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“Our students are transforming science and medicine in ways we never thought possible.”
Dear Colleagues,

Our students are changing the world.

The Bench-to-Bedside (B2B) competition is one of our most popular and impactful student programs, challenging students to the hands-on act of inventing, designing and prototyping medical devices and apps.

With a toolbox of six months, $500, a passion for innovation and the mentorship of dedicated faculty and industry professionals, students from multi-disciplinary backgrounds collaborate to transform science and medicine. Since 2010, B2B has mentored 820 participants on 176 teams that have invented 180 medical devices, filed 117 patents, and launched 38 companies.

For the 2017 competition, B2B awarded nearly $80,000 in prize money to winning teams. Teams presented real-world devices developed through collaborations across many unique disciplines including medicine, engineering, informatics, business, law, film & media arts, architecture, mathematics, biology, chemistry, computer science and others.

We are grateful to Zions Bank for their ongoing and generous support of the competition, year after year. This community partnership is founded on the belief that investing in the leaders, innovators and entrepreneurs of tomorrow is a roadmap to ensuring Utah’s future success.

As our highly-anticipated campus transformation continues, we look forward to having facilities that will propel collaborative innovation and discovery to new levels. A proposed, dedicated innovation center in the new Medical Education and Discovery Building, as well as a mobility garage in the Craig H. Neilsen Rehabilitation Hospital, will allow students, faculty and industry partners to create, test and implement solutions to health care’s most vexing problems.

Finally, I want to express thanks to the B2B student leadership for taking charge of the program this year. Additionally, faculty mentors John Langell, MD, PhD, assistant professor of surgery and director of the Center for Medical Innovation; and Troy D’Ambrosio, executive director of the Lassonde Entrepreneur Institute, have supported our students and partnered them with the right mentors to raise the bar even higher.

Our students are transforming science and medicine in ways we never thought possible. I’m looking forward to seeing what they come up with at next year’s competition and hope you’ll join me there.

Sincerely,

A. Lorris Betz, MD, PhD
Interim Senior Vice President for Health Sciences
Executive Dean, School of Medicine
CEO, University of Utah Health
The Bench-to-Bedside (B2B) competition is now entering its seventh year and has continued to grow in both scale and impact. B2B companies from previous years are driving forward with their innovative new technologies. As a result several have obtained regulatory clearance and have introduced their products to market.

B2B is an exciting and vibrant program that introduces medical students, engineering students and business students to the fascinating world of medical device innovation. It is a trans-disciplinary experiential educational program that teaches the impact and power of diversity of thought can bring to the innovation process. Over the first six years of the program it has grown immensely in both scope and quality. We have now engaged over 600 students into 143 cross-disciplinary teams that have spawned nearly 150 innovative new health care technologies. Additionally, more than 40 of these teams have move forward to commercialize their creations.

During the seven-month B2B program, student teams form “startup” companies to identify an unmet clinical need and design a technology solution to address the need. The process includes evaluating the intellectual property landscape, prototyping designs under regulatory requirements and constructing a business plan. Each team is allotted up to $500 to develop their medical device concept. Teams are also granted access to over 100 University of Utah physicians from a range of specialties that serve as consultants, key opinion leaders and stakeholders.

B2B culminates in formal presentation of all team projects at an annual awards competition, an event drawing participation from faculty physicians, residents, industry leaders, venture capital firms, local and national media and the highest echelons of University leadership. Projects are evaluated and scored for business strategy, design quality and health care impact by a panel of judges comprised of industry leaders, physicians, business experts, engineers and media. Top teams are collectively awarded over $75,000 in prizes intended to provide initial funding to support further milestone-based project development. The B2B competition has quickly become one of the University of Utah’s most popular student programs.

In 2016, we chose to honor an amazing individual with the introduction of the John Noorda Consumers’ Choice Award. John was a successful entrepreneur in software and business development. He also gave back to society, serving in many philanthropic trustee and director roles, including as a trustee of the Ray and Tye Noorda Foundation honoring his parents. John was a valued board member and team mentor for the University of Utah Center for Medical Innovation. He was passionate that the best ideas and innovations come from interdisciplinary teams that leverage the diversity of thought that occurs when medical, engineering and business experts work together to solve problems. He saw our students as the critical key to this success. He was dedicated to working with the University to find ways to make innovation and creativity available to everyone.

In our sixth year we had the chance to welcome some of our earlier teams back, with the introduction of the Legacy component. Some of these teams have gone on to not only receive utility patents, but also FDA clearance. This means we now are seeing these amazing, student-driven ideas in the market. This is a truly exciting phase, not only for the companies, but for B2B. As we see these innovations start to have real impact in the care of patients, we realize we are only beginning to see the long-term effects of programs like B2B.

Since its inception, enthusiasm for B2B has been remarkable, and it only continues to grow. The creativity and “out of the box” thinking shown by these teams has resulted in several unique design concepts. Every year the students continue to impress us, and we always look forward to the next year to see way unique concepts will emerge.

“The creativity and out of the box thinking shown by these teams has resulted in several unique design concepts.”
Our dear friends, colleagues and innovation enthusiasts, as this year’s competition draws to a close, we look back and are profoundly impressed by the interest, involvement, and support the Bench-to-Bedside (B2B) program has had over the past seven years. B2B is a fully extracurricular program designed to introduce students to the world of health innovation. What these students have been able to accomplish in just six short months on a budget of $500 is a testament to the students’ perseverance, resourcefulness, and ingenuity.

