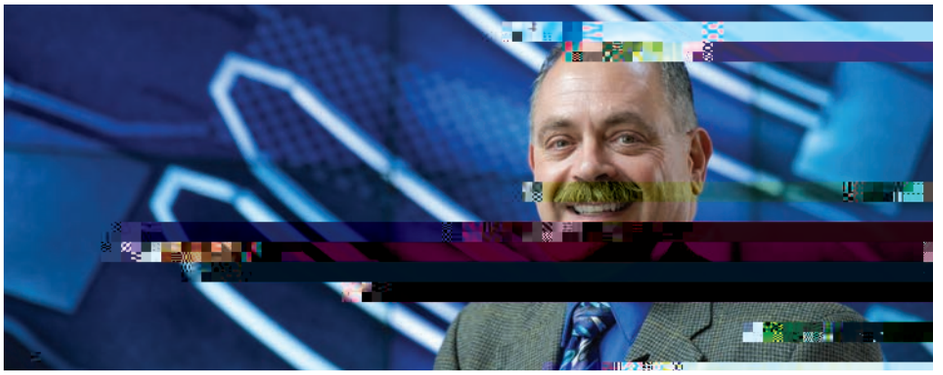
UC San Die
Jacobs School of Engi

Fall 2015

DEAN'S COLUMN



I am pleased to announce our new school-wide Experience Engineering Initiative. We will give each of our Jacobs School undergraduate students a hands-on or experiential engineering course or lab each and every year starting freshman year.

All Jacobs School undergraduates are engineers from day one. Our new hands-on classes serve as "spring training" for future internships and full-time jobs. Early on, we must give our students many opportunities for "a-ha!" moments — experiences that help students generate the confidence and motivation they need to persevere and succeed in classes, internships and ultimately in engineering careers. In their first year, students should feel that they are meant to be engineers. They need experiences that translate into stories for family and friends about the exciting things they designed and built. With the Experience Engineering Initiative, we give our students these opportunities through increasingly difficult real-world challenges that require them to integrate theory and practice. From personal teaching experience, I know that these kinds of hands-on classes propel undergraduates to higher levels of excellence in their coursework, research and internships.

Our first set of pilot courses for the Experience Engineering Initiative launched this past academic year. You can read about two of these great classes on page four of this issue of *P ! e*. During the upcoming academic year, we will roll (Y)ch and inter

Daniel Kane (editor), David Baillot, Liezel Labios, Deborah Osae-Oppong, Ioana Patringenaru

To Reply to the Editor

dbkane@ucsd.edu, (858) 534-3262
9500 Gilman Drive, La Jolla, CA 92093-0403

Contents

UNDERGRADUATE EDUCATION

4
5

RESEARCH CENTERS

6
7
8
9

RESEARCH

10
11
12

PiCle iernl nr .6 ( )0.86 (R)Tf 0 Tc 0

FRONT COVER

What is the secret to high-voltage batteries? Andrew Ulvestad (physics Ph.D. graduate), nanoengineering professor Shirley Meng and physics professor Oleg Shpyrko led a new study that o□ers an answer to this question (pg. 6).

