B2B
Bench to Bedside

Competition Report 2013

UNIVERSITY OF UTAH
HEALTH SCIENCES

Center for Medical Innovation
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“Through the B2B program, our students have tapped into something at the University of Utah we remain committed to fostering: thinking outside the box, working together, and coming up with brilliant solutions.”
Dear Colleagues,

For the third year, the University of Utah’s student-initiated Bench-2-Bedside Competition has brought together bright, enthusiastic and talented students, with the mentorship of dedicated faculty and staff, to learn about innovation through the very act of inventing, designing, and prototyping. Originally founded by students from three colleges—medicine, engineering (biomedical), and business—this year’s competition expanded to include students from biomedical informatics, electrical and mechanical engineering, fine arts (Entertainment Arts and Engineering), and the basic sciences of both chemistry and physics.

In the past three years, the competition has engaged 205 students who have worked together on 45 teams to create 48 new innovative medical devices.

While the majority of ideas focused on medical device development, this year saw the launch of several new video games and software programs designed specifically for health care. Bringing in the University’s exceptional Entertainment Arts and Engineering (EAE)—ranked No. 1 for undergraduate and No. 2 for graduate programs in the nation—adds a new dimension of ingenuity and impact for our health innovations. Through the B2B program, our students have tapped into something at the University of Utah we remain committed to fostering: thinking outside the box, working together, and coming up with brilliant solutions.

We are grateful to Zions Bank for their 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 Matthew W. Sorensen and Bob Chestnut for their student leadership of this program over the past two years and to Patrick Loftus and Craig Elder for taking over the program this year. Additionally, faculty mentor John Langell, M.D., Ph.D., assistant professor of surgery and director, Center for Medical Innovation, has 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
The Bench-2-Bedside competition is an exciting and vibrant program that introduces medical students, engineering students and business students to the fascinating world of medical device innovation. B2B originally began in 2010 as the vision of Noah Minskoff, an entrepreneur and former student at the University of Utah School of Medicine. Noah recognized the lack of formal medical school training in the fields of innovation and entrepreneurship. He believed that exposure to these areas is critical in preparing students to advance the future of health care.

Through his passion for medical device innovation, Noah developed the concept for B2B. He brought together a dynamic team of experienced faculty innovators and student representatives from across the disciplines of engineering, business and medicine to develop a basic blueprint for the competition. The concept rapidly gained momentum and support from both University and community leaders. Local organizations, including Zion’s Bank and USTAR, saw the importance of a multidisciplinary medical device competition and provided financial support.

During the seven-month B2B program, student teams form multidisciplinary “startup” companies tasked with identifying an unmet clinical need and designing a device to address the need. This includes evaluating the intellectual property landscape, prototyping designs and constructing a basic business plan. Each team is allotted up to $500 to develop their medical device concept. In addition, teams are given access to over 100 University physicians from a broad area of specialties to serve as consultants, 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 and the highest echelons of University leadership. Projects are evaluated and scored for business strategy, design quality and health care impact by a VIP panel of judges. Top teams are awarded over $70,000 in prizes intended to provide initial funding to support further milestone-based project development.

“The creativity and ‘out of the box’ thinking shown by these teams resulted in several unique design concepts, some of which are currently heading toward commercialization.”

John Langell, M.D., Ph.D., M.P.H.
Executive Director, University of Utah Center for Medical Innovation
B2B EVOLUTION: A STUDENT PERSPECTIVE

Bench-2-Bedside started out as a good idea with a small following. At first we worried about recruiting enough participants to justify calling it a competition, but when we approached students with this unique opportunity, the response was overwhelming.

Students felt a sense of urgency to participate in a program that would allow them to directly take part in something the University of Utah does best: technology commercialization. B2B quickly approached a bottleneck where there was not enough funding to supply the number of teams we were recruiting, but wise mentors advised us to push forward, promising that it would work out in the end.

Thanks to the generous contributions of Zion’s Bank and others, the funding has been there to match the enthusiasm of the students and make B2B what it is today.

In just three years, B2B included over 40 teams, each with their own solutions to real medical problems, and over $200,000 awarded to winning teams to help further their ideas. The scope of innovation has expanded to include surgical devices, global health solutions and software innovation. The competition has also become more inclusive, with students signing on from a growing number of disciplines.

We believe that the best way to learn is by doing, and that equates to success when students are given the opportunity to overachieve expectations. One of the most interesting things about B2B is that each team creates its own experience. Every team has new challenges and new outlooks regarding their solutions. In this way B2B has proven to be an educational experience second to none.

As our term of B2B leadership comes to an end, we look forward to the future with highest confidence in the next generation of B2B student leadership.

Matt Sorensen & Bob Chestnut, former B2B President and Vice President (respectively) and current fourth-year students at the University of Utah School of Medicine.

