“We believe investing today in the leaders, innovators and entrepreneurs of tomorrow is a roadmap to ensuring Utah’s future success.”
Dear Colleagues,

Our students are changing the world.

In what is quickly becoming one of our most popular and impactful student programs, the Bench-to-Bedside (B2B) competition challenges students to the hands-on act of inventing, designing and prototyping medical devices and apps. In this, B2B’s fourth year, the results would have made Thomas Edison proud.

With a toolbox of six months, five hundred dollars, a passion for innovation, and the mentorship of dedicated faculty, students from multi-disciplinary backgrounds collaborated to transform science and medicine. For the 2014 competition, B2B awarded a total of $71,500 in prize money to our largest field of competitors—189 students, working on 42 teams, presenting 43 inventions. Teams presented real-world devices from collaborations across 23 unique disciplines including medicine, engineering, informatics, business, law, film & media arts, architecture, mathematics, biology, chemistry, computer science, and more.

This year’s student innovations reached far beyond just improving patient care in hospitals via medical devices. We saw awards go to devices, software and apps that improve global health care delivery, wellness at home, and patient education and engagement. The 2014 competition also featured a new “Media Award” category, awarded by three VIP judges from CNN, The Salt Lake Tribune and Deseret News, to an invention called HUVI—a renewable energy device used to sterilize surgical instruments in developing countries. By challenging and supporting our students to “think outside the box,” we are continuing to see remarkable solutions.

We are grateful to Zions Bank for its generous and important support of the competition. We believe investing today in the leaders, innovators and entrepreneurs of tomorrow is a roadmap to ensuring Utah’s future success.

Finally, I want to express thanks to Patrick Loftus and Craig Elder, current medical students, for taking over the program this year. Additionally, faculty mentors John Langell, M.D., Ph.D., 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 will transform 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,

Vivian S. Lee, M.D., Ph.D., M.B.A.
Senior Vice President for Health Sciences
CEO, University of Utah Health Care
Dean, University of Utah School of Medicine
Bench-to-Bedside is an exciting and vibrant program that introduces medical, engineering, and business students to the fascinating world of medical device innovation. Over the first four years of the program it has grown immensely in both scope and quality. We have now engaged over 600 students into interdisciplinary teams that have spawned 91 innovative new technologies. Additionally, we have seen 21 of these teams 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 to address the need. This includes evaluating the intellectual property landscape, prototyping designs 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 who serve as consultants, opinion leaders and stakeholders.

B2B culminates in a formal presentation of all team projects at an annual awards competition. The event draws 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 leaders in industry, physicians, business experts, engineers, and media. Teams are awarded over $70,000 in prizes to seed further milestone-based project development.

The B2B competition has quickly become one of the University of Utah’s most popular student programs. This year alone, B2B more than doubled in size, with more than 200 students competing, including nearly half of the entire first- and second-year medical school classes. Another addition to 2013-14 was the Industry Mentor Program. Volunteer experts in business and industry donated their time to mentor teams along the way. We look forward to this support in the future.

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

“The B2B competition has quickly become one of the University of Utah’s most popular student programs. This year alone, B2B more than doubled in size, with more than 200 students competing, including nearly half of the entire first- and second-year medical school classes.”

John Langell, M.D., Ph.D., M.P.H.
Executive Director, University of Utah Center for Medical Innovation

Our dear friends, colleagues, and innovation enthusiasts, 2014 marks a momentous year for the 4th annual University of Utah Bench-to-Bedside (B2B) Medical Device Design Competition. To begin we would like to relate a question posed at the National Collegiate Inventors & Innovators Alliance Annual Conference by the keynote speaker, Saul Griffith, “How do we make the future awesome?” When we started the 2013-2014 B2B year, we had three goals in mind, deemed the three R’s: Recruitment, Retention, & Remote Future.

RECRUITMENT

We asked ourselves: “How do we increase recruitment and expand our invitation to participate?” First, we formed a structured B2B Student Committee, which deserves tremendous credit for all of the progress B2B has made:

**Health Sciences Chairs**
- Lynn Nguyen
- Jonathan Curtis
- Greg Gardner
- Ashley Langell

**Engineering Chairs**
- Ahrash Poursaid
- Niloofar Farhang
- Katie Sciuto

**Committee Coordinator**
- Nate Rhodes

Thanks to our fantastic committee we have expanded recruitment to include exercise and sports science, nursing, pharmacy, biomedical informatics, EAE, fine arts, architecture, mathematics, and many more.

Second, to help increase recruitment, we joined forces with Aaron Lovell, Laurie Robison, and other members of the University of Utah Health Sciences Marketing team. Together we produced the 2013 Competition Report, which helped us increase participation in this year’s competition.

Last of all we had a strict “No Pizza” policy, except for engineering events. We believe this policy brought many of the health sciences students out of their dark and lonely study caves.

RETENTION

During the first three years of B2B, we averaged a dropout rate from start to finish of about 50%. We are happy to report this year’s dropout rate of only 35%. A few factors have played a key role.

