Industrial Advisory Board (IAB) Meeting Minutes

Friday, October 28, 2016
Lory Student Center Grey Rock Room


ECE department: Margaret Cheney (joint appointment math professor), Anura Jayasumana, Andrea Leland, Tony Maciejewski, Olivera Notaros, Branislav Notaros, Sudeep Pasricha, Melissa Reese, HJ Siegel, Katya Stewart-Sweeney, Sid Suryanarayanan, Karen Ungerer, and a small group of ECE students.

New members: Jason Fritz, Rincon Research Group; Rich Troksa, Gold Aspen Consulting; and Alan Wang, Pelco by Schneider Electric.

1. Introduction and Welcome IAB Guests (Lance Guymon, IAB president)
   Steve Martin opened the meeting, welcomed the new IAB guests (outlined above), shared the day's agenda, and then turned it over to Tony Maciejewski, ECE department head, for the department update.

2. Agenda and Department Update (ECE Department Head Tony Maciejewski)
   Tony welcomed the meeting attendees and delivered an update on the department, touching on the following topics.
   • 10 years of service to the IAB: Dan Ferguson, Dana Kirchmar, Scott Lukes, Paul Monson, and Kurt Rentel
   • Two early career endowed professorships awarded
     o Lisa & Desi Rhoden Professorship in ECE (Sid Suryanarayanan)
     o Rockwell/Anderson Professorship (Sudeep Pasricha)
   • Menoni & Rocca named CSU Distinguished Alumni Employees
   • Chandra knighted by Finnish government
   • Faculty and staff honored at 2016 Celebrate! Colorado State awards ceremony
     o Sudeep Pasricha, Monfort Professor
     o Melissa Reese, Outstanding Administrative Professional
     o Branislav Notaros, CSU Distinguished Teaching Scholar
   • Results of 2016 Best Paper Contest: Signal manipulation for the hearing impaired team
   • Updates on Engineer-in-Residence program and Keysight mentoring program
   • Charts and data
     o College of Engineering research expenditures
     o ECE research expenditures
     o ECE direct and indirect costs
     o ECE student credit hours
     o ECE fall enrollment
     o ECE freshmen enrollment
**IAB comment:** The board wondered if the department would experience greater attrition due to the increase in freshmen enrollments as a result of the mechanical engineering cap. Tony indicated that this is quite possible.

- ECE freshmen enrollment Colorado institutions
- ECE undergraduate enrollment Colorado institutions
- ECE freshmen retention rates
- Women in engineering (FA16)
- Women in ECE
- International students in ECE at CSU
- Undergraduate degrees awarded
- Graduate degrees awarded
- Percent of international degrees awarded

- **Career outlook for ECE grads**
  - Among the top 10 majors in demand for B.S., M.S., and Ph.D. degrees
  - In 2015, 100% of ECE graduates had employment related to their major, CSU average is 75%
  - ECE graduates earned the highest starting salaries in the College of Engineering

- **Average starting salaries for recent CSU bachelor’s grads (’15 CSU First Destination Survey results)**
  - Electrical Engineering – $71,125
  - College of Engineering average – $60,497
  - CSU average - $47,039

- **Current status of RED project**
  - Delivering junior-level Learning Studio Modules and Knowledge Integration activities for FA16
  - Conducting formative assessment of new active learning components
  - Graduate Teaching Fellow designated to interface with Math department
  - Implemented cohort teams in freshmen and junior years

**IAB comments:** The board was interested in learning about data being collected and baseline measures for RED. They also had questions about transfer students and wondered what percent of the total population they make up.

- **RED next steps**
  - Break up sophomore-level curriculum
  - Deliver junior-level LSMs and KIs for SP17
  - Develop dedicated web site for the project
  - Conduct analyses, submit to conferences and journals, and continue data collection
  - Focus on broader dissemination
  - Continue to solicit IAB feedback about the project

- **Status of M.S & Ph.D. in computer engineering**
  - Approved! Currently recruiting new faculty member.

- **New ECE certificate available online and on-campus**
  - Computer Systems Engineering
  - Embedded Systems
  - Power and Energy

**Update on spring action items:**

- **Action item:** For next year’s E-Days judging, implement the following: allow for “n/a”, provide prompting questions, allow for .5 scoring.
- **Status:** These ideas will be added to judging form.
- **Action item:** Share results of SP16 E-Days judging.
• **Status:** Results were shared with the IAB. Communication and teamwork ranked highest among the professionalism skills in design projects.

• **Action item:** Consider IAB’s ideas for instilling professionalism.

• **Status:** Team created to advise and assist with professionalism thread: Pramit Rajkrishna, Jason Fegley, Jim Greener, Dan Ferguson, Richard Troksa, Alma Rosales (lead)
  - Professional formation team’s current initiatives and completed actions were shared with the board.

3. **Industry Spotlight: Ball Aerospace (Jacob Sauer, Director of Advanced Systems)**
   Jake Sauer gave an overview of Ball and shared interesting details about his own professional journey. He noted that he’s impressed with CSU grads and enjoys being involved with the university. Interesting facts about Ball: most of its leaders have technical degrees and almost all its employees are engineers (2,350 out of 2,600).

