

STANFORD BYERS CENTER FOR BIODESIGN



2017 ANNUAL REPORT

A Message from Paul Yock

2017 ended on a high note, with the exciting news that Stanford Biodesign would be recognized with the National Academy of Engineering's 2018 Bernard M. Gordon Prize for Innovation in Engineering and Technology Education. The prize is the academy's top honor for teaching.

In selecting Stanford Biodesign, the academy highlighted the center's role as a pioneering innovation training program dedicated to the design and development of medical devices, our focus on need-driven innovation, and the fact that Biodesign was among the first academic training programs to formalize a mechanism for bringing together talented engineers and physicians to collaborate on project-based learning experiences.

As I was honored personally along with the center, the entire nomination process was accomplished without my knowledge by dedicated Biodesign staff, faculty, and friends. Operating with impressive stealth, these individuals initiated the submission, wrote page after page describing the history and unique accomplishments of the program, and solicited references on my behalf. Speaking for both myself and Stanford Biodesign, I am truly grateful to all of you for making this significant honor a reality.

Motivated in part by this recognition, we are actively planning for the future of Biodesign. We are evaluating new focus areas and partnerships that will enhance our ability to provide trainees with robust opportunities and mentorship across the health technology ecosystem. Toward this end, we have created teams of staff, faculty, and external advisors around topic areas such as new programs, educational excellence, translation, and policy to help envision "what's next." These are exciting times at Stanford Biodesign and we look forward to keeping you posted on our new developments.

In the meantime, we continue to be inspired as our trainees and alumni tackle important problems across the spectrum of care and bring meaningful solutions to patients everywhere. As always, we are grateful for the commitment and support of our donors, advisors, and mentors — all of the efforts we undertake would be impossible without your support.

A handwritten signature in black ink, appearing to read "Paul Yock".

Paul Yock, MD
Director, Stanford Byers Center for Biodesign

2017

Highlights

January

Biodesign’s 7th class of Singapore-Stanford Biodesign (SSB) fellows arrived at Stanford to begin six months of training in the biodesign innovation process before returning to Singapore to innovate for patients in Asia. Their clinical focus area was pulmonary medicine. We also welcomed four new participants in our Global Faculty in Training program, two from Japan, one from China, and one from Brazil.

February

The second class of eight Japan Biodesign Fellows from Tohoku University, Osaka University, and the University of Tokyo arrived at Stanford for two weeks of training to advance their understanding of needs screening, ideation, and prototyping.

2017 also saw the first two start-up companies launch from the Japan Biodesign program. Remohab, Inc., founded by an Osaka University Fellow, focuses on digital solutions for better rehabilitation of patients with cardiovascular disease. Alivas, co-founded by two Japan Biodesign alumni from the University of Tokyo, is developing a novel treatment for refractory constipation.

March

72 participants from Abbott, Bard, BD, Johnson & Johnson, and Stryker attended Biodesign’s 5th annual Executive Education program, an intensive, hands-on training course intended to help corporate leaders more effectively drive innovation within their organizations.

New teaching segments in 2017 included “Insights on the Innovation Process in Big and Small Companies” with Maria

Sainz, former CEO of CardioKinetics and president of the cardiac surgery division of Guidant; “Health Technology Innovation: A High-Tech Perspective” with Asha Nayak, former CMO of Intel; and case studies with alumni of the Biodesign Innovation Fellowship on their start-up experiences applying the biodesign innovation process.

Attendees described the three-day program as provocative and insightful, with immediate applications to their current roles. As one participant summarized, “Great presentations with lots of concrete examples, insights, tips, and pitfalls that will allow me to implement specific strategies to drive innovation when I get back to work.”

April

A generous gift focused on undergraduate education enabled Biodesign to strengthen and expand the health

technology innovation training we offer to students enrolled at Stanford. One of the first initiatives supported by this gift was Biodesign NEXT, an extension funding program for students completing select Biodesign courses. NEXT provides promising project teams with one or two quarters of additional mentoring and funds to help advance their ideas towards patient care.

The first team to receive NEXT funding was NuLeaf, from the Biodesign for Mobile Health course, with a project seeking to improve dietary decision-making for users of California’s supplemental nutrition programs. The second was Amputeam, from the Bioengineering Capstone course, with a project to develop a novel sensor-based approach for improving prosthetic fit for amputees.

May

We wrapped up spring quarter at Biodesign with our first annual Health Technology Showcase, featuring projects from both undergraduate and graduate innovation teams, as well as the Biodesign Innovation Fellows. The showcase gave the Stanford community the opportunity to learn more about Biodesign; talk with our trainees about their innovation projects; and get involved by voting for their favorite needs and solutions.