First, we established an online system to track team progress via the university’s Instructure CANVAS. Team contact and submission went substantially smoother. Thank you to Jean Shipman and the Eccles Health Sciences Library Innovation Team for making this system possible.
Second, 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.

REMOTE FUTURE

The goal of addressing the remote future spawned from a simple question teams have asked: "What do I do now that the competition is over?"

First, we have established a collaborative milestone-funding program with the Utah Entrepreneur Club. Any team participating in B2B, whether or not they take home a prize, qualifies to receive further milestone funding by pitching to the Entrepreneur Club. The Entrepreneur Club vets the pitched ideas and B2B provides the further funding and resources deemed necessary for team progress.

Second, working with Troy D’Ambrosio and the Lassonde Entrepreneur Institute we have redefined the pre-business judging components of B2B to better allow teams to flow into the Utah Entrepreneur Series. We sincerely hope teams will take advantage of this opportunity. Thank you to Troy D’Ambrosio for his kindness and support this year.

Finally, the Center for Medical Innovation brought on two 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 Tenley Schofield and Mark Arrington for increasing the quality of our provisional patents and focusing teams on long-lasting utility and design patents. To our teams, please continue to use the Law Fellows in the future to develop your ideas. There won’t be a better resource so easily available.

We return now to where we started: How do we make the future awesome?

Our answer is simple:

We awake to the moment of innovation, today.

We take that extra time, that extra moment, to send an email – to reach out. We spend that extra late night hour building our solution. Day by day we develop an internal desire to make positive changes in health care.

To our dear friends, classmates, and participating students we conclude by saying that there is no better time than now and no better place than the University of Utah to make the future awesome. There is no comparable infrastructure of outstanding faculty, resources, and mentors. 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.

And finally, to all those who have made this competition possible, through donations of your time, money, talent and resources, thank you. To our sponsor, Zion’s Bank and Scott Anderson, thank you. To the Center for Medical Innovation and its wonderful employees, Megan McIntyre and Summer McDaniel, thank you. Megan and Summer are the real heartbeat of B2B, and without them there would be no life in it. Thank you to John Langell for his patience and outstanding leadership. Without him, the great leaps B2B made this past year would not have been possible. To Vivian Lee, our engineering team of Kelly Broadhead and Tomasz Petelen, and all of our faculty and mentors, we cannot thank you enough for making this program possible. We hope we can all continue to support each other as we strive to make the future awesome.

Patrick D. Loftus, Bench-to-Bedside Student President  
Craig T. Elder, Bench-to-Bedside Student Vice President
In March 2014, Bench-to-Bedside’s student president, Patrick Loftus, participated in the OPEN conference hosted by VentureWell (formerly NCIIA). VentureWell is a network of higher education partners that seeks to elevate the best ideas of young inventors and innovators. In its own words: “We enable powerful approaches to stimulating science and technology invention, innovation and entrepreneurship on university and college campuses, and move the strongest ideas rapidly forward to commercialization.” (venturewell.org)

At OPEN, Loftus presented a paper authored by himself and other B2B student and faculty leaders. “Creating a Benchmark Medical Technology Entrepreneurship Competition,” reviewed the structure, growth, and development of the University of Utah’s B2B Competition throughout the program’s first three years.

Highlighted in the presentation was the student-driven nature of the B2B program. “Formation of teams participating in Bench-to-Bedside is not assigned by leadership,” said Loftus. “Rather teams are self-selected via student interests and project needs.” Loftus went on to describe all aspects of the B2B program, including the competition timeline, concept generation, and product development. He included a description of Competition Night, B2B’s annual culminating event, and finished with a series of success stories about B2B teams past.

An invitation to present at OPEN is indicative of B2B’s power at turning student ideas into real solutions for perplexing health care problems.

Loftus’s presentation and the article were well-received throughout the entire peer review process.

The paper presented at OPEN can be downloaded by visiting: http://nciia.org/open/wp-content/uploads/2013/10/LANGELL.pdf
2013-14 B2B DEMOGRAPHICS

At the 2014 University of Utah Bench-to-Bedside Competition, 42 unique teams presented 43 medical devices/apps. A total of 189 students from 23 disciplines participated in the competition.

BY THE NUMBERS, B2B SINCE 2010

396 Participants
87 Teams
91 Devices developed
55 Provisional cover letter patents filed
15 Utility patents filed
24 Limited Liability Companies (LLC) formed

57 .... Biomedical Engineering
53 ......................... Medical
15 ................................ Business
14 ..................... Mechanical Engineering
10 ............... Entertainment Arts & Engineering
6 ............ Electrical Engineering
4 ................................ Chemical Engineering
4 ................................ Mathematics
3 ...................................... Biology
3 ......................... Biomedical Informatics
3 ................................... Computer Science
2 ................................ Architecture
2 ................................ Arts Education
2 ................................ Chemistry
2 ................................ Nursing
2 ................................ Pharmacy
1 ................................ English
1 ......................... Exercise & Sports Science
1 ..................... Film & Media Arts
1 ................................ Genetics
1 ................................... Law
1 ......................... Life Sciences
1 ................................. Materials Engineering

