The Center for Medical Innovation at the University of Utah presents

B2B COMPETITION REPORT:
2017–2018
TABLE OF CONTENTS

5| INTRODUCTION
6| STUDENT-DRIVEN INNOVATION
8| B2B EVOLUTION: 2018 STATE OF THE PROGRAM
10| 2017-2018 B2B DEMOGRAPHICS
11| 2017-2018 B2B TEAM SUMMARIES
40| COMPETITION NIGHT PHOTOS
42| SPECIAL THANKS TO OUR SPONSORS
43| GET INVOLVED AS A SPONSOR OR MENTOR
“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, Bench-to-Bedside has mentored 918 participants on 210 teams that have invented 214 medical devices, filed 139 patents, and launched 55 companies.

For the 2018 competition, B2B awarded more than $140,000 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 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 program that teaches the impact and the power diversity of thought can bring to the innovation process. The program has grown immensely in scope and quality over the last eight years. We have now engaged more than 900 students into 210 inter-disciplinary teams that have spawned innovative new health care technologies. Additionally, more than 50 of these teams have moved 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 more than 100 University of Utah physicians from a range of specialties that serve as consultants, key opinion leaders and stakeholders.

B2B culminates in a 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 more than $140,000 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.

Generous sponsors have allowed us to further expand our focus on Global Health technologies. This global health focus was stimulated by broader university initiatives to improve healthcare access and affordability on a global scale. With this focus, we have seen an increase in the quality and quantity of projects specifically developed to address these critical global health needs.

For the past three years, we have had the chance to welcome some of our earlier teams back to compete for a Legacy award. 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 also for this program. 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 what unique concepts will emerge.

"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."
B2B EVOLUTION:
2018 STATE OF THE PROGRAM

Friends and colleagues, as this year’s competition draws to an end, we stand in awe of the excitement and growth the Bench-to-Bedside (B2B) program has achieved over the past eight years. B2B is an extracurricular program designed to introduce students to the exciting world of medical device innovation. This year’s devices are a testament to the students’ ingenuity, passion and technological savvy.

The 2017-2018 competition saw a surge of innovative and original student projects covering a wide array of health care specialties. Projects ranged from an iron deficiency monitoring systems specifically for use in developing countries to an implantable depot of disulfiram used to treat alcohol abuse disorder. All of the students’ experiences and project successes would not be possible without the tremendous support from the academic, clinical, educational and industry communities. Specifically, we would like to thank several of B2B’s greatest supporters that made this year’s competition possible. From its inception, B2B has been a student run program. The student leaders are responsible for planning workshops focused on medical device design and organizing the competition night. We extend a special thank you to the following executive committee members for all of their hard work this year:

VICE PRESIDENT OF OUTREACH: Bianca Rich
VICE PRESIDENT OF OUTREACH: Holden Brown
VICE PRESIDENT OF ENGINEERING: Dan Spicer
VICE PRESIDENT OF BUSINESS: Erica Morey
VICE PRESIDENT OF MEDICINE: Cathy Mangum

“Opening the competition to all universities in Utah saw an increase in the level of competition and a corresponding increase in the quality of projects. We were ecstatic to see one of our Southern Utah University teams take away the Best in Medicine award, utilizing the B2B resources to develop their product.”

The program grew exponentially this year with the addition of teams from Brigham Young University, Utah State University, Southern Utah University, Juan Diego Catholic High School and Rolland Hall High School. Opening the competition to all universities in Utah saw an increase in the level of competition and a corresponding increase in the quality of projects. We were ecstatic to see one of our Southern Utah University teams take away the Best in Medicine award, utilizing the B2B resources to develop their product. With more schools came more teams and participants in the program. Fifty-four teams and over 200 students participated in the B2B program this year. We hope to continue to reach out to more schools across Utah in the coming years and grow the program into a statewide competition with Utah’s best and brightest minds.

Developing a medical device from scratch is a daunting task for students to tackle. Accordingly, we developed many new workshops and resources this year to help students learn more about the medical device design process and develop successful projects. The B2B resource seminar was added to
help students learn about all of the resources the Center for Medical Innovation and University of Utah provides teams. Thank you to the Innovation Librarians, Tj Ferrill and Alfred Mowdood, Law Fellows, Jason Perry, Andrew Unsworth, and Erika Hanson, Director of Regulatory Affairs, Spencer Walker, Director of Engineering, Tim Pickett, and Lassonde Partners, Troy D’Ambrosio, Anne Bastien, and Thad Kelling for their support of B2B student teams.

The Clinician Reverse Pitch Event was one of the most vibrant and successful events of the year. During this event, clinicians pitched healthcare problems they observed in the hospital for students to innovate solutions for. This event paired students who have the time and resources to create healthcare innovations with clinicians who have first-hand experience with current healthcare needs. A special thanks to all the clinicians who pitched healthcare ideas and mentored student projects.