Cover photo: Erik Jepsen / UC San Diego Publications

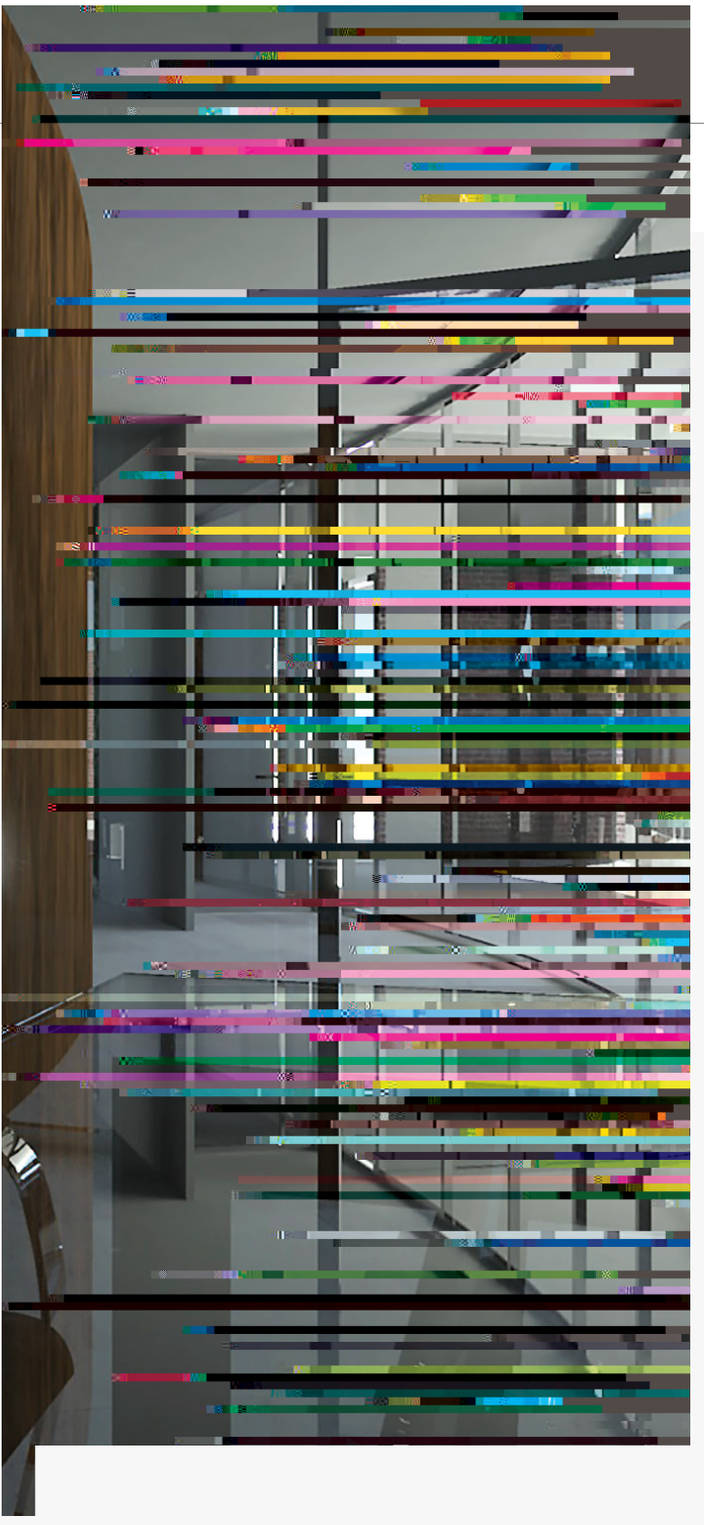
BACK COVER

Contextual Robotics Forum, October 30th 2015

Sustainabl

C

C



CHO.UCSD.EDU

Training next-g enera t on

Living cells serve as "factories" that chu rn out more than $140 billion in protein-based drugs annually. These iological factories, especially Chinese hamster ovary (CHO) cell lines, p roduce pharmaceuticals for people with arthritis, autoimmune disea es and m uch more.

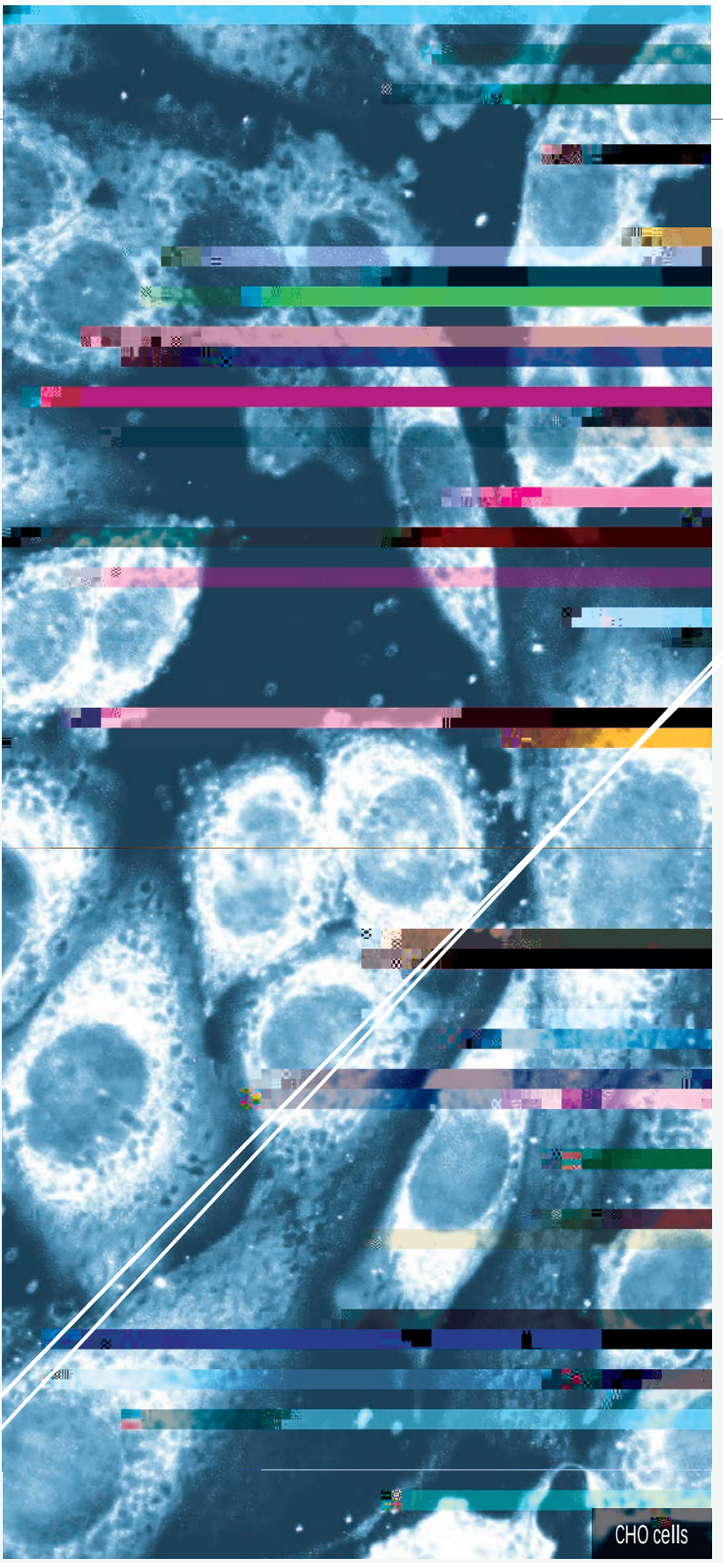
Thanks to recent advances in systen s biology and CHO research, including many breakthroughs made a UC San Diego, bioengineers can now control a wide range of prop e ties of these protein-based drugs — properties that determine sa e ty, e□cacy and production cost. But there is much more work to do