Image courtesy of the University of Utah
2013-14 B2B TEAM SUMMARIES

1. +Elegance
2. 3D Surgical Stereo-Microscope
3. 3MEDx
4. 6S Medical LLC/ Troclosure™
5. A.I.R. (Abdominal Insufflation Rescuer)
6. Anasta) (Guard™
7. Anti-infective Intraocular Needle
8. Balloon Lock
9. BlueSeal
10. CapnoGO
11. Cervical Scope
12. CHIMP
13. DYNA-DIALYSIS
14. ExamSnap
15. FeControl
16. Handy Habits
17. Hide-A-Fix
18. HUVI (Hand-powered Ultra Violet Irradiator)
19. hydraMD
20. Insta-Chair
21. InSpeculator
22. I.V. Wrangler
23. Just Relax
24. KidneyGuard
25. Lighted Trocar
26. LuerLite
27. Mechanical Syringe
28. MPIDDs
29. Navitas
30. Oculus Medical Viewer
31. OsteoGenesis™
32. Penephriend
33. PercVac
34. PRO-MD
35. Protect the Elderly from Falls
36. Retinal Permeability Device
37. Rox Rap
38. S3
39. SENSA-ICP sensor
40. StreamDX™
41. Thermotoscope
42. TRECC
43. TriagePro
44. VitaBoard

(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.)
+Elegance

**Problem:** Medications need to be taken at specific times, regardless of a patient’s physical location. For pill-takers, shoving several large medication bottles into a purse or pocket is annoying. Remembering to take the pills can also be difficult if patients are distracted by other activities.

**Solution:** +Elegance is a functional and customizable piece of jewelry for pill storage. The device discretely vibrates to remind the patient to take his or her medication.

**Team Members:**
Meng Gan  
Kyle Thornley  
Dallin Rees  
Niki Davis  
Amanda Truong

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3D Surgical Stereo-Microscope

**Problem:** Surgical microscopes have always been large, expensive, and too fragile for use in developing countries and operating military theaters. Conventional optical microscopes are unsuitable for use in surgical venues other than modern hospital operating environments.

**Solution:** By creating a digital microscope system, we have a device that is suitable for travel and rugged enough for “battlefield conditions.” It is also capable of focalizing two separate microscopes to the same point. This gives the user “stereoscopic” vision, retaining the depth perception necessary for tool and motor coordination.

**Team Members:**
Jayant Agarwal, M.D.  
Daniel C. Wright  
D. Colton Jackson  
Ashley N. Langell
Problem: Developing nations do not have access to affordable laparoscopic equipment, including trocars, cameras, and insufflation devices. 30 million laparoscopic surgeries and diagnostic procedures could be performed annually if affordable equipment were available.

Solution: MEDiflate™ is a light, lean, green, mobile, battery powered insufflator that uses ambient air to inflate the abdominal cavity during laparoscopic surgery. Used in conjunction with other laparoscopic equipment, MEDiflate™ provides affordable insufflation for developing nations and military applications.

Team Members: R. Christopher Bowen, Manikantan Nambi, Thomas Russell

$5,000 - Best Green Medicine Award

Problem: More than nine million intra-abdominal wounds require closure each year. The current standard of care to close these wounds is difficult, time consuming, risky to the surgeon and ineffective—6.3% herniation rate.

Solution: 6S Medical’s Troclosure™ incorporates a suture deployment mechanism that is integrated into the trocar. The device facilitates safe and accurate suture placement for effective closure of intra-abdominal wounds resulting from laparoscopic surgery.

Team Members: Pablo Johnson, Spencer Madsen, Mike Fogarty
A.I.R. (Air Insufflation Rescuer)

Problem: Non-compressible abdominal bleeding is the number one cause of death in potentially survivable combat injuries. Unlike external injuries, internal hemorrhaging cannot be staunched by applying a tourniquet or external pressure. As a result, combat personnel with penetrating abdominal trauma often die of blood loss before they can receive surgical treatment.

Solution: The A.I.R. is a compact, mobile device that safely seals and inflates the abdomen with compressed CO2. This causes an evenly distributed increase in intra-abdominal pressure, thereby compressing otherwise non-compressible hemorrhaging vessels.

Team Members:
Zach Eyre
Robert Price
Tim Price
Scott Curtis
Lynn Nguyen

Anasta) (Guard™)

Problem: Surgically placed bowel connections called anastomoses can leak following gastrointestinal surgeries. This can result in death or other complications, amounting to $1.3 billion in post-surgical health care costs each year.

Solution: Anasta) (Guard™ is a degradable, hydrogel-coated stent that helps prevent anastomotic leaks by sealing off and protecting the anastomotic site. The stent is intended for use in all colorectal resection surgeries as a preventive measure.

Team Members:
Nate Knighton
Bharath Velagapudi
Alice Chung
Joan Castillo
Anti-infective Intraocular Needle

**Problem:** Each year, millions of intraocular injections using standard hypodermic needles are used to treat diseases like endophthalmitis, age-related macular degeneration, and diabetic retinopathy. Unfortunately, post-operative infections are possible. These can cause severe pain and lead to long-term loss of vision acuity.

