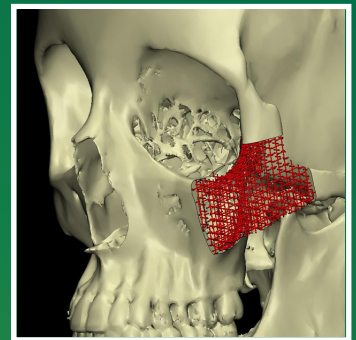
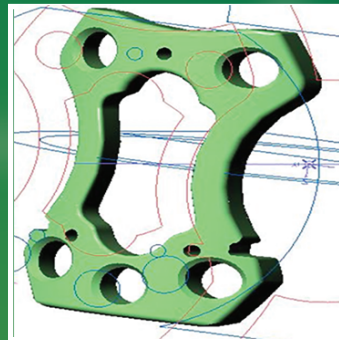


# Advancing USF Innovation



*Medical Devices*

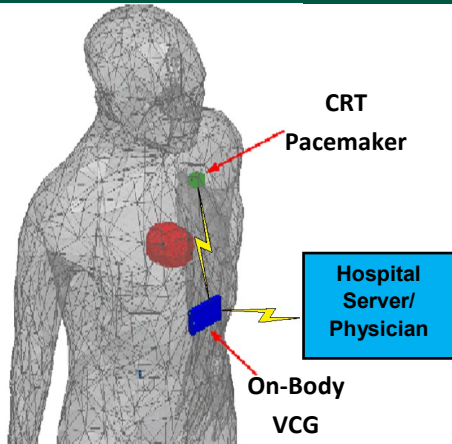


The University of South Florida (USF) Technology Transfer Office (TTO) was ranked in the Top 20 of American Universities for technology transfer by the prestigious Milken Institute. TTO endeavors to educate and promote innovation, the result of which is products, jobs and technologies utilized in the public interest. TTO's work allows for a sustained focus on transferring cutting-edge research and innovation to the commercial marketplace, generating revenue and diversifying the economy. USF is the nation's seventh leading public university in generating new United States utility patents and ranks 16th among universities worldwide in this key measure of innovation, according to the National Academy of Inventors (NAI) and the Intellectual Property Owners Association (IPO). With 96 new utility patents issued in CY 2018, USF continues to stand with some of the world's most prestigious institutions in the highly competitive arena. USF has ranked in the top 10 among public universities for U.S. patents granted for the past eight years.

The TTO negotiated 98 license and option agreements in FY 2019, and these agreements represent companies that have contracted with USF to further develop research into commercial products and to help bring USF's innovation into the marketplace.

USF facilitated the formation of seven new startup companies in FY 2019, and has facilitated the formation of 47 startup companies in the last five years. USF also had 173 disclosures in FY 2019.

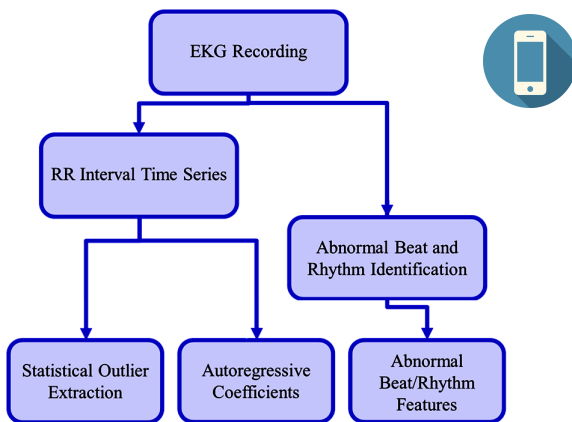
Page	Area of Interest
3	Cardiology
4	Drug and Gene Delivery
6	Medical Equipment and Devices
12	Imaging
13	Information Systems and Technology
19	Minimally Invasive & Laparoscopic
22	Neurology
24	Spine and Orthopedics
27	Women's Health
29	Medical Simulation



**VectorCardiogram (VCG) System**

- Enables remote real-time monitoring of the heart
- Provides clinical benefits such as shortened outpatient wait times
- Compact and low cost
- **Prototype Available**

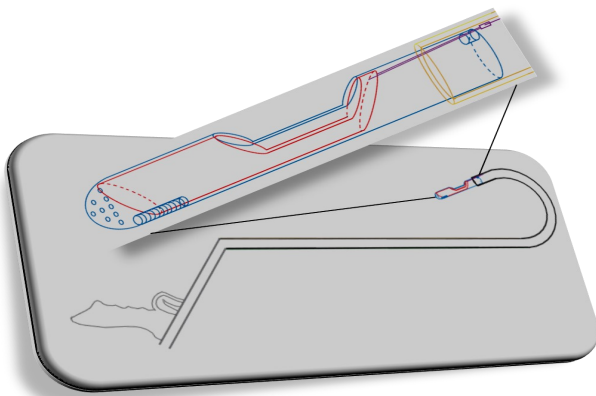
**USF Tech ID # 13B205**  
**US Patent# 9,451,890**



**Prediction of Heart Disease Using the Integrated Vector Cardiogram (iVCG) System**

- Application of method that predicts a heart condition based on data from devices such as the **VectorCardiogram (VCG)**
- Provides full diagnostic quality and remote long-term monitoring
- Can connect to user smartphone
- **Prototype Available**

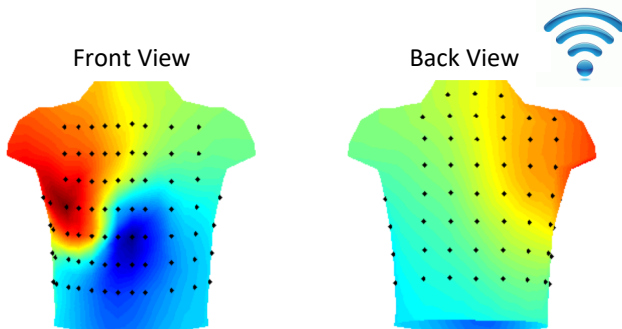
**USF Tech ID# 17B113**  
**Patent Pending**



**Cardiac Septal Myectomy Device**

- Non-surgical approach that eliminates need for open heart septal myectomy
- Requires only mild, local anesthetics
- Eliminates serious complications of standard treatment methods
- Can be used for the removal of tumors, circulatory plaque, and thrombosis
- **In Development**

**USF Tech ID# 09A005**  
**US Patent# 8,906,052; 9,629,651**



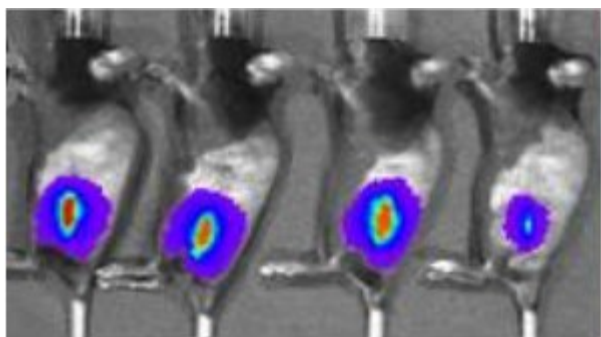
**Wearable Nano-Textile Cardiac Cartographic Imaging**

- Novel Wearable nano-fiber embedded ECGI smart shirt for the diagnostics of cardiovascular diseases
- High resolution remote monitoring
- Direct wireless communication with user
- Wearable and Comfortable
- **In Development**

**USF Tech ID# 12B120**  
**US Patent# 9,014,795**

Body area ECG sensor network.

Note: Black dots represent sensor locations.

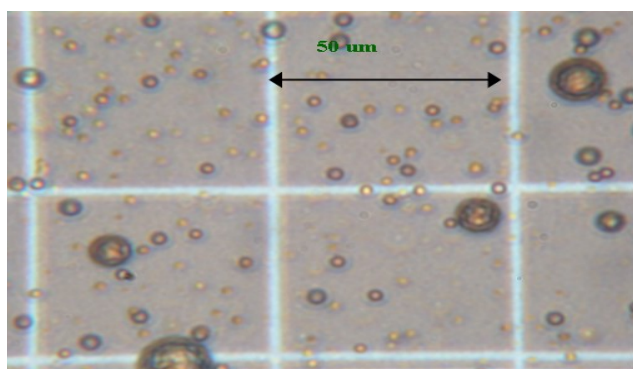


A visualization of the delivery of DNA in mice.

**Corona Ion Generation for Manipulation of Molecules and Biological Cells**

- Noninvasive technique for intracellular delivery
- Molecular penetration into cells/tissues without the need for contact between electrodes and cells
- Avoids muscle contraction
- Minimizes tissue damage; limits pain and discomfort
- **In Development**

**USF Tech ID# 02A003**  
**US Patent# 6,929,949**

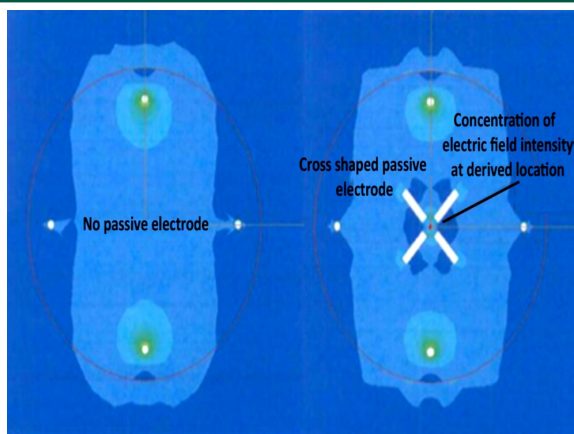


A micrograph of a noisome sample on a hemocytometer.