This year’s B2B participants produced solutions targeting a large variety of health care challenges ranging from suicide prevention apps to improved cardiac catheterization imaging. These students’ passion and dedication to the progression of health innovation are reflected in the quality and creativity of their respective projects. Their success was made possible through the support of the local biotechnology, academic, clinical, and educational communities.

“These students’ passion and dedication to the progression of health innovation are reflected in the quality and creativity of their respective projects. Their success was made possible through the support of the local biotechnology, academic, clinical, and educational communities.”

B2B is a student run program, and as such we leaned heavily on several committees of student leaders to recruit students from all corners of the University. These leaders were also responsible for organizing workshops, communicating with mentors, and teaching participants through their knowledge and experience about health innovation and entrepreneurship. We extend a special “Thank You” to the following committee members for all their hard work and dedication this year. This program would not exist without them.

B2B SENIOR COMMITTEE
Medical Chairs
• Laura Gardner
• Trevor Annis

Engineering Chairs
• Daniel Spicer
• Ahrash Poursaid

Business Chairs
• Nathan Finch
• Shelby Cate

Financial Chair
• Pahoran Da Silva

Marketing Chair
• Prescott Donovan

CS/EAE Chair
• Yashasvi (Yashi) Rawal

B2B AMBASSADORS
• Tisi Tuifua
• Ali Eisenbeiss
• Arjun Dulal
• Joseph Illingworth
• Ahrash Poursaid
• Daniel Spicer

B2B DEVELOPMENT COMMITTEE
Development Committee
Co-Founders
• Jamil Hawatmeh
• Mahdi Sofla
• Kapil Sharma

Development Committee President
• Prescott Donovan

Development Committee Vice-President
• Kade Loveridge

Development Committee Members
• Saeed Shihab
• Vincent Fu
• Max Byck
• Snehal Gajiwala
• Jordan Ruga
• Ria Sandhu
• Sarah Chaudhry
• Janki Patel
• Rohan Barkley
• Tayyeb Mubarak
• Rodmehr Semnani

UNIVERSITY OF HAWAII – MANAO STUDENT LEADERSHIP
• Forrest Martin
• Freddie Wheeler
• Christopher Wong
• Kiyonari Noguchi
• Jon Woo
This 2016-17 academic year stands as one of the most unique in the Bench-to-Bedside program’s history. This year began with a restructure of the B2B Student Executive Leadership via the addition of an Engineering Co-President to support the standard Medical Co-President and Student Director positions. Collectively, this newly organized leadership aimed to increase program expansion, student collaboration, and maintain participant recruitment throughout the six-month timeline. In addition, this 2017 B2B leadership aimed to enhance publicity of the program to new students and ensure proper management of student teams participating in the program via the implementation of two brand new subcommittees: the B2B Ambassadors and the B2B Development Committee.

The B2B Ambassadors aimed to increase support and guidance for registered teams competing in the program. Comprised of undergraduate and graduate students educated in the basics of the medical device design process, the B2B Ambassadors acted as middle men between the B2B leadership and the B2B student participants. In addition, these B2B Ambassadors educated new participants in the basics of the design process and tracked their progress throughout the six-month timeline of B2B via Slack and the online system, Instructure CANVAS. Overall, participant recruitment and management became much more organized and consistent. Team formation and project identification moved substantially smoother through this tool. Special thank you to Jean Shipman, Tallie Casucci and the Eccles Health Sciences Library Innovation Team for equipping our Ambassadors with this online system.

The B2B Development Committee worked to expand the name of the program within the University’s student body and help market the B2B workshops. Composed primarily of undergraduate engineering, business, entrepreneur, and pre-health students, this B2B Development Committee conducted various tabling events and class pitches across campus in order to educate new students about the B2B program. Special thanks to the Lassonde Studios, J. Willard Marriott Library, Warnock Engineering Building, Spencer Fox Eccles Business Building, and the Spencer F. and Cleone P. Eccles Health Sciences Education Building coordinators for your cooperation and opportunity to conduct our educational tabling events at your locations.

Through the Center for Medical Innovation each team was paired with an industry mentor. These mentors served as advisors, community resources, and positive influences on our teams. To our mentors: We have learned a tremendous amount from you this year. Thank you for your willingness to participate and your patience in developing the innovators of tomorrow. We hope you will continue to join us for years to come.

A novel interview process was introduced in order to improve the quality of student leaders entering the B2B Executive Leadership for the next academic year. Traditionally, three student leaders (two co-presidents and one student director) are in-charge of organizing and executing the initiatives of B2B. This year’s leadership chose to implement an interview process based solely on merit and restructure the B2B Executive Leadership into a six-man team: one president, three representative vice presidents (i.e. engineering, medicine, business), and two outreach vice-presidents. The implementation of this interview process and a six-man executive leadership will allow for better organization, improved transition of leadership ideals from one year to another, and further accelerate the expansion and innovative spirit of the B2B program. Special thank you to the B2B 2017 Executive Leadership, Megan McIntyre, and Tim Pickett from the Center for Medical Innovation for helping us devise and execute such process and reform.

From our ever-growing momentum as a successful student innovation program, B2B for the first time in its history expanded its reach to include high school students and peak the interest of the University of Hawaii - Manoa. Thank you to Rowland Hall and its phenomenal students. As the alma mater of our Engineering Co-President and our first successful beta-test with high school participants, we look forward to guiding young entrepreneurs into the world of health innovation with you once again. Special thanks to Dr. John Wu, Professor Scott Miller, and the student health innovation leaders of the University of Hawaii – Manoa, for your hospitality and the opportunity to discuss collaboration. We look forward to seeing you with us next year.