To our friends, classmates and participating students, we would like to conclude by saying, B2B is a platform of learning, which we hope inspires a future devoted to improving healthcare. If you desire to continue to develop your products into the future, we wish you all the best luck and success. And finally, to all those who have made this competition possible, through donations of your time, money, talent and resources – thank you. To our Premier Sponsor, Zions Bank, as well as our Impact Sponsor, Clinical Innovations —thank you. Special thanks to the Center for Medical Innovation and its wonderful employees, especially Megan McIntyre and Angela Ottley. These two are the heartbeat of this program and the competition would not be possible without their fearless leadership. Thank you to John Langell for his patience and outstanding leadership. Without him, the great bounds B2B accomplished this past year would not be possible. To all of our faculty, judges, and mentors, we cannot thank you enough for helping this program succeed. We hope we can all continue to support each other as we strive to improve the future of healthcare and innovation.

Ali Eisenbeiss, B2B Student President, 2017-18
Since 2010, Bench-to-Bedside has mentored 918 participants on 210 teams that have invented 214 medical devices, filed 139 patents and launched 55 companies.

**DISCIPLINES REPRESENTED IN 2018**

<table>
<thead>
<tr>
<th>Accounting</th>
<th>Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry</td>
<td>Health</td>
</tr>
<tr>
<td>Bioengineering</td>
<td>Humanities</td>
</tr>
<tr>
<td>Biology</td>
<td>Marketing</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Materials Science &amp; Engineering</td>
</tr>
<tr>
<td>Business</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Medical Laboratory Sciences</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>Medicine</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Microbiology</td>
</tr>
<tr>
<td>Dentistry</td>
<td>Multidisciplinary Design</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>Engineering</td>
<td>Physician Assistant Studies</td>
</tr>
<tr>
<td>Entertainment Arts &amp; Engineering</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td>Piano Performance</td>
</tr>
</tbody>
</table>

**2017-2018 TEAM STATS:**

- Participants: **163**
- Teams: **54**
- Devices: **54**
2017-2018 B2B TEAM SUMMARIES

This year’s competition included teams from other Utah universities, including Utah State University, Weber State University, Utah Valley University, Southern Utah University, and Brigham Young University.

1. AccuBreath
2. Beacon Sleep Solutions
3. Bioblate
4. Clinch Brace
5. Deco-UV
6. DentiOps
7. DripSense
8. Early Detection of Retinopathy
9. EasyAnemia
10. Endogrip
11. EPic
12. Force Spec
13. Gard Medical
14. Genuflexor
15. “Halt” Breaking System
16. HydroVac
17. IR Medical
18. KB Medical
19. KneeHarmony
20. Lotus Filter
21. MedivateU
22. MedSumo
23. Monarch
24. Myolert
25. Needleless Dental Shot
26. Next Generation Video Laryngoscope
27. NG2 Esophageal Imaging
28. NipaYe
29. PreOv
30. Posture Pal
31. PVAC
32. Rhinostasis
33. Rock Canyon Medical
34. Rudolph
35. Sit Up
36. Sixth Sensing
37. SmallTalk
38. Suresstop, BHAAM Innovations
39. TBBS BioNeedle
40. TonsilView
41. Winter-Broadbent Innovations
42. Zero Stitch
43. Line Protector
44. Smooth Stop
45. Advanced Flow Bronchoscopes
46. Bruxit
47. EZHeme Medical
48. LazyEyeX
49. Luerlite
50. Portaderm
51. Project Embrace
52. SonoShield, LLC
53. Veiser
54. Wacian-Pleth Patch

(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.)
**Problem:** Drug-induced respiratory depression and airway obstruction is the primary cause of morbidity associated with sedation and analgesia.

**Solution:** The AccuBreath Ventilator (ABV) is an efficient means to provide ventilation support and monitoring during procedural sedation to prevent airway obstruction. ABV improves the standard of care and provides any medical provider the ability to affordably administer state-of-the-art ventilation support and patient monitoring.

**Team Members:**
- Mike Fogarty Bioengineering

---

**BEACON SLEEP SOLUTIONS**

**Problem:** People have suffered with troubling sleep disorders, such as sleep paralysis, for centuries.

**Solution:** We propose a wearable device that produces a strong vibration in the user’s body upon noting a significant elevation in heartbeat during REM sleep. While designed for people with sleep paralysis, it can also help those who experience night terrors, PTSD, sleepwalking disorders and more.

**Team Members:**
- Joseph Arrington Business
- Pace Cranney Bioengineering
- Mica Sloan Biomedical Engineering
**Problem:** The United States has approximately 300,000 new diagnoses of nodular thyroid disease each year, 96 percent of which are diagnosed via fine needle aspiration (FNA). The patient must return for surgical removal if the nodule is malignant. FNA is inexpensive but can result in multiple patient sticks before a suitable sample is collected.

**Solution:** Our device combines the biopsy and ablation of thyroid nodules during the same patient visit, reducing the need for surgery and improving the patient experience.

**Team Members:**
- Davis Crosland (Biomedical Engineering)
- Chris Eixenberger (Biomedical Engineering)
- Anh Pham (Biomedical Engineering)
- Chase Spencer (Biomedical Engineering)

---

**CLINCH BRACE**

**Problem:** Current market solutions of ankle taping and bracing do not offer the protection and support needed to prevent ankle injuries.

