the laboratory for the first time at the National Ignition Facility."

Post's many roles have mostly involved program and project management, and he's on the senior leadership team.

Away from work, Post enjoys time with family and looks forward to being a grandfather this summer. And he's clearly drawn to Learn by Doing hobbies. One involves building a fully instrumented pilot home brewing system.

"It has been fun to build every little thing by hand, getting the weld beads just so, and polishing and powder-coating all the parts," he said. "I sure miss Shop 7 when I'm working on it; what capability we had there!"

RUSS ANGOLD

Russ Angold attributes his rewarding career to Cal Poly and to "following my passion for making cool things." The 2000 agricultural engineering graduate is chief technology officer at Ekso Bionics, a company he founded in 2005.

"Cal Poly prepared me for the real world with a diverse set of fundamental skills and knowledge, coupled with the courage to take on any problem and the character to see it through," he said.



Russ Angold with his wife, Julie, and their "three future Cal Poly grads" Trent, Ellie and Logan | COURTESY PHOTO

Since graduation, Angold has stayed busy. He worked for an automation company, designing optical fiber winding equipment and semiconductor robots.

His irrigation knowledge from classes and work at BRAE's Irrigation Training and Research Institute (ITRC) proved useful at Rain Bird, where he designed sprinkler products.

And he began an engineering consulting business and started working on a Defense Advanced Research Projects Agency (DARPA) program at UC Berkeley involving exoskeletons for soldiers.

"We developed some breakthrough technology, and in 2005, founded Ekso Bionics," he said.

Angold finds overseeing the company's exoskeleton technology labs to be stimulating work, noting, "It involves every discipline of engineering, understanding human and clinical issues, growing the business."

But most gratifying is helping people, he said. "There is nothing more rewarding than watching someone who has lost the ability to walk, stand and walk again with the help of an Ekso. That's the best!"





Cal Poly's water resources facility

A Valuable Resource

IRRIGATION TRAINING & RESEARCH CENTER QUENCHES THIRST FOR WATER EDUCATION

The Irrigation Training & Research Center (ITRC) was established on campus in 1989 as a center of excellence, building on Cal Poly's history of contributions to the irrigation industry.

The ITRC was developed to ensure long-term benefits to Cal Poly's academic irrigation teaching program, while retaining its self-sufficiency. ITRC has always depended on outside contracts in research and consulting to maintain its extensive facilities, which are used by students and faculty.

ITRC is led by Emeritus Professor Charles Burt as chairman and Professor Stuart Styles as director. Burt taught at Cal Poly for more than three decades until his retirement in 2012. He has a wealth of experience nationwide and internationally.

Professor Dan Howes and lecturer Franklin Gaudi serve as ITRC senior engineers and Cal Poly irrigation faculty.

The center employs up to 10 graduate and about 25 undergraduate students during the year, offering distinctive learning opportunities and invaluable training, as well as outside industry contacts. Most students are ASM or BRAE majors who average about 10,000 hours annually.

Current ITRC projects include working with the California State Water Board on nitrate contamination in groundwater, technically assisting irrigation districts through a decades-long partnership with the U.S. Bureau of Reclamation, testing innovative irrigation technology, developing online courses for both agricultural and landscape irrigation training, and estimating crop water use with new techniques, such as high-resolution satellite imagery.

— *Monica J. Holman*



Ag Industrial Manufacturing, Inc.

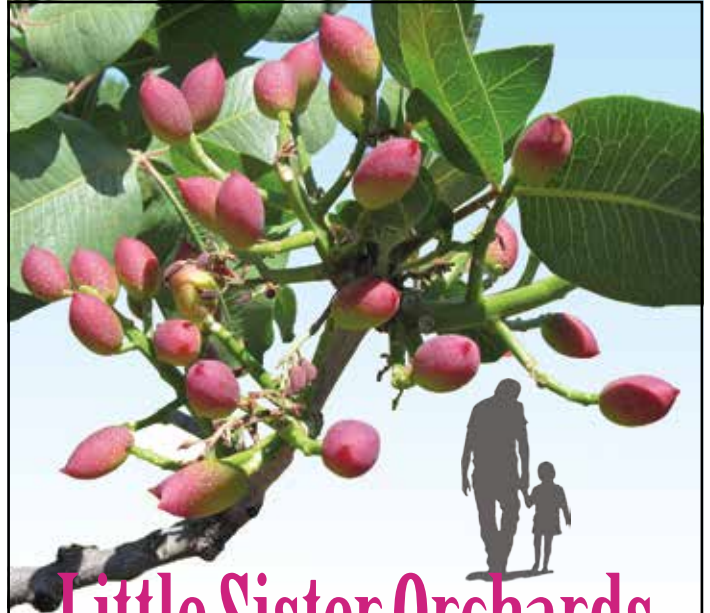
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BRAE sophomore Andy Falconer (above, right) explores opportunities with Orchard Machinery Corporation's Joe Cavaletto (BRAE 2013).