**Ultrasound Enhancement of Drug Release Across Non-Ionic Surfactant Membranes**

- Therapeutic application of ultrasound
- Targeted drug delivery with 'niosomes' and controlled release
- Decreased drug dosage, lower cost, and reduced side effects
- Site specific drug delivery with increased efficacy

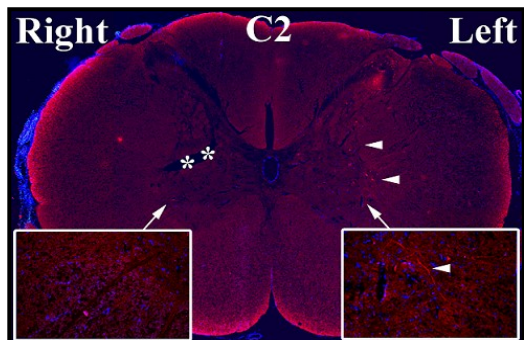
**USF Tech ID# 04A057**  
**US Patent# 7,981,442; 8,435,558**



**Passive Electric Field Focus System for In Vivo and In Vitro Applications**

- Directs electric fields for applications on living cells and tissues
- Facilitates "in vivo" electroporation in tissues that are in hard to reach locations
- Reduces and/or eliminates Joule heating and redox reactions that would occur at active electrodes
- **In Development**

**USF Tech ID# 05B087**  
**US Patent# 9,014,800; 9,486,626**

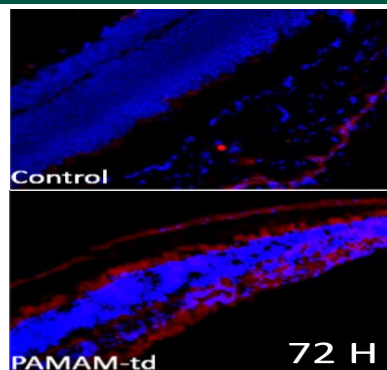


Selective delivery of Evans Blue (EB) dye in cross-section of rabbit cervical spinal cord.

**Novel Non-Invasive Method for Direct Delivery of Therapeutics to the Spinal Cord in the Treatment of Spinal Cord Pathology**

- Highly specific delivery of therapeutics to the spinal cord
- Improves delivery and enhances efficacy and less brain or systemic exposure
- Multiple application in the treatment of neurodegenerative disorders

**USF Tech ID# 15B171**  
**Patent Pending**

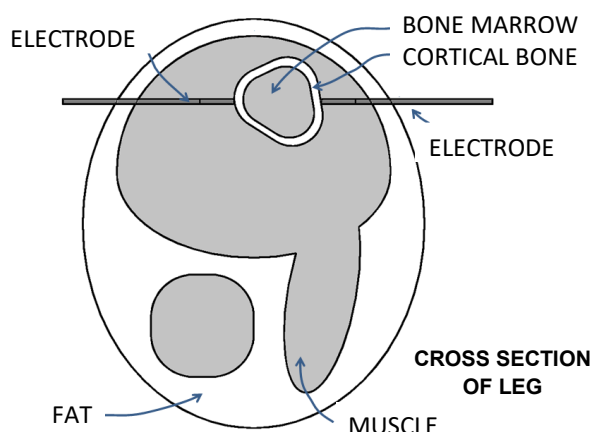


Gene Expression of PAMAM Dendrimer Based Drug Delivery to Retinas in Mice

### A Method of Delivering Genes and Drugs to the Posterior Eye

- Does not disturb integrity of the protective layers of the eye
- Non-invasive
- Simple delivery method
- **In Development**

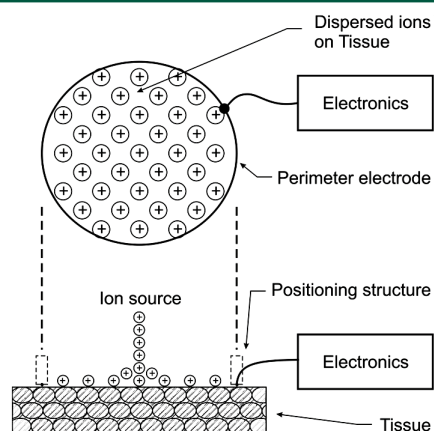
**USF Tech ID# 18B149**  
**Patent Pending**



### Device to Control Frequency Dependent Spatial Energy Distribution

- Method and device to distribute electromagnetic energy in biological tissues for many diagnostic and therapeutic purposes
- Useful in tissue ablation procedures
- Control the level of distribution of electromagnetic effects
- Control the magnitude of electromagnetic effects
- **In Development**

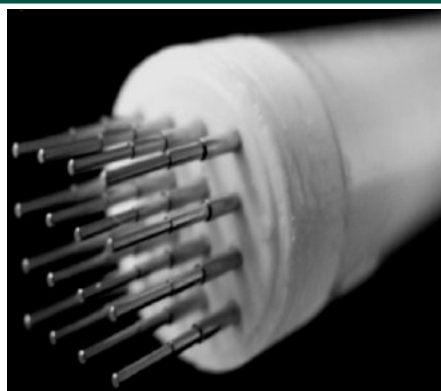
**USF Tech ID# 12B139**  
**US Patent# 10,080,907**



### Perimeter Ion Control and Ion Extraction

- Drug and gene delivery, disinfection, chemical surface treatments and hair removal
- This method defines the region of treatment and facilitates temporal modulation of the electric field at the treatment site
- Protect the treatment subject, nearby personnel and equipment from electrostatic discharge
- **In Development**

**USF Tech ID# 14B148**  
**US Patent# 9,981,126**

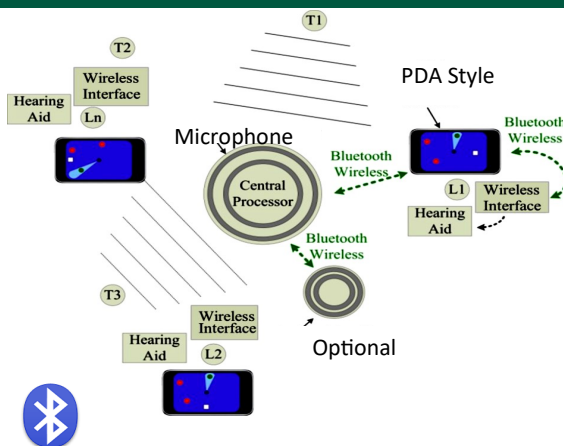


The electroporation and impedance measurement device.

### Electroporation Controlled by Electrical Impedance Measurements

- System is capable of measuring murine skin impedance spectra before, during, and after gene electro transfer pulse.
- Control the electrical “dose” for molecular delivery
- Optimized drug delivery and customized electrical treatment
- **In Development**

**USF Tech ID# 14B169**  
**Patent Pending**



### Adaptive User-Guided Assistive Listening System

- Enables hearing disabled in multi-talker or noisy environments
- Ergonomic user-guided location selection
- Supports multiple simultaneous users
- Wireless communication between the central system and person ear-level hearing enhancement device

**USF Tech ID# 13B136**  
**US Patent# 9,729,994**



The resistive localized rehabilitation exoskeleton.

### Resistive Consumer Rehabilitation Exoskeleton

- A rehabilitation exoskeleton geared to aid stroke victims with muscle movements
- Injury-specific rehabilitation and motion restoration
- Full control of muscle through engage and disengage mechanism
- Can be installed in hospitals and clinics
- Cheap, safe, light and noise-free

**USF Tech ID# 16B139**  
**Patent Pending**



The folding frame motorized prone cart in horizontal or transfer position.

### Folding Frame Motorized Prone Carts

- Reduces neck strain
- Improves circulation, respiration, pressure relief and digestion
- Prevention of contractures
- Increase independence

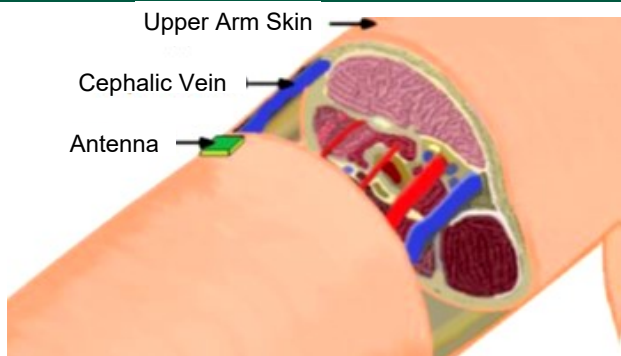
**USF Tech ID# 07A036**  
**US Patent# 7,690,057**



### Pill Bottle Opener

- A tool to assist individuals with decreased hand motor skills in opening a wide variety of medicine containers
- Easy to use and cheap to manufacture
- Easily labeled with company product names and logo
- **Prototype Available**

**USF Tech ID# 09A044**  
**US Patent# 8,438,951**

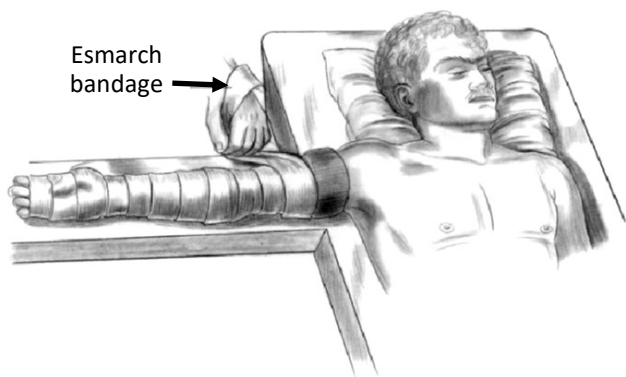


This arm physiology sectional cut shows how the antenna will be placed over the skin.

