

5TH ANNUAL

# UCLA MEDICAL DEVICE PARTNERING CONFERENCE

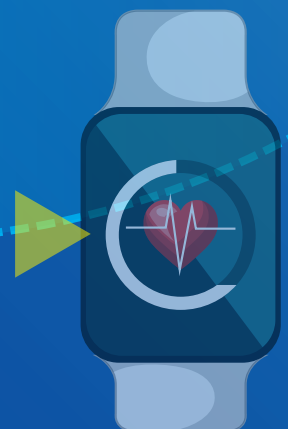
TUESDAY MARCH 7, 2017  
CNSI—UCLA CAMPUS



INDUSTRY

INVENTORS

INVESTORS



**UCLA** TECHNOLOGY  
DEVELOPMENT  
GROUP

#UCLAMedDevice

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## Conference Program

9:00 am REGISTRATION/NETWORKING

9:30 am WELCOME  
Emily Waldron Loughran

### MORNING SESSION

9:45 am PROOF OF CONCEPT FUNDING AT UCLA  
Thomas Lipkin

9:55 am INVESTOR PANEL  
JJDC | Option3 | Kaiser Permanente Ventures

11:00 am DEAN'S KEYNOTE  
Jayathi Y. Murthy – Dean of Engineering, UCLA  
Kelsey Martin – Dean, School of Medicine, UCLA

12:00 pm LUNCH

### AFTERNOON SESSION

1:00 pm FACULTY PANEL  
Sam Emaminejad | Ali Mosleh | Peter Reiher

2:00 pm INDUSTRY PANEL  
EY | Boston Scientific | Medtronic | Galvani Bioelectronics |  
Edwards Lifesciences | Promenade Software

3:15 pm BREAK

3:30 pm STARTUP PITCHES

4:00 pm WINE AND CHEESE RECEPTION

5:00 pm EVENT CLOSE

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## Daniel Beard

VP of Technology  
Promenade Software Inc.

Daniel is a founder and VP of Technology at Promenade Software, Inc. He is passionate about new technology and strives to bring best-in-class infrastructure and techniques to the Medical Device Sector's connected devices. His background includes over 7 years in the Medical Device sector, creating custom software for IVD and Therapy devices, and he is currently overseeing several development systems with mobile and cloud components. Prior to medical devices, Daniel had his own mobile app business, White Hat Design.

Ever since he exposed security flaws and spearheaded an audit of his high school's network as a teen, Daniel has been passionate about cyber-security in infrastructure. He is a founding member and director of MedISAO, an Information Sharing and Analysis Organization tailored to medical device manufacturers, consults on how to improve device security in regulated manufacturing environments, and contributes to multiple open-source security tools.

Daniel holds a Bachelors in Computer Science from the University of California, Irvine.



## James Dreher

Founder / Managing Partner  
Option3

James has founded and helped launch a number of highly valued start-ups including: **General Surgical Innovations, Inc.** (acquired by Tyco Healthcare in 1999), **Embolix Protection, Inc.** (acquired by Boston Scientific in 2001), **HotSpur Technologies** (acquired by Teleflex in 2012), **Access Closure** (acquired by Cardinal Health in 2014) and both **Axiom Technology Partners & Atsina Surgical** (Axiom was acquired in 2012 and Atsina in 2015). When James is not playing hockey, baseball, or basketball with his son Dash, he also serves as an Industry Mentor & Advisor to UCLA's MedTech Innovations Program. Prior to his entrepreneurial career, James held various US and International Senior Management positions at Johnson & Johnson and Baxter Healthcare. James has authored and co-authored a number of patents and patent applications. He attended the Sorbonne University in Paris and obtained a Bachelor of Arts degree from Wabash College, where he also serves on the College's Advisory Board for The Center for Innovation, Business, and Entrepreneurship (CIBE).



## Samuel Emaminejad

Assistant Professor, UCLA  
Department of Electrical Engineering  
Interconnected & Integrated  
Bioelectronics Lab (I<sup>2</sup>BL)

Professor Sam Emaminejad is an assistant professor and the director of Interconnected and Integrated Bioelectronics Lab (I<sup>2</sup>BL) in the Electrical Engineering department at UCLA. His lab focuses on developing an ecosystem of portable, wearable, and in-vivo physiological monitoring platforms to enable personalized and precision medicine. Sam received his BASc (2009) and MS/PhD (2011/2014) degrees in Electrical Engineering from the University of Waterloo and Stanford University, respectively. He pursued his PhD thesis at Stanford Genome Technology Center where he developed low-cost and handheld biosensing and bioelectronics platforms. Furthermore, as a joint-postdoctoral scholar at UC Berkeley and Stanford School of Medicine, Sam exploited flexible electronics technology to create non-invasive wearable sensors and systems for physiological monitoring and diagnostic applications. Sam has previously worked as an ASIC and Analog Designer in semiconductor companies such as Analog Devices.

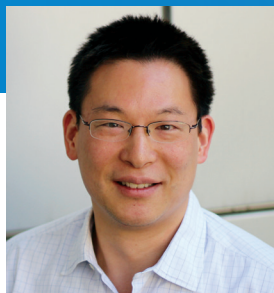


## **Paul Grand**

**CEO MedTech Innovator**

Paul Grand is CEO of MedTech Innovator, the medtech industry's global competition and accelerator, the largest platform of its kind, with a mission to accelerate the development of transformative innovations that benefit patients and deliver improved value to the health care system. He has an extensive global network in transformative medical innovation.

Prior to MedTech Innovator, Grand was Managing Director at RCT Ventures, an early-stage life science investor since 2005. At RCT, Grand focused on medtech investments and sourcing innovation. He founded MedTech Innovator as a program within RCT Ventures in 2013, and he left to run MedTech Innovator as a stand-alone company with RCT's support in 2016.



## **Edward Hsieh, J.D., MBA, MSc.**

**Technology Transfer Officer, Physical Sciences  
UCLA Technology Development Group**

Ed Hsieh joined UCLA TDG in December 2014 as a Technology Transfer Principal. Ed is responsible for managing a portfolio of UCLA intellectual property, reviewing invention disclosures for patentability and commercial potential, negotiating and drafting licensing and inter-institutional agreements, and guiding UCLA faculty and students through the patenting and commercialization process. Prior to joining TDG, Ed practiced patent law for eight years both in-house at Tessera and at the law firm of Irell & Manella, LLP. Ed received his B.S.E in Chemical Engineering at Princeton, his M.S. in Material Science from UCLA, his J.D. from USC, and his MBA and MEM (Masters in Engineering Management) from Northwestern University.



## **David Knapp, Ph.D.**

**Vice President, Corporate R&D  
Boston Scientific**

David M. Knapp, Ph.D. is a leader in the area of Medical Device Development and Exploratory Research working to treat unmet needs in coronary, cardiovascular and pulmonary medicine for 20 years. Dave's current focus as Vice President of Corporate Research at Boston Scientific is on developing new solutions and fostering growth in White Space areas. He is passionate about coordinating open, collaborative efforts that cut across all Boston Scientific Divisions, including developing relationships with external institutions and connecting functions to drive meaningful innovation. Dave also serves as a Board Member on the Boston Scientific Foundation and is a member of the Boston Scientific Health Advisory Panel.



### **Thomas Lipkin**

**Head of New Ventures  
UCLA Technology Development  
Group**

Thomas Lipkin joined UCLA TDG in 2012 and serves as Head of New Ventures. Dr. Lipkin and his team work to further the entrepreneurial environment at UCLA by building startup companies around UCLA's intellectual property, serving as a resource to faculty members, aiding existing UCLA startups in sourcing financing and talent, and helping secure additional funding for campus-wide startup initiatives. Dr. Lipkin is also responsible for actively promoting UCLA's intellectual property assets and engaging with parties interested in further developing early-stage technologies in the life sciences, physical sciences, and internet technology space. Previously, Dr. Lipkin was with Osage University Partners, a venture capital fund that invests exclusively in university-based startup companies. Dr. Lipkin received his B.S. in Biology from Indiana University and his Ph.D. in Cell Biology and Pathology from Columbia University.