Right: BRAE senior Kerilyn Ambrosini, an AES officer and Career Fair coordinator, welcomes Ag Industrial Manufacturing Inc. Vice President Paul Burkner.



THE ONE-STOP Job Shop

Cal Poly's Agricultural Engineering Society (AES) student chapter hosted the BioResource & Agricultural Engineering (BRAE) Department Career Fair in March 2014 on campus.

Agricultural Systems Management (ASM) and BRAE students turned out to explore internship and career opportunities with participating companies, which included: Acme Engineering Inc.; Ag Industrial Manufacturing Inc.; Bowsmith; Cannon; Deerpoint Group Inc.; Granite Construction; HCL Machine Works; J.G. Boswell Company; Lodi Irrigation; Nichols Farming; Olam International; Orchard Machinery Corporation; Pacific AG Rentals; Paramount Citrus; Paramount Farming; Provost & Pritchard Engineering; RDO Equipment/ Water Tech AG Supply; Reiter Affiliated Companies; Sage AG LLC; Sensient; Waterford Irrigation Supply; Wallace Group; and Woodside Electronics.

"Thank you, industry partners and alumni, for taking an interest in hiring our students," said BRAE Interim Department Head Art MacCarley. "Your participation in this event creates win-win opportunities for the students and the companies."

BRAE

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BIORESOURCE & AGRICULTURAL ENGINEERING DEPARTMENT | SUMMER 2015



MAKING A DIFFERENCE:
OUTSTANDING STUDENTS, PAGES 8-9



Hello again! For the second year, I am privileged to introduce the BioResource & Agricultural Engineering (BRAE) Department's annual newsletter, the "BRAE News."

So much has occurred since the last BRAE News that I will only mention a few of the highlights. Probably the most significant event this academic year was the BRAE Program Evaluation visit by the Accreditation Board for Engineering and Technology Programs (ABET) in October. The preliminary response was positive, although we were asked to provide additional copies of senior project reports to verify that the design criteria were adequately addressed. We are submitting these reports as they become available in June. The formal accreditation results will be released in July. We have come to appreciate the rigor of the accreditation process, as an ongoing reminder of our dedication to excellence in education.

We are embarking on a similar journey for the Agricultural Systems Management program, seeking accreditation as an Engineering Technology program for the first time. The process will involve six years of preparation during which we assess, review, and improve the curriculum, as well as the facilities and faculty capabilities. Accreditation not only increases the market value of future degrees, but the value of all previously awarded degrees as well.

In addition, we are pleased to announce that a new faculty member Professor Bo Liu, a mechanical engineering graduate from the University of Missouri, joined us in September. He has wasted no time in becoming a major contributor to the department,

teaching the intro agricultural electrical course and founding the new Robotics Club, which will compete in the American Society of Agricultural and Biological Engineers (ASABE) National Unmanned Aerial Vehicle (UAV) Student Competition in Fall 2015.

Another new hire, Administration Support Coordinator and Office Manager Tina Pedersen, joined the department in February. Pedersen previously worked for the Rancho Mirage campus of Santa Barbara Business College, where she served as the registrar and financial aid officer.

In other news, the Agricultural Engineering Society again hosted the annual BRAE banquet on May 16, concurrent with our Spring Industry Advisory Council (IAC) meeting. This year, more than \$125,000 was raised at the banquet for student scholarships. Starting this year, the department began holding meetings of the IAC twice a year. The first meeting was held Oct. 23, 2014, just prior to the ABET accreditation visit. The IAC meeting provided a final opportunity to strengthen the department's internal program assessment with the most recent industry feedback. It also allowed some council members direct involvement in the accreditation activities. IAC Chair, John Schaap, was interviewed by the ABET evaluation team as part of the formal visit.

Department enrollment has remained steady since last academic year, with 189 BioResource and Agricultural Engineering (BRAE) majors and 105 Agricultural Systems Management (ASM) majors. In the fall, we anticipate the arrival of 58 new BRAE majors and 11 ASM majors.

This year has been a time of great change in the College of Agriculture, Food & Environmental Sciences. New leadership includes Dean Andrew Thulin, four new assistant deans, as well as new office staff and department heads throughout the college. Significant efforts by college staff has secured more than \$28 million in donations designated for new buildings and programs.

I wish you all a fantastic summer and great year ahead! And I urge all alumni to keep in touch... As former Cal Poly President Warren Baker used to say, "We'll leave the light on for you."

A handwritten signature in black ink, reading "Art MacCarley". The signature is stylized and cursive.