**Solution:** Clinch Brace is a heat shrink composite system that offers superior protection and ease of application needed to combat this issue.

**Team Members:**
- Aaron Dobron (Material Science and Engineering)
**DECO-UV**

**Problem:** Methicillin-resistant Staphylococcus aureus (MRSA) bacteria can cause devastating infections for those who are immunocompromised. MRSA kills up to 18,000 people every year in the U.S., and more than 94,000 cases of invasive MRSA infections are reported each year. Current “decolonization” methods are time and resource expensive and can risk antibiotic resistance.

**Solution:** Deco-UV aims to leverage UV technology to create a portable, hand-held decolonization device that can swiftly reduce MRSA colonization numbers and improve outcomes without the use of antibiotics.

**Team Members:**
- Azmi Ahmad, Bioengineering
- Cait Cooper, Medicine
- Cameron Jensen, Business
- Kristen Saad, Medicine
- Brooke Zhao, Medicine

**DENTIOPS**

**Problem:** Dentists have a difficult time viewing certain parts of the mouth during routine dental procedures. Local illumination is advantageous and can ensure proper cleaning.

**Solution:** Our product incorporates localized illumination into an intraoral mirror, reducing the need for multiple tools. The dental mirror consists of a battery powered light source.

**Team Members:**
- Trevor Hafer, Engineering
- Christine Henry, Engineering
- Michael Kane, Engineering/Business
- Ahrash Poursaid, Engineering/Business

$5,000 - Ted Stanley Innovation Award
Problem: Blocked intravenous (IV) flow during surgery can trigger patient awareness, potentially causing physical or emotional harm to the patient. Currently, the only way for an anesthesiologist to know that the necessary IV medication is getting to the patient is to look closely at the drip chamber on the IV apparatus.

Solution: DripSense is a simple, disposable U-shaped monitoring device that attaches to the IV drip chamber. The tool gives both patients and anesthesiologists peace of mind by using infrared technology to detect changes in drip patterns. An alarm alerts the anesthesiologist if flow ceases.

Team Members (Utah State University):
Greg Bell Pre-Medicine
Todd Brown Pre-Medicine
Colton Creech Business
Dalton Dobson Business
Rick Larsen Engineering
Kaden McKenzie Engineering

EARLY DETECTION OF RETINOPATHY

Problem: In the pursuit of technology that can assist with the early diagnosis of disease, simple eye tests such as retinal photography can be a source of valuable information.

Solution: We propose a non-evasive and cost-effective retinal imaging analysis tool that can be used by physicians for early diagnosis of disease. Our platform uses image processing algorithms and artificial intelligence techniques to automatically provide physicians with valuable information they would otherwise have to glean manually during physical examination or that could be missed due to human error.

Team Members:
Khalid Ahmad Computer Science
Ahmad Alsaleem Computing

$5,000 - Best in Health Care IT Award
$5,000 - Ophthalmological Global Health Award
**Problem:** Medical guidewires can be long, awkward, slippery, and difficult to handle. This leads to longer procedure times, increased contamination rates, and procedure complications.

**Solution:** EndoGrip is a simple device that can be used in any medical specialty for diagnostic and treatment purposes. By securing guidewires anywhere on the surgical field, Endogrip reduces potential complications of probe movement. It also rotates to allow for bending of wires in desired configurations for optimal organization and maneuvering.

**Team Members:**
- Farshad Mogharrahbi, Mechanical Engineering
- Amir Ali Ghaffarian, Medicine/Engineering
- Benjamin Reed Fogg, Medicine

$5,000 - Best in Engineering Award
$2,000 - Eccles and Marriott Library Award

---

**Problem:** Machines used today for anemia diagnoses are expensive, especially for hospitals in developing countries where anemia can be a big problem.

**Solution:** EasyAnemia is a simple, inexpensive machine that will be able to read blood cells and identify the amount of iron in them to more accurately diagnose anemia.

**Team Members:**
- Daniel Damiani, Business
- Nicolas Mavromatis, Medical Laboratory Science
**EPIC**

**Problem:** Current EKG and monitoring cable setups in EP and cath labs utilize redundant recording sites to deliver identical signals to 5-8 independent cardiac monitoring systems. These redundancies decrease the quality of monitoring, hamper EP lab throughput, introduce risk in the operating space, and frustrate staff.

**Solution:** We propose a device that eliminates redundant patches and lab cables altogether. The Epic Active EP Cable allows hospitals to acquire a single EKG of enhanced quality and transmit the necessary portion of that signal to any monitor already being used in the lab.

**Team Members:**
- Jordan Johnson  Bioengineering
- Geethanjali Muruganandam  Bioengineering
- Naveen Rathi  Bioengineering
- Mia Wipfel  Bioengineering

**FORCE SPEC**

**Problem:** Pelvic floor disorders affect one in three women in the U.S., leading to incontinence and pelvic organ prolapse. The current standard to evaluating pelvic floor muscles is digital palpation, which is subjective and has poor inter and intra visit repeatability.