Special thanks to Aaron Lovell, Laurie Robison, and the entire team at the University of Utah Health Marketing and Communications. Their continuous support throughout the years has tremendously impacted B2B marketing efforts in such a fruitful manner. Without their partnership and involvement, B2B would not have the student growth and expansion of its innovative spirit that it exemplifies to this day.
Thank you to Troy D’Ambrosio, Anne Bastien, Thad Kelling, and the Lassonde Entrepreneur Institute. Our collaboration has not only enhanced our exposure to the entrepreneur community, but also ameliorated the vital business components of the Bench-to-Bedside program. Special thank you to Anne Bastien for accelerating our collaboration with complimenting student-run programs like the Utah Entrepreneur Challenge and GetSeeded. Furthermore, the B2B leadership would like to thank Thad Kelling, Marketing & Public Relations Manager of Lassonde, for his stellar advice on marketing and how to professionally launch and maintain social media for the Bench-to-Bedside program. Overall, Troy D’Ambrasio and the Lassonde Entrepreneur Institute have been foundational pillars to the Bench-to-Bedside program over the years. We are grateful for their support and look forward to accelerating health innovation and the University’s entrepreneurial spirit together.

Lastly, the Center for Medical Innovation brought on three Law Fellows – students at the S.J. Quinney College of Law – to help teams develop claims and analyze the intellectual property space surrounding them. Thank you to Andrew Unsworth, Dave Duncan, and Jason Perry for increasing the quality of our provisional patents and focusing teams on long lasting utility and design patents. The Law Fellows are one of our best resources that are so easily available that can be utilized in the future development of ideas and companies.

To our dear friends, classmates, and participating students, we would like to conclude by saying there isn’t a better time than now nor a better place than here at the University of Utah to explore your passions and aim for the stars. There is no comparable infrastructure of outstanding faculty, resources, and mentors in the world who can provide you with the guidance you need to become a successful innovator. If you will continue to develop your products far into the future, we can promise that you will look back on this time with fondness and gratitude.

Finally, to all those who have made this competition possible, through donations of your time, money, talent, and resources – thank you. To our lead sponsor, Zions Bank and Scott Anderson – thank you. Thanks to the Center for Medical Innovation and its wonderful employees, especially Megan McIntyre. Megan is the heartbeat of the B2B program. Her support and guidance ensure the longevity and continuous improvement to this program. Thank you to John Langell for his outstanding leadership. Without his integrity, vision, and direct guidance the substantial growth and positive reform this program has experienced throughout the years would not have been possible. To Vivian Lee, our engineering team, and all of our faculty, judges and mentors, words cannot express how grateful we are to you for making this program possible. To our new B2B 2018 student leadership team, we wish you all the best as you carry this mantle of innovation that is Bench-to-Bedside to new heights.

NEWLY ELECTED B2B 2018 EXECUTIVE LEADERSHIP
• Newly Elected B2B President: Ali Eisenbeiss
• Vice President of Engineering: Daniel Spicer
• Vice President of Business: Erica Morey
• Vice President of Medicine: Kathy Mangum
• Vice President of Outreach: Bianca Rich
• Vice President of Outreach: Holden Brown

We hope we can all continue to support each other as we strive to make the future of healthcare and health innovation amazing.

B2B EXECUTIVE LEADERSHIP
B2B Engineering Co-President
• Kapil Sharma

B2B Medical Co-President
• McKay Allred

B2B Student Director
• Jacob Whittle
2016–2017 B2B DEMOGRAPHICS

Since 2010, Bench-to-Bedside has mentored 610 participants on 172 teams that have invented 147 medical devices, filed 86 patents, and launched 27 LLC’s.

DISCIPLINES REPRESENTED IN 2017

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GRAND TOTAL 194

2016–2017 TEAM STATS:

- Participants: 98
- Teams: 34
- Devices: 34
- Patents: ??
- LLCs: ??

Image courtesy of the University of Utah
2016-2017
B2B TEAM SUMMARIES

1. Anesthetic Gas Reflector
2. Bruxit
3. Cardiac Cath Cam
4. CleanSpark
5. CloviTek
6. Drug Safe
7. Edgeotomy
8. EM.J Medical
9. EyeLead
10. EZ Heme
11. Garlick Retractor
12. Gasteroid
13. InternaLock
14. Lullabreathe
15. Meshr
16. MoodPal
17. Neonatal Rescue
18. Neonatal Vital Sign Scale
19. Polysanus
20. Portaderm
21. Project Embrace
22. Retrahere
23. SaniCube
24. SmartCath
25. SHERO
26. Swen care
27. Ultrasound Impact Protector
28. Veiser
29. VIAkit
30. XenoSpec
31. XLynk Surgical

LEGACY TEAMS

32. Fin Blade
33. Easy Arm
34. Mechanical Leech

HIGH SCHOOL COMPETITORS

35. Rowland Hall Team 1:
   ARC Brace
36. Rowland Hall Team 2:
   ColoClean

(Note: Team summaries were written and submitted by members of each B2B team. The teams themselves are responsible for the material claims therein. They have been edited for readability.)
**ANESTHETIC GAS REFLECTOR**

**Problem:** Gases used in general anesthesia are exhaled by the patient at nearly the same rate as they are inhaled. The current design of anesthesia machines only allows a small fraction of anesthetic gas to be recycled back to the patient. This also results in large amounts of anesthetic gas being released into the environment.