PH.D., P.E.

BRAE | SPRING 2015 - ISSUE 2

The BRAE newsletter is published annually by the BioResource & Agricultural Engineering Department at California Polytechnic State University, 1 Grand Avenue, San Luis Obispo, CA 93407-0250.

On the Cover: Outstanding students from left to right Arturo Barajas, Sarah Alford, and Cameron Dale all have bright futures ahead of them. Read the feature story on pages 8-9.

4-5

Department
Clubs



12-13

Alumni



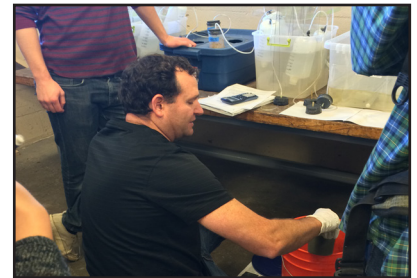
6-7

Ed Carnegie



14

Class Feature



8-9

Student
Features



15

Industry
Partners



10-11

Staff
Highlights and
ITRC



16

AES Banquet



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DEPARTMENT CLUBS THE TRUE LEARN BY DOING

1 Agricultural Engineering Society | CAFES Large Club of the Year for the Third Year in a Row

The Agricultural Engineering Society (AES), which was named the CAFES Large Club of the Year for the past three years, still finds time to add more events into their schedule every year. AES is a student run club with strong roots in professionalism, community service, personal growth, education and friendship. Those who join the club find themselves busy yet still asking for more. The AES club is constantly on the move and gets involved year round. The club holds monthly meetings offering industry-related presentations, networking opportunities, social gatherings and the BEST BBQ on campus. The club puts on over fifty barbecues each year! Members are invited to attend the annual BRAE career fair, field trips to events such as the World Ag Expo, and social outings including bowling, trapshooting, sports days and the Ag Olympics.

Members of the AES club find themselves involved in community outreach and service activities such as the Great AgVenture, Building an Engineer Day and the 26-Hour Program. Such activities not only benefit the community but also provide members a chance improve on their

communication, leadership and teamwork skills. This year the club donated over \$1,000 to non-profit organizations. Additionally, AES lent a helping hand to Sinsheimer Elementary School's Parent Teacher Association dinner and auction. With the club's help, they raised the auction amount from \$16,000 last year to over \$28,000 this year. Every May, the AES club holds its annual banquet. At the banquet, special recognition is given to members who went above and beyond.

AES President Alan Isaacson states, "The AES Club consists of dedicated and hardworking students, staff and faculty who are committed to the betterment of the club, college and community. Those involved truly embody the "Learn By Doing" motto in all they do."

Page 4 picture: AES Club members pose for a picture after being awarded 2014-2015 Large Club of the Year for the College of Agriculture, Food and Environmental Sciences

Page 5 picture: AES BBQ crew at one of the weekly Thursday BBQ's on the BRAE Ramp.

Tractor Pull Club & Team | Awarding over \$20,000 in Scholarships 2

Tractor Pulling continues to be one of the most competitive motorsports across the U.S.. Tractor pulling, on the West Coast, was started by students and faculty with big dreams in our very own shops of California Polytechnic State University's BioResource and Agricultural Engineering Department (BRAE). From there, one of the most hands-on and beloved clubs was integrated on campus.

Tractor Pull is comprised of the team and the club, both of which are made up of a lot of the same students. The team travels up and down California competing with Mustang Fever and Poly Thunder, their two tractors, throughout the season, almost every weekend from February to November. This past season they attended 20 different events.

The club is in charge of planning and executing all aspects of the Cal Poly Open House Tractor Pull. Students coordinate everything from advertising, sponsorships, apparel, BBQ, security, trackside equipment to stats and

tabs, and more.

Agricultural Systems Management (ASM) senior and 2014-2015 club president Jiggs Briggs said his favorite part of tractor pull is, "Advocating for the sport and making sure we put on a good show for spectators of all ages and backgrounds to keep them coming back."

The Cal Poly Open House Tractor Pull raised over \$25,000 dollars that was awarded last year at the AES Club Banquet in scholarships. The club would like to thank all the generous sponsors.

Page 4 picture: Past Tractor Pull Presidents from left to right-Myles Anderson 1999, Russ Angold 2000, Rob Brown 2012, Aaron Flores 2013, Arturo Barajas 2014, Jiggs Briggs 2015, New President Alan Isaacson 2016

Page 5 picture: 2015 President Jiggs Briggs drives Poly Thuder during the Open House pull.