### **Non-Invasive Blood Glucose Sensing**

- The antenna is on the external surface of the body
- Provides accurate measurements without implanting the device into the skin
- Continuous monitoring of glucose levels
- Easy replacement

**USF Tech ID# 18A003**  
**Patent Pending**



### **Modified Stretchable Band (Esmarch) for Limb Hemoevacuation**

- Image guides to indicate an approximate bandage pressure
- Improvement upon current bands by adding image guides
- Gives indication of amount of force on the limb
- Helps control pressure and prevents excessive pressure caused by judgment of force

**USF Tech ID# 09A053**  
**US Patent# 8,372,024**



An Example of the Electronic "Eye" Connected to a Computer

### **Digital Timed Walk Assessment Device**

- More accurately measures the timed 25 foot walk
- More consistent and accurate than a stopwatch
- Removes human error
- **Prototype Available**

**USF Tech ID# 18B130**  
**Patent Pending**



### **Gastrostomy Tube Allowing Optimized Stomach Suctioning**

- Continuous stomach suction without occlusion of the tube
- Reduction in the need to monitor the tube frequently
- Still allows the use of the tube for feeding procedures
- **In Development**

**USF Tech ID# 13B132**  
**US Patent# 9,867,915**





### Omni-Directional Mobility Transportation System

- Body weight controlled automated multi-directional wheelchair
- Remote wireless control with voice activation capability
- Solar powered charging capability and interconnectivity options such as Bluetooth, wifi, and short range RFID
- Configurations include: multi-motion chair, a skateboard like device, and body conforming unit with variable shape
- **Prototype Available**

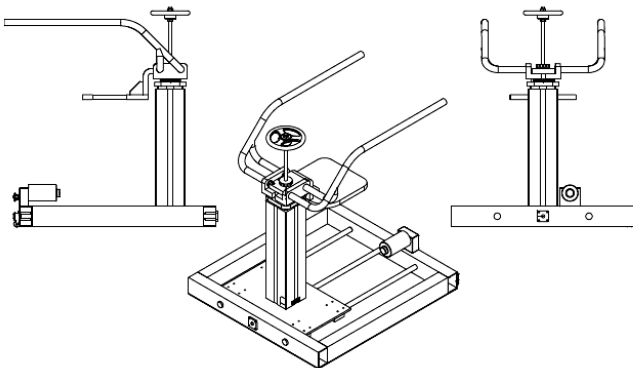
**USF Tech ID# 09B085**  
**US Patent# D642,962**



### Hands-Free Control System and User Interface for Mobility Device

- Functional, hands-free control of a mobility device with user interface for greater freedom and independence
- Engineered for greater stability and easy maneuverability
- Increases capacity for chair user to interact with upper body in sports, recreation, dance or daily life activity

**USF Tech ID# 11A072**  
**US Patent# 7,748,490; 9,241,851**

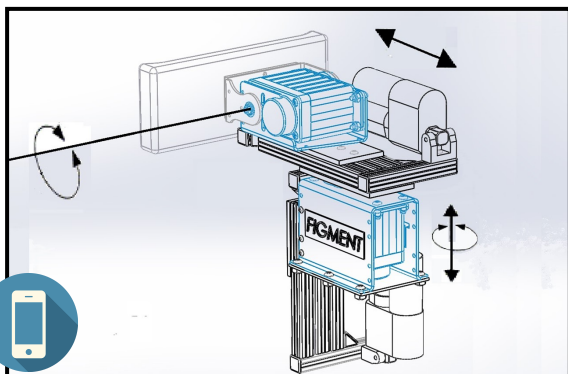


A blueprint of the portable lift and chair.

### Portable Lift and Chair to Make Chair to Bed Transfer Simpler and Easier

- Equipment to aid disabled individuals transferring from a wheelchair to a raised bed
- Effectively and efficiently transfer
- Device can be transported with very little effort

**USF Tech ID# 10A045**  
**US Patent# 8,584,273**

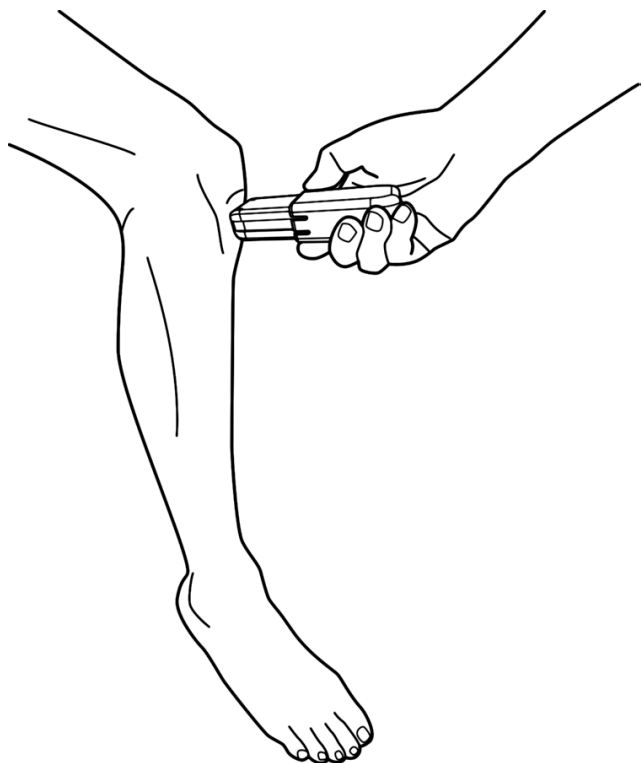


A diagram of the complete headrest assembly.

### Bluetooth Adjustable Wheelchair Headrest Control

- Motorized adjustable headrest system with multi-directional control
- Wireless app-based control interface can be used with existing devices (i.e. Apple or Android)
- Can be used on any wheelchair

**USF Tech ID# 15B143**  
**Patent Pending**



### Spring-Loaded Device for Eliciting Deep Tendon Reflexes

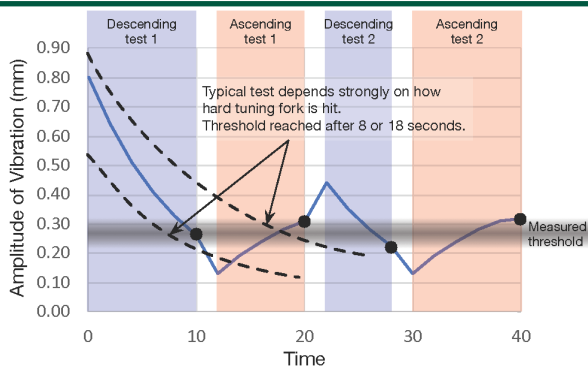
- An easy to use, repeatable and consistent device
- Is compact, durable, cost effective and reusable
- Is effective even when used on patients with limb contractures or obesity
- **Prototype Available**

**USF Tech ID# 17B165**  
**Patent Pending**

#### Technology Description:

Researchers at USF have invented a device which specifically tests deep tendon reflexes. This device improves upon current methods and is effective when used on patients with limb contractures or obesity. To operate, the device is pressed against the desired tendon. Pressure against the patient's skin releases a spring-loaded mass which delivers force to the tendon, generating a reflex. After release, the device automatically returns to the ready position. This device has the potential to improve assessment of deep tendon reflexes.

A depiction of the device tested on a patient's knee.

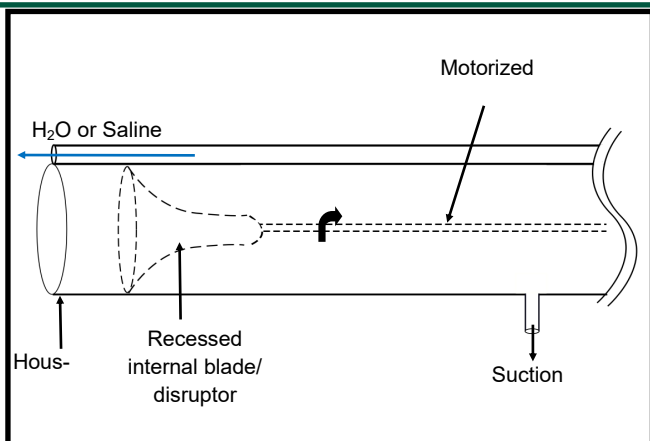


The Dependence of Screening Efficiency on the Amplitude and Frequency of Vibration

### Systems and Methods for Electronic Neurologic Vibratory Sense Evaluation

- Measures more specific and accurate vibratory senses
- Does not rely on verbal cues
- Vibration amplitude follows a set pattern
- **Prototype Available**

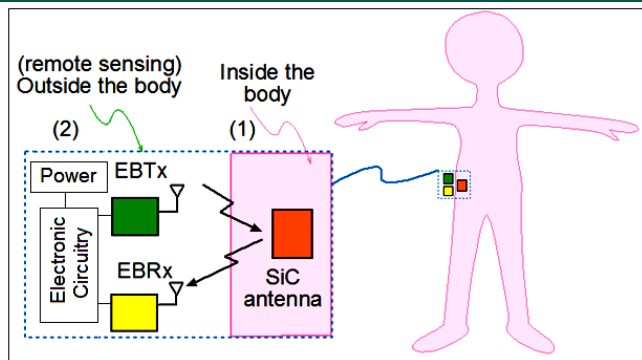
**USF Tech ID# 18B133**  
**Patent Pending**



### Endoscopic Tissue Removal System

- Safer and more efficient laparoscopic morcellator device
- Decreases spread of potentially cancerous cells
- For removal of large tissue masses during minimally invasive surgery in a contained environment
- **In Development**

**USF Tech ID# 15B145**  
**Patent Pending**

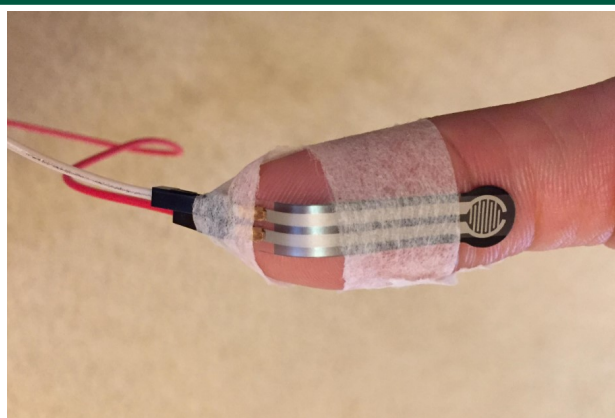


A depiction of the passive sensing continuous glucose monitoring system.