**Solution:** A biodegradable polymer dip-coated on the tip of the Anti-infective Intraocular Needle prevents bacterial introduction. After the needle passes through the conjunctiva and scleral membrane of the eye, the cover is removed for drug injection.

**Team Members:**
Nick Mostafavi-Rejali  
Harjit Kaur  
Jeremy Hammer  
Annicka Carter

$15,000 - Grand Prize

Balloon Lock

**Problem:** Postpartum hemorrhage (PPH) occurs in up to 15% of deliveries and is the leading cause of maternal deaths worldwide, accounting for up to 33.9% in some parts of the world. Expensive equipment to manage PPH is unavailable in many rural communities and developing nations, which often use an improvised, but unreliable, technique involving a catheter and an inflatable membrane.

**Solution:** Balloon Lock creates a pressurized seal to secure and lock the membrane-catheter interface in improvised PPH treatment devices. This eliminates accidental disassembly in utero and allows delivery of therapeutic pressure within the uterus.

**Team Members:**
Erick R. Vega  
Farah E. Vega

$5,000 - Best Global Health Award
BlueSeal

**Problem:** During rigid bronchoscopy procedures, artificial ventilation is used to maintain blood oxygen saturation levels near 100%. But doing so is difficult because of air leaking from the open space between the bronchus and the bronchoscope instrument.

**Solution:** BlueSeal offers a simple solution. Attaching a balloon cuff directly to the rigid bronchoscope seals the open space between the instrument and the bronchus. This allows physicians to operate on patients with compromised respiratory tracts and maintain consistent ventilation at or near the 100% oxygen saturation level.

**Team Members:**
- Nick Brown
- Derek Chang
- Taran Packer
- Tessa Sommer
- Albert H. Park, M.D.

CapnoGo

**Problem:** Capnographs monitor carbon dioxide output of patients under anesthesia to ensure they are receiving the correct amount of anesthetic drug for the procedure. Current capnograph technology is expensive, not portable, and susceptible to power grid failure. These drawbacks are problematic for low resource settings, especially developing countries.

**Solution:** CapnoGo is an affordable and portable capnograph that can be used to check for proper intubation and monitor patient breathing throughout a surgical procedure without relying on an electrical grid. The device consists of two hand-sized units and runs on rechargeable batteries.

**Team Members:**
- Kit Osborn
- Michael Hansen
- Alexys Allen
- Bridger Allred
Cervical Scope

**Problem:** Routine pap smears and pelvic exams with a conventional speculum are uncomfortable for many patients.

**Solution:** Cervical Scope has a smaller diameter than a traditional speculum and has no moving parts, which makes it more comfortable for patients. It allows for clear, accurate examination of the cervix and vagina, while also permitting collection of tissue samples using a pap smear brush. The device is sanitary, easy to use, and inexpensive.

**Team Members:**
Corey Barger
Abhijit Mondal
Anthony Castro
Spencer Black
Sijia Wu
Olesya Ilkun

CHIMP

**Problem:** Patients often bring cultural, religious, and ideological mindsets with them as they interact with medical personnel in a health care setting. Health providers expectations of acceptable conduct and good social etiquette may challenge or conflict with those held by patients.

**Solution:** CHIMP (Cultural Health Intelligence for Medical Personnel) is a mobile app for medical personnel. The app integrates technology, cultural barriers research, and diversity in health studies to brief providers on patients’ potential cultural treatment practices, health beliefs, and family structure immediately before patient interaction.

**Team Members:**
Jon Wheelwright
Minna Wang
Christy VanAtta
Joey Vokas
Curtis Wheelwright
Bryce Wilson

$1,000 - Sex & Gender Award
**ExamSnap**

**Problem:** Fundoscopic eye exams are underutilized because conventional ophthalmoscope devices are bulky, difficult to use, and offer no avenue for telemedicine.

**Solution:** ExamSnap provides a novel, compact solution to the challenges of fundoscopic exams. ExamSnap incorporates a compact smartphone ophthalmoscope attachment and software to facilitate immediate visualization of the optic nerve and central retina. The images can be viewed simultaneously by multiple people and can be securely sent to off-site specialists for consult.

**Team Members:**
Mathew Wells
Quinn Tate
Amanda Fujiki
Kirsten Johnson

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**Dyna-Dialysis**

**Problem:** Dialysis is an effective treatment for end-stage renal disease, but it is available to only approximately half of the patients who need it. Disparity in technology and electrical functionality are challenges for people needing dialysis in developing countries.

**Solution:** Because it does not require electricity, DYNA-DIALYSIS passive-flow dialysis device will greatly increase the number of patients who can receive dialysis treatment. The minimalist device requires very little training for use and maintenance.

**Team Members:**
Cutter Bach
Bridger Bach
Jordan Renner
Megan Welsh
Benjamin Harris
Timmins

$10,000 - Runner-Up Award
FeControl

**Problem:** Nearly 18 million US adults have fecal incontinence, a condition defined as involuntary passage of fecal material through the anal canal. Soiled underwear, clothing, furnishings or bedding are often features of the condition. People with fecal incontinence often try to hide the problem and can struggle to live normal lives.