Quarter Scale | Competing Nationally 3

The Polybuilt Quarter Scale Team at Cal Poly prides itself as one of the furthest traveling teams at the 2015 ASABE International 1/4 Scale Tractor Design Competition. The 2015 team was comprised mostly of first and second year students, however the few returning team members were active leaders in the design, fabrication, and management facets of the team. The team showed good unity at the competition, which was highlighted by an excellent run in the new "durability" competition, and an overall 9th place.

The majority of the fabrication process is done in-house, which embodies Cal Poly's Motto of Learn by Doing. This allows students to find out for themselves which processes in manufacturing are more efficient and accurate than others.

Paying attention to details of past tractors' successes and short comings, this year's tractor is built for a lifetime of value, strength and performance. PolyBuilt attributes a

large portion of its success with Poly Lite to the 2013 and 2014 years. The 2013 team integrated a centrifugal clutch to improve performance and robustness of the tractor. The 2014 team began using one 31 horsepower engine instead of two.

This year, the team added a dynamic ballast system to the tractor, giving greater traction in performance pulling applications. To sustain the ease of operation for the customer, PolyBuilt elected to use the student modified automatic transmission for the fourth year in a row. With one more year under its belt, the quarter scale team is very excited to implement fresh ideas for next year's competition.

Page 4 picture: MacKensiz Ward getting the tractor ready for competition.

Page 5 picture: Lucas Salem drives their tractor during the competition in Peoria, Illinois.

Robotics | Building Robots and Looking to the Future 4

We are excited to announce a new club that joined the BRAE Department this year: The American Society of Agricultural and Biological Engineers Robotics Club (ASABE Robotics Club).

As the world's population grows, farmers must address the issue of feeding and clothing more and more people. Technological advances in automation acts as a tool for farmers, allowing for more accurate analyses and confident decision-making. This new aspect to farming is what the ASABE Robotics Club strives to bring to Cal Poly students. The ASABE Robotics Club focuses on developing solutions to real life agricultural problems through design, construction, and automation.

Every year the American Society of Agricultural and Biological Engineers hosts an international robotics competition where schools from around the world compete

to address a specific agricultural problem.

This year Cal Poly's ASABE Robotics Club will make its maiden voyage to New Orleans, La. to compete against a variety of schools.

The club will face the challenge of constructing a fully-automated robotic system designed to simulate the assessment of soybean plants in a field. The parameters that will be assessed are plant color and height. A sample of each phenotype present in the field must be collected and delivered to the reporting station. For more information email CalPoly.ASABE.Robotics@gmail.com.

Page 4 picture: Advisor Dr. Bo Liu and student Charlie Ross work on their robot during a Robotics Club meeting.

Page 5 picture: Students learn how to program a robot in their weekly club meeting.



MR. ED CARNEGIE

PAST DEPARTMENT HEAD HIGHLIGHT



We are honored to highlight past Department Head, Ed Carnegie. Although he retired from the department in 1995, he has closely connected the Swanton Pacific Railroad to the department, including a list of projects for the BRAE department concrete classes and machine design classes to work on as class projects for Swanton.

Retired Professor Ed Carnegie was born and raised on a goat dairy in Orange County, Calif. In high school, he was active in 4H as a junior leader and was awarded the diamond star in Orange County for his involvement in 1953.

Carnegie attended Fullerton College but joined Navy before graduating. He spent a summer on a Landing

Ship Tank hauling supplies to help build the DEW Line Radar System in northern Alaska and Canada. He spent the next few years in Pearl Harbor, on a diesel submarine. Carnegie then left active Navy duty to go back to school, but remained in the naval reserves for the next twenty-four years. During that time, he served as local Commanding Officer of the local Naval Reserve Unit next to the San Luis Obispo Airport until it was disbanded.

When Carnegie returned to Fullerton College after the Navy, his advisor suggested he use his strong interests in engineering and agriculture to study agriculture engineering at Cal Poly. Carnegie was accepted at Cal Poly in 1959 and graduated three years later with a

“Enjoy the moments in life, share with others.
Listening is sometimes the best answer.”

bachelor's degree in agricultural engineering. He then received a master's degree from UC Davis in 1963.

Carnegie spent the next two years teaching at both Cal Poly and UC Davis until a tenure position opened up at Cal Poly, where he worked until he retired 31 years later in 1995 as the department head for the BioResource and Agricultural Engineering Department. Some of his proudest moments were watching students come to Cal Poly, grow academically and personally, graduate, and then excel professionally in their careers.

Carnegie always told students, “Become and stay involved. Volunteer, stay engaged with family, friends, community, and other activities. Enjoy the moments in life, share with others. Listening is sometimes the best answer.”

Carnegie will tell you how much he loves retirement and freedom and spontaneity each day brings, however,

he continues to be involved. He has been the director of Cal Poly Swanton Pacific Railroad since 1993. Swanton Pacific Railroad, in Santa Cruz County, is an operating railroad museum that features model steam locomotives from the 1915 San Francisco Panama-Pacific International Exposition. He also serves as the SPRR Treasurer, as well as helps organize and direct the volunteers with the organization's various projects.