B2B: ENTREPRENEURIAL FOCUS

The University of Utah’s entrepreneurial cultural is truly unique. The depth, breath and number of programs available to students, as well as the approach to student entrepreneurship, is unparalleled. Bench-2-Bedside is one great example of the kinds of programs the University seeks to offer students:

1. B2B’s multidisciplinary approach combines students from health sciences, engineering, business, and other disciplines.
2. B2B provides financial resources to teams to help them execute their ideas.
4. B2B is integrated into other student programs, such as the Utah Entrepreneur Series business plan competitions, where students from across the state vie for funds to launch their businesses.
5. Finally, B2B is supported by the many professionals that serve as event judges, as well as great community sponsors such as Zion’s Bank.

So, continuing in the University of Utah’s great tradition of entrepreneurial focus, we look forward to the continuation of B2B and anxiously await the industry-changing concepts that emerge from it.

Troy D’Ambrosio, Executive Director, Pierre Lassonde Entrepreneur Center and Lassonde New Venture Development Center
B2B brings students together for a cross-college collaboration effort involving many academic and professional disciplines. This diversity is one of the keys to the program’s success.

Chemistry ....................... 1%
Physics ............................. 1%
Electrical Engineering ....... 1%
Biomedical Informatics ...... 6%
Entertainment Arts & Engineering .......... 6%
Mechanical Engineering .... 7%
Business ......................... 10%
Biomedical Engineering ...... 33%
Medicine .......................... 35%
In April 2013, Bench-2-Bedside participated in From Your Garage to the Assembly Line, an annual inventors conference orchestrated by Mike Enzi, a US senator from Wyoming. The event, held at Sheridan College, in Sheridan, Wyo., brought together experts in law, business, politics, and manufacturing to aid entrepreneurs in taking their ideas from concept to marketplace.

At the event, the University of Utah Health Sciences Center for Medical Innovation and the B2B program were recognized as leaders in the field for developing new technologies and building young entrepreneurs dedicated to bettering patient lives.

In a capstone presentation, B2B’s Patrick Loftus and Craig Elder discussed the formation of the competition, its rapid success in just a few short years, the University of Utah’s participation, and the support of the local community in making B2B a continuing success. Loftus and Elder also illustrated how the innovative minds of students combined with the resources of the University of Utah has created, in the past three years, as many as 48 medical devices being developed for the marketplace.

B2B leadership will continue its collaboration with Senator Enzi and his team in hopes of building continued relationships between the state of Wyoming and the University of Utah’s Center for Medical Innovation.
Every invention from wheels to light bulbs to medical prostheses begins as nothing more than a simple idea. Innovators and inventors understand that they must always think of ways to improve on past solutions and create new solutions for emerging problems.

But like most of the innovators before them, students in the Bench-2-Bedside competition need help turning their ideas into reality. That’s where the Engineering Feasibility Team of advisors comes in. Their goal is to have each aspect of the invention process well-represented in order to maximize the success of each team’s project.

Three biomedical engineering professors—Kelly Broadhead, Robert Hitchcock and Tomasz Petelenz—met with each of this year’s teams during the projects’ beginning phases to help students understand the feasibility of their designs and to ensure that each project has the appropriate level of engineering.

“Our role was to help them come up with ideas,” says Broadhead. “We help them figure out what purpose and what role they want the device to fill and the reality of how they can create it.”

For his role in B2B, Broadhead says he signed on to be a mentor at the beginning of the program three years ago because he was excited by the creativity of the ideas. He also served as a judge during the most recent B2B Competition Night in April. The winning teams were judged on whether they achieved what they said they would, if they came up with unique prototypes, if they gave a successful demonstration of the technology and how it works, and if the inventions were tools that would be viable in the real world.

“Sometimes you get these students who are just barely getting into their engineering studies, and they have some really creative ideas,” Broadhead said. “But I think the best part about the whole thing is the fact that they are getting involved. They are doing something new, getting feedback, figuring out how the whole thing works. It’s a process that will shape the rest of their education, and really change their lives.”
For the first time since Bench-2-Beside was created, members of all three libraries at the University of Utah joined forces to help students find the information and resources needed to get their projects off the ground.

The Library Innovation Team consisted of 16 people:

**SPENCER S. ECCLES HEALTH SCIENCES LIBRARY**
- Abby Adamczyk
- Amy Honisett
- Peter Jones

**S. J. QUINNEY LAW LIBRARY**
- Jeanne Le Ber
- Jean Shipman

**J. WILLARD MARRIOTT LIBRARY**
- Ross McPhail
- Abby Adamczyk
- Amy Honisett
- Peter Jones

But one of the most significant resources of the Library Innovation Team is associate librarian and US patent office expert David Morrison, who helps B2B teams navigate the vast network of patent information.

“Most students probably never thought of the patent database as an information resource, but what it really does is house the history of all inventions,” he said. “Students learn that each is one in a line of patents which discloses how this technology can be done and how or if it was later improved. By understanding this we are able to teach students creativity in technology.”

Morrison typically meets with each team in the beginning stages of the competition to show them how to search patent types that relate to their project. This is a crucial part of their research because it allows teams to see if their idea is unique enough to become a possible new invention or if the technology already exists.