**Solution:** FeControl offers a safe, non-invasive treatment that offers temporary control of anal sphincter leakage. The device uses a plug design with an outer support frame with an inner tube that allows for gas exchange and is covered with a mesh grid. The goal for FeControl is for patients to live normally and feel secure leaving their homes.

**Team Members:**
Viktor Jiracek
Jonathan Burns
Jonathan Harrison

Handy Habits

**Problem:** Hospital-associated infection remains among the top health care safety issues. Globally, an estimated 1.5 million people suffer from them at any given time. An estimated 99,000 Americans die each year as a result of such infections.

**Solution:** Handy Habits monitors hand sanitization compliance and notifies those who fail to participate. This includes health care providers, but also support staff, visitors, and patients, thereby facilitating a climate to stimulate good hand hygiene habits.

**Team Members:**
Leslie McNaughtan
Amanda Devlin
Marjorie Allard
Vincent Christensen
Matthew McNaughtan
Hide-A-Fix

**Problem:** Upper extremity external fixators used to stabilize limbs after surgery are highly exposed. Patients with these fixators often suffer social anxiety due to the devices' appearance. They may also experience discomfort due to temperature differences between themselves and the device or may inadvertently injure themselves or others with the external fixator.

**Solution:** Hide-A-Fix alleviates the anxiety caused by external fixators by providing an aesthetically pleasing and protective cover. The cover is customizable and includes protective thermo-kinetic insulating core that adapts to the wide variety of external fixator configurations.

Team Members:
- Sean McCandless
- Niloofar Farhang
- Kris Loken
- Kendra Keenan
- Martin Jensen

HUVI (Hand-powered Ultra Violet Irradiator)

**Problem:** Due to lack of funds and reliable electrical infrastructure, hospitals in developing countries cannot run conventional sterilization equipment. Instead they are forced to use ineffective disinfection techniques. As a result, they experience surgical site infections and mortality rates 10 times higher than developed countries.

**Solution:** The Hand-powered UltraViolet Irradiator (HUVI) is an inexpensive portable sterilization device. Using manual power, health care providers in developing countries can cheaply and effectively sterilize surgical instruments and help prevent surgical site infections.

Team Members:
- Zachary Warren Eyre
- Robert Price
- Scott Curtis
- Lynn Nguyen

$500 - Media Award
**Problem:** The American health care system suffers from a lack of price transparency. For elective procedures, such as LASIK, patients often “shop around,” but providers do not usually disclose prices online, requiring patients to call each office to compare costs.

**Solution:** hydraMD’s solution is a cost-comparison website for elective procedures. Beginning with LASIK, hydraMD applies the online marketplace model, displaying all provider options and prices—including breakdowns of what the prices include. This solution is designed to help patients save time and money on elective procedures.

**Team Members:**
Kit Osborn
Duncan Humphries
Josh Jackson

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**Insta-Chair**

**Problem:** Health care providers in developing countries are faced with unique hardships. One concern many of them face is the lack of a reliable platform on which to complete patient examinations and procedures.

**Solution:** Insta-Chair aims to eliminate this issue by providing a portable, fully-adjustable examination table. The 50-pound Med-Throne can be used anywhere, from permanent clinics to remote villages accessible only by foot. It creates a customizable workspace that will improve mobile health care in developing areas.

**Team Members:**
Alex Gerber
Kapil Sharma
Eric Johnson
InSpeculator

Problem: Pelvic exams are recommended annually for all women when they reach the age of 21 to test for health risks such as cervical cancer. However, the rate of obesity has increased in recent years, which in turn has made some pelvic exams difficult for physicians.

Solution: InSpeculator is designed to prevent sidewall collapse in obese patients during pelvic exams. This single-use device can be rolled directly onto the speculum and provides three key features: affordability, convenience, and performance.

Team Members:
Taryn Young
Michael Chen
Wynchester Whetten
Sarah Greenman

I.V. Wrangler

Problem: Disorganized peripheral IV lines pose a tripping hazard in health care settings. Because of that hazard, they also present a risk for accidental IV removal. Both of those offer significant safety and cost implications for both patients and providers.

Solution: IV Wrangler is a device that secures a portion of the IV lines. When under tension, the devices frees up more line to prevent the IV catheter from being pulled out of a patient’s IV insertion site. IV Wrangler will improve safety by reducing infection rates from unsecured IV lines.

Team Members:
Zachary Lee
Tiffany Han
Lauryn Roth
David Smyth
Haley Carlson
Brian Coburn
Ethan Davis
**Just Relax**

**Problem:** Individual psychotherapy is the gold standard for relaxation and communication skills training, but it is expensive. Current computer software games for such training is neither individualized nor sufficiently interactive.

**Solution:** “Just Relax” is an individualized, interactive and low-cost video game designed to improve users’ relaxation and communication skills. Users are monitored with a biofeedback device as they learn to and practice relaxation and communication skills based on their own experience.