Carnegie lives in Cayucos with his wife, Mary Ann, and their dog, Zorro. He is a member of the Cayucos Lions Club, the Cayucos Community Advisory Council and the Morro Bay Yacht Club. The couple travel as much as possible, enjoy family gatherings, leisure reading and working in the yard, maintaining his garden model railroad.

BRAE DEPARTMENT HEAD FROM 1982 TO 1995



Left: A crane car that was built at Cal Poly for Swanton

Right: Taken as a joke after switching hot seats from BRAE Department Head to Director of Swanton Pacific Railroad



OUTSTANDING

"BRAE students are those who go into the industry and excel."



From left to right: Arturo Barajas, Sarah Alford, and Cameron Dale



Sarah Alford

"Being a part of my family's ranch has shown me the importance of agriculture and how much opportunity exists in the industry."

Sarah Alford, part of a fifth generation San Luis Obispo ranching and farming family, knew that one day she would work in the agriculture industry. "Being a part of my family's ranch has shown me the importance of agriculture and how much opportunity exists in the industry," Alford said.

In high school, Alford discovered mechanical engineering and became interested. She knew Cal Poly was nationally recognized for its engineering department and when she got admitted to Cal Poly as a mechanical engineer she immediately pushed the accept button. Eventually she transferred to the BRAE Department where she could combine her love of engineering with her passion for agriculture.

While attending Cal Poly, Alford became more familiar with the water industry and its challenges. She began taking internships and working on solving water problems. Last summer, she was part of the Irrigation Training and Research Center's Distribution Uniformity (DU) Evaluation Team. She spent the summer in the San Joaquin Valley evaluating drip systems and micro spray systems. Currently, Alford works part-time at the Coastal San Luis Resource Conservation

District helping with its mobile evaluation lab and other projects.

In addition to her internships, Alford excels in all of her classes. She has been recognized for being on the President's List the past two years in a row. The President's List recognizes undergraduate students who have demonstrated consistent achievement, such as being named on the Dean's Honors List for any three or four quarters of the university year. To be on the Dean's Honors List you must have a 3.5 GPA or above for the quarter.

In the future, Alford plans on making a difference in the agriculture industry. "Generally, I'm interested in conservation, management and policy. Water and conservation work interest me because innovation in these areas is going to be essential for farmers to continue their work and make agriculture sustainable as they face long-term droughts and harsh policies," Alford said.

Alford graduates in June with a bachelor's degree in bioresource and agricultural engineering.

STUDENTS



Arturo Barajas

"I truly value the BRAE Department for the family aspect that it has."

Senior Arturo Barajas's name is well known in the BRAE department because of his extraordinary involvement in clubs, classes and extracurricular activities.

Barajas attended a truck and tractor pull in his hometown of Modesto, Calif. when he was growing up. Little did he know, that day would set his college career on track for the BRAE Department at Cal Poly.

His club involvement began during his first quarter. As an incoming freshman he immediately joined Agricultural Engineering Society (AES) and the Tractor Pull Club. By his sophomore year, he was the Ag Council Rep for AES. Barajas has been extremely involved in the department club activities holding leadership positions as the 2013-14 Tractor Pull President, AES President in 2012-13 and a career fair organizer in 2014-15.

"I truly value the BRAE Department for the family aspect that it has," Barajas said.

"You are able to build relationships and make connections that are so valuable today."

One of his favorite classes so far was Internal Combustion Engines, taught by Professor Gary Weisenberger and the keystone project classes BRAE 418 and 419 taught by Professors Andrew Holtz and Mark Zohns.

"These classes have a hands-on aspect that is unique and an opportunity that not every student gets to have," Barajas said.

Outside of school, he worked in different aspects of the agricultural industry while doing internships throughout the state. His last internship was for a local vineyard management company.

In June Barajas will graduate with a bachelor's degree in agricultural systems management.

From a young age, Cameron Dale has always enjoyed being outside and fishing the days away. He could be found at the pond, involved in FFA, playing on the football field or jamming out to his favorite Eagles song. Having a strong leadership ability was a natural thing to him and it was no surprise Dale excelled through FFA, and came to pursue his career education at Cal Poly.

Dale quickly got involved in the College of Agriculture, Food & Environmental Sciences. He joined Tractor Pull, Agricultural Engineering Society (AES) and Alpha Gamma Rho as a freshman. His sophomore year, he got elected to the AES Ag Council Representative position and has been involved ever since, currently serving as the Vice President of Ag Council.