4. **ECE Faculty Spotlight (Branislav Notaros, CSU Distinguished Teaching Scholar and ECE Professor)**
   Professor Notaros shared his current research focused on the areas of computational electromagnetics, higher order methods, RF/antennas, scattering, remote sensing of snow/rain, weather radar, MRI, transformation optics, and EM education.

5. **Engineering the Future (Tony Maciejewski)**
   Tony provided trends in engineering education over the last decade. He highlighted statistics supporting the following themes:
   - Women in undergraduate engineering has remained mostly unchanged in the last decade
   - Enrollments and bachelor’s degrees have increased for last 10 years
     - Mechanical enrollments are soaring
     - Dropout rates still higher than desired
   - International student enrollment in the U.S. has increased considerably at undergrad and grad levels
     - Increase in public/private partnerships
     - Global student mobility
   Tony also gave a recap of the IAB’s recommendations for educating the engineer of 2020 from the 2005 and 2011 meetings. This included a summary of actions taken as a result of the board’s feedback (shown below).

**ECE’s response to 2005 suggestions:**
- Lectures, seminars shared with IAB; online courses and certificates now offered through department
- Deeper IAB engagement in all aspects of program – from serving as adjunct faculty to delivering lectures to securing equipment/funding
- Best Paper Contest launched to emphasize and assess communication skills

**ECE’s response to 2011 suggestions:**
- Math collaboration strengthened
  - Special calculus recitations for ECE students
  - Math Foundations Thread established
- Student projects introduced at freshman and sophomore levels to spark interest in ECE
- Increased emphasis on industry engagement
  - Engineer in Residence program created in partnership with IEEE
- Active teaching and assessments are being implemented, e.g., flipped classroom approach
- Social media outlets utilized to share information with students
  - However, recent survey of ECE students indicated low preference for social media for communicating department-specific info
• K-12 recruitment efforts bolstered
  o ECE recently received competitive institutional grant to educate high school counselors about ECE

Steve and Art asked the board to break into groups and consider the following questions:
• Do industry trends align with current issues in higher education?
• How are we doing in our efforts to generate globally-engaged engineers?
• Are you hiring CSU ECE students? Why or why not?
• How do our students compare to our peers nationwide?
• How can industry and ECE come together to address the grand challenges of our profession and the needs of our global economy?
• Are the needs and tactics different for undergraduate vs. graduate students?

Key Points and Suggestions from Breakout Sessions:
• K-12 outreach is important. Getting students into the engineering could be one of the biggest challenges facing engineering education.
• The board grapples with how to help students see the importance of effective communication skills starting early in the program. Many believe it’s a skill set that develops over time.
• Showing impact of ECE education is important. Prospective students need to see that engineering moves society forward.
  o Tony’s comment: We struggle with the public’s perceptions about engineering. IEEE is struggling too. Branding is important and we are dealing with this at the national level through the ECE Department Heads Association.
• How can employers assess graduates on professionalism? Currently, GPAs reflect technical knowledge.
  o Tony’s comment: Competency-based assessments are the current trend. We are also experimenting with the idea of portfolios to show students’ skills beyond technical proficiency.
• The board suggested sharing opportunities with students for global/cultural exploration, e.g., study abroad or Engineers Without Borders.
• They like that we are introducing students to the StrengthsFinders tool.
• To address cultural awareness, the IAB suggested having undergrads interact more with grad populations as a way to understand cultural differences, e.g., partner with cultural groups to create “Meet & Greet” with grads/undergrads from different cultures.
• Consider geographically distributed teams to bolster teamwork and emulate the real world.
• Bring recent grads back to campus to give info on looking back: 1 year out or within last 5 years.
• Never forsake ECE fundamentals.
• Expand social media as a tool to recruit and retain students, communicate key information, and build community.
• The IAB is pleased with the employment rate and salaries of CSU ECE grads.
• Some board members commented on the corporate culture shock that new graduates encounter in industry – the idea that companies are focused on financial success versus that of the individual.

7. Closing Remarks (Tony Maciejewski)
Tony wrapped up the meeting and thanked the board for their participation. He encouraged the board to contact him or Andrea with additional ideas or comments regarding the meeting topics.
ACTION ITEMS:

- Continue to emphasize and expand K-12 outreach.
- The department will provide an update on the ECE Department Heads Association's nationwide rebranding effort.
- Continue to share engagement opportunities with students to raise cultural awareness, e.g., study abroad, Engineers Without Borders, and events hosted by student organizations.
- Explore the idea of creating more geographically dispersed teams.
- Provide an update on assessments/tools to evaluate students’ skills beyond technical abilities.
- Continue to provide enrollment data for the College of Engineering; in particular, the board is interested in seeing how mechanical and ECE enrollments compare.
- Show data on transfer students.

The spring IAB meeting is scheduled for Friday, April 14, 2017.