“One of the most gratifying responses I’ve received since becoming a mentor for B2B was that the winner from last year’s competition said working with me and learning about patent database was the single most valuable part of the project,” Morrison said. “My goal is to have this awareness of the database brought into every technological discipline taught on campus. It merges technology with commercial interest better than any other feature what we’ve created.”
At the close of the 2012-2013 competition, Bench-2-Bedside saw a change in student leadership as Matt Sorensen (B2B President) and Bob Chestnut (B2B Vice-President) passed the torch.

Other student leadership positions held during the 2012-2013 year include: Ahrash Poursaid (Engineering Chair), Nate Rhodes (Engineering Chair), Johnathan Harrison (Health Sciences Chair), Craig Elder (Health Sciences Chair), and Patrick Loftus (Health Sciences Chair/Jr. Vice President).

For the past two years Matt Sorensen, Bob Chestnut and the other student officers have done a tremendous job of improving and growing B2B. We thank them for the leadership and hard work that has made B2B a momentous success.

As B2B moves into the future, the new student leadership has three main areas of focus: recruitment, retention, and expansion.

For the past two years Matt Sorensen, Bob Chestnut and the other student officers have done a tremendous job of improving and growing B2B. We thank them for the leadership and hard work that has made B2B a momentous success.

As B2B moves into the future, the new student leadership has three main areas of focus: recruitment, retention, and expansion. To help us with these goals we have created a fantastic student committee composed of the following students:

- Nate Rhodes – Committee Coordinator
- Ahrash Poursaid – Engineering Chair
- Niloofar Farhang – Engineering Chair
- Katie Sciuto – Graduate Engineering Chair
- Lynn Nguyen – Health Sciences Chair
- Jonathan Curtis – Health Sciences Chair
- Greg Gardner – Health Sciences Chair
- Ashley Langell – Health Sciences Chair
- Michael Bobbe – Business Chair
- Garred Lentz – Business Chair

In addition to the student committee, we look forward to working closely with the S.J. Quinney College of Law. Cheers to another great year!

Patrick Loftus, B2B President
Craig Elder, B2B Vice-President
2012-13 B2B COMPETITION TEAMS

1. Applied Innovative Epidural Systems
2. ArrhythmiTech
3. Attach & Latch
   $5,000 - Best Medical
4. Chest Tube Securement and Closure Devices
5. ClearPort
   $10,000 - Runner-up
6. Doxy.me
   $3,000 - Consumer’s Choice
7. DynoSuction
8. Emery Retractor
9. Endo Bio Device
10. GLO Light
    $10,000 - Runner-up
11. HEAD Bit
    $5,000 - Best Engineering
    $2,000 - Best Innovative Design
12. iTheraplay
13. JVAT
14. Mechanical Leech
    $10,000 - Runner-up
15. MobiSight
16. Phe-Nominal
17. TeddyCare
    $5,000 - Entertainment Arts & Engineering Award
18. Tro Closure
    $15,000 - First Place
    $5,000 - Best Business

B2B has continued to grow and succeed as new students have been introduced to medical device design and entrepreneurship. The numbers are impressive. The most recent competition night, held in April 2013, featured 72 students on 18 teams presenting 20 unique and innovative medical devices. Since 2010, B2B has had a measurable impact.

BY THE NUMBERS, B2B SINCE 2010

205 Participants
45 Teams
48 Devices developed
39 Provisional cover letter patents filed
4 Utility patents filed
8 Limited Liability Companies (LLC) formed
3+ LLCs currently in formation

(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.)
More than 8 million epidural blocks are performed in the United States each year. About 4 percent of these are considered difficult and carry a high risk for complication.

Anesthesiologists use a simple technique, testing for loss-of-resistance (LOR), to identify the epidural space. This technique involves using an air or saline-filled syringe attached to the epidural needle. The anesthesiologist applies pressure to the syringe to check if the medium experiences resistance or not. When there is a loss-of-resistance, the epidural space has been reached and the procedure may continue.

Current technology requires that a stylet, used by anesthesiologists to prevent bone and tissue from filling the epidural needle, be removed to check for loss of resistance each time the needle is advanced further toward the epidural space. During difficult cases, replacement and removal of the epidural stylet to retest wastes time and movement.

We have developed a cost-effective and efficacious method for testing LOR with the stylet remaining in place. The method will decrease procedure length, reduce costs and improve patient outcomes by minimizing patient discomfort. Our fenestrated stylet prevents tissue and bone from entering the epidural needle while still allowing saline or air to flow toward the advancing needle edge to correctly determine when the epidural space has been reached.

This new technology will be useful in decreasing complications while increasing the use of loss-of-resistance technique in training and practice.

Replacement and removal of the epidural stylet to retest wastes time and movement.
For the past 75 years, heart disease has consistently ranked as the No. 1 cause of death in the United States, with an estimated 600,000 lives claimed by the disease in 2011. Cardiac arrhythmia is a specific heart condition characterized by irregular electrical conduction and beating of the heart. Arrhythmia can result in a variety of serious complications, including heart attack, stroke, and death.