**Solution:** Anesthetic Gas Reflector uses the absorption properties of activated charcoal to absorb these gases and release them back to the patient, reducing the amount of anesthetic needed in a surgical case by up to 90 percent. This technology results in almost zero emissions while significantly cutting costs for surgery.

**Team Members:**
- Sarah Broderick  
  Public Health
- Paul Holman  
  Bioengineering
- Dr. Michael Karsy  
  Neurosurgery Resident
- Patrick Kolbay  
  Bioengineering

---

**BRUXIT**

**Problem:** Bruxism is the unconscious grinding and gnashing of teeth that affects up to 30 percent of U.S. adults. It causes wearing of the teeth, joint disorders, headaches, lack of sleep, and other negative outcomes.

**Solution:** Brixit works like a retainer that abates the effects of bruxism and reduces bruxing events through a Pavlovian response. The wearer is alerted with a soft vibration when bruxing begins, subconsciously causing them to unclench their teeth without waking fully from sleep. Over time, the patient is conditioned away from the bruxing behavior.

**Team Members:**
- William Eccles  
  Bioengineering
- Travis Neuberger  
  Bioengineering
- David Williams  
  Bioengineering
**CARDIAC CATH CAM**

**Problem:** Physicians have no direct visualization of the septum when performing trans-septal cardiac catheterization procedures. Lack of direct visualization limits accuracy and increases OR time.

**Solution:** Cardiac Cath Cam provides direct, real-time visualization inside the heart in order to facilitate easier crossing of the septum. The device incorporates fiber optics through the catheter that integrate with a small camera in the handle of the device. Cardiac Cath Cam reduces operating room time and the overall cost of procedures.

**Team Members:**
- Ali Eisenbeiss  
  Bioengineering  
- Alex Gerber  
  Bioengineering  
- Kellen Hilton  
  Bioengineering  
- Ashley Langell  
  Bioengineering  
- Trent Parry  
  Bioengineering

---

**CLEANSPARK**

**Problem:** Current methods used in hospitals to measure hand hygiene produce inaccurate adherence rates and require expensive equipment, numerous sensors, or hours of human observation.

**Solution:** CleanSpark use low-energy bluetooth technology to create a mobile, proximity-based hand hygiene tracking and alert system that captures more hand hygiene opportunities and measure adherence more accurately than current systems.

**Team Members:**
- Tessa Sommer  
  Psychology
**CLOVITEK**

**Problem:** Assistive listening – integrating a personal device with a venue’s audio system to amplify sound to assist hearing impairment – is still considered a niche market. Existing technologies are expensive, have limited capabilities, and are complicated to install.

**Solution:** CloviTek uses WiFi to stream audio to multiple mobile devices from one TV or any device with an audio-out port. This affordable, easy-to-use technology can be applied at home or in a variety of public settings, including waiting rooms and patient rooms.

**Team Members:**
- Cory Heward  
  Business
- Vitaliy Mahidov  
  Business

---

**DRUG SAFE**

**Problem:** Opioid abuse remains a major public health concern nationwide. Careless disposal may still allow unused medications to be abused and may also pose environmental concerns.

**Solution:** Drug Safe provides an extremely inexpensive way of mechanically isolating medications from potential abuse. Drug Safe is intuitive and easy to use. A foil packet is added to a pharmaceutical bottle and when water is added, a hard matrix encases unused tablets rendering them inaccessible to use. The bottle and its contents may be disposed of in landfills via ordinary household waste.

**Team Members:**
- Daelin Arney  
  Multi-Disciplinary Design
- Christian Schumtz  
  Medicine
- Hans Schumtz  
  Business/Chem. Engineering
**Edgeotomy**

**Problem:** At roughly $20,000 each, hospital readmissions increase health care costs for everyone. No solutions exist for detecting when postoperative patients are exhibiting signs and symptoms suggestive of being at increased risk for admission.

**Solution:** Edgeotomy is a wearable, cellular-based health tracker. It offers an easy and reliable method to obtain home activity metrics and vitals and provide evidence-based recommendations for patients. We also seek to develop an algorithm to predict and prevent hospital readmissions following high-risk surgery.

**Team Members:**
- James Cardinal, Medicine
- William Eccles, Electrical Engineering
- Cory Heward, Business
- Nick Heward, Mechanical Engineering
- Austen Slade, Medicine

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**EM.J Medical**

**Problem:** During laparoscopic surgery surgeons spend an average of 15 minutes clearing the laparoscopic camera lens. That adds up to around 75 million operating minutes, wasting $4.5 billion annually. This unnecessary procedure increases the probability of complications and/or tissue damage. Current methods to address this problem are inefficient and expensive.

**Solution:** SwipeScope clears the vision field for the operating team without removing the laparoscope from the patient. This easy-to-use, disposable device does not require new equipment. It can significantly reduce laparoscopic procedure times, mitigate risk to healthy tissue, reduce the number of surgical staff needed, and provide an inexpensive and more effective alternative to existing solutions.

**Team Members:**
- Jon Browne, Bioengineering
- Evan DeGray, Multi-Disciplinary Design
- Mats Peterson, Bioengineering

$5,000 - Best Medical Innovation Award
EYELEAD

Problem: Currently, providers performing fluoroscopy procedures are required to wear cumbersome glasses to block radiation. A lighter, more convenient form of optical protection is needed for performing these procedures.

Solution: EyeLead is a silicone hydrogel, radiopaque contact lens designed to protect providers and patients from harmful radiation.