**Team Members:**
Rong Xiao  
Jianlin Shi  
Viktor Jiracek

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**KidneyGuard**

**Problem:** The current process for decreasing warm ischemia time during renal transplantation surgery requires unnecessary supplies and labor, fails to regulate an ideal temperature for organ preservation, and poses a potential infection risk by exposing the tissue to foreign fluids and materials.

**Solution:** KidneyGuard is a cooling jacket device that minimizes warm ischemia time by providing a pre-packaged method for handling the kidney. KidneyGuard allows for ideal preservation of renal tissue, eliminates exposure to foreign fluids and unnecessary materials, allows for easy access to the ureter and vessels during the surgical procedure, and improves overall intra-operative efficiency.

**Team Members:**
Rami Shorti  
Pete Browning  
Adam Sperry  
Kelsie Anderson  
Diane Walsh
### Lighted Trocar

**Problem:** During laparoscopic surgery, the single light source used by surgeons provides incomplete lighting. Glare and discoloration are other problematic factors resulting from insufficient lighting.

**Solution:** The Vulcan lighted trocar is designed to eliminate poor surgical lighting issues. By providing a secondary light source, it illuminates the entire surgical site and is non-disruptive to surgeons. The Vulcan will promote more efficient procedures, lower rates of infection, and faster patient recovery.

**Team Members:**
- Viktor Jiracek
- Matt Parkins
- Alberto Fuentes
- Johnny Le
- Ahrash Poursaid

### LuerLite

**Problem:** Each year 25,000 deaths each year are attributed to central line acquired bloodstream infections. Aside from the tragic loss of life, these infections create between $11 and $14 billion in non-recoverable costs annually for hospitals and clinics.

**Solution:** Luerlite uses proven UV technology in a novel way. The device disinfects the external access port of central line catheters and intravenous needless access sites, identified as the source for most central line acquired bloodstream infections.

**Team Members:**
- Sam Braden
- Eric Peterson
Mechanical Syringe

**Problem:** Current syringes are ergonomically inefficient and inaccurate. The use of a syringe requires pencil-like handling, but there is currently no way to dispense a syringe’s contents while holding it in this manner.

**Solution:** The Mechanical Syringe enhances the design of standard syringes, enabling one-handed operation while holding the syringe like a pencil. The Mechanical Syringe eliminates the awkward changing hand position to depress the syringe’s plunger. This design improves precision and is easier to use than a standard syringe.

**Team Members:**
Nate Lambert
Steve Kesler
Eric Oborn

MPIIDDS

**Problem:** Rates of adverse medical events are high. Many of these are caused by improper intravenous administration of medication in both clinical and home settings. Such events, combined with misreporting, can expose hospitals to litigation and prolong patient recovery.

**Solution:** The Multi Port Intravenous Drug Delivery System (MPIDDS) device by DripDynamics allows administrations of multiple drugs on a peripheral cannula line. Dosages are set, administered and recorded at the time of initial administration, providing better patient safety and record keeping.

**Team Members:**
Josh Conarton
Joshua Keeler
McKay Parr
Navitas

**Problem:** Sixty-three percent of overweight or obese children will become obese adults. Medical costs for treating obesity surpass $150 billion a year, and childhood obesity is a serious health concern among parents, topping drug abuse and smoking.

**Solution:** Navitas ties together hardware, a mobile app, and alternate reality video game software on a platform designed to get kids moving and eating well. Kids who play the game are rewarded in the virtual reality for the good health choices they make in their real lives.

**Team Members:**
- Jake Burch
- Bradley DeHerrera
- Peijun Zhou
- Jennifer Francis
- Hailin Liao
- Kehan Chen
- Binoy Mohanty
- Nick Edwards
- Gloria Hayley
- Kummer
- Erick Vega
- Meng Jia

$5,000 - EAE Award

Oculus Medical Viewer

**Problem:** Existing medical virtual reality hardware is too expensive relative to the benefits of virtual medicine. This has limited its adoption among health care providers.

**Solution:** Our solution adapts the Oculus Rift 3D Virtual Reality display to existing 3D medical applications. Using existing high-performance, low cost hardware with such applications retains the benefits of medical virtual reality at a fraction of the usual cost.

**Team Members:**
- Kenneth Melrose
- David Record
- Quinton Williams
- Daniel Anderson
- Phillip Shaw
**OsteoGenesis™**

**Problem:** Millions of patients every year are admitted for neurosurgical treatment or with traumatic craniofacial damage requiring complex surgical reconstruction. Patient-specific craniofacial repair allowing for regrowth of natural bone without the need for multiple revision surgeries is non-existent.

**Solution:** OsteoGenesis™ is a degradable support structure that harnesses natural bone healing processes and allows for a cosmetically perfect repair in a single procedure. Our novel design utilizes patients CT-scans to reconstruct damaged bones with computer modeling and then 3D print degradable containment plates that serve as exoskeleton support structure while transplanted bone ossifies into healthy natural bone.