Continuous patient-physician interaction is required for cardiac arrhythmia patients to properly manage their condition. But adequate, continual long-term care is difficult due to several possible limitations: high health care costs, infrequent patient-physician interaction, and insufficient long-term patient data.

With the current prevalence of smart-phone technology, the development of an iOS application and web client interface will allow a unique mode of patient-physician communication and acquisition of consistent, long-term patient data. ArrhythmiTech aims to improve patient treatment efficacy by allowing physicians to view trends in drug compliance, symptoms, and side effects. Collection and analysis of this data has the potential to decrease the probability of serious arrhythmia complications.
Breastfeeding has been shown to have both short-term and long-term health benefits for children. Each year in the United States, more than 3 million women choose to breastfeed their newborns. Many of these women have special circumstances that hinder their ability to breastfeed. Some of these include a lack of breastfeeding experience, flat or inverted nipples, pain during breastfeeding, or other social circumstances.

But a newly developed nipple protraction device for breastfeeding mothers seeks to help them feed their babies more effectively. Attach & Latch is a cone-shaped nipple protraction device that is made to attach to a Leur-Lock syringe.

By retracting the plunger of the syringe, a negative pressure chamber is created between the device and the breast, causing the nipple to protrude. Attach & Latch forms a proper seal around the nipple, and the newly protruded nipple allows the infant to latch on with more ease. Using Attach & Latch increases the rate of successful breastfeeding and may boost the likelihood that babies will be breastfed for the appropriate term (one year). Breastfeeding for this term ensures that newborns receive adequate amounts of breast milk to sustain growth and development.

Attach & Latch is designed for both hospital and in-home use to assist in overcoming many of the hurdles associated with breastfeeding. Attach & Latch will facilitate healthier breastfeeding habits and allow babies to experience the benefits of breastfeeding as they grow and develop. And as breastfeeding rates rise, so rises the overall health of the community.
During medical emergencies chest tubes are often placed to remove air and fluid in the space between the lungs and the chest cavity. While chest tube placement is common, securement and closure of these tubes to the side of the body is not done in an efficient manner. The chest tube securement and closure device is a solution to this problem.

The device is placed around the chest tube and wound site to hold the chest tube securely to the body through the duration of its insertion. This device is placed at the time of chest tube insertion and functions for a wide range of chest tube sizes.

The chest tube securement and closure device is an easy-to-use, three-part, single-use device that approximates the wound site and secures the chest tube to the body. Two of the parts join together with a simple locking mechanism around the inserted chest tube and secure the chest tube to the body. The chest tube is secured to the device itself with a clipping mechanism.

Suture tabs allow for the application of sutures to hold the device to the patient, after the final placement of the device. The chest tube securement and closure device is made to secure the chest tube to the patient through the duration of placement, allowing for higher mobility and comfort of the patient.

While chest tube placement is common, securement and closure of these tubes to the side of the body is not done in an efficient manner.
The innovative idea behind ClearPort is that the best way to create a barrier between offending pathogens and patients with a central line is to replicate the body’s own mechanisms for doing so. ClearPort replaces dangling catheter lumens with a single hub accessed through self-healing silicone ports, which mimic key protective characteristics of the skin. Port access is obtained using Luer compatible blunt-tipped non-coring needles.

ClearPort offers three distinct advantages over currently employed venous catheters:

1. A single flat surface is easier to clean than separate round hubs with narrow threading and retractable centers.
2. ClearPort’s consolidated hub eliminates the need for multiple lumens dangling in the pathogen-dense neck and axillary regions and is more easily concealed during long-term placement.
3. Luer-Light dock on the hub enables ultraviolet disinfection of IV infusions.

The best way to create a barrier between offending pathogens and patients with a central line is to replicate the body’s own mechanisms.
Telehealth and remote monitoring solutions are growing in health care as they provide a cost-efficient means of facilitating health care in rural areas or where it may be difficult to visit with a specialist.

Unfortunately, many current telehealth solutions are cumbersome, require significant buy-in, and are linked to their own electronic medical record system. Due to these problems, many physicians have resorted to non-secure teleconferencing solutions like Skype or Facetime. While these solutions offer physicians a simple and free telehealth experience, they are not compliant with HIPAA regulations and may compromise patients’ personal information.

Doxy.me provides a simple, inexpensive, HIPAA-secure video conferencing solution designed specifically for health care. Its design includes several add-on features, such as a “Waiting Room,” which enhance flexibility for busy schedules.

Capitalizing on new conferencing software, Doxy.me connects one secure web browser directly to another, keeping patient information private. Doxy.me allows physicians to experiment and find new, meaningful applications and has already received significant enthusiasm from telemedicine practitioners.

Doxy.me follows both “Premium” and “Freemium” business models. The Premium is available for an affordable fee and allows practitioners full-featured access. The “Freemium” model is supported by a third party payer in exchange for display of pharmaceutical ad-ware integrated with the downtime between patients, helping avoid interference with patient interactions.