June

June is like the holiday season at Biodesign, as hundreds of members of our extended Biodesign family gathered to celebrate the graduation of the Biodesign Innovation Fellows. Together with their real families, we congratulated the



2016-17 fellows on their achievements and wished them well as they embarked on their next adventures (see sidebar “Where Are They Now?” for an update).

of Stanford undergraduates’ experience through his humor, compassion, charisma and genuine desire to help everyone succeed.”

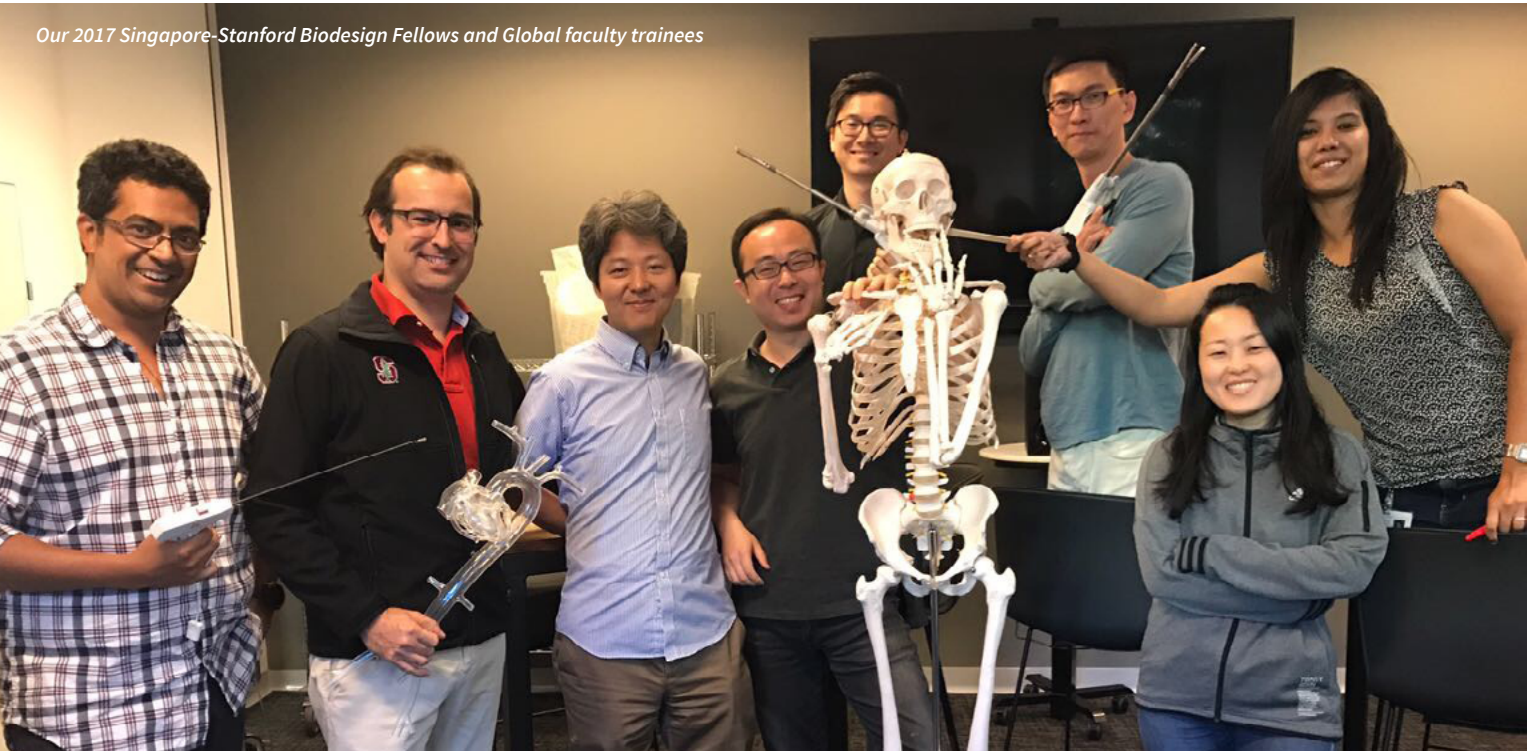
Also in June, Biodesign’s own Ross Venook was one of three faculty members selected to received the Lloyd W. Dinkelspiel Award for Distinctive Contributions to Undergraduate Education. Ross was recognized for “transforming the culture

We are privileged to have Ross as a part of the Biodesign faculty team, and we applaud him on this impressive accomplishment.