### **Emily Waldron Loughran**

**Senior Director of Licensing &  
Strategic Alliances  
UCLA Technology Development  
Group**

Emily Loughran joined UCLA TDG in 1994 as a technology transfer officer. Currently, as the Senior Director of Licensing, she manages the licensing and patent prosecution groups and oversees the office's large portfolio of invention disclosures, patents, and license agreements. Emily started in intellectual property administration at the City of Hope Medical Center, where she was the Technology Transfer Manager responsible for patenting and licensing activities. Emily holds an MBA from USC and a BS from UC Berkeley.



### **Kelsey Martin, M.D., Ph.D.**

**Dean, David Geffen School of  
Medicine, UCLA**

Dr. Kelsey Martin is the Dean for the David Geffen School of Medicine at UCLA, where she is also a Professor in the Departments of Biological Chemistry and Psychiatry and Biobehavioral Sciences. Dr. Martin is very active in the medical community. She is a Senior Fellow at the Howard Hughes Medical Institute Janelia Research Campus and serves on the editorial board of Cell, the board of directors for the Burroughs Wellcome Fund, the selection committee of the McKnight Scholar Awards, and the board of directors for the McKnight Endowment Fund for Neuroscience. In 2016, she became a member of the American Academy of Arts and Sciences and a member of the National Academy of Medicine.



## John Mastrototaro, Ph.D.

**Vice President, Informatics  
Medtronic PLC**

John Mastrototaro is the VP of Informatics at Medtronic. In this role, he is developing a strategy around the use of data and analytics to improve healthcare delivery and reduce costs with remote monitoring and disease management solutions.

John was previously CTO at Medtronic Diabetes from 2011-2013. John oversaw R&D of drug delivery products including the artificial pancreas. In addition, John led global R&D activities to address specific needs in local geographies. He has also served as VP of Global Clinical, Scientific & Health Affairs.

John joined MiniMed in 1993 to lead development and commercialization of the world's first ambulatory Continuous Glucose Monitoring system. Subsequently, other products were commercialized, including the first integrated sensor-pump system and the Veo platform, which represented the first step toward an artificial pancreas.

John started his career with Eli Lilly. He has a BA in Math and Physics from Holy Cross College and M.S. and Ph.D. in BME from Duke University. John holds over 50 US patents.



## Ali Mosleh

**Distinguished Professor and Evelyn Knight Chair in Engineering  
Director, B. John Garrick Institute for the Risk Sciences  
Henry Samueli School of Engineering and Applied Science**

Dr. Ali Mosleh is a Distinguished University Professor and Evelyn Knight Chair in Engineering at UCLA, where he is also the director of the UCLA Garrick Institute for the Risk Sciences. Previously he was the Nicole J. Kim Eminent Professor of Engineering and Director of the Center for Risk and Reliability at the University of Maryland. He was elected to the US National Academy of Engineering in 2010, and is a Fellow of the Society for Risk Analysis and the American Nuclear Society, recipient of several scientific achievement awards, and technical advisor to numerous organizations, including appointment by President George W. Bush to the U.S. Nuclear Waste Technical Review Board. He conducts research on methods for probabilistic risk analysis and reliability of complex systems and has made contributions in diverse fields of theory and application. He holds several patents and has edited and authored over 500 publications.



## Jayathi Y. Murthy

**Ronald and Valerie Sugar Dean,  
UCLA Henry Samueli School of Engineering and Applied Science**

Jayathi Y. Murthy is the Ronald and Valerie Sugar Dean of the UCLA Henry Samueli School of Engineering and Applied Science.

The Samueli School of Engineering is recognized around the world as a leader in engineering education, research and service. UCLA Engineering has developed generations of rigorously trained engineers and has been the home for solutions to challenges in critical fields including energy, sustainability, healthcare, communications, transportation, infrastructure and information technology.

Murthy's own research interests include nanoscale heat transfer, computational fluid dynamics, and simulations of fluid flow and heat transfer for industrial applications.

Murthy received a Ph.D. in mechanical engineering from the University of Minnesota, an M.S. from Washington State University and a B. Tech from the Indian Institute of Technology, Kanpur. She is a fellow of the American Society of Mechanical Engineers and the author of more than 280 technical publications.



## **Rick Paul**

**Sr. Director, R&D  
Edwards Lifesciences**

Rick Paul is a Senior Research and Development leader with over 20 years of product development experience in the Medical Device Space. He currently leads the Instrumentation and Connected Solutions R&D Organization in the Critical Care Business Unit of Edwards Lifesciences. Prior to joining Edwards in 2011, he held positions of increasing technical leadership responsibility at Viasys Healthcare (now Becton Dickinson) and Masimo Corporation.

In his role with Edwards, Mr. Paul oversees development programs for new patient monitoring products, most recently leading the development effort for Edwards' next generation connected Hemodynamic Monitoring Platform. In addition to his technical management responsibilities, he also sits on the Edwards Critical Care R&D Leadership team and the Critical Care Portfolio Strategy Board.

Mr. Paul holds a Bachelor's degree in Biomedical Engineering from the University of Southern California and a Master's degree in Computer Engineering from the California Polytechnic State University. He resides in Orange County, California with his wife and son where he is active in the community as a youth sports coach and official.



## **Peter Reiher**

**Adjunct Professor, UCLA Computer  
Science Department**

Dr. Peter Reiher is an Adjunct Professor in the Computer Science Department at UCLA. He received his Ph.D. from UCLA in 1987. After spending five years working at JPL, he returned to UCLA in 1992. He has led research projects and published over 120 papers on many topics in computer security, operating systems and file systems, ubiquitous computing, and computer networks, and teaches classes at UCLA on these subjects. He is co-author of the first book on distributed denial of service attacks. His research interests include cybersecurity (particularly Internet security issues, such as distributed denial of service attacks), computer networks, ubiquitous computing, security of autonomous vehicles and vehicular networks, security of wireless medical devices, and file systems.



## **Liz Rockett**

**Director  
Kaiser Permanente Ventures**

At KP Ventures, Liz focuses on investments in healthcare IT, digital health and technology-enabled services. Liz's experience in healthcare IT and technology-enabled services is rooted in building and delivering products for the Advisory Board Company, Outcome (now a Quintiles company), and the TriZetto Group.

Prior to joining KP Ventures, Liz ran the health practice at Imprint Capital, advising foundations and endowments on healthcare investments that aligned with their mission interests.

Liz holds her Bachelor's Degree from Princeton University, as well as an MBA and a Masters of Public Health from the University of California Berkeley.



## **Renee Ryan**

**Vice President, Venture Investments  
Johnson & Johnson Innovation,  
JJDC, Inc**

Renee Ryan, Vice President, Venture Investments, joined Johnson & Johnson Innovation—JJDC, Inc. (JJDC) in 2011. She is based in Silicon Valley, California and primarily supports the strategic investment activities in medical devices.

Mrs. Ryan's background includes over 15 years of healthcare investment banking. Most recently, she ran the medical device investment banking effort at R.W. Baird & Co. Previously, she led the West Coast healthcare group at Jefferies & Co. and was in the healthcare investment banking groups at Goldman Sachs and Credit Suisse.

Mrs. Ryan received an MBA from Columbia Business School and a Bachelor's degree from Georgetown University. She was nominated for the Silicon Valley Business Journal "Women of Influence" in 2011 and participated in the Smith Tuck Global Leaders for Women Program in 2014. She recently was nominated to the Fierce Medical Devices Top Women in Medical Devices 2015 list.