Doxy.me is a standout innovation and has significant market potential in that it is software that can be downloaded anywhere and has application in most healthcare settings. Following the 2013 Bench to Bedside Competition, where Doxy.me won the Consumer’s Choice Award, and the team has received additional funding from the University of Utah’s Telemedicine department.
Current electrocautery devices use electricity to cut into tissue, providing a powerful advantage for surgeons. However, as with every cutting instrument, bodily fluid flow at the incision point can obstruct the surgeon’s view. In current practice, an assistant using a separate instrument clears this fluid away, but the added set of hands can obstruct vision just as much as bodily fluid. Surgeons also complain that there are too many cords and tubes within the operating room that distract from the task at hand. Therefore, there is a need for a device that effectively clears fluid away, but does not obstruct vision or contribute to the tangle of cords.

The DynoSuction is an innovative suction mechanism to be used with electrocautery knives to conveniently clear away bodily fluids as a surgeon cuts into tissue. The DynoSuction attaches a small vacuum tube to the electrocautery device, providing greater range of vision, enhancing control for the user, and reducing the number of instruments needed during surgery.

The DynoSuction device has a dynamic design with powerful suction and an adjustable tubing length that can be catered to the operator’s specific comfort. It conveniently attaches to the bottom of any electrocautery device giving the surgeon the freedom to control both instruments at once. The suction tubing, normally hanging by itself in each procedure, can be run in-line with the electrocautery device’s own electrical cording to reduce clutter. Added benefits include reduced potential for infection from multiple instruments and decreased probability of accidentally severing arteries or other organs.

Millions of operations are performed every year throughout the US. There has been little change in the design of fluid removal devices for these operations. The DynoSuction will help improve operating room procedure by allowing surgeons to focus less time operating in low visibility, and more time in healing patients.
Although easier for surgeons, laparoscopic hysterectomies are far more expensive and dangerous to patients than the alternative vaginal approach. The Emery Retractor is designed to improve surgeons’ workspace during vaginal hysterectomies, and thus remove the procedure’s stigma of difficulty.

The Emery Retractor is inserted into the vaginal canal in a deflated state. When the desired orientation is achieved, the retractor expands with the help of an electric pump. This design makes it easy for the surgeon to quickly expand the vaginal canal to allow him/her to work hands-free from any retraction device.

The Emery Retractor contains a mesh that extends out of the vaginal canal, and with the use of a locking ring, anchors the retractor in place and retracts the outer tissues of the vagina. This mesh also protects the inflated retractor from any damage made by the movement of surgical instruments in and out of the vaginal canal.

Finally, the Emery Retractor has the ability to expand the vagina to an average diameter of about 10 cm, which provides the surgeon an adequate workspace for the removal of the uterus through the vaginal canal. This retractor will save hospitals and patients money and provide an easier recovery for those undergoing the procedure.

Although easier for surgeons, laparoscopic hysterectomies are far more expensive and dangerous to patients than the alternative vaginal approach.
Endoscopy is the examination of the gastrointestinal tract and entails the passage of an endoscope through the mouth or the anus. This tool provides a visual diagnosis and grants the opportunity for biopsy or removal of suspected cancerous lesions.

Colonoscopy is a subset of endoscopic examination and has become an important preventative procedure for examining the large bowel and the distal small bowel. Colonoscopies are performed for biopsy, diagnostic, and screening purposes. Many patients have more than one abnormal growth in the colon and require multiple biopsy samples. These procedures are time-consuming due to repetitive insertion and removal of biopsy tools, which increases risk of bowel perforation.

Approximately 1.27 million colonoscopies are performed per year in the United States. Every collective minute of wasted physician time equals $1.8 billion, nationally. If a device existed that saved 20 minutes per biopsy set, $36 billion would be saved annually.

The Endo Bio Device can realize these savings by revolutionizing endoscopy procedures. This device allows for the collection of multiple tissue samples without retraction of the endoscope or tissue biopsy component. Samples are immediately suctioned into pathology collection containers, thus protecting the integrity of the samples for analysis and diagnosis.

The Endo Bio Device will decrease instances of bowel perforation, reduce procedure time, and also allow for better precision and cleaner cuts, while lowering both provider and patient costs.
When performing gynecological examinations and procedures, clinicians require a means to properly illuminate the vaginal cavity. Of the handful of lighting solutions used by clinicians, each has significant drawbacks. Specifically, no product on the market currently can be used with both metal and plastic specula. Neither is one available small enough to fit into an area of the speculum to allow maximal space for procedures and still eliminate shadows and allow optimal viewing of the cervix.

The GLO Light, with its streamlined, single-use design, provides an elegant solution to some of the most common clinician complaints regarding speculum use.