**Team Members:**
Vishal Bhola
Matthew Ackerman
Michael Polei
Nathaniel Rhodes

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**Penephriend**

**Problem:** Anaphylaxis affects one person every three minutes in America. Epinephrine auto-injectors are used to treat this is severe and potentially life-threatening allergic reaction. Unfortunately, many sufferers do regularly carry an auto-injector, largely because they are long, bulky, and outdated.

**Solution:** The Penephriend is a keychain-sized epinephrine auto-injector. Penephriend’s small, convenient shape and size lets users carry needed medication without a bulky device. With battery-powered injection delivery, it’s easy to use and accommodates for gender and different body types.

**Team Members:**
Natan Chetrit
Tony Church
Kadan Atkin
Katy Yu
PercVac

Problem: Modern prosthetics restore some functionality to millions of people with limb loss. Percutaneous osseointegrated prosthetics (POP) are implanted directly into the bone, protruding through the skin where the prosthetic attaches. POP’s utilize the body’s skeleton for support but often fail due to poor skin integration and subsequent infection in the residual limb.

Solution: PercVac incorporates negative pressure wound therapy into POP design to increase tissue integration and reduce infections while allowing for more secure attachment of prosthetic limbs. This novel device greatly increases users’ quality of life by allowing more effective use of POP.

Team Members:
- Michael Bobbe
- Mark Christiansen
- David Page
- Sean Ermer

PRO-MD

Problem: The current hospital discharge process is outdated, ineffective, and difficult for patients to navigate. Preventable readmissions account for $11 billion in wasted spending annually in the United States.

Solution: MobiMD is a smart phone app that syncs with a streamlined clinical platform. The app provides care managers with the ability to quickly and painlessly identify at-risk patients and intervene before they are readmitted to the hospital. MobiMD also empowers patients through customized notifications, educational videos, and clinical alerts.

Team Members:
- James Barrett
- Matt Lamont
- Quinn Tate
- Jonathan Curtis
- Greg Phillips
- Jake Brandenburg

$5,000 - Consumer’s Choice Award
**Retinal Permeability Device**

**Problem:** Patients with diabetes are at a high risk for developing diabetic retinopathy (DR). DR is the most common cause of legal blindness, but access to care is often limited due to expense, and there is no definitive screening tool for catching DR early.

**Solution:** The Retinal Permeability Device (RetPerm) is a preventive eye care device for preventing blindness globally. Affordable and non-invasive, RetPerm is a screening tool that anyone can administer to detect vascular leak, a common DR symptom. Early detection can lead to better, more affordable DR treatment.

**Team Members:**
- Dallas Shi
- Nanikantan Nambi
- Elyssa Pickle
- Ashlie Bernhisel
- Michael Bobbe

$5,000 - Best Business Award
Rox Rap

Problem: No flexible, cheap, and painless method exists for surgeons, radiologists, and technicians to mark patient skin with radiopaque material during diagnostic, therapeutic, and surgical procedures.

Solution: The Radiopaque X-ray Attenuating Pen (RoxRap) is a semi-solid ink dispensing device to make radiopaque markings on patient skin. The marks are visible, painless, and safe. The solid ink glides gently over the skin, dispensing a thin marking visible both to the eye and under radiation.

Team Members:
Kevin O’Neill
Ting Ruan
Andrea Davis
Joseph Passmun

$10,000 - Runner-Up Award

S3

Problem: Glaucoma is a leading cause of blindness in the United States and is associated with elevated intraocular pressure. Most treatments for primary open angle glaucoma are short-term or simply inadequate.

Solution: Schlemm’s Stent Sieve (S3) is a new drainage device that is implanted into the Canal of Schlemm, which is often collapsed or blocked in glaucoma. S3 regulates fluid outflow in the eye to relieve intraocular pressure and represents a cost effective, long-term solution for glaucoma.

Team Members:
Isha Gupta
Judd Cahoon
Chris Lambert
Erik Sibbernsen
Richard Didier
**Problem:** In patients with shunt-dependent hydrocephalus, the means of diagnosing the common shunt malfunctions is difficult and highly inaccurate. Risks include radiation exposure, higher infection rates, and increased patient morbidity and mortality.

**Solution:** The Sensa Shunt System (S3NSA) is a smart shunt device that is 100% specific and sensitive for diagnosing shunt malfunction in patients with shunt-dependent hydrocephalus. S3NSA is fast, easy, inexpensive, and MRI compatible. Health care providers can make assessments without consulting a specialist.

**Team Members:**
Hana Kazbour
David Phan
Alex Hoang
Teresa Ta
Mary Ta
Heather Narisco

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**Problem:** Half of men in their 60’s experience lower urinary tract symptoms (LUTS), including urinary hesitance, post-void dribbling, and urgency. Urologists diagnose LUTS with uroflowmetry graphs, but standard urine flow results are difficult to read. This often results in multiple clinic visits, expensive testing, and preventable visits to the ER.

**Solution:** StreamDX™ is an at-home diagnostic tool that captures and transfers urine flow data to clinicians, enabling urologists to make faster, more informed treatment decisions. This saves time, reduces costs and prevents trips to the ER.