Team Members:
Kyler Hodgson Bioengineering

EZ HEME

Problem: Anemia is an enormous global problem, particularly in pregnant women. Affecting 54% of pregnant women in India and nearly 40% of women worldwide, anemia can cause fatigue, weakness, and may lead to preterm delivery or low birth weight. Misdiagnosis is common and leads to these adverse events.

Solution: EZ Heme is a non-invasive, portable, anemia detection device that will produce results in 15 seconds and can effectively be used in healthcare facilities and rural settings globally.

Team Members:
Joseph Illingworth Bioengineering
James Morgan Bioengineering
Brian Kirk Medicine
Kapil Sharma Bioengineering

$5,000 - Best in Business Award
**GARLICK RETRACTOR**

**Problem:** Optic nerve sheath fenestration surgery requires three individual retractors, each held separately by a hand, to expose the surgical field deep within the orbit. This usually requires that three people be scrubbed for the surgeon to operate. A need for better retraction exposure with less manpower is needed.

**Solution:** The Garlick Retractor minimizes the number of hands needed from three to one. This will increase efficiency, lower costs and give surgeons complete control of the retraction and diameter size of the surgical site while the retractor maintains exposure. The scrub tech can assist more effectively during the remainder of the surgery and the surgeon can utilize both hands to operate.

*Team Members:*
- Jordan Ballam  Business
- Jared Garlick  Medicine
- James Willcockson  Medicine
- Brent Winterton  Chemical Engineering

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**GASTEROID**

**Problem:** Good food choices are critical to maintaining health. Scientific literature has shown that consumers have a hard time using nutrition labels, making it difficult for consumers to always make wise food choices. When complicated information is simplified and presented in graphical form, consumers make better food choices.

**Solution:** Gasteroid is a game that decodes nutrition information and guides food decisions in real time. Using interactive visuals that are generated by scanning foods with a smart phone, Gasteroid presents nutrition information in a simple format that allows users to make better food choices.

*Team Members:*
- Jacob Broderick  Neuroscience
- Nathan Broderick  Videography
- Sarah Broderick  Bioengineering/Business
- Paul Owens  Computer Science
INTERNALOCK

**Problem:** It takes time to secure chest tubes in place and they have a tendency to slip out. Current methods of securing them to the patient are inadequate. There is a need for a method that secure chest tubes internally in the intrapleural space of patients to remove excess air or drain fluids and allow the lungs to function properly.

**Solution:** InternaLock is a chest tube with a balloon at the proximal end. Once inserted into the intrapleural space, it is inflated and inhibits the tube from being pulled out of the patient. This removes the need to secure the tube at the insertion site.

**Team Members:**
- Mats Peterson  Bioengineering
- Teresa Ta  Bioengineering
- Phil Waldis  Bioengineering

$L5,000 - Best Green Award$

LULLABREATHE

**Problem:** Anesthetic induction elicits anxiety in pediatric patients resulting in a prolonged procedure times and a negative mental state prior to induction, which is carried over post-operatively during postoperative recovery. Current induction agents can have an unpleasant odor and can elicit effects that last longer than the operation.

**Solution:** Lullabreathe is a custom virtual reality headset that can accommodate an Android smartphone and can attach directly into the anesthetic breathing circuit at the gas mask. It calms the patients and guides their breathing in a fun virtual reality game environment, resulting in greater compliance with the induction and quicker postoperative recovery.

**Team Members:**
- Ana Chacin  Bioengineering
- Caroline Daley  Business
- Daniel McClellan  Bioengineering
- Dudsadee Jubsee  Marketing/Entrepreneurship
**MESHR**

**Problem:** Laparotomies lead to incisional hernias in almost 50% of patients. Current mesh materials used to prevent hernias can be painful or cost prohibitive for most patients.

**Solution:** The Meshr hydrogel is a new low-cost technology to prevent herniation. It supports the incision to allow full healing without causing discomfort. Meshr then biodegrades into the body without toxic or acidic breakdown products like some meshes on the market.

Team Members:
- Cathy Mangum: Medicine
- Travis Neuberger: Bioengineering
- Jacob Whittle: Medicine
- David Williams: Bioengineering

$5,000 - Best in Engineering Award

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**MOODPAL**

**Problem:** A growing number of families are effected by rising trends in depression, anxiety and suicide.

**Solution:** MoodPal™ is a mobile application that monitors mood and provides options for people to watch motivational and positive messages in the form of videos, gifs, or quotes. This easy-to-use app will help users have a better spark in their day. MoodPal™ also allows the consumer to share their numerical mood with a select group of family or friends, alleviating the stigma associated with depression and anxiety.

Team Members:
- Alex Au: Medicine
- Tarun Banala: Electrical & Comp Engineering
- Surabhi Kasera: Medicine
- Alex Piedra: Dentistry
- Emma Shannon: Business
- Mark Van der Merwe: Computer Science

$5,000 - Best in Entertainment Arts & Engineering Award
NEONATAL RESCUE

Problem: Thousands of babies die annually from treatable respiratory diseases. For example preterm birth complications (especially immature lungs) and birth asphyxia and trauma are listed as the seventh and ninth top causes of death in Cambodia. CPAP Ventilators are a great solution to these sicknesses, but are far too expensive and require too much maintenance for use in developing nations.

Solution: NeoLife Ventilator is a CPAP Ventilator designed specifically for the developing world. It applies technologies commonly found in American hospitals and simplifies them to provide the core functions necessary to sustain life. It is durable and simple to use, with only a few knobs and dials. Device components easy to replace or repair, increasing longevity and reducing cost. The NeoLife Ventilator is the ultimate device for respiratory assistance in the developing world.