### Continuous Glucose Monitoring Based on Remote Sensing of Variations of Parameters of a SiC Implanted Antenna

- Biocompatible passive implant for continuous glucose monitoring
- Eliminates constant pricking for blood samples
- No internalized power source
- Highly biocompatible

**USF Tech ID# 15B155**  
**Patent Pending**

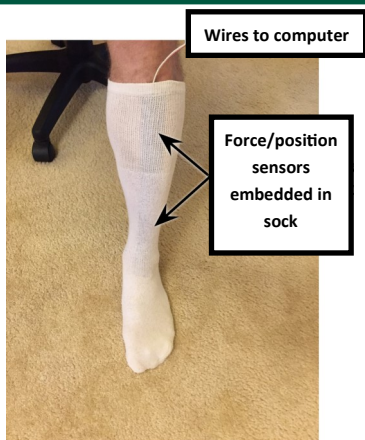


A Prototype of the Electronic Device

### Systems and Methods for Accurate Electronic “Finger to Thumb Crease” Measurement

- An accurate electronic assessment
- Unbiased
- Gives quantified results
- Leads to more accurate diagnoses
- **Prototype Available**

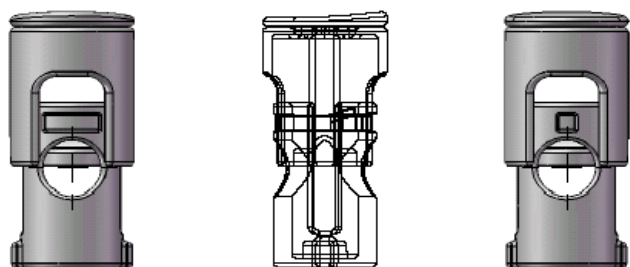
**USF Tech ID# 18B132**  
**Patent Pending**



### An Electronic Method of Performing the “Heel to Shin” Test

- Provides an unbiased assessment
- Removes human error
- Accurate and repeatable
- **Prototype Available**

**USF Tech ID# 18B131**  
**Patent Pending**

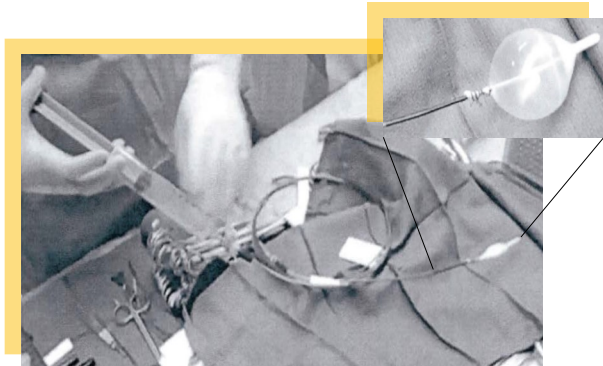


Bladder Drainage Valve

### Improved Postoperative Bag-Less Bladder Drainage Aid

- Catheter is hygienic and can be discreetly worn in underwear
- The system is bag-less; there is no urine-collecting bag
- Patients can empty their bladder only when they choose to
- It is compact and easily operated
- **Prototype Available**

**USF Tech ID# 07A053**  
**US Patent# 8,579,873**

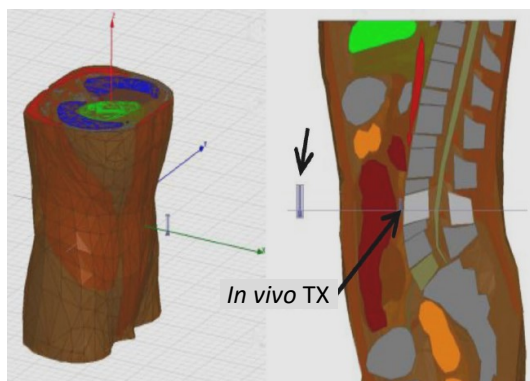


The initial form of the intraluminal bowel occluding catheter with a flexible balloon filled with air.

### Intraluminal Bowel Occluding Catheter

- Prevents loss of endoluminal insufflation
- Improves safety of complex interventional intraluminal procedures
- Internally occludes any gastrointestinal cavity to which is able to conform

**USF Tech ID# 13B150**  
**Patent Pending**

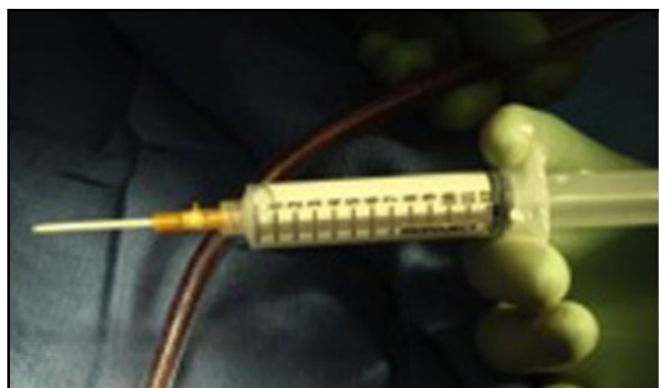


A truncated human body model used to derive SAR levels and channel model.

### Minimally Invasive Networked Surgical System and Method

- Wireless communication for biomedical applications reduces the invasiveness of a number of medical procedures
- Optimized high data rates and improved real-time monitoring
- Simultaneously model BER and SAR levels

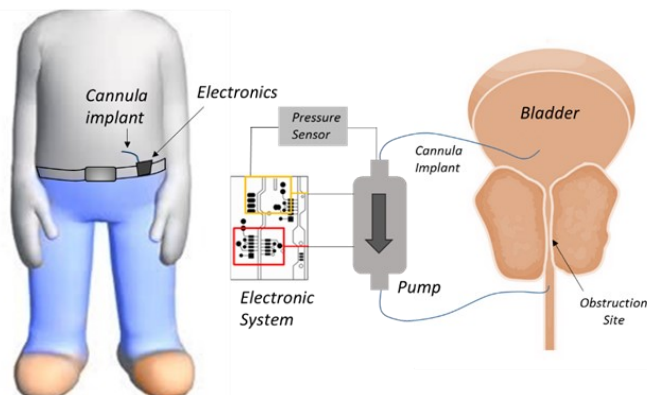
**USF Tech ID# 13B191**  
**US Patent# 9,743,823**



### The Carrion Cast: For The Treatment of Penile Implant Infections

- Cast that is mixed with antimicrobials for the treatment of penile implant infections
- Continuous local exposure to antibiotic/antifungal medication
- Prevents intracorporal fibrosis and loss of phallic length
- Ideal for use in high risk/complex patients
- **Clinical Testing**

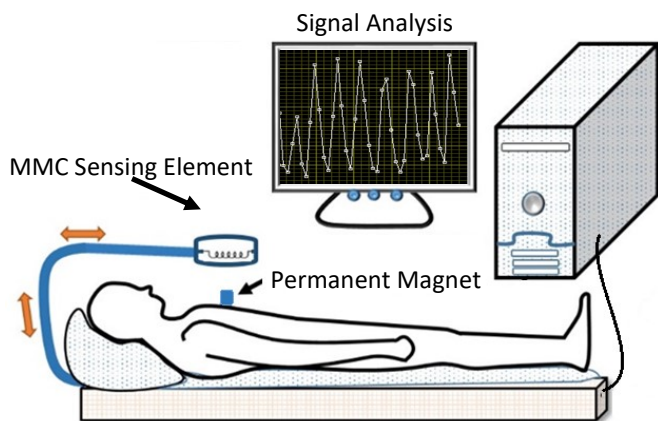
**USF Tech ID# 13B195**  
**US Patent# 9,839,718**



### User-Controlled Urination Management System

- Means for patients suffering from urological conditions to effectively control urination
- Bypasses the obstructed portion of urinary tract
- Electronics can be worn or implanted
- Eliminates leakage and involuntary urination
- **In Development**

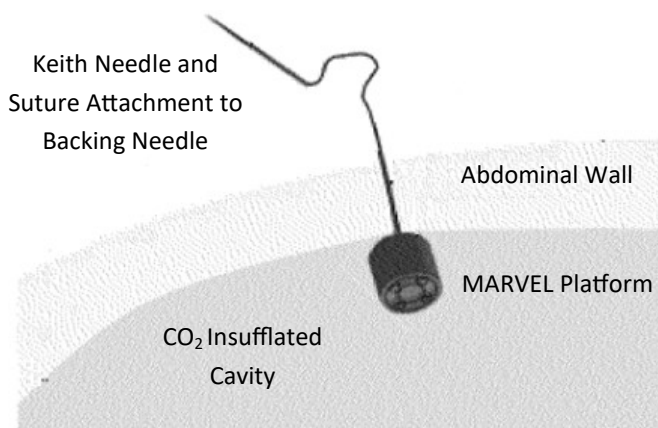
**USF Tech ID# 16B164**  
**Patent Pending**