**Solution:** Our device provides the ability to objectify evaluation and maintain accuracy over time.

**Team Members:**
- Brian Cottle  Engineering
- Stefan Niederauer  Engineering
**Problem:** Currently, there is no effective way of clamping/停止ing the flow of urine through a catheter. This is a serious issue for any catheter user, specifically for patients who use an indwelling catheter because there is no way to stop and pause the flow temporarily while one drainage bag is switched to another.

**Solution:** Gard Medical proposes Slip Flow, a convenient catheter clamp that can be added or taken away from any catheter at any time. Slip Flow effortlessly gives catheter patient's convenience, security, independence, and cleanliness. The device also helps care givers and health care workers.

**Team Members:**
- Justin Duncan: Entrepreneurship (University of Utah)
- Camron Erickson: Microbiology (Brigham Young University)
- Brad Shelton: Electrical Engineering (University of Utah)

**GENUFLEXOR**

**Problem:** One in 15 total knee replacements and other highly-invasive knee operations fail because of a lack of affordable rehabilitation solutions for patients following surgery.

**Solution:** MediColina, LLC, presents the Genuflexor, a low-cost, easy-to-use knee flexion device that increases patient range of motion and decreases recovery time.

**Team Members:**
- Maxwell Hill: Business (Brigham Young University)
- Von Hill: Physical Therapy (Arizona State University)
“HALT” BREAKING SYSTEM

**Problem:** People who live daily with manual wheelchairs are currently expected to slow themselves using friction between their hands and wheel rims. This is an inadequate solution that wheelchair manufacturers have failed to address.

**Solution:** Halt is a simple and affordable solution that allows users optimal steering and parking without the need to grip or pull anything with their hands.

**Team Members:**
- Aaron Dobron: Materials Science Engineering
- Trevor Hattabaugh: Finance
- Austin Scaccianoce: Multidisciplinary Design

HYDROVAC

**Problem:** No simple/versatile suction products currently exist in dentistry. Most devices require their own complex tubing, are very specialized, and can only be placed in one location.

**Solution:** HydroVac proposes a hands-free suction device that adheres to soft tissue to maintain a fixed position and provide continuous fluid suction. HydroVac is low-profile and can be connected to current vacuum systems without special attachments.

**Team Members:**
- Cathy Mangum: Medicine
- Chad Mangum: Biology
**IR Medical**

**Problem:** Many interventional radiology (IR) procedures involve drains placed inside the patient. These drains often clog, necessitating replacement.

**Solution:** IR Medical proposes a brush that is inserted into these drains and vibrated at a high frequency. The vibrations break down plaques that develop inside the drainage catheters, enabling them to be cleaned rather than replaced.

**Team Members:**
- Brandton Ferrin  Business/Engineering
- Kapil Scharma  Business/Engineering

---

**KB Medical**

**Problem:** Lymph node dissections are common for metastatic cancer patients. To prevent fluid buildup, drains typically remain in place for 1-4 weeks, but they can create complications when used for an extended period of time.

**Solution:** KB Medical proposes a comfortable drain that has a hydrophobic coating on the inside to prevent clogging and establishes negative pressure to maintain fluid flow.

**Team Members:**
- Hannah Butcher  Business
- Michael Kane  Business/Engineering
**KNEEHARMONY**

**Problem:** Patient noncompliance after a knee injury prolongs physical limitation and pain, thereby prolonging a return to normal work and recreational life.

**Solution:** The kneeHarmony™ is a fully portable rehabilitation system consisting of a lightweight and versatile knee brace that promotes kinetic function, along with a modular cooling component to simultaneously accelerate recovery.

**Team Members:**
- Jason Huang: Biomedical Engineering
- Dan Kim: Biomedical Engineering
- Jason Miller: Business
- Jess Thayne: Laboratory Sciences
- Luke Todd: Business
- Sri Radakrishnan: Biomedical Engineering
- Annie Rowley: Biomedical Engineering

$5,000 – Best in Business Award

**LOTUS FILTER**

**Problem:** Vascular filters often migrate and are very difficult to place properly and remove, potentially causing significant harm and possibly death to patients who need them.

**Solution:** Lotus Filter is an innovative vascular filter that resists migration and simplifies the placement and removal process in order to reduce morbidity and mortality.

**Team Members:**
- Kellen Hilton: Medicine/Engineering
- Kapil Sharma: Engineering/Business
**MEDIVATEU**

**Problem:** Medical socks currently worn by patients increase the risks for patient slips and falls.

**Solution:** MedivateU proposes an inexpensive add-on for socks that greatly reduces the risk of slipping.

**Team Members:**
- Avani Latchireddi, Medical Laboratory Science
- Michelle Mora, Biomedical Engineering
- Keaton Rowley, Biomedical Engineering
- Guang Yang, Medicine

---

**MEDSUMO**

**Problem:** There is an extreme labor shortage for medical professionals, particularly in nursing and occupational therapy. With an aging American population in need of care, solutions to the shortage are needed.