Team Members:
Rob Brown
Stetler Eppley
Margaret Melville
Ryan Moffet
Deana Mugimu
Erica Palmer

Economics
Mechanical Engineering
Business
Marketing
Information Systems
Communications

NEONATAL VITAL SIGN SCALE

Problem: Neonatal distress occurs frequently in the developing world and is the result of poor nutrition, dehydration, and lack of resources. Measurement of neonate vital signs requires multiple tools, many of which need power sources, not to mention the skills to operate them. The lack of proper tools and training make it very difficult to detect neonate distress.

Solution: The Neonatal Vital Sign Scale is a robust system that easily measures most basic indicators of neonate vitality and health and will help to reduce infant mortality and morbidity. It allows health workers in developing countries to easily and accurately take weight and vital signs of neonates in any setting. The device could help keep over 20 million neonates per year healthy by enabling prompt detection of health complications at a reasonable projected price point.

Team Members:
Justine Goebel
Michael Guo
Emilie Unricht
Fiona Weathersby

Bioengineering
Bioengineering
Bioengineering
Bioengineering
**POLYSANUS**

**Problem:** Glaucoma leads patients down a painful road to blindness. Current treatments use medicated eye drops to help with pressure and slow vision loss. Many patients miss out on the full benefits of the medication because they have issues getting the right amount of medication and having it available for complete metabolism.

**Solution:** Polysanus uses contact lenses as a drug delivery system, administering the right amount of medication. No drug is lost and the patient feels the full therapeutic effect. The prescribed dose is delivered over a steady course lasting 12 hours, which extends the therapeutic effects of the drug to last all day.

**Team Members:**
- Patrick Nichols
  - Materials Science & Engineering

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**PORTADERM**

**Problem:** Every five seconds, a person is severely burned around the world leading to 11 million severe burns annually. 95% of these cases happen in developing nations. Plastic and trauma surgeons there often use older skin grafting technology with a high failure rate, impeding proper burn care and recovery.

**Solution:** Portaderm is a cost effective, battery-powered dermatome with an interchangeable head pre-set to the dimensions for an accurate skin graft. With an interchangeable head, Portaderm can be used in multiple cases or use multiple blades within the same case. It offers many features found in current dermatomes used in the US, but for a fraction of the cost.

**Team Members:**
- Alex Gerber
  - Bioengineering
- Kellen Hilton
  - Bioengineering
- Maziar Nourian
  - Medicine
- Ahrash Poursaid
  - Business
- Adam Schmidt
  - Bioengineering
**PROJECT EMBRACE**

**Problem:** Medical devices are typically labeled as excess of waste after limited use. While this may be an appropriate practice for some devices, for others it is wasteful and potentially harmful to the natural environment.

**Solution:** Project Embrace aims to disrupt this waste cycle by intercepting medical devices for skeletal structural support or mobility assistance and reusing them for patients in need abroad. Providing this service would significantly reduce medical waste and also help offset the demand for certain health care devices in communities abroad. Project Embrace is currently partnered with the Vegesna Foundation and STAR hospital, in Hyderabad, India.

Team Members:
Gabrielle Hoyer  
Mohan Sudabattula  
Bioengineering  
Biochemistry/Philosophy/Health

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**RETRAHERE**

**Problem:** Patient obesity affects surgical treatment, especially in catheterization laboratories. Staff need access to groin, chest and arms for cardiac catheterization.

**Solution:** Retrahere offers a solution to manage the panniculus during catheterization. It uses ladder lock buckles to tighten straps that go on either side of the panniculus and pull it together into a “beehive.” The device allows easy access to the groin during cardiovascular related surgeries, while not constricting or restricting access to the chest or arms. The strap allows for 360 degrees of access to the patient and helps secure them to the operating table.

Team Members:
Sarah Apple  
Rainey Cornaby  
Joshua Martin  
Joshua Ong  
Bioengineering  
Business  
Mechanical Engineering  
Electrical Engineering
**SANICUBE**

**Problem:** Contaminated physical examination equipment increases patient exposure to pathogens. For instance, up to 85% of all stethoscope diaphragms used by physicians in the U.S. carry infectious organisms. Examining patients with unsterile equipment increases the risk of health care associated infections. Alcohol swabs are effective but rarely used because of inconsistent placement and the added time required to open them.

**Solution:** SaniCube is a dispenser that gives health care providers consistent and convenient access to alcohol swabs. Cleaner examination equipment will translate to fewer avoidable patient infections and reduced costs of care. Furthermore, SaniCube does not damage equipment with repetitive use.

Team Members:
- Ty Eldridge - Business
- Zachary Gardner - Medicine
- Robert McRae - Medicine
- Jacob Mitchell - Medicine
- Mathieu Squires - Medicine

**SMARTCATH**

**Problem:** Patients with chronic kidney failure (CKD) are at high risk of organ damage and death due to the inadequate excretion of metabolites by the kidneys. Patients must undergo dialysis treatment to prevent organ damage that results from toxic buildup. Currently patients are only assessed for toxic metabolites during their appointments. This can lead to early and late treatment of patients which results in unnecessary organ damage and inefficient use of dialysis center resources.

**Solution:** SmartCath offers a sensor device for the catheters many CKD patients commonly use. The sensor can detect potassium and pH levels in patients' blood. This along with the measured change in weight of a patient can be used to assess the need of dialysis treatment.