**Novel Magneto-LC Resonance Technology for Real-Time Respiratory Motion Monitoring**

- Novel technology for real-time monitoring of breathing rates
- Monitors breathing patterns and period rhythm
- Real-time eye/head motion monitoring
- **Clinical Testing**

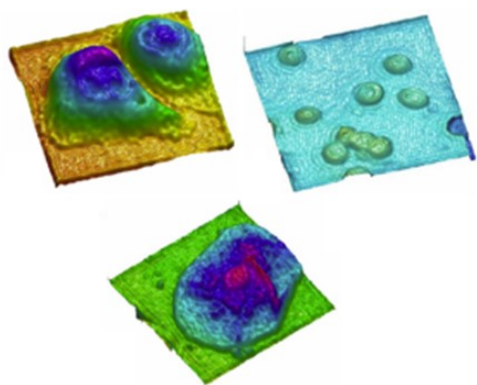
**USF Tech ID# 16B173**  
**Patent Pending**



**See-Through Abdomen Display for Minimally Invasive Surgery**

- Aligns images with actual internal organs at the appropriate location, scale, and orientation
- Uses real-time images
- Improves hand eye coordination
- Can be sterilized by a variety of methods

**USF Tech ID# 09B107**  
**US Patent# 8,504,136**

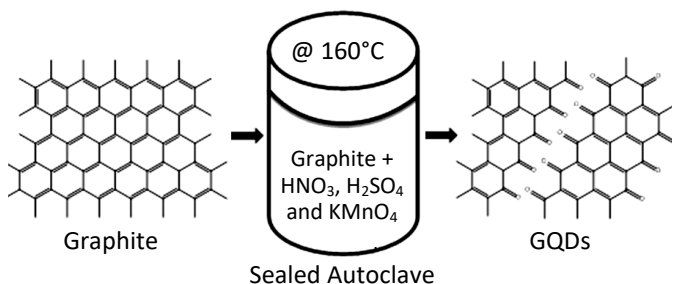


Quantitative phase microscopy by digital holography

**Total Internal Reflection Digital Holographic Microscope**

- Image live cell-substrate interface with nanometer precision
- High signal to noise ratio allows precise quantitative measurement of surface features
- Observe ligand-receptor interaction for purposes of drug discovery
- **Prototype available**

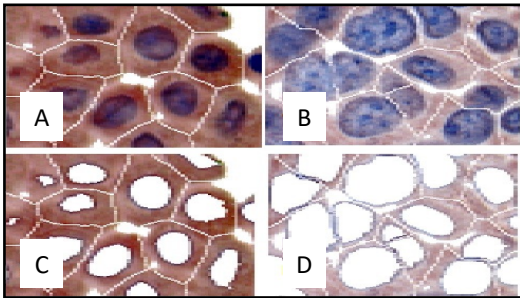
**USF Tech ID# 07A018**  
**US Patent# 7,812,959; 7,880,891**



**One-Step Fast and Facile Preparation of Graphene Quantum Dots from Graphite for Bioimaging Application**

- Synthesis route of graphene quantum dots (GQDs) from graphite for bio-imaging applications
- Produces small, monodisperse size distribution
- Excellent solubility in water and many organic solvents
- Low cytotoxicity, high biocompatibility and inexpensive
- **In Development**

**USF Tech ID# 14A053**  
**US Patent# 9,505,623; 9,751,766**

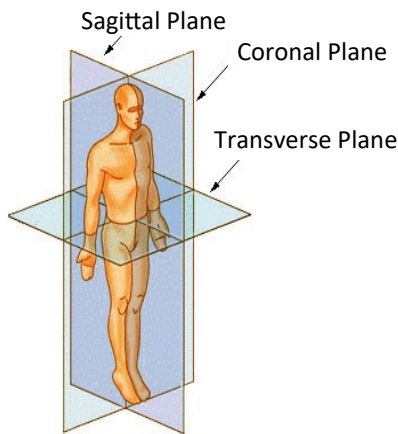


Cell Segmentation Result of Normal Cell Image (A) & Cancer Cell Image (B) Segmented Cytoplasm Tissues of Normal cell image (C) & Cancer Cell Image (D)

### Computer-Aided Pathological Diagnosis System

- System designed for assessment and differentiation of cancer biomarkers as well as identification of cancer cells
- Solution for the issue of cancer diagnosis often depending on the pathologist's subjective interpretation
- Computer-Aided; Self-adjusting parameters of modules
- Highly accurate and objective results

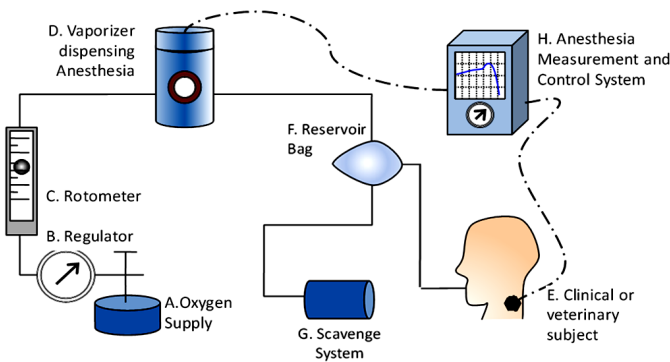
**USF Tech ID# 06A051**  
**US Patent# 8,077,958**



### Novel 3D Imaging System for Disease Diagnosis: Human Morpho-Informatics

- Creates 3D imaging based on any imaging data
- Utilizes more types of measurements in performing diagnoses to rule out similar diseases
- Establishes normal or reference morphology data in differential diagnoses
- Use computer analysis for "first-pass" diagnoses

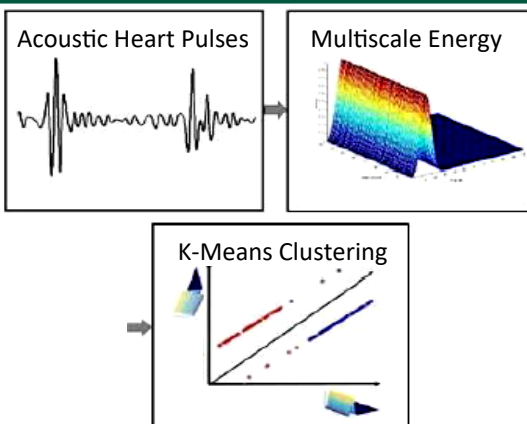
**USF Tech ID# 07A057**  
**US Patent# 8,331,635**



### Anesthesiology Measurement and Control System

- Accurately determines the depth of anesthesia or sedation level of a patient
- Application to both local and systemic modes of anesthesia administration
- Can be used on all organs and tissues, both invasively and non-invasively

**USF Tech ID# 09A011**  
**US Patent# 8,914,102**



### Bio Acoustic Signal Feature Extraction and Pattern Recognition Framework

- Identifies and processes acoustic heart pulses using pattern recognition framework
- Provides sensitive and specific visual results
- Accuracy rate of 90%

**USF Tech ID# 18A113**  
**Patent Pending**

On a scale 0 to 100, where 0 indicates no regret and 100 indicates the maximum regret you could feel, how would you rate the level of your regret if you failed to provide necessary treatment to your patient?



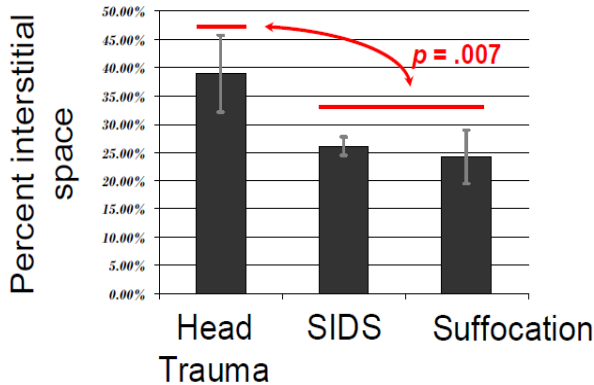
On a scale 0 to 100, where 0 indicates no regret and 100 indicates the maximum regret you could feel, how would you rate the level of your regret if you administered unnecessary treatment to your patient?



**Clinical Decision Support System-Integrating Best Research Evidence with Patient & Physician Preferences at the Point of Care**

- Applicable to any medical condition
- Includes module for chronic pain
- First system to take into account logical, deliberative as well as emotional response and preferences in decision making

**USF Tech ID# 10B105**  
**Copyright TXu 1-736-049**

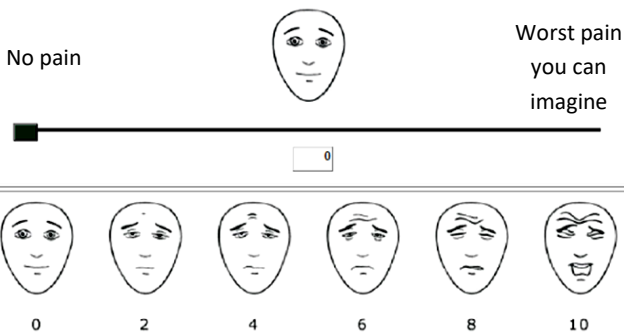


**A Method for Quantitative Assessment of Thymus Integrity**

- Assessment of post-mortem thymus integrity
- Objective and definitive assessment of thymic integrity
- Provides a standardized, quantitative, and more objective approach

**USF Tech ID# 10B121**  
**US Patent# 8,551,713**

How would you describe the level of your pain?