Ross Venook (second from right) receives the Dinkelspiel Award

Our 2017 Singapore-Stanford Biodesign Fellows and Global faculty trainees



Where are they now? An update on the 2016-17 Innovation Fellows

Back to clinical practice:

Akash Chandawarker is a plastic surgery resident at Johns Hopkins Hospital. Leor Perl is an interventional cardiologist at Rabin Medical Center and the medical director at an early-stage Israeli medtech company. Chirag Chauhan is an advanced interventional and structural heart fellow at Cedars-Sinai hospital, a product manager at Osso VR, and continuing his work with his fellowship team (see below).

On to industry:

Craig Nichols is a senior development engineer at InnAVasc Medical, Inc. Shaili Sharma is a manager of emerging business opportunities at Stryker. Ashley Waring is human factors manager at J&J Medical Devices and an analyst-in-residence at HealthTech Capital.

Start-ups and other adventures:

Katie Blevins is continuing her work at Biodesign in her second research year as a general surgery fellow, where she and other members of her fellowship team including Eric Kramer, Vivian de Ruijter, and Chirag Chauhan, are working to advance their large bore arterial closure project. Amanda French and Janene Fuerch are also working on a project initiated during the fellowship. Their start-up, Cadence, seeks to improve oral contraceptive adherence.

July

In July we launched a new educational offering, a summer needs finding program for undergrads. While these students have access to an increasing variety of project-based courses, it's rare for them to get the chance to directly participate in needs finding activities .

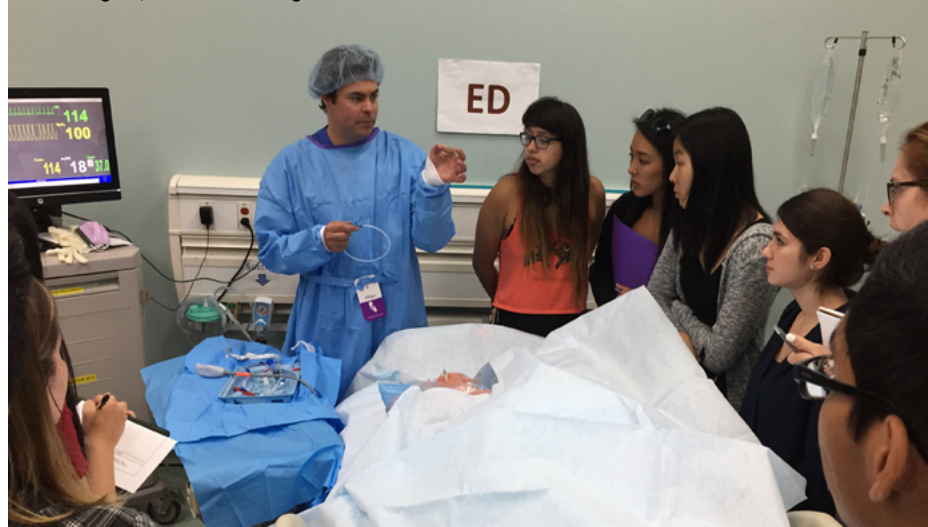
To remedy this, a team of Biodesign faculty and staff led the creation of a 10-week program focused on exposing students to the earliest stage of the innovation process. Fifteen enthusiastic

research, and validating needs through interviews with patients and physicians.

Upon completion, the students enthusiastically endorsed the learning experience and unanimously encouraged us to offer it again in 2018.

As one engineering participant said, "This is a really exciting program that offers a unique opportunity to explore the clinical field through the lens of technology innovation.

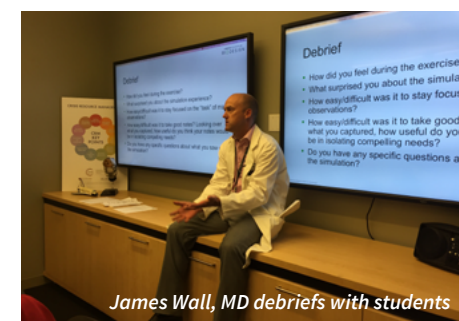
Alexi Wagner, MD leads undergraduates in a simulated observation exercise



undergrads signed on. They developed skills in needs finding through a series of progressively more complex firsthand observations; initially in the waiting rooms of the Stanford emergency room and cancer center, then at the Stanford Center for Immersive and Simulated Learning, and finally in the Stanford ER, hospital, and clinics.