**Solution:** We propose MedSumo, an on-demand employment platform for growing the pool of medical professionals. MedSumo creates a direct pathway for entry-level hourly workers to a career in the medical field by connecting them to the right resources, training opportunities, and ultimately, the right career in health care.

**Team Members:**
- Zach Johnson, Computer Science (Utah State University)
- Teki Koloa, Business (California State Polytechnic)
MONARCH

**Problem:** Tears in the perineum during childbirth cause pain, incontinence and potentially serious long-term issues. Early studies have shown that heat application can reduce pain and risk of tearing but there are currently no devices/solutions on the market.

**Solution:** Monarch is a non-evasive, low-cost, disposable heat source designed to attach to the perineum during labor and delivery which will reduce pain during and after delivery, and decrease the risk of perineal tears.

**Team Members:**
- Joshua Burton  Biomedical Engineering
- Alexandra Ciolkko  Biomedical Engineering
- Brian Curran  Business
- Karissa Keenan  Medicine
- John Lackey  Biomedical Engineering
- Alli Straubhar  Medicine

MYOLERT

**Problem:** Patient movement during surgery is very dangerous to the safety of both the patient and operating staff. When patients experience pain during surgery, they will initially wrinkle their forehead muscles.

**Solution:** Myolert offers an EMG monitor with electrodes on the forehead that provide an early indicator of patient movement. Early detection enables appropriate intervention to movement and disruptions during the surgery.

**Team Members:**
- Pace Cranney  Bioengineering
- Lizzie Einarson  Bioengineering
- Ashley Farnsworth  Bioengineering
- Jason Huang  Bioengineering
NEEDLELESS DENTAL SHOT

**Problem:** Dental shots are painful and dreaded by patients. Current dental anesthesia consists of an initial application of topical anesthetic followed by an anesthetic injection for deeper numbing. Topical anesthetics perform poorly, however, and patients still feel pain from the subsequent shot.

**Solution:** We propose a pressure-driven needleless injector that painlessly delivers the anesthetic deep into the gum, more effectively eliminating pain from the dental shot.

Team Members:
- LeAnn Lam  Engineering
- Melissa Pysnak  Dentistry
- Ria Sandhu  Engineering
- Tivon Semnani  Engineering
- Lizzy Stauder  Engineering
- Taylor Tate  Dentistry

NEXT GENERATION VIDEO LARYNGOSCOPE

**Problem:** While current video laryngoscopes increase visualization of vocal folds, they have limited effectiveness and valuable data is often not recorded because it is a hassle to transfer the data to a permanent storage device.

**Solution:** The Next Generation Video Laryngoscope (NextGen VLS) is equipped with a timer, attempt counter, and anatomy recognition guide to assist with intubation. Additionally, NextGen VLS automatically captures and uploads each intubation, removing the time-consuming burden of transferring memory cards to a computer.

Team Members:
- Matt Byrne  Mechanical Engineering
- Kyphuong Luong  Biology
NG2 ESOPHAGEAL IMAGING

Problem: Every year, there are an estimated 16 million clinic visits for gastrointestinal symptoms with 7 million upper endoscopies. Currently, visualization of the upper GI tract is done by inserting a endoscope through the mouth and throat into the esophagus after a patient is sedated. Endoscopy is expensive, time-consuming, invasive, and requires sedation.

Solution: To reduce the burden placed on patients and the health care system, NG2 offers a low-cost, minimally invasive way to image the esophagus. The device combines a camera with a feeding tube for screening of the upper GI tract, allowing the procedure to be done at the clinic bedside without sedation.

Team Members:
John Lackey Engineering
Josh Whisenant Engineering

NIPAYE

Problem: Breast milk is proven to be the best nutritional choice for infants. However, 91 percent of mothers struggle initially with breastfeeding and many become discouraged and eventually give up. These women are at higher risk of experiencing postpartum depression.

Solution: NipaYe offers Akoma, a solution that supports nursing mothers by supplementing the mother’s milk with donated breast milk or formula. Akoma promotes natural milk production, leading to a more positive nursing experience for mother and baby. This encourages long-term breastfeeding while decreasing postpartum stress and depression.

Team Members:
Brenda Diaz Accounting
Nana Ewusi-Emmim Business
**PREOV**

Problem: 12-13 percent of U.S. couples struggle to conceive and are relying on assisted reproductive technology. This is often time consuming, stressful on relationships, and expensive.

Solution: We propose a low-cost device that is accurate, user-friendly, and provides couple with real-time data. Unlike many other fertility monitoring products, PreOv identifies the pre-ovulatory phase of the menstrual cycle by measuring the water content of cervical mucus. This information provides couples with time to plan for their optimal fertile days.

Team Members:
- Joni Aoki  Pre-Medicine
- Young Hong  Pharmacy
- Lars Lofgren  Biomedical Engineering
- Jeanna Ryan  Physician Assistant Studies

**POSTURE PAL**

Problem: It is estimated that over a fifth of the world’s population suffers from chronic constipation.