**Evidence-Based Decision Support System for Pain Management**

- Pain management module to help terminally ill and other patients suffering from acute and chronic pain
- Easy to use intuitive web interface
- Can be integrated within electronic medical records
- Recommends dosage duration and route of administration

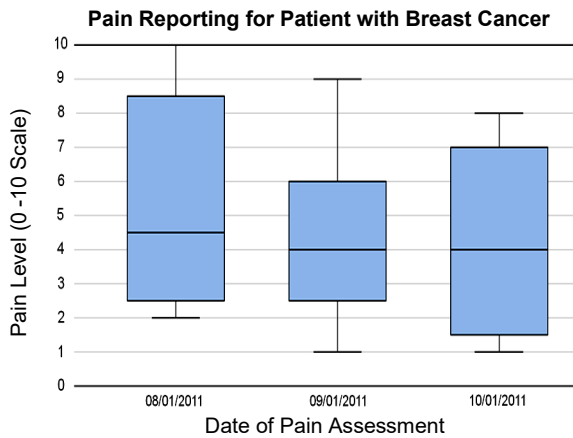
**USF Tech ID# 10B140**  
**Copyright TXu 1-759-008**



**Java Web Platform Update for SCAN (Schedules for Clinical Assessment in Neuropsychiatry)**

- A version of the SCAN that could be used on a variety of electronic platforms, including smart phones, tablets, and conventional computers
- Interactive internet database for data pooling and back up
- Easy collaboration and inherent organization of data

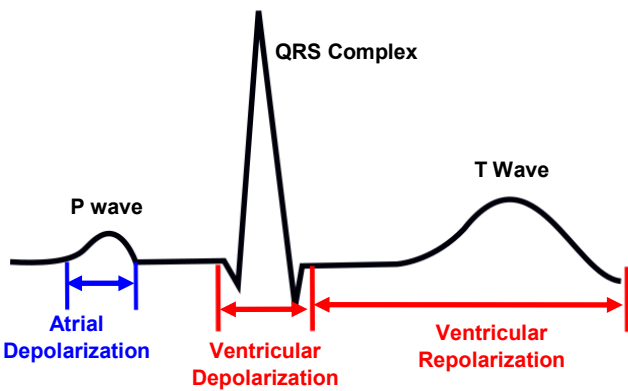
**USF Tech ID# 11A034**  
**Patent Pending**



### Module for Monitoring Quality of Pain Control: Evidence-Based Decision Support System

- “At a glance view” of patient’s treatment and progress of pain management
- Can analyze pain over adjustable time periods, by patient populations, single patient, or disease type
- Leads to improved patient care

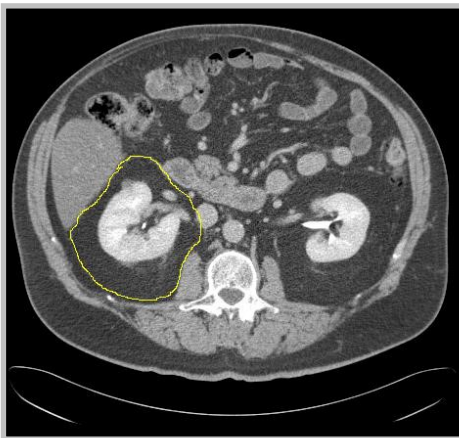
**USF Tech ID# 11B194**  
**Patent Pending**



### Spatiotemporal Differentiation of Cardiovascular Diseases

- Quantifies the dissimilarity of disease-altered patterns in cardiovascular diseases.
- Captures critical spatiotemporal heart dynamics by displaying the real time motion of VCG cardiac vectors in a 3D space.
- Wearable, low cost device

**USF Tech ID# 12B115**  
**US Patent# 9,566,011**



### Using Preoperative CT Imaging to Predict Perinephric Fat Adhesion and Ease of Surgical Dissection

- Non invasive technique to assess amount of perinephric fat to prepare for renal sparing surgery
- Evaluate perinephric fat characteristics from CT imaging
- Helps to determine the ease/difficulty of surgical dissection

**USF Tech ID# 13A009**  
**Patent Pending**

Proportion of patients with adherent perinephric fat		
MAP score	Fraction (%)	95% CI
0	2/36 (6)	1–19
1	3/19 (16)	3–40
2	5/16 (31)	11–59
3	2/4 (50)	7–93
4	6/7 (86)	42–100
5	12/12 (100)	74–100

CI = confidence interval; MAP = Mayo Adhesive Probability.

### Predicting Ease of Perinephric Fat Dissection at Time of Partial Nephrectomy Using Pre-Operative Fat Density Characteristics

- Predict partial nephrectomy complications via CT image scoring
- Non-invasive method that allows the physician to better predict complications prior to surgery
- Optimizes surgical scheduling and improves patient counseling

**USF Tech ID# 14A002**  
**Patent Pending**

MAP score predicts the probability of perinephric fat encounter

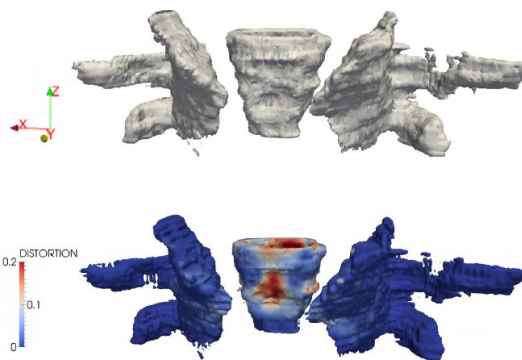




### Computerized Method to Quantitate Blurriness of Ocular Fundus Images

- Computer aided automated grading of the severity of vitritis
- Rapid and unbiased measure of fundus clarity
- Strongly correlates with subjective readings of a skilled physician

USF Tech ID# 14A023  
US Patent# 9,384,416

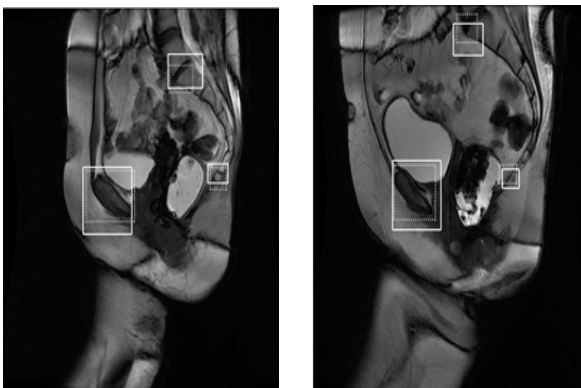


Analysis on vaginal contracture: original configuration (top) and plotted distortional strain (bottom)

### Analysis Suitable Geometry from Discrete Point Sets Using a Mesh-Free Method

- Fully Automated Geometric Model Generation
- Effective analysis-suitable geometric model generation
- Direct application in engineering approaches in medicine where the object to be analyzed is described by discrete medical images, such as MRI or CT scans

USF Tech ID# 14A075  
US Patent# 9,715,760



### Image-Based Automated Measurement Model to Predict Pelvic Organ Prolapse

- Novel method to facilitate the diagnosis of female pelvic organ prolapse
- Automatically extracts pelvic floor measurements from MRI
- Faster and more consistent when compared to the manual process

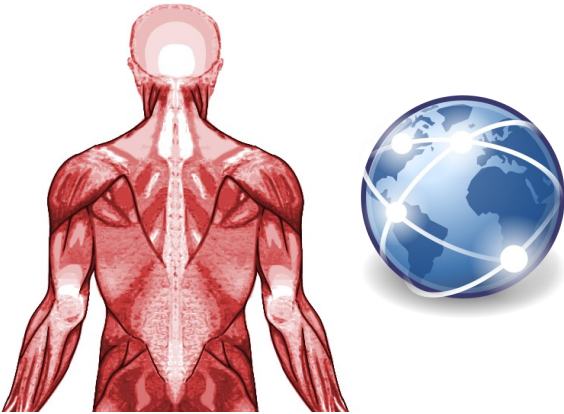
USF Tech ID# 14A082  
Patent Pending



### Realistic Model of the Interior Architecture of the Heart

- Accurate, realistic model of the heart
- Teaching tool for navigating complex cardiac surgical procedures
- Uses raw material that resembles or feels like a heart
- Reduces surgical training time

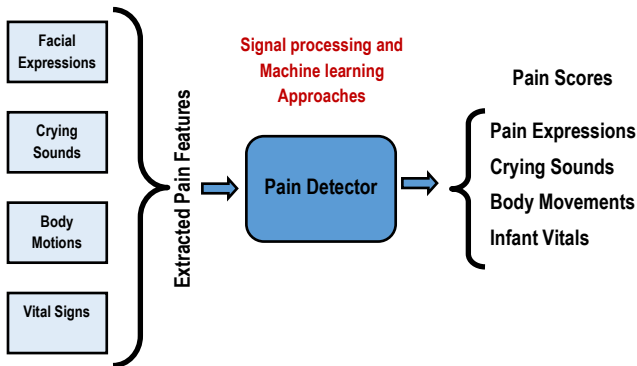
USF Tech ID# 14A095  
Patent Pending



### Web-Based Back and Core Exercise System

- Web-based system to deliver exercise and education programs for the prevention and treatment of spinal disorders
- New model enhancing supervised delivery of back exercise and education programs
- Can be implemented in a practical manner

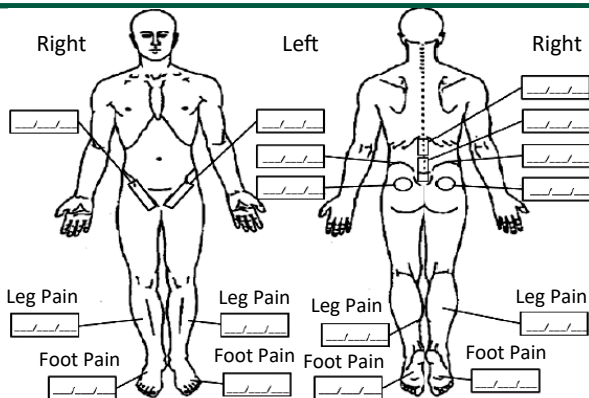
**USF Tech ID# 15A022**  
**Patent Pending**



### Pain Assessment in Infants: Quantifying Pain Based on Infants' Facial Strain

- Provides more consistent and objective pain assessment
- Reduces the clinical assessment and costs of continuous monitoring of infants
- Can be used as a home monitoring tool or in developing countries where there is a lack of medical workers/supplies

**USF Tech ID# 15A042**  
**Patent Pending**



An example of the given patient questionnaire.