## **Sri Vasudevan**

**Executive Director  
EY Cybersecurity**

Sri Vasudevan is an Executive Director within EY's National Advisory Cybersecurity practice, where he stewards the development of innovative cybersecurity service offerings in the emerging technologies space. He is responsible for identifying and addressing cybersecurity issues affecting emerging technologies such as mobile, cloud computing, big data, medical devices, connected vehicles, Internet of Things (IoT), artificial intelligence, augmented/virtual reality and interstellar communications. Sri has over 15 years of deep technical experience in product security, security architecture, information security risk management, attack and penetration and identity and access management focus areas. Sri has advised some of the largest healthcare delivery organizations and medical device manufacturers in tackling complex cybersecurity issues, using a comprehensive lifecycle approach that begins with early product development /adoption and extends throughout the product's lifespan.

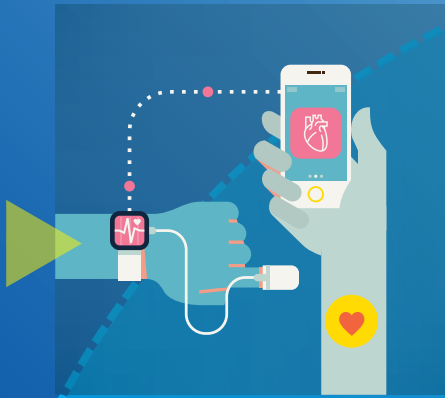


## **Firat Yazicioglu, PhD**

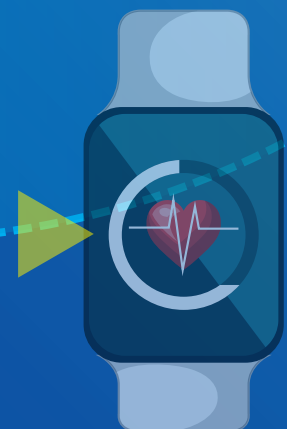
**VP and Head of  
Neuromodulation Devices  
Galvani Bioelectronics**

Firat brings pioneering our miniaturised Bioelectronic devices to reality. Working in Neuromodulation Devices, he joined GSK Bioelectronics in 2015 after spending 13 years at imec, Europe's largest independent research centre in microelectronics and nanoelectronics. He has developed devices and technologies for medical-grade wearable and implantable biomedical devices, including wireless cardiac monitoring patches, wearable EEG monitoring headsets and implantable neural probes for high density recording. Firat was also involved in the creation of a San Francisco-based wearable healthcare start-up, Bloom Technologies.

With a Ph.D. from KU Leuven in Belgium, Firat has authored more than 100 peer-reviewed publications along with 20 patents, including a book on low-power biomedical microsystems. He has served on the technical program committees of European Solid State Circuits Conf (ESSCIRC), International Solid State Circuits Conf (ISSCC), and Biomedical Circuits and Systems Conf (BioCAS) and remains Associate Editor for IEEE Trans. of Biomedical Circuits and Systems.



## UCLA Medical Device Technologies Available for Licensing



## Neuromodulation and Recording Technologies

### Mechanical Cutaneous Nerve Stimulation for Pain, Stroke, Mood and Vascular Action

UCLA researchers have developed a procedure that uses simple mechanical vibration at particular frequencies, instead of electrical stimulation, to activate the underlying cutaneous sensory fibers to mask pain perception. When placed over the sensory fields of the cranial and cervical nerves for the head, neck and shoulders, the vibratory stimuli may disrupt on-going activity of multiple cranial and spinal nerves in a variety of ways. This is accomplished (1) by interfering with transmission within the common pain projection, (2) by masking pain signaling by overwhelming faster-conducting mechanoreceptor nerve signaling, and (3) in the case of chronic pain, by interfering with thalamocortical circuitry known to be involved in long-term pain. The vibration stimuli are non-invasive and patient-controllable in intensity, frequency and pulse pattern to minimize pain and maximize comfort. The patient can adjust the stimuli when pain appears. The patient may have the option to apply vibration to “train” the brain to suppress brain activity that might lead to later pain onset.

**UCLA Case No. 2016-686**

**LEAD INVENTOR:** Ronald Harper

**Patent Status:** Pending

### A Highly-Efficient Near-Field Wireless Power Transfer System that is Immune to Distance and/or Coupling-Coefficient Variations

Power transfer technologies transfer power optimally at one specific distance. As a result, product designs may require a constant distance and therefore include things like magnets in cochlear products to align the implant and external earpiece. UCLA researchers from the Department of Electrical Engineering have developed a wireless power transfer system that can deliver stable power to the load over a large range of distances. Additionally, the circuitry is mainly built at the power transmitter side of the system, allowing the receiver end (e.g. biomedical implant) to remain very small.

**UCLA Case No. 2016-390**

**LEAD INVENTOR:** Asad Abidi

**Patent Status:** Pending

### Autonomous Thermoelectric Energy-Harvesting Platform for Biomedical Sensors

To make thermoelectric energy harvesters (TEH) a truly autonomous energy source for size-constrained, wireless biomedical sensors and eliminate the need for batteries, it has been necessary to drastically improve their energy density and conversion efficiency. UCLA researchers from the Department of Electrical Engineering have developed an autonomous energy source for implantable biosensors by developing a TEH that can operate with a 68% end-to-end peak efficiency with <20ms tracking time, and start-up voltages as low as 65mV. A 645μW regulated output power was harvested from the head of a rat (0.83cm<sup>2</sup> surface area) with an implanted TEH device. The new TEH device achieves a 7.9x improvement in regulated power density and represents the first fully autonomous energy harvesting platform for energy-starved applications.

**UCLA Case No. 2015-245**

**LEAD INVENTOR:** Dejan Markovic

**Patent Status:** Pending

### Method, Apparatus, and Circuit to Monitor Cardiac Disease, Control Arrhythmias and Function by Modulating the Nervous System

Most heart conditions are characterized by detectable abnormalities of electrical (neural) heart function, but currently there exists very limited technology for the prolonged active monitoring and early stage treatment of these abnormalities. Dr. Kalyanam Shivkumar's technology is a neural recording and analysis system for the diagnosis, continuous monitoring, and treatment of heart disease. The system records heart neurons using electrodes implanted in or around the heart wherein the electrodes can deliver neuro-modulatory stimulation to correct for functional abnormalities.

**UCLA Case No. 2015-093**

**LEAD INVENTOR:** Kalyanam Shivkumar

**Patent Status:** Pending

### Wireless Implantable System to Restore Memory

Traumatic brain injury (TBI) may cause both anterograde and retrograde memory impairment. While implantable deep brain stimulation (DBS) systems are FDA-approved for the treatment of Parkinson's disease and epilepsy, there are currently no interventional therapies for memory restoration in TBI patients. UCLA researchers have developed a wireless, implantable DBS system that delivers electrical brain stimulation via

specially designed electrodes (UCLA Case No. 2014-287) in order to restore and enhance the memory of patients suffering from TBI.

**UCLA Case No. 2014-959**

**LEAD INVENTOR:** Itzhak Fried

**Patent Status:** Pending

### Wireless Wearable Big Data Brain-Machine Interface

In order to improve the investigation, diagnosis, and treatment of brain activity, UCLA researchers have designed a user-friendly brain-machine interface (BMI) that consists of an implanted recording-and-transmitting module, a wearable receiving-and-forwarding module, and a mobile post-processing unit. Whereas previous systems designed to monitor neural activity are limited in data transfer rates and use physically connected wires, this newly designed BMI can wirelessly transmit data at an unprecedented rate of ~1 Giga-bit/second. This BMI could support research investigating brain activity mapping, the diagnosis of brain abnormalities, and the development of new treatments to prevent or cure brain-related illnesses.