Solution: One treatment is to improve bowel evacuation posture. By creating a powered stool that can lift a user’s legs, an ideal posture can be obtained and constipation can be history.

Team Members:
- Parker Bassett  Mechanical Engineering
- Brian Curran  Business
- Zac Fica  Medicine
- Jason Gurney  Mechanical Engineering
PVAC

**Problem:** Current smoke evacuators are too large and loud, which results in their insufficient use throughout the world. Smoke particulates from electrosurgical procedures can carry harmful matter into the air, making the environment unhealthy and unstable.

**Solution:** PVAC is a smaller, quieter, less-expensive smoke evacuator that is convenient to use, especially in rural hospitals and developing nations where there is less space and less resources.

**Team Members:**
- Tom Gordon Humanities
- Luke Koenen Health
- Kade Loveridge Science
- Jesse Nelson Biomedical Engineering
- Luke Son Medicine
- David Taylor Biomedical Engineering

$10,000 – John Norda
Consumers Choice Award

RHINOSTASIS

**Problem:** Nosebleeds account for one in 200 visits to emergency departments in the U.S. Nosebleeds are particularly dangerous for patients over 60 and children under 10. The solution is medically treated with cost-effective nasal inserts that provide a better alternative to at-home remedies.

**Solution:** We propose an at-home treatment that will provide an intermediary device between simple home remedies and expensive or urgent medical care. This product is safe for pediatric and geriatric use.

**Team Members (Weber State University):**
- Dalton Facer Economics
- Jacob Hess Biochemistry
- Kortney James Pre-Medicine
**Problem:** Individuals suffering from insulin-dependent diabetes have difficulty maintaining consistent blood glucose (BG) levels. That difficulty leads to long-term hyperglycemia and hypoglycemia.

**Solution:** To combat this, we are creating an artificial pancreas device system (mostly closed-loop) with customizable alert systems that offer patients greater health from in-range BG levels and less time spent on BG management.

Team Members (Brigham Young University):
- David Ashby Engineering
- Benjamin Walter Entrepreneurial Management

---

**RUDOLPH**

**Problem:** For critically ill patients, especially those in shock, a standard finger pulse oximeter fails to give accurate readings of the blood oxygen levels because the extremities aren’t properly perfused.

**Solution:** Our product uses a novel method of measuring pulse oximetry, obtaining this reading from the septum of the nose, which remains relatively well-perfused in the sickest patients and during situations of shock.

Team Members:
- Trevor Annis Medicine
- Ian Christensen Medicine
- Will Eccles Electrical Engineering
- Arthur Jacquez Electrical Engineering
- Rob McLaughlin Electrical Engineering
SIT UP

**Problem:** Spending long periods of time in bed and with conditions that require sleeping in an inclined position affects elderly, injured, and disabled individuals and their caregivers with numerous inconveniences.

**Solution:** We propose a portable, low-cost, air-filled, mobile reclining device that improves the quality of life of those individuals and is easily adjustable with a remote control. Sit Up has the potential to be an affordable substitute for costly adjustable beds.

Team Members:
Stella Markova Piano Performance

SIXTH SENSING

**Problem:** Annually, more than 1.5 million people in the U.S. who are at risk to others or themselves due to mental health conditions enter in-patient psychiatric hospitals or care facilities. Checking on a patient regularly during the night is necessary to detect suicide or overdose, but impacts quality of sleep. Hospitals need a reliable method to monitor and detect irregular respiratory patterns that won’t disrupt a patient’s sleep or have the potential for self harm.

**Solution:** Sixth Sensing is a contact-free, out-of-sight respiratory monitoring device that discreetly monitors a patient’s breathing rates and alerts caregivers of potential problems, without a person entering the room. The system can be installed behind the wall in a patient’s room to prevent self harm.

Team Members:
Alemayehu Abrar Engineering
Justin Brunson Business

$15,000 – Runner-up
SMALLTALK

**Problem:** Even though the neuroplasticity of a child’s brain aged 0–3 is 85 percent greater than an adult brain, children are often deprived of the resource nature uses to build their brain: words.

**Solution:** SmallTalk is a phone application that tracks parent-to-child speech by providing useful speech metrics like total words spoken, amount of time spent speaking and conversational turns for the purpose of helping parents more effectively foster children’s brain development.

Team Members:
- Jon Harper  Engineering
- Scott Krstyen  Engineering
- Jordan Marsh  Engineering
- Dallin Van Mondfrans  Engineering
- Youngjae Shin  Engineering

SURESTOP, BHAAM INNOVATIONS

**Problem:** There are an estimated 88,000 alcohol-related deaths in the U.S. each year, making it the third leading cause of preventable deaths. Disulfiram (Antabuse), the first drug approved for alcohol abuse, works by interfering with the body’s ability to process alcohol, resulting in sickness and discomfort upon alcohol consumption. As a result, prescriptions have steadily declined due to non-adherence.

**Solution:** BHAAM Innovations is developing Surestop, a depot of disulfiram that is injected into the peritoneum where it slowly releases over a month’s time, thus reducing non-adherence.