The GLO light distinguishes itself through its:

1. Versatility: The GLO Light can be used with any metal or plastic speculum. Research suggests that both clinicians and patients prefer metal specula, for which there is no adequate light source.
2. Custom illumination: The GLO Light’s peel-and-stick nature allows for custom placement on the bill of the speculum, according to physician preferences.
3. Bright and shadow-free light: The GLO Light clearly illuminates the cervix and surrounding vaginal tissue with 120 degrees of high-powered light.
4. Ease of use: The GLO light is self-contained, simple, and requires no chords or batteries. Simply peel, use, and dispose.
5. Sustainability: Compared to the bulky, single-use plastic speculum, which are about the size of a 1-liter bottle, the GLO Light, about the size of a piece of hard candy, drastically reduces waste.
6. Global women’s health: One of the more exciting applications of the GLO Light is its potential role in improving maternal and women’s health in international settings. The GLO Light is a high-quality, low-cost light that can be used in smaller clinics the world over in addressing the goals of the World Health Organization.
Severe head trauma and brain tumors are on the rise. Reparative head trauma and brain tumor treatment each require craniotomy, or entrance into the brain space. Unfortunately, the current drills used in today's operating rooms lag far behind the rest of medical technology.

The ACRA cranial perforator, patented in 1988, accounts for the majority of the 500,000 craniotomies performed per year in the US. About 10 percent of craniotomies employing a perforator fail in some way. Failures increase operating times and prolong patient exposure to general anesthesia, driving up health care costs and causing unneeded risk to the patient.

The Helical Epidural Access Drill (HEAD) bit helps prevent these failures. The HEAD bit incorporates an innovative new flute design conceptualized with biological tissue in mind. It is the first drill that deviates from traditional design in that it discriminates between bone and soft tissue to safely displace meninges while efficiently cutting through slivers of bone.

The HEAD bit features a simple, helically-fluted, tapered ball-end drill bit. The tapered shaft improves maneuverability of the drill angle through the skull. The flute design efficiently clears debris and allows a lower RPM, minimizing heat and damage to surrounding tissue. Additionally, the bit integrates with a standard drill chuck.

In sum, the HEAD bit will improve safety and efficacy of craniotomies, yet cost much less than its competitors and reduce trauma to the patient. At the same time, it places versatility and assurance into the hands of the surgeon.
Children with Autism Spectrum Disorders (ASD) have a difficult time developing essential personal and social skills. This leads to a decreased quality of life and poorer health outcomes, resulting in markedly increased costs in medical care.

iTheraplay’s targeted video games address the urgent need of effective therapy for children with ASD in three ways:

1. They create and conserve a virtual environment in which specific activities of daily living and social skills are taught and practiced through mini-games.
2. They use established, evidence-based methods for ongoing therapeutic treatment between provider visits.
3. Their active interface promotes physical activity, and each game increases in complexity as specific skills are mastered.

Video games stimulate the brain’s reward center, enhancing focus and formation of memory. iTheraplay’s strategy involves both a product and a service. We are currently designing a suite of video games that will serve as the portal for individualized health care in real-time. The video games will be fun, interactive, instructional, and addictive. Most importantly they will provide therapeutic results supported by proprietary analytics that will deliver patient health data to providers and interdisciplinary partners.

The service of statistical analysis derived from the therapeutic games will allow health care providers to monitor disease states and treatments in real-time. iTheraplay will improve overall health care delivery by integrating mobile technology with medical treatment plans.
Measurement of the jugular venous pressure (JVP), performed in hospitals and clinics, is crucial to addressing fluid status to determine cardiac, pulmonary, renal, and or hepatic function. Specifically, JVP measurement indirectly observes pressure of the right atrium by visualizing the internal jugular vein in the neck.

The methods of measuring JVP have not changed since 1951, though JVP measurements remain a standard assessment on all patient charts and on yearly physical exams. Traditionally, JVP measurements are taken manually and with common tools such as an index card, ruler, flashlight, and pen. This leads to inaccuracies between physicians and unnecessary fumbling at the patient bedside.

Improvements have been made to other examination practices, resulting in devices such as the stethoscope and pulse oximeter, JVP measurement remains cumbersome. Because of this and the uncertainty associated with the accuracy and reproducibility of the current method, a need exists for a new method of measuring JVP.

The JVAT solves these issues by combining the ruler and index card components with a flashlight to form a pocket size tool. The device will significantly reduce patient discomfort and measurement time while increasing precision of measurement results.
Leech therapy is the practice of placing biological leeches onto congested tissue to induce blood flow through the region. Currently, leeches are used during post surgical therapy to increase and maintain blood flow through recently reattached tissue flaps. The leeches primarily serve to prevent blood pooling and reduce pressure in areas where arterial blood flow is adequate to supply blood but where venous blood flow is insufficient to remove it. This is accomplished through the natural feeding process of the leech, in which it creates a small incision, secretes an anticoagulant, and consumes excess fluid.

In order to eliminate patients’ adverse reaction to biological leeches and provide more consistent, controllable performance over its parasitic counterpart, we propose a Mechanical Leech device that would be more desirable to doctors and surgeons to use during therapy.

The Mechanical Leech will mimic the effects of the biological leeches used in leech therapy. It will be approximately the same size as an actual leech, plus some additional tubing. The primary customers for the Mechanical Leech will be doctors and surgeons.

The completed device will provide a suitable replacement for the biological leech by removing excess fluidic pressure and injecting an anti-coagulant into patients at the placement site. The Mechanical Leech is intended to replace a $10-20 million/year industry of medicinal leeches.
Diabetes is on the rise worldwide, with the greatest number of new cases occurring in rural areas and developing countries. These particular locations suffer a shortage of physicians, complicating diabetes management.