**UCLA Case No. 2014-495**

**LEAD INVENTOR:** Wentai Liu

**Patent Status:** Pending

### A Non-Invasive Device for Treating Migraine Pain

Dr. Ron Harper, a Distinguished Professor of Neurobiology, and colleagues at UCLA's School of Medicine have developed a novel neuromodulation device and methods for treating migraine pain. The device developed by Dr. Harper's team employs non-invasive, non-pharmacological stimulation of specific neural pathways involved in migraine pain propagation. The device has been prototyped and tested in patients in an IRB-approved study at UCLA. Study results demonstrate that the device is effective in treating severe and chronic migraine pain, as patients have reported significant improvement in pain intensity or a complete abrogation of pain following a short intervention with the device. The device is non-invasive (Class II) and integrates stimulation controls through a customized software application that is enabled from a personal mobile device. Preliminary data suggests the device may also be useful for treating other types of neuropathic pain, including trigeminal neuralgia, other chronic pain syndromes, and surgical-, dental-, or trauma-associated pain.

**UCLA Case No. 2014-299**

**LEAD INVENTOR:** Ronald Harper

**Patent Status:** Pending  
**Pub. No. US/2015/0141879**

## Silicon Microsystems for High-Throughput Analysis of Neural Circuit Activity

Functional MRI (fMRI) and electroencephalography (EEG) techniques can provide coarse-grained pictures of neuronal activity in the brain; however, they are unable to provide information on rapidly changing activity of single neurons, which is key to unraveling how the brain codes information. UCLA researchers in the Department of Neurobiology have developed a unique electrode array capable of simultaneously mapping neural activity from two or more brain structures. This technology addresses major technical obstacles of recording single neuron activity and expands on the potential for neuronal monitoring by allowing single-cell-resolution measurements of activity from numerous networked brain structures. In addition to enhanced recording performance, these new electrode array-probes will be more cost-effective to manufacture, as well as smaller and hence less invasive.

**UCLA Case No. 2013-039**

**LEAD INVENTOR:** Sotiris Masmanidis

**Patent Status:** Pending

## A Method for Deep Brain Stimulation Targeting Based on Brain Connectivity

Researchers at UCLA have developed a method to more effectively place the electrodes used in deep brain stimulation by using diffusion-tensor magnetic-resonance imaging (DTI) to customize the implantation protocol for each individual. This new method of precise targeting is based on tractography (i.e., a procedure for visualizing neural tracts) and uses DTI to map brain connections in individual patients. Therefore, the location of the most effective placement of the electrode can be identified for each individual. This methodology may also have significant implications for targeting new regions in the brain that have poor internal anatomical definition using standard imaging.

**UCLA Case No. 2011-700**

**LEAD INVENTOR:** Nader Pouratian

**Patent Status:** U.S. Patent Issued  
#9,220,458

## Site-Specific, On-Demand Deep Brain Stimulation for Enhancement of Memory in Humans

Researchers at UCLA have developed an advanced surgical procedure that utilizes electrical deep brain stimulation with intracranial electrodes to enhance memory function. In controlled human experiments, the procedure confers significant improvements in spatial learning

tasks. The researchers discovered specific brain regions that improve memory task performance over others. The results of these studies suggest that deep brain stimulation is a highly translational and efficacious approach to treating memory and cognition disturbances in a variety of diseases.

**UCLA Case No. 2011-330**

**LEAD INVENTOR:** Itzhak Fried

**Patent Status:** Pending

## Intracranial Implantable Mechanical Device for Housing Neurostimulators or Drug Infusion

Traditional implantable brain stimulators and drug infusion pumps require stimulation generators and drug pumps to be implanted in the patient's chest, with wires or catheter tubes running up through the neck. UCLA researchers in the Department of Surgery have developed a novel device described as the Skull Universal Indweller for Generators (SUIG) to house cranial energy or drug delivering apparatuses. A rigid mechanical enclosure houses an implantable electrical pulse generator (IPG) or drug infusion pump in the thickness of a removed portion of the skull, eliminating the need for wires and tubes tunneling through the neck. Enclosures can readily accommodate a range of commercially available IPGs and pumps.

**UCLA Case No. 2008-616**

**LEAD INVENTOR:** Scott Krah

**Patent Status:** U.S. Patent Issued  
#9,421,363

## Quantitative EEG Method to Identify Individuals at Risk for Adverse Antidepressant Effects

Antidepressant medication has demonstrated efficacy for the symptoms of depression, but some individuals may experience adverse effects on mood during antidepressant treatment that could result in harm to themselves or others. Researchers at UCLA have developed a method that identifies patients likely to experience adverse effects from antidepressant medication. A patient's response to the treatment is measured by using quantitative electroencephalographic recordings (QEEG). This method has been validated in a small double-blind placebo-controlled clinical trial with 97% accuracy. Patient response to medication was corroborated by using standard clinical checklists that diagnose adverse symptoms.

**UCLA Case No. 2006-262**

**LEAD INVENTOR:** Aimee Hunter

**Patent Status:** U.S. Patent Issued  
#8,521,270

## Cardiovascular Devices

### Flexible Heart Valve Prostheses

UCLA researchers have invented a novel flexible heart valve prosthesis that can more closely follow the natural movement of the heart. The frame of the valve is made of flexible material and utilizes security barbs that can retract into the body of the frame. The advantage of such a configuration is that the frame is flexible and contracts with the heart. Therefore, use of this prosthesis could decrease blood flow disturbance and interference with the heart function, improving the replacement of damaged heart valves, including the aortic and mitral valves.

**UCLA Case No. 2016-797**

**LEAD INVENTOR:** Bashir Tafti

**Patent Status:** Pending

### System and Method for Improved Treatment of Metabolic Acidosis

Professors Thomas Mason and Jeffrey Kraut in UCLA's Department of Chemistry and School of Medicine, respectively, have developed improved materials and methods of treating acute metabolic acidosis, a condition in which pH within a patient has become abnormally acidic and can be life-threatening. The inventors have developed more effective base-treatment solutions involving a strong base, such as disodium carbonate, mixed with a weak base, such as sodium bicarbonate to raise both intracellular and extracellular pH while beneficially consuming dissolved carbon dioxide. Additionally, the investigators have conceived new methods of delivering these formulations in a time- and spatially-varying manner, thereby optimizing the solution's mixing ratio and rate of delivery based on past and present measurements of a patient's blood-gas parameters, including pH.

**UCLA Case No. 2013-076**

**LEAD INVENTOR:** Thomas Mason

**Patent Status:** Pending  
**Pub. No. US 2015/0196708**

## Novel Application of Laser Lithotripsy for Treating Vascular Calcification

Traditionally, vascular bypass surgery has been considered the “gold standard” of treatment for peripheral arterial disease. However, surgery is associated with significant morbidity and mortality, and 40% of these patients are not eligible for surgery. Percutaneous Transluminal Angioplasty (PTA) has been introduced as an alternative to surgical revascularization demonstrating favorable clinical outcomes, but still carries its own limitations. To overcome the limitations of PTA, UCLA researchers have developed a special endovascular catheter that can be used for laser-assisted angioplasty under direct visualization. This method also allows for irrigation and extraction of ablation-induced debris, thus reducing the risk of distal embolization. This method is based on Holmium laser and provides a higher energy and repetition rate for smoother cutting and faster, more efficient tissue ablation.

**UCLA Case No. 2012-565**  
**LEAD INVENTOR:** Bashir Tafti  
**Patent Status:** Pending  
**Pub. No. WO/2013/184697**

## Novel Catheter for Precise Stent Delivery

Current therapeutic strategies for the management of cerebrovascular disease (CVD) include endovascular stents to expand a narrowed or blocked artery. The flexible nature of the stent that permits expansion and enables passage through tortuous blood vessels also imposes a technical challenge, known as foreshortening, to the accurate placement of the stent. Foreshortening describes the change in length of the stent as it elongates to fit the confines of the delivery catheter and shortens following its expansion within the target vessel—leaving the surgeon to estimate precise placement. UCLA clinician Dr. Satoshi Tateshima in the Division of Interventional Neuroradiology has developed a novel catheter to help anticipate the degree of foreshortening during stent deployment. The present technology overcomes the inherent limitations of the widely used braided and laser cut stents—providing a superior device with increased placement accuracy and ease of use.