Following these observations, students practiced translating observations into need statements, performing need

Added another, "It felt like discovering the missing link in the crossover between engineering and life sciences on campus."



James Wall, MD debriefs with students



Founder's Forum attendees

August

While the in-country Indian medtech ecosystem has become significantly more robust over the last ten years, getting new technologies "the last mile" into the hands of patients and doctors where they can make a difference remains a formidable challenge.

To help address this issue, Stanford Biodesign initiated the "Founder's Forum," in India, to enable innovators to seek assistance from global experts in R&D, manufacturing, supply chain, distribution, and after-sales services.

The second convening of the Founders Forum was held in August, in Mumbai. Attendees included company founders and representatives from Stryker, Boston Scientific, Medtronic, Villgro, and TEAMFund.

Also in August, we welcomed our 2017-18 Biodesign Innovation Fellows! Our newest class of innovators included six physicians, five engineers, and one MBA. Their clinical focus for the year is orthopedics.

September

Twelve entrepreneurial Stanford faculty members from medicine and engineering were selected to join our Biodesign Faculty Fellows (BFF) program. During their time with us, they will learn and implement the biodesign innovation process to identify important innovation opportunities

within or outside their departments, invent solutions, and prepare to bring those solutions to patients. Our BFF physicians with expertise in pediatrics were sponsored, in part, by the Stanford Medicine Child Health Research Institute.

October

In the fall, we co-hosted the 19th annual Thomas J. Fogarty, MD lecture with the Fogarty Institute for Innovation. Our featured guest speaker was Jessica Mega, MD, chief medical officer of Verily Life Sciences.

Dr. Mega gave a fascinating presentation about the use of technology to understand the shift from health to illness in order to more effectively prevent, detect, and manage disease. The lecture was standing-room-only, with more than 300 people in attendance.



Four of the 2017-18 Biodesign Innovation Fellows

The Health ++ judges included two BFF alums and two Biodesign faculty members



October also included the Stanford Health++ Hackathon, an action-packed two-day event that brought together engineers, designers, healthcare professionals, and business experts to tackle problems in healthcare affordability. Team Medibot, which developed an idea to help low-income Americans manage their Medicaid benefits, won the grand prize. Medibot also won the Stanford Biodesign prize for “Best Understanding of an Unmet Need.”

United States. As Anurag Mairal, director of global outreach programs for Stanford Biodesign, explained, “We need to learn from and support each other to better address the barriers that affect us all.” Such barriers include identifying and recruiting talent, fundraising, building local innovation ecosystems, and helping trainees translate their inventions into patient care.

Executives from multinationals in the medtech field also joined the event to discuss how the Asia Pacific region can build and sustain “Medtech Leadership through Innovation Education” – the theme of the event.

November

In November, more than 50 individuals from across the Asia Pacific region convened for the second annual BME-IDEA (biomedical engineering, innovation, design and entrepreneurship alliance) APAC meeting, an opportunity to network and share best practices in medtech innovation education.

The day-long event fostered an exchange of ideas and information across training programs in Australia, China, India, Japan, Singapore, Taiwan, and the



Emily Johnson and Shiqin Xu

December

At the Biodesign for Mobile Health course final presentations, eight student teams presented their needs and solutions before a panel of expert judges. While the judges praised all teams for the quality and depth of their work, two teams, Migraine AI and SmartAid, took first and second place, respectively. They were also awarded Biodesign NEXT extension funding to carry their projects forward.

Migraine AI seeks to enable proactive planning surrounding migraine attacks in patients who suffer severe migraine in order to reduce migraine disability days per month. SmartAid is a technology to detect early signs of wound infections in discharged C-section patients, with the goal of reducing re-hospitalizations.

New Biodesign Staff

Stanford Biodesign welcomed three new staff members in 2017. Emily Johnson joined as fellowships manager, Shiqin Xu became our course manager, and Howard Bobb assumed the role of financial analyst. We are more than delighted to have them on our team!



Howard Bobb

Stanford Biodesign is proud to have helped educate and empower...

149 Innovation Fellows since 2001

1,700 Stanford students since 2002

288 corporate executives since 2013

111 Global fellows and faculty since 2015

38 Stanford faculty since 2015



Biodesign alumni gathered at graduation, June 2017

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We are exceptionally grateful to the following sponsors who have helped advance the Stanford Biodesign mission. Thank you for your continued support!

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2016-17 Innovation Fellow Craig Nichols speaks with Biodesign sponsors