When uncontrolled, diabetes can lead to blindness in the form of diabetic retinopathy. Approximately 90 percent of new cases of diabetic retinopathy are preventable with proper interventions. But without a specialized optometrist or ophthalmologist readily available in many rural towns, these retinopathies go undiagnosed and cause unnecessary loss of vision. How can optical expertise be delivered to these patients?

Presenting the MobiSight System: a portable fundoscope attachable to any smartphone. Using the phone’s built-in camera, rural healthcare professionals can periodically capture images of the retina. These images are automatically screened for abnormalities and uploaded to a secure medical record system shared by specialists in other areas. Specialists who receive the images can review the retinal photos to look for signs of developing disease.

Ophthalmologists can detect diabetic retinopathy before it causes any visual impairment and take steps to prevent blindness. If preventable disease is detected, patients can travel to urban hospitals equipped to perform advanced interventions if needed. Rural physicians can consult specialists anywhere in the world and receive expert diagnoses and treatment recommendations.

The MobiSight System integrates new technology into health care to improve patient outcomes by saving sight. It makes possible long-term monitoring and recording of optical health in at-risk patients, even without a local specialist available.
Persons suffering from phenylketonuria, or PKU, must manage a strict protein diet that can have dire consequences for just one day of error. Video games have the potential to provide PKU patients with a safe environment in which to see the consequences of dietary mistakes. They can also teach patients how to maintain a healthy diet.

Phe-Nominal is the next step in video games built by clinicians and game designers. Keeping PKU patients in mind, the game lets the patient fail in a safe environment not offered before.

Phe-Nominal is played on a mobile device with a touchscreen to help patients understand what it takes to manage their diet and avoid costly errors.

Video games have the potential to provide PKU patients with a safe environment in which to see the consequences of dietary mistakes.
The wealth of currently existing medical technology for children is seldom tailored for use by everyday people, limiting its utility in homes and hampering parents’ ability to monitor and improve their children’s health directly. TeddyCare, a pediatric diagnostic company, has created three devices to address this gap in patient personalization and medical technology accessibility in the home environment: SoundCare, BabyBear and ThermometerBear.

**SoundCare:** According to the Centers for Disease Control and Prevention, Autism Spectrum Disorders (ASD) are present in 1 out of 88 children. Autism occurs in all racial, ethnic, and socioeconomic groups and is five times more common in boys. Two key features of ASD are difficulty in auditory processing and hypersensitivity to specific sounds. Both of these create problems with attention, social interaction, communication and mental development.

While much research and some preliminary devices have sought to desensitize patients with ASD to audible stimuli, active audio filtering designed specifically for autistic patients has largely been ignored. As a solution to these problems, we have created SoundCare, a smartphone compatible audio app that allows real-time filtering of external sounds that distract and negatively effect individuals with autism. SoundCare’s software uses a device’s internal microphone, microprocessor, and audio line-out in combination with programmable filters and white noise to build tolerance to unwanted sounds.

Currently, no hand-held device exists with all of the mentioned filtering and soft noise capabilities for individuals with autism.

**BabyBear & ThermometerBear:** In recent years, much attention has been focused on the lack of medical devices designed specifically for children. Furthermore, of the current pediatric medical devices, most are not tailored for use by every day people, limiting their utility in homes and hampering parents’ ability to monitor and improve their children’s health directly. Leading institutions, such as the U.S. Food and Drug Administration, have called for more devices designed specifically with children in mind. To fulfill these needs we have created BabyBear, an easy to use pediatric pulse oximeter, and ThermometerBear, a temporal thermometer.

Both devices are housed within a plush teddy bear. The teddy bear also contains an embedded processing unit, a microphone for real time audio monitoring of an infant’s environment, a data recording unit for tracking infant diagnostics over time, and a white noise producer. All of the signals from these components are transmitted to an external baby monitor with smartphone compatibility.

Using a smartphone app a caregiver can receive warnings about extreme reported diagnostics as well as real-time feedback of sight and sound within an infant’s environment.

Overall, TeddyCare combines all of the advantages of traditional monitoring systems, pulse oximetry, and thermometry in one convenient package to relieve undue parental and provider stress.
More than 2.5 million laparoscopic surgeries are performed annually in the US. Trocars are used to introduce ports into the patient’s abdomen during laparoscopic surgery. Each surgery uses at least one trocar sized 10mm or larger to accommodate larger instruments for the procedure. Each 10mm sized port causes an intra-abdominal defect that the medical staff must close.

Unfortunately, the “standard of care” for closure of intra-abdominal defects is difficult, time consuming, and often performed inadequately. Ineffective closure of these defects increases the patient’s risk to herniation at the closure site. Additionally, suture-related injuries to medical staff occur frequently during these procedures due to the difficulty of accomplishing an effective closure. Patients with thick abdominal walls magnify each of these problems, which often result in misplaced sutures and ineffective closure of the port.