**UCLA Case No. 2012-218**  
**LEAD INVENTOR:** Satoshi Tateshima  
**Patent Status:** Pending  
**Pub. No. WO/2014/042900**

## Unobstructing Microdevices for Self-Clearing Implantable Catheters

Implanted medical catheters are now an integral part of clinical care. However, many chronically-implanted catheter systems are plagued with reduced performance as a result of accumulating biological debris. Dr. Jack Judy and colleagues in the Department of Bioengineering at UCLA have developed an unobstructing microdevice for self-clearing catheters that alleviates flow obstruction. The researchers designed micro-mechanical mechanisms to disrupt the accumulation of biological material and keep catheter pores clear of debris. This device may be directly integrated into commercially available catheter systems for use in existing surgical techniques (e.g. chronically implanted catheters).

**UCLA Case No. 2010-175**  
**LEAD INVENTOR:** Jack Judy  
**Patent Status:** Pending  
**Pub. No. US 2011/0313340 A1**

## Dual Rotational Stent

Researchers at UCLA invented a novel dual rotational stent device for the endovascular treatment of cerebral aneurysm without the need for placing coils in the aneurysm lumen. The adjustable and variable struts density pattern of the new stent device allows it to cover the orifice of the aneurysm. This is advantageous for causing blockage of blood flow to the occluding aneurysm while sparing blood flow to perforators or side branches near the aneurysm neck. Specifically, the new compound stent has two main, but separate components; one for being positioned and stabilized in the parent vessel spanning the neck of the aneurysm, and another for controlling the degree of blood flow into the aneurysm.

**UCLA Case No. 2009-668**  
**LEAD INVENTOR:** Dieter Enzmann  
**Patent Status:** Pending  
**Pub. No. WO/2014/028913**

## Bioactive Endovascular Coils

Researchers at UCLA have developed a detachable endovascular coil system with increased biological activity. These coil materials are inherently bioactive and can be further coated with, or act as a delivery vehicle for, bioactive or therapeutic agents, such as drugs to control the inflammatory reaction inside an aneurysm. The innovation maintains the mechanical flexibility of the coils, ensuring that they are highly effective at preventing blood

flow. These improvements will accelerate aneurysmal healing and minimize their rate of recurrence.

**UCLA Case No. 2011-135**  
**LEAD INVENTOR:** Benjamin Wu  
**Patent Status:** Pending  
**Pub. No. US 2014/0180395 A1**

## Brain Collateral Perfusion Augmentation by Cerebral Venous Pressure Modulation

UCLA researchers have developed a novel method and device to improve cerebral blood flow to about 50% of normal baseline value, thereby treating acute or chronic ischemia associated with stroke. The device and corresponding method uses applied pressure to artificially achieve collateral circulation in the brain. To increase cerebral venous pressure and thereby, redirect maldistributed blood flow, the device creates an occlusion of one or more veins coupled to the collapsed vessel. The device consists of an elongated tubular member with proximal and distal ends for insertion into a patient's superior vena cava (or other vein), an expandable occluder located at the distal end of the tubular member (the occluder has an expanded and a collapsed state), a device to measure pressure at the distal end of the tubular member, a device to measure cerebral blood flow in the patient, and a controller programmed to actuate the expandable occluder as a function of the measured venous pressure and the measured cerebral blood flow.

**UCLA Case No. 2009-224**  
**LEAD INVENTOR:** David Liebeskind  
**Patent Status:** Pending  
**Pub. No. US 2010/0318114 A1**

## Method and Device for Treating Intracranial Vascular Aneurysms

Inventors at UCLA have developed a device, and a method, for the therapeutic management of intracranial vascular aneurysms. This technology involves the use of intravascular catheters that can directly image the aneurysm, and can occlude the entire lumen of the aneurysm sac using liquid sealing agents. The intracranial catheters are designed in various configurations so that they can be used to treat aneurysms regardless of their neck size or location within the intracranial vascular system.

**UCLA Case No. 1996-528**  
**LEAD INVENTOR:** Tarik Massoud  
**Patent Status:** U.S. Patent Issued  
**#5,776,097**

## Device Materials

### UCLA Inventors Create Platform Technology to Create Customizable Nanoscale Wound Management Tools

UCLA researchers in the Departments of Chemistry, Physics, and Bioengineering, led by Dr. Tim Deming of the Bioengineering department, have developed a platform to create and modify nanoscale vesicles and hydrogels for use in wound management. The poly-peptide based platforms created by the Deming group are customizable in nearly all physical characteristics, can be tailored in size, be loaded with hydrophobic, hydrophilic, or cellular payloads, adaptable to specific delivery locations, low toxicity, are fully synthetic, possess highly reproducible properties, and are inexpensive to prepare compared to solid-phase peptide synthesis. The platform can be used to create novel, need-based nanoscale vesicles or injectable hydrogels, and can be used to augment existing material systems.

**UCLA Case No. 2015-124**

**LEAD INVENTOR:** Timothy J. Deming

**Patent Status:** Pending

### Poly(p-xylylene) Polymer-Based Microfilms for Oral Delivery of Therapeutics

Poly(p-xylylene), trade name Parylene, is an FDA-approved material used as a protective coating for medical devices, but its elution capabilities in pharmaceuticals are less exploited. UCLA researchers have utilized semi-porous poly(p-xylylene) film as a stand-alone vehicle for the intraoral delivery of pharmaceuticals with predetermined time scales and dimensions. The film is synthesized as a semi-porous patch to be placed in the mouth for long-term (greater than 1 month) storage and delivery of therapeutic compounds. Due to the benign synthesis process of the Parylene film, a variety of therapeutic compounds can be incorporated, including small molecule drugs and proteins for anti-inflammatory, anti-cancer and anti-mucosal ulcer therapies.

**UCLA Case No. 2014-555**

**LEAD INVENTOR:** Dean Ho

**Patent Status:** Pending

### Graphene-Based Catalysts for Biomimetic Generation of Antithrombotic Species

Thrombogenicity (the tendency for blood to adhere to a material's surface) has remained a major challenge for implanted medical devices since their inception.

UCLA researchers from the Departments of Chemistry and Materials Science and Engineering have developed a graphene-based catalyst for generating HNO, an antithrombogenic species, for biomedical applications. This material greatly extends the lifetime of antithrombogenicity by using endogenous and abundant glucose and L-arginine for the production of HNO. The graphene-based conjugates can be incorporated into polymer coatings that can be applied to biomedical devices.

**UCLA Case No. 2014-521**

**LEAD INVENTOR:** Xianfeng Duan

**Patent Status:** Pending

### A Novel Polymer Platform for Drug Delivery

Aggressive surgical resection and chemoradiation therapy (CRT) are the dominant treatment course for patients with Head and Neck Squamous Cell Carcinoma (HNSCC), but these approaches often negatively impact patient quality of life, including disfigurement and loss of facial mobility in some cases. UCLA researchers have developed a novel implantable drug delivery device that reproducibly reduces tumor growth *in vivo*, bypassing the traditional HNSCC treatment course. The technology combines biocompatible polymer sheets with anti-tumor drugs and immune-boosting proteins that can be implanted to the surgical bed after debulking of the tumor. These layers of sheets are highly customizable, as they can incorporate multiple drugs at different concentrations and release rates.