**Team Members:**
Chris Bowen
Matt Converse
Tab Robbins
Alvin Le
Thermotoscope

**Problem:** Ear examinations performed with traditional otoscopes can be uncomfortable for patients, especially children. In addition, traditional otoscopes do not allow unobstructed viewing of the ear canal while extracting debris.

**Solution:** The Thermotoscope enhances the ear examination experience. The device simultaneously measures body temperature and provides an adjustable digital screen for continuous viewing during examination or extraction of debris. An unobstructed path through the specula allows practitioners to insert and use tools in the ear canal while maintaining visibility.

**Team Members:**
- James Campbell
- Thomas Goates
- Trey Gunnell
- Justin Coles
- Nicholas Hagen
- Thomas Houser
- Nicholas Brown

$5,000 - Best Engineering Award

TRECC

**Problem:** Persons with cleft lips who do not receive early surgical intervention can struggle with developmental and psychosocial disabilities. Many children in the developing world cannot access cleft deformity correction due to expense and a lack of care providers.

**Solution:** TRECC presents a nasoalveolar remodeling device that can be administered with limited medical training, requires minimal follow-up care, is easily maintained, and improves outcomes in children who receive surgical intervention at an older age.

**Team Members:**
- Casey Whale
- Erick Christensen
- Ryan Caldwell
- Tyson Gray
- Cameron Love
**TriagePro**

**Problem:** Emergency department (ED) visits are costly and potentially avoidable. Only about one third of all ED visits are deemed necessary, and half could be treated by a primary care clinician.

**Solution:** TriagePro is a web application that can be deployed on any mobile device or computer to mitigate improper ED use and appropriately target better utilization during flu, cold and allergy seasons. Using specific data channels, the app helps nurses triage patients over a secure HIPAA-compliant telemedicine connection and, if necessary, pre-register them to see a physician once they arrive at the ED.

**Team Members:**
Elizabeth Nelson  
Bob Angell  
Brandon Welch  
Garred Lentz  
Justin Clutter

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**VitaBoard**

**Problem:** Tasks that require high back compressive force are correlated with increased back injury rates. Because lifting patients on backboards falls into this category, first responders often incur repetitive stress injuries.

**Solution:** VitaBoard is a two-stage lift system designed to reduce strain while lifting the backboard by putting the medical professionals in a more ergonomically correct posture. By breaking the lift into two less stressful lifts, VitaBoard reduces back compressive force by up to 50%, which will reduce injuries and improve job safety for EMS professionals.

**Team Members:**
MaryEllen Hunt  
Logan Remillard  
Nathan Godfrey
Competition Night

April 9, 2014

Held at the Utah State Capitol Rotunda, the 2013-2014 Bench-to-Bedside Competition Night was attended by a host of university, community and business leaders and innovation stakeholders.
A B2B SUCCESS STORY

In its short, four-year history, Bench-to-Bedside has spawned a number of great concepts that have gone on to further development. The following is an example of how B2B is succeeding.

**Veritas Medical – The LIGHT LINE Catheter™**

Nate Rhodes and Ahrash Poursaid, are part of the team at Veritas Medical behind the LIGHT LINE, an innovative catheter designed to reduce hospital-acquired infections. They have made great strides since they competed in the 2011-2012 Bench-2-Bedside competition. The idea behind the LIGHT LINE Catheter began after a discussion of one of the largest problems in health care; hospital-acquired catheter infections. The team initiated discussions with clinicians and patients who used these catheters to better understand their experiences and general methods of infection occurrence. After months of research, they came up with the idea of using high intensity visible light therapy. Previous studies using similar treatment proved to be 99% effective at killing bacteria, but the treatment had never been used in a catheter residing inside a patient.

In April 2012, the LIGHT LINE team’s concept won B2B’s Best Engineering Award, Best Visual Aids/Poster Award and Startup Center for Students Award, earning a total of $9,000 in the competition. In March of 2013, the team submitted a utility patent for their device. Since then they have filed numerous additional provisional and utility patents related to their technology.

Since that time they have competed and won awards in several competitions including the Utah Entrepreneurial Challenge, the Baylor New Venture Competition, The Collegiate Inventors Competition, and most recently winning the grand prize at the International Business Model Competition and $75,000. They have been featured in dozens of national and international publications and are currently working with investors to fund their seed round through the FDA clearance.

The team credits the University of Utah for their successful start. “Through the gracious help of many departments and laboratories at the U of U, we have been able to narrow down to a few versions of our next generation prototype,” says Rhodes. As inventors, the team says they hope the LIGHT LINE is just one of many devices they will patent. The team is already moving forward with new ideas even as they work on manufacturing the next generation prototype of LIGHT LINE. Their goal is to have the LIGHT LINE as a key medical instrument in hospitals across the United States by 2016.

For more information visit them at www.LightLineCatheter.com

*Other team members include James Allen, Mitch Barneck, Martín de la Presa, and John Langell, M.D., Ph.D. (not pictured).
THANK YOU!

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