According to a 2011 study published by NIH, 1.85 percent of laparoscopic surgery patients experience trocar site herniation. The results were highly dependent on surgical technique, and complication rates ranged from 0.07 percent to 22 percent. This indicates a need for a consistent and safe method of port closure in laparoscopic surgery. Other devices have been developed to address this problem, but they are either too complex and cumbersome, or require the purchase of an additional costly device.

6S Medical’s Troclosure system incorporates a suture deployment mechanism that is integrated into the trocar and facilitates rapid and accurate suture placement for effective closure of internal abdominal defects. This device will improve patient outcomes, reduce operating room procedure time, decrease the incidence of suture-related injuries to medical staff, and lower the rate of post-surgical herniation through the trocar port site. The Troclosure provides an unprecedented solution to trocar port closure. The solution is mechanically simple, reliable, and effective.
Competition Night

April 12, 2013

Held at The Pointe in the Huntsman Cancer Institute, the 2012-2013 Bench-2-Bedside Competition Night was attended by a host of university, community and business leaders and innovation stakeholders.
LIYEN

Jackson Murphy and Chris Ciancone are models of persistence and believing in your work. They and the rest of the LIYEN team* first competed in Bench-2-Bedside in 2010-2011, but the team didn’t win or place in the competition. The following year Murphy and Ciancone again entered into the competition, and this time they took the 2011-2012 grand prize. Their device, the LIYEN Inhaler, or Last Inhaler You’ll Ever Need not only impressed judges at the University of Utah, but across the country.

Since the competition, the team has filed four provisional patents, between October 2012 and March 2013. With their B2B winnings, they were able to build more realistic prototypes and secure legal and regulatory consulting that have helped them refine their go-to-market strategy. To ensure their product is useful they have spent time meeting with physicians and asthmatics to ensure the product will in fact be desired.

Since B2B Murphy and Ciancone have competed in other competitions, including Westminster University’s Opportunity Quest Business Plan competition where the team took 1st place. The duo has also been a part of the University of Utah’s Entrepreneurship Club, where they have raised additional funding to develop their device.

As for investors, the team’s mentors have put them in touch with the Park City Angels and the Salt Lake Life Science Angels. They are also planning on working with Kickstart Seed Fund. Individual investors, including physicians and biotech veterans, have express interest as well.

The team is looking forward to exciting approvals later this year. The team is currently finishing testing required for FDA clearance by the end of 2013, which would allow them to market their item in late 2014.

“The Bench 2 Bedside competition has led to a complete shift in my career plans,” says Murphy. “Before developing this device I was planning on working for a large medical device company after graduation, but since starting this project I have decided to pursue the entrepreneurial path.”

*Other team members include Jamal Abdinor and Camilo Corredor.
LIGHT LINE

Nate Rhodes and Ahrash Poursaid, part of the team behind the LIGHT LINE, an innovative catheter designed to reduce hospital-acquired infections, have made great strides since they competed in the 2011-2012 Bench-2-Bedside competition.

The idea behind the LIGHT LINE began after a discussion of one of the largest problems in healthcare; 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, Rhodes, Poursaid and their colleagues 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 the summer of 2012 the team began working with Veritas Medical, LLC, as the parent company for LIGHT LINE. A few months later the team was selected as a top 10 finalist in Utah’s statewide techTITANs competition for young inventors. It wasn’t long before they teamed up with a patent attorney.

In March of 2013, Rhodes and Poursaid submitted a utility patent that, if approved, will enable the LIGHT LINE to be a patented medical device in the fall of 2014.

The duo 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.

*Other team members include James Allen, Mitch Barneck, Adam Bracken, Ryan Coil, & Martin de la Presa.

AdvanceCath

Since Bench-2-Bedside, Ryan O’Callaghan and his AdvanceCath team have seen their device honored by multiple agencies across the United States. The technology is a urinary catheter intended for patients requiring indwelling catheterization for longer than one day due to urinary incontinence, urinary retention, or other bladder dysfunction.

After the 2011-2012 competition, O’Callaghan and his team went on to win Utah’s statewide techTITANS competition for young inventors, placed third at Opportunity Quest, ranked in the top 10 at Utah Entrepreneur Challenge, and finished in the top 20 at Grow America. Through these competitions, the team was awarded with an additional $9,000. Along with that, the team was awarded $40,000 from the state of Utah.

The team has filed an international patent application and has used its prize money to help pay for prototyping and consulting. O’Callaghan and his colleagues are eager to enhance their design and make it available on the market. The team says there are currently several entrepreneurial investors who have shown interest in the product.

“All these experiences opened up several career and networking opportunities for me that would have not been possible had we not developed this device during Bench-2-Bedside,” says O’Callaghan.

*Other team members include Nick Blickenstaff and Garret Coman.
HOW TO GET INVOLVED AS AN INVESTOR OR CONTRIBUTOR

Interested in becoming a sponsor, participant, or team mentor?

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Visit our Investor website: http://healthsciences.utah.edu/center-for-medical-innovation/investors/index.php
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