**UCLA Case No. 2014-235**

**LEAD INVENTOR:** Benjamin Wu

**Patent Status:** Pending

**Pub. No. US 2015/0094518**

### Bidirectional Hyperelastic Covers for Woven Stents

Current stent designs frequently result in hazardous wrinkling of the cover upon deployment, substantially increasing the risk of stent failure, and subsequent morbidity. UCLA researchers have developed a novel hyperelastic thin film nitinol (HE-TFN) that can be used to cover medical stents. This porous film maintains a deformation ratio that matches the commercial stent distortion during deployment. As a result, potentially dangerous kinks and folds that arise from the crimping/expanding process are substantially avoided. This ensures the conformal stent delivery and deployment. Furthermore, the design strategy and the hyperelastic material allow customization of the cover to different

deformation ratios, making the novel cover widely applicable to various types of commercial stents.

**UCLA Case No. 2013-238**

**LEAD INVENTOR:** Greg Carman

**Patent Status:** Pending

**Pub. No. WO/2014/134568**

### Surface Modification of Endovascular Devices

Current endovascular procedures for the treatment of vascular diseases use a number of metallic devices including guidewires, stents and coils. Although these materials are commonly used, they have several limitations, such as friction generated during the installation procedure and the need to be on blood thinning medication for a long time after implantation. Researchers at UCLA have discovered a method of treating NiTi, "nitinol," sheets, wires, or stents that overcomes these limitations. The devices are treated with a type of light, causing them to take on super hydrophilic properties. This conversion increases the affinity between the device and vascular tissue, resulting in the acceleration of the healing process and a reduction in clotting. The hydrophilic device also demonstrates less friction during insertion and delivery.

**UCLA Case No. 2008-007**

**LEAD INVENTOR:** Satoshi Tateshima

**Patent Status:** U.S. Patent Issued

**#8,487,284**

### Improvement of Dental Resins: Decreased Toxicity and Improved Biocompatibility

Resin-based and resin-containing materials are routinely used in dental practice as direct filling materials, fissure sealing agents, and as bonding resins or resin cements for metal, porcelain, resin inlays, veneers, crowns, and bridges. While the use of resin-containing materials is beneficial to the appearance of patients, these materials carry the risks of cytotoxicity and allergy often through resins such as HEMA or TEGDMA. UCLA investigators have discovered that the presence of a chemical inhibitor (CI) can inhibit HEMA- and TEGDMA-mediated apoptosis (cell death) in numerous human cell lines. Not only was cell death inhibited, but the presence of the CI also led to an increased viability and function of treated cells. The results indicate that the CI prevents adverse effects mediated by HEMA, TEGDMA and bleaching agents and may be incorporated into additive resin materials.

**UCLA Case No. 2005-379**

**LEAD INVENTOR:** Anahid Jewett

**Patent Status:** U.S. Patent Issued

**#8,481,005**

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## Diagnostic Tools

### Rapid, Portable and Cost-Effective Yeast Cell Viability and Concentration Analysis Using Lens-Free On-Chip Microscopy and Machine Learning

UCLA researchers led by Prof. Aydogan Ozcan have developed a novel portable lab-on-chip lens-free microscope system to monitor yeast cell viability and concentration. Furthermore, the device utilizes machine learning algorithms to process images, eliminating user subjectivity, and reducing acquisition and analysis time. These dual developments have allowed for the development of the Automated Yeast Analysis Platform technology which yields data that agrees well with current gold-standard technologies.

**UCLA Case No. 2017-093**

**LEAD INVENTOR:** Aydogan Ozcan

**Patent Status:** Pending

### Quantitative Fluorescence Sensing Through Highly Autofluorescent and Scattering Media Using Cost-Effective Mobile Microscopy

UCLA researchers have developed a novel method for quantitative fluorescence sensing through highly autofluorescent and scattering media. The inventors have created a compact and cost-effective fluorescence microscope to perform quantitative measurement of the concentration of a target fluorescent dye embedded inside a tissue phantom that mimics the autofluorescence and scattering characteristics of human skin. Then, a spatial Fourier transform-based image-processing method is used. This method takes advantage of the spatial modulation of the excitation beam. It digitally separates the signature of the target fluorescent signal from tissue autofluorescence although they severely overlap in space and optical spectrum.

**UCLA Case No. 2016-833**

**LEAD INVENTOR:** Aydogan Ozcan

**Patent Status:** Pending

### Demosaiiced Pixel Super-Resolution for Multiplexed Holographic Color Imaging

UCLA researchers have developed a new high-resolution color microscopy technique, which solves Bayer CFA related spatial sampling limitations and color artifacts of previous color de-multiplexing approaches, significantly improving the performance of holographic high-resolution color imaging.

This D-PSR approach first captures a plurality of raw holograms on a Bayer color sensor chip using simultaneous multi-wavelength illumination, where the sensor plane is shifted by small increments. Then it performs pixel super-resolution based on these sub-pixel shifted raw holograms to digitally synthesize smaller pixels (e.g., by a factor of ~3 fold) for each element of the Bayer CFA. Using the pre-calibrated spectral cross-talk matrix of each filter of the Bayer CFA at the selected illumination wavelengths, this approach de-multiplexes three color channels, each of which is also pixel super-resolved.

**UCLA Case No. 2016-802**

**LEAD INVENTOR:** Aydogan Ozcan

**Patent Status:** Pending

### Multi-Modal Depth-Resolved Tissue Status Monitor

Researchers at UCLA have developed a portable tissue status monitor that sits on the surface of the skin and can provide depth-resolved information about tissue health status, which is of paramount importance where tissue is very thin or consists of multiple layers. The monitor uses a variety of sensors to perform not only near-infrared spectroscopy, but also ultrasound, pressure, temperature and stretch sensing. In providing depth-resolved physiologic information, the technology may be used to monitor tissue after vascular surgery, during prolonged surgeries, or after mastectomy. In addition, the device can fit easily under surgical dressings or casts, and operates wirelessly, making it rather simple to use.

**UCLA Case No. 2013-527**

**LEAD INVENTOR:** Warren Grundfest

**Patent Status:** Pending

**Pub. No. WO/2014/165049**

### A Device for *In Vivo* Characterization of Body Fluids

The rheological properties of certain fluid reservoirs in the body, such as the vitreous humor of the eye, hold clinical value for monitoring a variety of disorders as well as evaluating effects of therapeutic treatments. However, no devices currently exist to rapidly assess fluid properties in humans *in vivo*. Dr. Pirouz Kavehpour, Professor in the Department of Mechanical & Aerospace Engineering at UCLA, and colleagues have developed a needle-like probe to directly quantify the rheological properties of human body fluid in real time. Dr. Kavehpour's work has demonstrated that the physical properties of human body fluid can be informative in determining macromolecular structure and organization within an organ and that this information may be useful for detecting and monitoring disease. This probe has the advantages of

being minimally-invasive and can measure fluid properties *in vivo*, obviating the need for fluid extraction. Thus, this device can be used to diagnose the risk or the presence of a degenerative or pathologic state through measurement of body fluid.

**UCLA Case No. 2011-208**

**LEAD INVENTOR:** Pirouz Kavehpour

**Patent Status:** Pending

**Pub. No. WO/2014/182317**

### Non-Invasive Optometric Medical Diagnostic Device

UCLA researchers have created a fast, low-cost, and non-invasive approach for diagnosing various skin-related diseases. The technology takes advantage of the temporal response of endogenous fluorophores to a pulse of excitation light. A non-invasive optometric device is used to measure skin autofluorescence which depends on the health of the patient. The optometric device can be used to diagnose any disease affecting the auto-fluorescence of the skin. Examples include hyper-pigmentation diagnosis of non-melanoma skin cancer, photo-aging caused by UV, and monitoring utriculus. It can also be used to determine the depth and size of a cancerous lesion and changes in skin morphology. The device could be used for—but is not limited to—monitoring diabetes, skin-related disorders, cancer, acne, and photo-aging.