"I am honored to be apart of Ag Council because this council unites clubs together throughout the whole College of Ag. The impact and opportunity through this council is immense," Dale says.

Through Ag Council, Dale is able to further his leadership by working in groups, organizing people, networking and having fun. His classes in the BRAE Department

help him stand out in the organization and make a difference on the Cal Poly campus.

Dale is also involved in AES. He is the reporter this year and is often found behind the camera lense, documenting everything going on, or working with the crew for the weekly Thursday BBQ. Dale remarked that being a part of AES will help build you up and develop skills needed in the industry.

Dale continues to fish, and last summer he worked at an Alaska fishing dock. It was there he was able to apply his school experiences and knowledge to his hobby of fishing.

"I hope one day I can work in a mechanical engineering role where I am able to work with people and use the skills and knowledge I have gained through my BRAE studies and Ag Council experience," Dale said.

Dale continues to stand out amongst his colleagues and has been elected as the 2015 President of Ag Council.



Cameron Dale

"The impact and opportunity through this council is immense."

FACULTY UPDATE



Tina Pedersen

The BioResource & Agricultural Engineering Department welcomes new Administrative Support Coordinator, Tina Pedersen.

Pedersen was born and raised south of Odense, Denmark. She earned two master's degrees in international business and french at the University of Southern Denmark and the University of Savoy, France. She saw an opportunity in America and immigrated to the United States in 1992.

Pedersen and her family moved to Albuquerque, N.M. where she began her experience in the banking world. She continued to work for the bank after relocating to the Coachella Valley. For the last six years she worked for Santa Barbara Business College, a small private satellite college in Coachella Valley, prior to joining Cal Poly.

"My favorite part about the job is being part of the BRAE family supporting students and seeing them succeed." Pedersen said.

Off campus, Pedersen enjoys being outside, hiking, and reading. Her favorite vacation is visiting her family back home in Denmark and spending time catching up with them.

Articles written by: Cristina Kinslow, Megan O'Hearn and Charline Baum



Dr. Bo Liu

We are proud to welcome a new mustang to our department!

After completing his undergraduate work in China, Professor Bo Liu received a master's degree in mechanical engineering and a doctorate in biological engineering at the University of Missouri. He is also fluent in Mandarin and English.

Professor Liu joined Cal Poly right after he graduated. Liu said he was drawn to the university because of its Learn by Doing philosophy and he believes in the importance of applying knowledge to real world problems.

Professor Liu teaches the following courses: Fundamentals of Electricity, Principles of Agricultural Electrification, Measurements and Computer Interfacing and Computer Controls for Agriculture. His research interests include power ultrasonics, mechatronics, sensors and instrumentation, and agricultural safety.

Along with teaching, Liu remains active in the school community by being the lead adviser of the ASABE Robotics Club. This club, new to the department, is featured on page 5.

In his free time, Liu likes to travel with his family and to fish. He has a passion for rollercoasters and has even ridden some of the fastest in the world. He hopes to one day visit and tour all the national parks in the U.S. and also visit all 50 state capitals.



Internationally Recognized Irrigation Training & Research Center

Chairman of the Board: Dr. Charles Burt Director: Dr. Stuart Styles

The Irrigation Training & Research Center (ITRC) recently entered into two new long term contracts with the U.S. Bureau of Indian Affairs (BIA), Branch of Irrigation and Power, and the Los Angeles County Sanitation Districts (LACSD). These two multi-year contracts will bring nearly \$2 million to Cal Poly through the ITRC in the form of faculty, staff, and student employment hours, and provide excellent opportunities for ITRC student employees to enhance their irrigation training. The contract with the BIA, headed by Professor Dan Howes of ITRC, is a five-year cooperative agreement that is intended to produce two full modernization plans for large irrigation projects. The BIA oversees 16 irrigation projects throughout the western U.S. ranging in size from a couple thousand acres up to nearly 150,000 acres. Much of the infrastructure in the BIA projects is in substantial need of maintenance.

ITRC brings expertise in modernization as opposed to simple rehabilitation to improve irrigation delivery service to farmers in the project and project operation. A major goal of the modernization in these projects will be to allow farmers and project operators to maximize the beneficial use of tribal water rights. This will result in improved water quality through reduced runoff and deep percolation, which will positively impact many of the environmental concerns shared by tribal members. A major part of this project is to provide on-site operator training at four or five projects each year. The training includes improved flow measurement, system operation, and recommendations for improved operation.

Additional tasks include creating an irrigation safety manual and investigating the possibility of recruiting tribal members to attend Cal Poly as BioResource & Agricultural Engineering and Agricultural Systems Management majors to enhance the irrigation expertise throughout the BIA irrigation projects. ITRC student employees are working on the irrigation safety manual. In addition, information gathered and learned from the BIA irrigation projects is used in BRAE irrigation courses. ITRC is also assisting LACSD conform to regulatory compliance with agronomic requirements for irrigation crops with recycled water at two sites: the Lancaster eastern agricultural site and the Palmdale agricultural site.