Team Members:
- Michael Empey - Electrical Engineering
- Ben Fogg - Medicine
- K. Beau Freckleton - Mechanical Engineering
- Ashley Langell - Bioengineering
- Rinchen Phuntsok - Biomedical Engineering
- Jacob Whittle - Bioengineering
**SHERO**

**Problem:** Recent studies have found that up to 70% of reproductive diseases are caused by unsanitary feminine hygiene. Poor feminine hygiene also results in socioeconomic disparities. Many Central and South American women lack access to affordable and effective feminine hygiene products. As a consequence, women must resort to a range of unsanitary solutions.

**Solution:** SHERO proposes to give women access to biodegradable, locally-sourced disposable pads through a microfranchising model, beginning in Guatemala, though the model may be exported to a wide range of locations throughout the region. In doing so, SHERO aims to reduce the health risks involved in poor feminine hygiene, reduce the amount of time which women in developing countries spend out of school and work, and empower them to live healthy and productive lives.

**Team Members:**
- Amber Barron, Materials Science & Engineering
- Alicia Dibble, Materials Science & Engineering
- Ashlea Patterson, Materials Science & Engineering
- Sarai Patterson, Materials Sciences & Engineering

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**SWEN CARE**

**Problem:** Gaps in communication between patients and providers cause added stress, pain, discomfort and complications for patients. Nurse response times to patient requests are not optimal and need to be improved.

**Solution:** Swen Care offers a modular, icon based, communication system that will provide increased efficiency for nurses and improved patient outcomes. Swen Care also allows nurses to be more efficient with their time. By logging, and timestamping requests and actions it can help provide valuable information to the staff.

**Team Members:**
- Trevor Beazer, Business
- Connor Groskreutz, Business
- Jentzen Rose, Business

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$5,000 - John Noorda Consumers’ Choice Award
ULTRASOUND IMPACT PROTECTOR

Problem: Ultrasound probes currently have no structural components that to absorb impact when dropped. The piezoelectric element, acoustic lens, and acoustic matching layer are critical parts of the probe and readily subject to fracture when the probe is dropped or impacted during use or storage. Breakage of fragile components reduces image quality and requires expensive repairs.

Solution: Ultrasound Impact Protector is a low-cost, biocompatible, ultrasound-transparent device that protects ultrasound equipment from impact shock. The material the device is made from is very low cost and biocompatible. It can be wiped down after use with the same cleaners used on most ultrasound probes.

Team Members:
Holden Brown Medicine
Matt Byrne Mechanical Engineering
Tucker Smith Business
Jacob Steenblik Public Health/Health Admin/Nursing

VEISER

Problem: About 25% of Americans suffer from painful and potentially dangerous varicose veins. Interventions each have intrinsic drawbacks, many of which can lead to eventual vessel recurrence, serious side effects, and a significant cost burden to both physician and patient.

Solution: Veiser provides a safe and simple way to perform minimally invasive vein ablations. It improves safety and lowers cost for treating problematic veins by increasing vessel wall exposure to ablative chemicals. Through controlled stretching of the vessel into a more flat shape significantly decreases vessel fluid volume, reducing the amount of sclerosing solution required than with a typical round vein. Also, forced mechanical loading creates a constant maximized exposed internal surface area, which restricts spasms and leads to more reliable ablation.

Team Members:
Ben Anderl Computer Science
William Anderl Mechanical Engineering
Shelby Murdock Bioengineering
**VIAKIT**

**Problem:** Because cervical biopsy and histology and HPV testing are not available in many countries, it is appropriate to perform a Visual Inspection with Acetic acid (or VIA) test to screen for cancer. Unfortunately, VIA protocol is not standardized, especially in developing countries. This results in confusion about when to perform VIA testing and how to interpret results.

**Solution:** VIAkit is an easy to use kit with everything needed to complete a successful VIA. The kit includes a small vial of acetic acid at the correct concentration and without impurities. It also includes a sterile swab applicator and a universal instruction card with pictures. VIAkit will standardize the way VIA is performed and improve women's health globally.

**Team Members:**
- Laura Gardner (Medicine)

**$5,000 - Ensign College Global Health Innovation Award**

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**XENOSPEC**

**Problem:** The most commonly used vaginal speculum can be uncomfortable for patients, especially during insertion and expansion. This 2-billed device can also incite psychological stress, inhibits communication and can discourage gynecologic care for women worldwide. A new speculum is needed that facilitates effective gynecologic care and reduces both physical and psychological discomfort for patients during examination.

**Solution:** Designed for women, by women, XenoSpec is a vaginal speculum used in conjunction with the Xenoscope. It enables clinicians to comfortably provide health exams to female patients. XenoSpec allows clinicians to maintain face-to-face contact with patients during the exam, which aids in patient communication. Additionally, cervical images taken with the Xenoscope can be attached to the patient file or medical record, or electronically transmitted for review. XenoSpec is a minimally invasive, sterilize, and disposable system.

**Team Members:**
- Laura Gardner (Medicine)
- Melissa Gulbransen (Bioengineering)
- Annie Johnson (Bioengineering)
- Jessie Lam (Bioengineering)

**$10,000 - 2nd Runner-up**
Problem: Each year in the U.S., 5.5 million abdominal and pelvic surgeries are performed. Tissue adhesions from these surgeries occur in up to 95% of patients and represent the single largest cause of bowel obstruction in the developed world. Adhesions are linked to up to 40% of all infertility cases, and play a significant role in chronic pain.