The CHO Systems Biology Center par ers with industry to train the next generation of cell-line engineers to everage emerging genomic and systems biology tools to accelerate d rug de velopment. The Center also collaborates with industry to deve op new resources and techniques that empower the biopharmaceu tical in dustry to engineer and optimize CHO cell lines for drug develop ment.

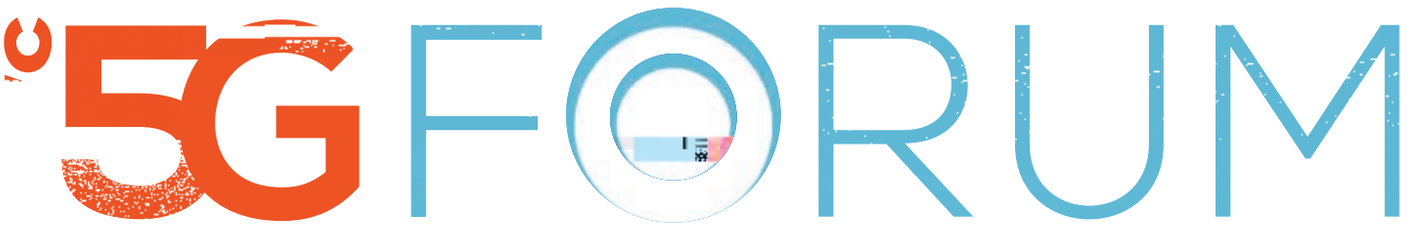
Ne Era for S stems Bio log

"Here at UC San Diego we are unique positioned to train scientists in CHO cell design and expand the CHO cell engineering toolbox. For three decades, CHO cells have been th biopharmaceutical industry workhorse. While the modus operandi f r controlling drug quality included randomly screening cells, our res earch teams at UC San Diego are helping to open an era of rational C IO cell engineering, with the release of CHO genome sequences, s stems biology models and CRISPR tools. In the hands of innovative cell engineers trained in big data analytics and systems biology, thes tools will enable the design of the next generation of CHO cells."

— **Bernhard Palsson, Ph.D.**
CHO Systems Biology Center Dire tor


CHO cells

Galletti Endowed Chair Professor
Department of Bioengineering
bpalsson@ucsd.edu
+1 (858) 534-5668


5G FORUM

for liver cancer and the widely used probiotic bacterium E. coli Nissle 1917 (EcN). This meant shipping o their probiotic to the study's other

Engineers e plain h skin resists tearing.

Skin is remarkably reeii

innovation

Gioia Messinger highlights the importance of small teams.

Gioia Messinger was 17 when she arrived in the United States from South America. She went on to earn a bachelor's in electrical engineering and a master's in computer engineering at the Jacobs School. For the first five years after graduation, Messinger worked as one of the only female engineers at a number of companies before moving on to a startup, where she was responsible for everything from market research to product launch. Soon after, she decided it was time for a change.

"I had worked with a number of consultants as an engineer, and I decided I wanted to try it," said Messinger. "The startup that I was working with asked me to come back as a consultant. I left on a Friday, and came back on a Monday having started my own business."

As a consultant, Messinger began managing both teams and projects.

"It required a lot of innovation," she said. "Things started shifting in my mind — I wanted to start innovating for myself."

As a result, Messinger's team participated in the development of the first cable modem and later began working with Kaiser Permanente and the Centers for Disease Control and Prevention (CDC) to conduct the largest population study by the CDC to date.

"I came up with the idea to use touchscreen kiosks to collect data from patients," said Messinger. "Around that success, I was on the team that created the Pill Cam, a digital device that can be swallowed to take video and images of the intestines."

Messinger says she realized that innovation happens in pieces. "I always highlight the importance of working in small teams," she said. "I also want people to think about their job as a lifelong investment instead of a two or three year stand. It's critical that you enjoy your job, because innovation takes time."

Currently, Messinger serves as the Founder and CEO of LinkedObjects, a technology and strategy firm specializing in the Internet of Things. Until recently, she served as the founder and CEO of Avaak, Inc. (VueZone) which created simple, beautiful and connected cameras for your home.

Messinger told her story at a Gordon Engineering Leadership Forum at the Jacobs School in February.

Learn more: [redacted]

Jacobs Sc