**UCLA Case No. 2004-657**

**LEAD INVENTOR:** Laurent Pilon

**Patent Status:** U.S. Patent Issued  
**#7,904,140**

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## Orthopedic Devices and Biomechanics

### Tendon-Driven Actuation Module for Robotic Hands

Researchers, led by Dr. Veronica J. Santos in the UCLA Biomechatronics Lab, have developed a compact actuation module that can deliver fast, forceful, high-precision control of any tendon-driven robotic manipulator. The design is based on a rotary motor unit that can exert either uni- or bi-directional ("push-pull") control of any tendon-driven rotational joint, thereby enabling independent, high-performance control of each individual active degree of freedom in a robotic hand, including a palmar flexion degree of freedom.

**UCLA Case No. 2015-071**

**LEAD INVENTOR:** Veronica Santos

**Patent Status:** Pending

**Pub. No. WO/2014/055753**

## Objective, Real-Time Acoustic Measurement and Feedback for Proper Fit and Fill of Hip Implants

Orthopedic surgeons currently rely on manual assessment of the fit of implants in bone, leaving the procedure prone to technical errors that require revision surgeries. The present invention helps improve implant fit by aiding surgeons' senses during the broaching procedure by analyzing and classifying acoustic features generated from hammering the broach into cancellous bone. The method monitors the impact between the femoral component of a hip prosthesis with the patient's femur. The impact data is decomposed by a data acquisition and analysis device. Metrics based on a number of acoustic features are calculated to determine the fit and stability of the broach in the femur. Results are classified and output to a user interface to assist the surgeon.

**UCLA Case No. 2014-935**

**LEAD INVENTOR:** George Hafzalla

**Patent Status:** Pending

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## Radiation Therapy and Oncology

### A Breast Immobilization Device to Improve Radiation Therapy Dosimetry

Breast setup and immobilization is a difficult problem for external beam radiation therapy of breast cancers. A lack of setup reproducibility with breast tissue results in sub-optimal dosimetry and tissue toxicity in non-targeted, healthy tissues. Dr. Ke Sheng, Associate Professor in UCLA's Department of Radiation Oncology, has developed a novel breast immobilization device that allows for more comfortable support as well as a robust radiation dosimetry improvement in breast tissue without the skin dose build-up effect that has plagued existing methods. The device is low-cost and modifiable for the desired breast morphology.

**UCLA Case No. 2013-077**

**LEAD INVENTOR:** Ke Sheng

**Patent Status:** Pending

**Pub. No. WO/2014/074602**

## Magnetic Resonance Imaging (MRI) Device for Improved High-Dose-Rate (HDR) Brachytherapy Treatment Planning

Internal radiation therapy (brachytherapy) involves the positioning of tiny, radiation-emitting sources within tumor tissue by using delivery devices such as catheters, needles or other hollow conduits. Dr. Daniel Ennis, Dr. Jeffrey Demanes, and colleagues in UCLA's Department of Radiological Sciences have developed a device that allows for the effective imaging of the radiation-delivering catheter and the surrounding tissue. Under MRI, the device can be detected with high contrast, thereby providing valuable positioning information of the treatment catheters relative to the tumor and normal tissue. The device will allow optimal positioning of the radiation source for the purpose of radiation therapy. This device has utility in visualizing catheter placement in the body where brachytherapy is the preferred treatment strategy and where catheters are used as brachytherapy conduits.

**UCLA Case No. 2012-546**

**LEAD INVENTOR:** Daniel Ennis

**Patent Status:** Pending

**Pub. No. US 2016/0030768**

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## Sensors and Patient Monitoring Devices

### Non-Invasive System for Classification of Individual's Intake

UCLA researchers have developed a method for processing data from piezoelectric sensors worn around the neck in order to more accurately assess what foods an individual has ingested. Algorithms are being refined that employ a spectrogram analysis towards multiple piezoelectric sensor data. This method could greatly improve monitoring of food intake in an effort to better meet weight management goals.

**UCLA Case No. 2015-108**

**LEAD INVENTOR:** Majid Sarrafzadeh

**Patent Status:** Pending

## Wireless Remote Sensing of Changes in Fluid Filled Containers

Trials of remote sensing of patient metrics, such as blood pressure, have been successful in reducing hospital visits and medical costs by increasing the accuracy and amount of data, while lowering the amount of staff time necessary to take the data. However, for accurate fluid management, staff must measure and analyze the fluids, their flow rates, and their compositions in order to ensure quality care. UCLA researchers have developed a novel device and method for continuous and dynamic monitoring of patient fluids. This technology may extend beyond patient fluids to other medium such as evaluation of air (air leaks) following lung surgery or injury that guide timely management of drainage tubes. Wireless remote sensing technology may quickly detect changes in fluid or air measurements suggestive of complications before or after surgery enabling earlier discharge from the hospital and safer outpatient monitoring.

**UCLA Case No. 2014-499**

**LEAD INVENTOR:** Dieter Enzmann

**Patent Status:** Pending

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## BigFoot: Analysis, Monitoring, Tracking, and Sharing of Biomedical Features of Human Appendages

Many diabetic patients suffer from peripheral neuropathy, a disorder that results in the loss of sensation in their extremities. Individuals with this condition may develop severe infections from sores on the soles of their feet without their knowledge, which can lead to the loss of limbs. BigFoot uses customized software integrated with a commercial flatbed scanner that enables easy image acquisition and analysis of feet abnormalities. For patients that find checking their feet difficult, this tool can easily monitor, track data and share image data in order to identify abnormalities early and prevent complications.

**UCLA Case No. 2014-132**

**LEAD INVENTOR:** Aydogan Ozcan

**Copyright Status:** Pending

## Method to Non-Invasively Determine Respiration Rate Using Pressure Sensors

UCLA researchers in the Department of Electrical Engineering have developed a noninvasive method for measuring respiratory rate. Although not required, the system is intended to be used when the patient is sleeping, either at home or in a clinical setting. While the user is lying on top of the mattress embedded with pressure sensors, the system calculates and displays the breathing rate of the user, which can be used to identify irregular breathing patterns. Of particular note is that the system can detect episodes of apnea and subsequently alert a medical professional or caregiver. The graphical user interface developed as part of the invention provides several additional features.

**UCLA Case No. 2013-009**

**LEAD INVENTOR:** Majid Sarrafzadeh

**Patent Status:** Pending

**Pub. No. US 2014/0155774**

## NMR Probe for Detection of Microstructures

Nuclear Magnetic Resonance (NMR) spectroscopy is a widely-utilized method for analyzing small molecule compositions. However, NMR sensitivity is too poor for diagnostic purposes and has limited its use to academic research. A key component responsible for the sensitivity is the NMR probe, which holds the sample as it is inserted into the magnetic field. UCLA researchers developed an NMR probe with sensitivity superior to current designs. It contains a novel noise reduction mechanism, making it the most sensitive probe of its kind. These properties allow the detection of metabolites at the single cell level. Additionally, the probe has a planar configuration, making it ideally suited for microfluidic chips used for diagnosis and prognosis. It is also made with an ultra small detection region, 0.08 mm length by 0.05 mm width by 0.05 mm height, for samples of small volume and low concentration (such as biological samples).

**UCLA Case No. 2012-550**

**LEAD INVENTOR:** Louis Bouchard

**Patent Status:** Pending

**Pub. No. WO/2014/011937**

## Corneal Hydration Sensing with THz Illumination

Proper corneal hydration levels are critical to maintaining optical vision. Researchers at UCLA have developed an imaging system to detect corneal hydration levels by illuminating the cornea with low power, low energy, terahertz (THz) frequency light and measuring the magnitude of the reflected THz signal. The system is capable of resolving 0.18% changes in the water concentration of the cornea *in vivo* and results suggest a ~3x increase in dynamic range over ultrasound-based pachymetry. This system can be used for detecting inflammation, immune responses, edema, or other disease in the cornea.