Team Members:
- Ali Eisenbeiss  Bioengineering
- Bianca Rich  Medicine
- Austin Schlirf  Bioengineering
- Molly Streiff  Bioengineering
- Hunter Wright  Medicine
**Problem:** Whole core biopsies are performed through invasive surgeries, which require longer recovery time. Minimally invasive procedures involve the use of aspiration and cannot obtain large tissue samples for biopsy.

**Solution:** We have developed a needle that can collect a satisfactory core biopsy while remaining minimally invasive.

**Team Members:**
Trevor Hafer  Bioengineering
Suzette Mastrangelo  Bioengineering

---

**Problem:** When patients come to the emergency department with throat infections, such as peritonsillar abscess or sore throat, clinicians have difficulty seeing and maneuvering in the back of the throat for treatment and diagnosis. Currently, clinicians must rely on coaching the patient or using a tongue depressor alone to get a view of the throat.

**Solution:** TonsilView is an easy-to-use, disposable device that provides a better view of the throat by propping open the patient’s mouth and depressing their tongue, allowing for quick and efficient treatment and reduces patient discomfort or pain.

**Team Members:**
Brandton Ferrin  Business/Mechanical Engineering
Stuart Loertscher  Biomedical Engineering
Tylar Pruiksma  Biomedical Engineering
Jane Saviers-Steiger  Biomedical Engineering
**Winter-Broadbent Innovations**

**Problem:** Patients in extended care situations in hospitals, nursing homes, etc., can develop pressure ulcers over the course of their stay due to broken protocol and neglect.

**Solution:** Winter-Broadbent Innovations proposes a sheet of pressure sensors that lies under hospital bedding and alerts the nursing team to patients who are in the beginning stages of pressure ulcers.

**Team Members:**
- Tyson Broadbent Medicine
- Trey Winter Medicine

---

**Zero Stitch**

**Problem:** Currently, the only option to repair lacerations is to go to a medical provider to receive sutures, staples or medical adhesives. Lacerations are costly to repair, time consuming, and painful to receive.

**Solution:** Zero Stitch is an alternative solution to ER waiting rooms and bills. Zero Stitch allows individuals to repair their lacerations on the go or in their homes at a fraction of the cost and time and are painless to apply. Using patent pending zip-tie technology and medical grade adhesives Zero Stitch allows the user to compress the wound edges in a precise user-friendly manner.

**Team Members:**
- Christopher Christiansen Biology (Southern Utah University)
- Candice Christiansen Undeclared

---

$5,000 – Best in Medicine Award
HIGH SCHOOL COMPETITORS

We’re excited to continue involving competitors from local high schools. This year, teams from Rowland Hall and Juan Diego Catholic High School came with well-planned projects that were on par with their university competitors.

LINE PROTECTOR

**Problem:** Nearly two million visits to intensive care units occur annually in the U.S. Patients in these settings can experience ICU delirium, where they can significantly harm themselves by ripping out lines (catheders, I.V.s, ventilators, respirators). Current devices and procedures are costly and ineffective.

**Solution:** We’re developing a device to reduce self-harm for patients in ICU settings.

Team Members (Rowland Hall):
Hunter Crosland
Emma Jones
Kira Langell
Problem: Wheelchairs frequently do not have brakes, making it difficult for users to operate the wheelchair on downhill routes and over uneven terrain. Although the user may use their hands to reduce speed, this is dangerous and may cause injury.

Solution: Smooth Stop is a safe, comfortable disc brake system for the wheelchair that allows the user to stop the wheelchair without putting their hands or fingers at risk.

Team Members (Juan Diego Catholic High School):
Chris Ausbeck
Leo Doctorman
Nico Edgar
Michael Palmer
Joseph Wang

$1,000 – Young Entrepreneur Award
ADVANCED FLOW BRONCHOSCOPEs  Legacy Team

**Problem & Solution:** Physicians complain that currently available rigid bronchoscopes negatively affect the ventilation of the patient. This often results in pausing the procedure to remove the tools, visualization devices, or bronchoscope until oxygen levels return to normal. The Advanced Flow Bronchoscope provides more direct and laminar airflow to patients without compromising the use of other tools, lights, and visualizations. The device reduces patient risk and length of procedure, saving hospitals time and resources.

Team Members:
Joshua Burton  Business
John Nelson  Materials Engineering
Trent Parry  Biomedical Engineering
Kyle Thornley  Mechanical Engineering

BRUXIT  Legacy Team

**Problem & Solution:** Bruxism, or unconscious teeth grinding, 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. Our device reduces bruxing events through a Pavlovian response. The wearer is alerted with a soft vibration when bruxing begins, subconsciously causing them to stop bruxing without waking fully from sleep.
**EZHEME MEDICAL**  
*Legacy Team*

**Problem & Solution:** Anemia is an enormous global problem. In pregnant women, it can cause fatigue, weakness, and may lead to preterm delivery or low birth weight. Misdiagnosis of anemia is too common and leads to these adverse events. We propose a non-invasive, portable, anemia detection device that will produce results in 15 seconds and can effectively be used in health care facilities and rural settings globally.