### USF Sacroiliac Joint Questionnaire

- Questionnaire form that assess the most commonly used signs and symptoms of sacroiliac joint pain
- Standardized tool for diagnosis and study of sacroiliac joint pain
- Facilitates systematic collection and transmission of information
- Simplifies the patient's and clinician's procedures

**USF Tech ID# 15B156**  
**Patent Pending**

### Portable System and Application to Facilitate Rehabilitation Exercise

- Smart phone application that monitors, assists, and provides feedback to a user working through physical therapy
- More cost effective and easier than traditional options
- Improve Patient Compliance
- Improve mobility and enhance overall health

**USF Tech ID# 16A065**  
**Patent Pending**

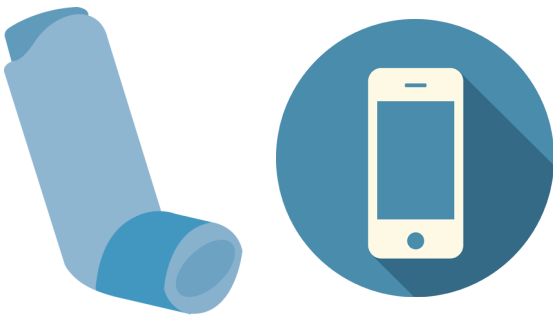




### QR Code Based Medication Adherence App

- Solution of the issue of low compliance in medication consumption by patients
- Synergy of automated prompts and behavior management that results in high medication compliance
- Fuses behavioral technology with automation

**USF Tech ID# 16B117**  
**Patent Pending**



### Asthma Self-Management Mobile App for Adolescents

- Platform-independent mobile app for adolescent asthma self-management tailored to user preferences
- Helps adolescents understand and track their asthma, identify triggers and note changes with asthma severity or medicine effectiveness

**USF Tech ID# 16B129**  
**Patent Pending**

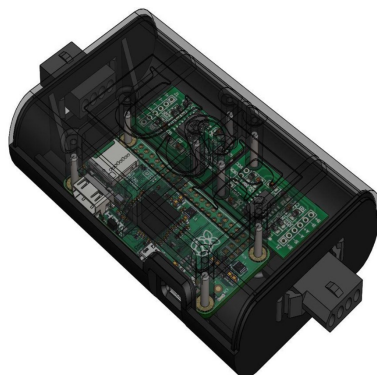


The ultrasonic sensor used in the navigation device.

### Wheelchair Navigation Assistance in Busy Environments

- Wheelchair navigation device augments user input to avoid obstacles
- Actively avoids obstacles
- Does not require additional user input
- System maintains user navigational freedom

**USF Tech ID# 16B170**  
**Patent Pending**

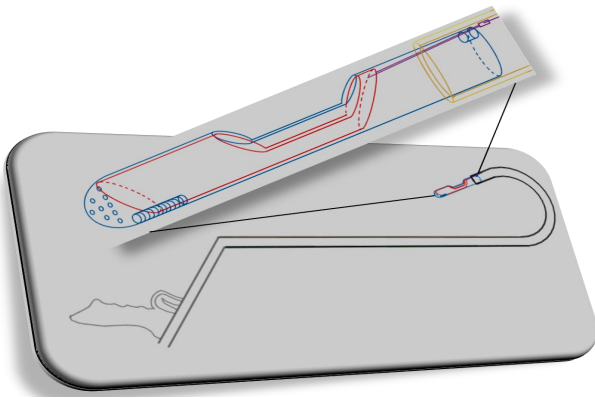


An isometric view of the sensor with components installed.

### Systems and Methods for Monitoring a Patient

- Senses if a patient is lying in bed
- Easy installation and maintenance
- False readings are minimized
- Device is not detectable by the bed occupant
- Is compatible with any computer

**USF Tech ID# 18A026**  
**Patent Pending**

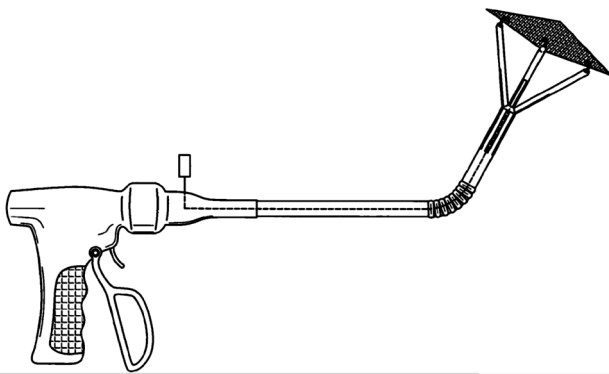


### Cardiac Septal Myectomy Device

- Non-surgical approach that eliminates need for open heart septal myectomy
- Requires only mild, local anesthetics
- Eliminates serious complications of standard treatment methods
- Can be used for the removal of tumors, circulatory plaque, and thrombosis
- **In Development**

**USF Tech ID# 09A005**

**US Patent# 8,906,052; 9,629,651**



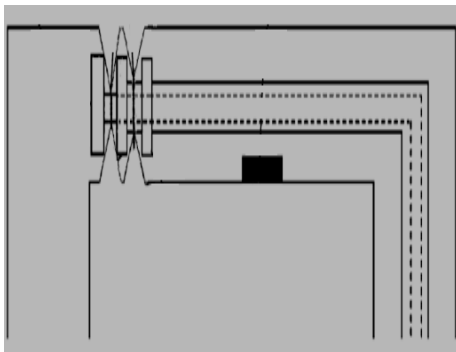
### Laparoscopic Hernia Mesh Spreader

- Hold, spread, position and attach meshes
- Hinged for maneuverability
- Individually actuated arms
- **Prototype Available**

**USF Tech ID# 05A028**

**US Patent# 8,097,008**

The laparoscopic device holding the surgical mesh.



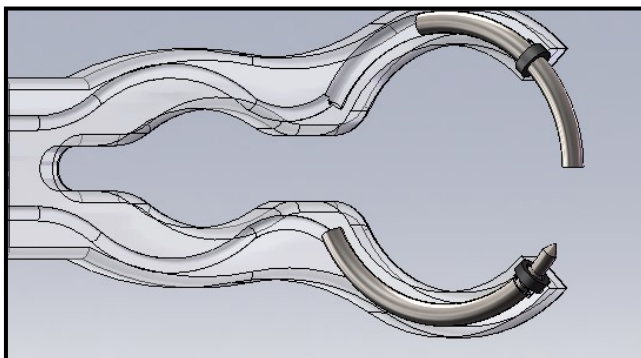
### Device for Total Laparoscopic Colon Resection

- Removal of the resected colon transanally
- Anvil for stapling
- Supports for suturing, resection and removal
- Animation available

**USF Tech ID# 07A023**

**US Patent# 8,623,035**

A block diagram of the surgical apparatus.

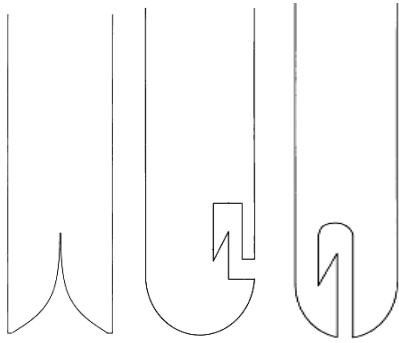


### Universal Laparoscopic Suturing Device

- Sutures tissue after a laparoscopic surgical procedure
- Quick and efficient closure of fascia
- Small, systematic suture placement
- Reduced surgical time

**USF Tech ID# 09B096**

**US Patent # 9,072,480**

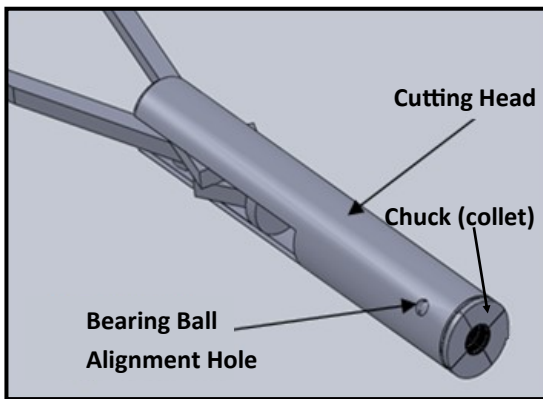


Free needle with open end jam cleat, side opening jam cleat or front facing and end-opening jam cleat