**UCLA Case No. 2012-100**

**LEAD INVENTOR:** Martin Culjat

**Patent Status:** U.S. Patent Issued  
**#8,690,331**

## Surgical Tools

### Novel Surgical Device for Scleral Buckling Retinal Detachment Repair

UCLA researchers Michael Klufas and Jean-Pierre Hubschman and colleagues have invented a novel surgical tool that aids in the placement of scleral buckles for the treatment of detached retinas. The compact tool allows the surgeon to directly visualize the sclera during the procedure, allowing for more accurate and acceptable placement of both the scleral buckle and drains. Currently, placement of subretinal fluid drains is done "blind" in most clinics. The device requires no electronics and can be used with standard ophthalmic equipment. It can also be utilized as a teaching aid for new ophthalmic physicians.

**UCLA Case No. 2016-99K**

**LEAD INVENTOR:** Michael Klufas

**Patent Status:** Pending

### IVC Filter Web Retrieval Device

UCLA researchers have developed a new IVC filter retrieval system that can be used for extraction of the web component of an inferior vena cava (IVC) filter, a device designed to stop a blood clot from traveling to the heart and lungs. Generally, the filter is removed when the patient is no longer thought to be at risk for future thromboembolic disease, due to the risk of potential complications associated with longer filter dwell times (including caval thrombosis, IVC or adjacent vessel perforation, and filter migration). Despite that, filter retrieval rates remain low, ranging from 20% to 60%, as IVC filter retrieval requires a

trans-jugular approach, and these techniques cannot be used for secure and reliable retrieval of the web component. This device can be used for secure and reliable retrieval of the web component of IVC filters, which cannot be achieved by other filter retrieval systems. After web retrieval, the frame remains in the IVC.

**UCLA Case No. 2016-639**

**LEAD INVENTOR:** Bashir Tafti

**Patent Status:** Pending

## Percutaneous Catheter for Lung Assist Device

Some patients with severe lung disease need to be treated with ECMO systems that oxygenate the blood using extracorporeal, bedside machines. The currently used catheters for ECMO systems suffer from two primary disadvantages: blood that has already been oxygenated often gets re-circulated through the system; and the catheter's strong dependence on position results in inefficiencies when a patient inevitably moves. Dr. Ardehali has designed a catheter that overcomes these inefficiencies in ECMO catheter design by having both more stability during use and a better fluid flow design that reduces re-circulation.

**UCLA Case No. 2014-642**

**LEAD INVENTOR:** Abbas Ardehali

**Patent Status:** Pending

## Device for Creating Stoma with Desired Characteristics

An ostomy is the surgical process of creating an opening (i.e. stoma) between a hollow organ and the skin. The opening can be used to treat certain diseases of the digestive or urinary systems, or it can be used to remove an organ. Currently, the skin defect for an ostomy is created freehand by the surgeon using a knife or cutting electrocautery and often is irregularly shaped and inappropriately sized. Even when a template is used to mark the defect, intrinsic skin tension due to collagen fiber still introduces imperfection in the opening. Physicians from UCLA Department of Surgery conceptualized a device for creating clean stomata that involves a circular saw and a mechanism for stretching the skin to specific tension. The invention can tailor to the appropriate size of the patient and the size of the hollow viscous. This easy-to-use instrument can assist in reliably and consistently creating optimal stoma.

**UCLA Case No. 2014-597**

**LEAD INVENTOR:** Jonathan Sack

**Patent Status:** Pending

## Image-Guided Irrigating Suction Cannula for Removal of Intracerebral Hemorrhage and Other Lesions

Intracerebral hemorrhages (ICHs) are potentially life-threatening conditions that occur when a blood vessel ruptures within the brain and causes an accumulation of blood. Dr. Neil Martin at UCLA has designed a simple multifunctional cannula system for performing minimally invasive image-guided evacuation of ICHs. After making a small burr hole in the skull, the cannula system is inserted toward areas of localized bleeding to both evacuate excess blood and irrigate the wound site until hemostasis is reestablished. With multiple instrument adapters, this system is capable of performing visual endoscope guidance, stereotactic image guidance, MRI image guidance, and computerized tomography image guidance. Additionally, Dr. Martin's instrument may be adapted to allow the use of a rotational clot or tissue fragmentation device for hematomas with higher levels of blood clotting.

**UCLA Case No. 2014-320**

**LEAD INVENTOR:** Neil Martin

**Patent Status:** Pending

**Pub. No.** WO/2016/007553

## Organ Resuscitation Solution and System for Enhanced Liver Transplantation

Researchers in the Department of Surgery and UCLA Pflieger Liver Institute have developed a novel solution and system to minimize the tremendous degree of ischemia and reperfusion injury (IRI) associated with liver transplantation. The invention serves to replenish exhausted nutrients and resuscitate the organ before revascularization. In a swine model, use of the novel solution and system demonstrated enhanced liver function and improved survival compared to conventional approaches. This system may salvage livers that are deemed to have incurred a severe degree of ischemic injury and are discarded. A solution and system to alleviate organ damage from IRI would have significant consequences on patient outcomes as well as the availability of transplantable organs.

**UCLA Case No. 2012-292**

**LEAD INVENTOR:** Johnny Hong

**Patent Status:** Pending

**Pub. No.** US 2014/0329221

## A Video-Guided Chest Tube Insertion System

Dr. Robert Cameron, Professor of Clinical Cardiothoracic Surgery and Surgical Oncology in the Department of Surgery at UCLA, has designed a novel trocar system that supports real-time visual monitoring of chest tube placement. Thousands of chest tubes are placed annually into the pleural space of patients who have excessive air and/or fluid collapsing the lung. Currently, chest tube placement involves either an extremely painful "medieval" incision and clamp technique or a trocar/dilator system, both of which are "blind" procedures often leading to poor tube position, organ damage, and even death. Dr. Cameron's device capitalizes on existing medical video technology to provide real-time monitoring and guidance of anatomical position of the chest tube during placement.

**UCLA Case No. 2012-287**

**LEAD INVENTOR:** Robert Cameron

**Patent Status:** Pending

**Pub. No.** US 2015/0342699

## Lung Isolation System

Researchers at UCLA have invented a novel system that achieves reliable lung isolation using a standard large bore single lumen endotracheal tube, which maximizes compatibility with other devices. The system enables true dual lumen lung isolation/ventilation thus enabling all the benefits of both a double lumen tube and a bronchial blocker (the current methods of treatment) without the downsides of either. It also incorporates a video visualization system, thus precluding the need for traditional fiberoptic bronchoscopy.

**UCLA Case No. 2011-739**

**LEAD INVENTOR:** Nir Hoftman

**Patent Status:** Pending

**Pub. No.** WO/2013/188845

## Robotic Micro-Surgery System

Researchers at UCLA have developed a robotic system that performs complete micro-surgical procedures by exactly mimicking the motion of a joystick controlled by a surgeon. The system incorporates multiple arms, which can be moved separately or in unison. Each arm holds a surgical instrument that is moved in real time, has high range of motion, and has access to a universal cartridge that facilitates connections for multiple utilities. The instrument precision is further refined by filtering and removing the natural tremor of the surgeon's hand. Additionally, because micro-surgery requires the instrument to mechanically maintain a fixed-point of rotation at the site of penetration, the system incorporates an integrated tracking system that allows the robot to compensate for patient movement. The tracking system also triggers automatic termination in the event that the patient moves beyond a determined threshold.

**UCLA Case No. 2009-300**

**LEAD INVENTOR:** Tsu-Chin Tsao

**Patent Status:** U.S. Patent Issued

**#9,283,043**

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