*2017 Best in Business Award*

**LAZYEYEX**  
*Legacy Team*

**Problem & Solution:** Lazy eye is much easier to treat if diagnosed when a patient is still a child. Current methods for diagnosing lazy eye are expensive and patient noncompliance often leads to high misdiagnosis rates. LazyEyeX proposes a video game that can affordably diagnose lazy eye with high accuracy.
**LUERLITE**

**Problem & Solution:** Each year, in the United States alone, over 80,000 critically ill patients are treated for bloodstream infections. More than 85 percent of these are related to the use of intravenous access catheters, which carry high mortality rates and cost hospitals billions every year in treatment. Luerlite is a simple, effective and sustainable solution to this widespread problem. Utilizing ultraviolet (UV) light in an innovative penlight form, Luerlite delivers powerful germicidal light directly to the surface of catheter access points. The unique application of proven UV-C technology eradicates a wider range of pathogens than current solutions without the need of any chemicals and without creating unnecessary waste.

**Team Members:**
- Sam Braden: Medicine
- Eric Peterson: Business

**PORTADERM**

**Problem & Solution:** Ninety-five percent of severe burn cases happen in developing nations. Plastic and trauma surgeons in these nations often use older skin grafting technology with a high failure rate. Portaderm is a cost effective, battery-powered dermatome with an interchangeable head pre-set to the dimensions for an accurate skin graft. It offers many features found in current dermatomes used in the U.S., but for a fraction of the cost.
**SONOSHEILD, LLC**

**Problem & Solution:** Ultrasound probes currently have no structural components that absorb impact when dropped. Breakage of fragile components reduces image quality and requires expensive repairs. We have created a low-cost, biocompatible, ultrasound-transparent device that protects ultrasound equipment from impact shock.

**PROJECT EMBRACE**

**Problem & Solution:** 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. 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.
VEISER

Problem & Solution: About 25 percent 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. 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.

$20,000 – Legacy Award

WACIAN-PLETH PATCH

Problem & Solution: Many surgical settings in low and middle-income countries lack the ability to continuously monitor patient vital signs during perioperative procedures. Wacian-Pleth Patch offers low-cost solution combining a reusable electronics package with a disposable sensor-embedded patch to provide continuous wireless monitoring of heart rate, respiration, and oxygen saturation.

2016 Best in Business Award

$17,000 – Ensign College of Public Health Global Health Award
COMPETITION NIGHT
April 9, 2018

Held at the Utah State Capitol Rotunda, the 8th Annual Bench-to-Bedside Competition Night was attended by a host of university, community and business leaders and innovation stakeholders.
SPECIAL THANKS TO OUR SPONSORS:

CENTER FOR MEDICAL INNOVATION

SUSTAINING SPONSORS

University of Utah Health
Ray and Tye Noorda Foundation
Sorensen Legacy Foundation

BENCH-TO-BEDSIDE

PREMIER SPONSOR

Zions Bank

IMPACT SPONSOR

Clinical Innovations

HOST SPONSORS

Becton, Dickinson and Company
BARD Access Systems

INNOVATE SPONSORS

Fabian VanCott
Church and State
Ensign College of Public Health
JP Morgan
University of Utah Health,
Department of Ophthalmology
Mr. and Mrs. Derek Sakata

START UP SPONSORS

Mr. and Mrs. Jack Ferraro
Eccles Health Sciences Library
J. Willard Marriott Library

THANKS ALSO TO OUR CORPORATE AND PROFESSIONAL MENTORS:

Barbara Araneo
Bradley Bertoch
Matt Bills
Danny Blanchard
Randall Block
June Chen
Mark Crawford
Greg Critchfield
Phil Davidson
James Dreher
Mark Durham

Kelly Echols
John Erdmann
Shawn Fajtik
Kirk Fowers
Andy Gotshalk
Eric Gourley
Ron Heffernan
Jim Hogan
Bruce Irvine
Ben Kieffner
Elliott Kulakowski

Steven Labrum
Jon Luu
Marcus Malmberg
Chad Mann
Scott Marland
Kamran Najmabadi
Jeff O’Bryan
Gary Olsen
Thomas Orsini
Dinesh Patel
Steve Peterson

Joshua Phillips
Andrew Raguskus
Ken Reali
Fred Dwddiqui
Govind Subramanian
Spencer Thomas
Dean Wallace
Will West
Ashley Wittorf
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.

JOHN LANGELL
Executive Director, Center for Medical Innovation, Faculty Sponsor of Bench-to-Bedside
john.langell@hsc.utah.edu, (801) 587-3221

VICKY DAVISON
Senior Director, Health Sciences Development
victoria.davison@hsc.utah.edu, (801) 585-0591

Visit our B2B website:
Uofuhealth.utah.edu/center-for-medical-innovation/bench-2-bedside

Center for Medical Innovation
University of Utah Health
10 North 1900 East, Eccles RM 24
Salt Lake City, Utah 84132
(801) 587-7281

Credits:
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.