Solution: XLynk Surgical offers a hydrogel solution to provide a reliable, cost effective adhesion barrier for surgeons. The delivery device combines hyaluronic acid and polyethylene glycol diacrylate via turbulent flow and sprays the gel onto the tissue surface for effective in situ crosslinking. Surgeons can spray tissue surfaces with high specificity in 20-30 seconds, and the gel will be reabsorbed by the body after 7 days, once the window for adhesion formation has passed.

Team Members:
- Jordan Davis  Chemical Engineering
- Ari Hassett  Bioengineering
- Brody King  Bioengineering
- Ram Nirula  Medicine
- Shawn Owen  Public Health

FIN BLADE

Problem & Solution: Carpal tunnel release surgeries are among the most common surgical procedures in the U.S. These typically require general anesthesia with its associated risks and costs. Fin Blade provides an inexpensive, minimally invasive, low-risk method of carpal tunnel release through a small cutting tool that does not require general anesthesia. The device is inserted like a needle or through a tiny incision. It can be used in a variety of similar procedures.

2016 B2B Competition runner-up

$10,000 – 1st Runner-up
$2,500 – Legacy Award
**EASY ARM**

**Problem & Solution:** Patients in a supine position during a CT scan must either hold their arms to their sides, compromising imaging quality, or hold them above their heads for prolonged periods of time, causing fatigue and possible injury. Easy Arm provides an inexpensive, lightweight and comfortable place for patients to rest their arms above their heads and minimizes injury risk.

*2015 Best Green Award winner*

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**MECHANICAL LEECH**

**Problem & Solution:** Live leeches are used to reintroduce venous flow to post-operative regions, but they also carry several challenges, including patient appeal, availability, sanitation and control. Mechanical Leech provides more consistent and controllable performance to a medical technology that is more appealing to patients and drastically improves tissue survival. The device is intended to replace a $10-20 million/year industry of medicinal leeches.

*2013 B2B Competition Runner-up*

*$2,500 – Legacy Award*
HIGH SCHOOL COMPETITORS

An exciting first this year was the inclusion of two teams from Rowland Hall, a local private high school. Both teams came with well-planned projects that were on par with competitors from the University. We look forward to seeing this aspect of the competition grow.

ROWLAND HALL TEAM 1: ARC BRACE

**Problem:** There has yet to be a knee brace that incorporates both stability and compression into a single device. Additionally, no current brace can isolate swelling and prevent further injury.

**Solution:** ARC Brace is a brace that combines compression and stability using isolated air bladders. This regulated system creates an easy and efficient transfer of pressure. The device is designed to eliminate the manual error of compression often associated with the rehabilitation process.

Team Members:
Courtney McCabe
Josh Nkoy
Elena Zipp
ROWLAND HALL TEAM 2: COLOCLEAN

Problem: Colon cancer is the No. 2 cancer-related killer in the U.S. Fortunately, colonoscopy is a highly effective preventative procedure, but inadequate prep may complicate the procedure and cause inaccurate diagnoses.

Solution: The ColoClean prep kit is a user-friendly solution that minimizes patient discomfort and encourages compliance with complete colonoscopy preps, leading to life-saving colonoscopies. The kit includes 30 laxative magnesium citrate tablets, anti-nausea tablets, and our own gastroenterologist-approved cookbook with a low-fiber meal plan to keep patients comfortable and satisfied while maintaining an effective prep.

Team Members:
Chloe Fleischer
Eleanor Mancheski
Emilie Orfanakis
Elias Taylor
Tobi Yoon

$500 - Best Young Entrepreneur Award
COMPETITION NIGHT
April 3, 2017

Held at the Utah State Capitol Rotunda, the 7th Annual Bench-to-Bedside Competition Night was attended by a host of university, community and business leaders and innovation stakeholders.
Through the Cords has made some big progress since competition night in April 2016 where we were awarded runner up. Our student team consisted of a Medical student, PhD Bioengineering student, and a MBA student. We were partnered with Anesthesiologist Dr. Sean Runnels through the Lassonde New Venture Development program. Dr. Runnels is the primary inventor and driving force behind the company. Our student team has continued working with Dr. Runnels to further develop Through the Cords airway products. Since B2B competition we have received multiple awards and grants including:

- Utah Entrepreneur Challenge – Grand Prize $40,000
- CMI NSF I-CORPS workshop series & Grant – $3,000
- Department of Anesthesia grant – $$$
- TVC Engine Grant – $$$
- GOED – TCIP grant – $100,000

We have conducted preclinical studies in the anesthesia simulation lab using our products, which show promising results. We have filed additional Utility and Design patents. We completed our first round of funding for $500,000 and recently hired a full-time COO who is setting up for production and coordinating channels for sales and distribution. We are also preparing for next investment round in the near future.
THANK YOU!

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Thomas Eastwood  Jeremy Horton  Kamran Najmabadi
Todd Ferrell  Steven Labrum  Dinesh Patel
GET INVOLVED AS A SPONSOR OR MENTOR

We welcome community participation. If you or your organization would like to get involved, please let us know.

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Visit our B2B website:
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A publication of the University of Utah Health Center for Medical Innovation, produced by the University of Utah Health Marketing & Communications. Assoc Dir, Marketing & Sales Communications: Aaron Lovell (aaron.lovell@hsc.utah.edu). Senior Designer: Laurie Robison. Photography: Kristan Jacobsen, kristanjacobsen.com. Special thanks to Megan McIntyre for all her hard work.