Led by Dr. Franklin Gaudi, ITRC's activities include utilizing an irrigation scheduling program at both sites to supply farm operators with the correct amounts of water to apply to their fields on a weekly basis to help ensure that just enough water is applied to meet plant needs without overwatering. Knowing how much water is applied also allows irrigators to track the amount of nitrogen being used in the fields.

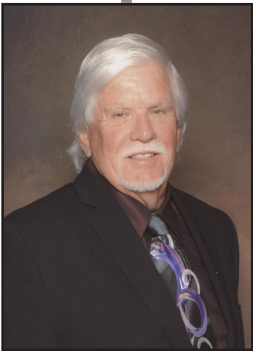
Both irrigation scheduling programs are set up with the goal of using as much of the recycled water as practicable for the irrigation of crops in a manner that meets crop requirements and complies with the Lahontan Regional Water Quality Control Board's permit requirements. ITRC is also assisting LACSD with maintenance tasks such as soil moisture monitoring and distribution uniformity evaluations on center pivots.

Photos and Article submitted by ITRC

SUCCESS THROUGHOUT

1960's

1970's



1965
Don Mayo

Don Mayo graduated from the Agriculture Engineering Department in 1965 and went to work for Deere and Company as a Waterloo Factory Specialist. He then joined Orchard Machinery Corporation (OMC) in 1970, where he continues to work 45 years later serving as the President and CEO of Orchard Machinery Corporation/ Wesco Trailer Manufacturing.

In 2003, Mayo purchased the company and expanded it to one of the largest nut equipment manufacturers in the industry. OMC now has over 14 different models in their product line up.

The BRAE department taught Mayo that failure is not an option. "If I failed, I would continue until I succeeded," said Mayo.

He offered some advice to current and graduating students: "Enjoy your college career. Take some time off after graduating, go travel or do something fun; enjoy life a little bit before jumping into a fast paced and often stressful work environment," he said.



1975
Johnny Starling

Johnny Starling graduated from the department in the spring of 1975, with a bachelor's degree in mechanized agriculture. Some graduates say that they use nothing in their working careers from what they learned in college but Starling used what he had learned right from the start.

Starling attended Cal Poly on an Army ROTC Scholarship. His first job out of college was as a combat engineer platoon leader at Fort Sill, in Lawton, Okla.. After the Army, Starling returned to farming. He is now the vice president of farming operations for Nichols Farms, in Hanford, Calif.. Nichols Farms grows pistachios, almonds and some row crops, in addition to hulling and processing pistachios and almonds.

"Try to get as much experience as possible," Starling advises. "Don't be afraid to take hard or less glamorous internships to get the experience necessary for the future. Become proficient in public speaking and take as many business classes as you can."



John Schaap | Chair of the Industry Advisory Council Highlight

John Schaap is a 1995 Agricultural Engineering graduate and is a Vice President at Provost & Pritchard Consulting Group. He is a registered agricultural and civil engineer and has worked extensively with dairy and other animal facilities. Since 2011, he has been very involved with nonpoint source regulatory issues, working on behalf of irrigated agriculture in Kern County, California.

THE DECADES

1980's

1990's

1995

Yvonne Sams



Yvonne Sams, a 1995 BRAE graduate, said that one of her favorite memories of the department is that she was the first woman to major and graduate in agriculture engineering technology at Cal Poly.

Sams said, "BRAE taught me when learning something new, not to be afraid of getting my hands dirty, dig in and learn by doing!"

Sams started her career at Frito Lay, Inc responsible for production in Cheetos, Sun Chips and potato chips. She then ran a pre-cut produce warehouse, worked at Tyson Foods in human resources and at the E&J Gallo Winery she ran their warehouse special services department. She started at G3 in a business development role selling warehousing and transportation services. Sams, who continues to work for G3 Enterprises as a senior manager of ag logistics, is responsible for the largest wine grape transportation in the state.

Sams recommends getting involved in campus clubs and organizations. "Don't stop there, be a leader in at least one of them," she said. "Companies want to hire those individuals who can lead projects and people."

2000

Traeger Cotten



Traeger Cotten graduated from the department in 2000. It wasn't until his senior year that he zeroed-in on the career path that he later pursued (automation, controls, sensors and instrumentation).

Cotten has now worked for Southern California Edison for more than 10 years, focused primarily on energy efficiency. Many of the projects he oversees are tied to agriculture and food science.

Cotten remains involved with the BRAE department through the American Society of Agricultural and Biological Engineers Society and helps to plan the annual meeting each year.

His advice to current and prospective students is, "Find a balance between hard work and hard play. Don't let your college years pass you by with your head in a book. Get your hands dirty. Sweat. Make mistakes. Volunteer. Find your passion. Live life. Do things that are out of your comfort zone. Oh and try to find the joy in whatever you are doing."

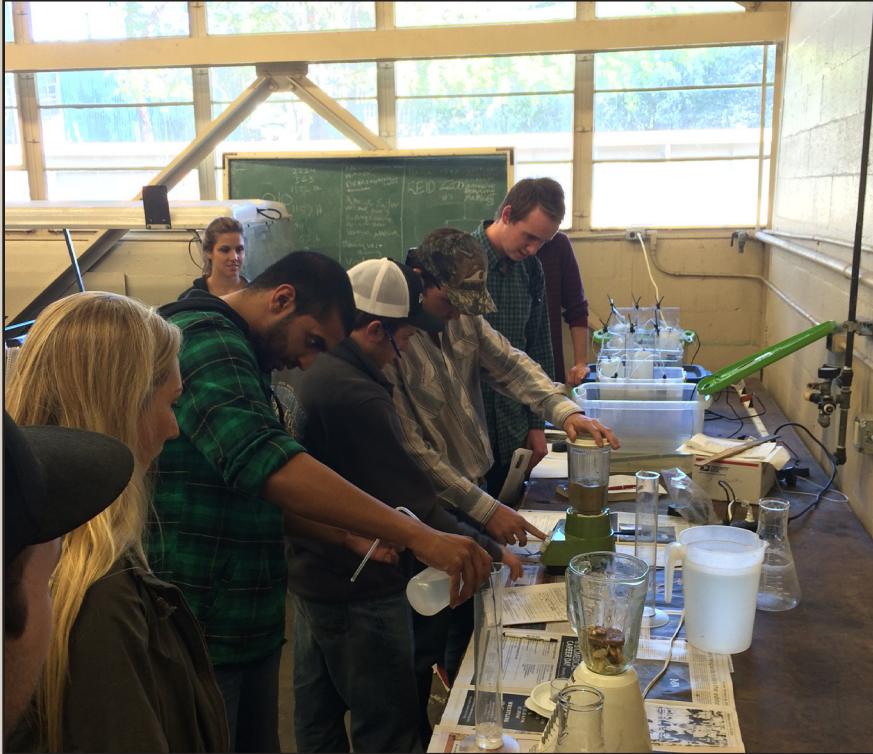


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Search: Cal Poly BioResource and Agricultural Engineering Department.

BRAE 348

EXPERIMENTING WITH DR. GREG SCHWARTZ



Left: Students grind up waste food for anaerobic digestion experiment.

Above: Tim Ditrich pauses for a photo while working on the recipe development section of the lab.

Energy for a Sustainable Society is a class that you don't want to miss. This class is definitely worth taking because the coursework and the knowledge students gain throughout the quarter is applicable to life beyond Cal Poly.

Dr. Greg Schwartz, BRAE 348 Professor, notes that there is an extensive amount of material to cover in just 10 weeks. Schwartz continuously encourages discussion throughout lectures and encourages students to reflect on American society's use of energy. He mixes videos into lectures and uses props to help explain some of the more complicated concepts.

Some of the numerous hands-on activities that the class engages in include: a survey of manure and other organic wastes for the production of energy through anaerobic digestion, working with commercial scale solar panels, and examining the students personal energy consumption and per capita energy consumption globally through observation of habits.

Students rave about BRAE 348 not only because they think Schwartz is such an engaging and passionate professor, but because they walk away from the class with a better understanding of the amount of energy they use on a daily basis and the amount of energy required to lead their personal lives.

Schwartz said his favorite part of teaching this class is the variety of students he is able to interact with. The class is open to any major on campus. He recognizes the fact that BRAE 348 is a general education course, and strives to make his students experience fun, stimulating and useful.

"It makes my day when students pass by a solar or wind farms, take a picture, and send it to me," he said. "It shows that they have learned something and they are genuinely excited about it."

Written By: Charline Baum

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AES BANQUET

Awarding over \$125,000 to Students

The Agricultural Engineering Society holds an end of the year banquet in May. It is a time when the students, faculty, and industry come together to celebrate the success of the club, the department and its students. Every year, thousands of dollars in scholarships are awarded to students. The department's faculty is also recognized for their yearlong efforts. It is a fun night full of recognition and memories of the past year!



Left: Students receive scholarships from Dr. Stuart Styles.



Top Right: Sarah Alford receives the Presidents Award from Department Head, Dr. Art MacCarley.

Bottom Right: Lecturer Tom Mastin hands out an award during the banquet.