**Free Needle with Jam Cleat**

- Incorporates a jam cleat-type design modification to allow for temporary, stable anchoring of suture to the needle
- Allows rapid locking and unlocking of suture within the needle
- Prevents suture slippage during surgical procedure
- Facilitates easier disengagement of the suture from the needle

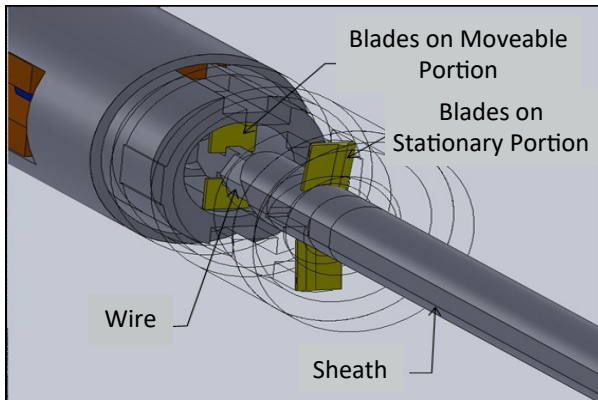
**USF Tech ID# 10A027**  
**US Patent# 8,617,207**



**Incision-Less Laparoscopic Instrument**

- Novel laparoscopic instrument that leaves no scar
- Easy and efficient manipulation of operative instruments
- Decreased surgical time
- Allows surgeons to place multiple instruments, in any location, during the laparoscopic surgery (flexibility)

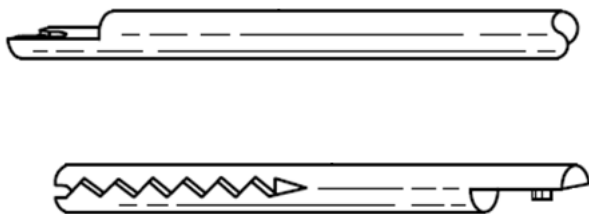
**USF Tech ID# 10A062**  
**US Patent# 9,381,029**



**Small Diameter Laparoscopic Tool Docking Mechanism**

- Minimizes the likelihood of scarring and post-operative pain
- Allows the use of standard size tips
- Does not compromise tip size or force capability

**USF Tech ID# 10A075**  
**US Patent# 9,186,167**

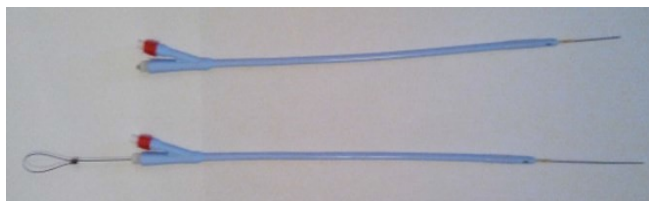


**Laparoscopic Nitinol Grasper**

- Combination of clamp and wire system
- Allows for triangulation
- Minimizes tissue trauma

**USF Tech ID# 10B091**  
**US Patent# 9,375,228**

The design of the laparoscopic nitinol surgical grasper.

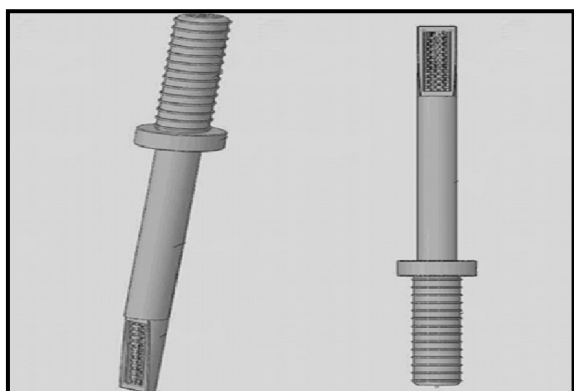


The urethral urinary catheter guidance assembly with the glide wire™

### Urethral Catheter Assembly

- Facilitates the safe placement of a urethral catheter
- Vastly superior design to existing foley catheter models
- Reduced risk of trauma
- Inexpensive and simple device
- **Prototype Available**

**USF Tech ID# 12B132**  
**US Patent# 8,956,340**



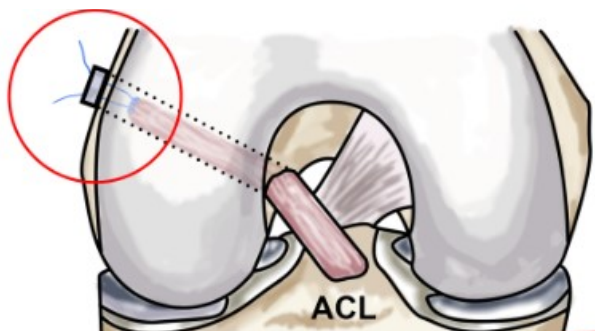
A perspective view of the tissue removal device.

### Minimally Invasive Laparoscopic Tissue Removal Device

- Ability to cut and transport tissue in an all in one design
- Safe, ergonomic, and time efficient device for traditional and complex hysterectomy surgeries
- Reduces surgical time and fatigue
- **Prototype Available**

**USF Tech ID# 12B160**  
**US Patent# 9,861,380**

### Crimp Device



The anchoring device in an ACL reconstruction procedure.

### Reversible Crimp Device for ACL Reconstruction Surgery

- Used To Secure A Tendon In Surgery
- Lower cost of surgery
- Reversible fixation
- Reduce complexity of surgery

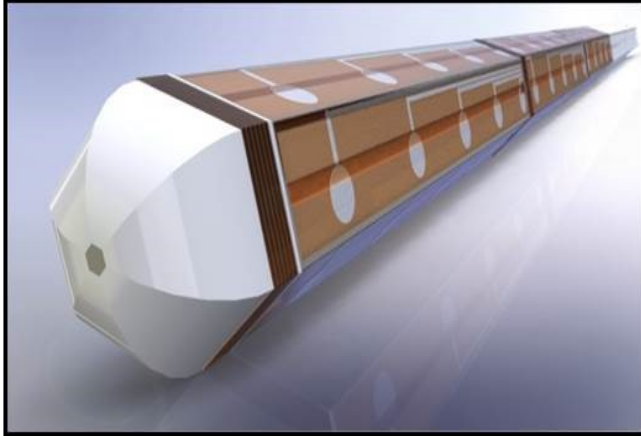
**USF Tech ID# 14A006**  
**Patent Pending**



### Power Morcellation in a Protected Environment

- Device and method to allow for power morcellation without the risk of cancerous tissue spreading
- Eliminates tissue dispersal
- Allows for direct visualization
- Low Cost and Easy to Use
- **Prototype in Development**

**USF Tech ID# 14A063**  
**US Patent# 9,044,210**



A concept image of the stylus top, which contains SiC electrodes.

### MRI Safe Deep Brain Stimulator

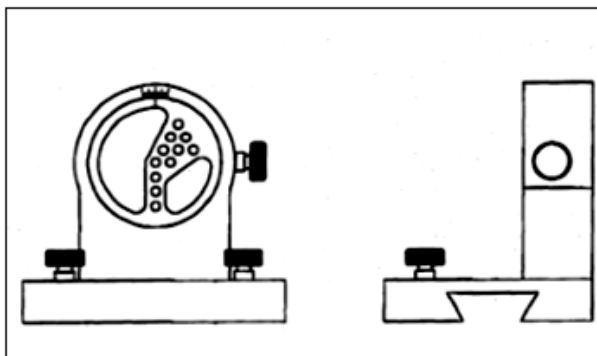
- Novel pacemaker stylus and lead that stimulates and records
- Safe for use with magnetic resonance imaging (MRI)
- Provides the necessary biocompatibility and resilience for permanent implantation

**USF Tech ID# 14A033**

**US Patent# 10,046,165**

#### Technology Description:

Researchers at USF have designed a MRI compatible deep brain stimulator/ pacemaker stylus and leads using silicon carbide. This novel new pacemaker stylus and lead/deep brain stimulator (DBS), that is safe for use with magnetic resonance imaging (MRI). Not only does this material provide the necessary biocompatibility and resilience for permanent implantation, but it has the ability to dissipate the heat generated when subjected to the MRI field, allowing it to operate within normal (3T-7T) magnetic fields. The device is modular and constructed not only to provide stimulation, but also recording capability for closed loop.



A front and lateral elevated view of a needle guide with a puck-like shape secured within the apparatus.

### Novel Putamen Grid for Use in Neural Transplantation

- Direct visualization of the needles as they enter the brain, an important safety feature
- Grid array may be used with structures other than the putamen
- Allows for 3-D transplantation
- Decreases operating time

**USF Tech ID# 02B070**

**US Patent# 8,012,159**

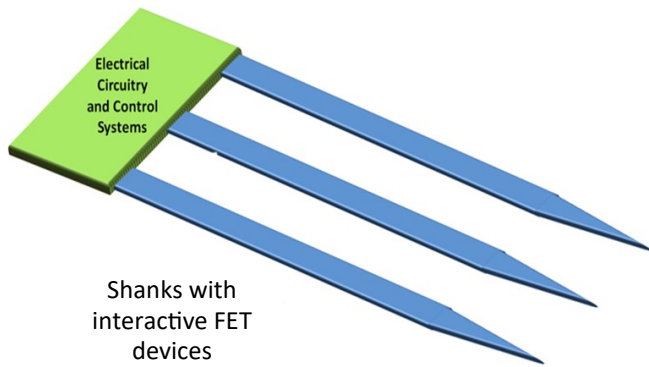


### Intracranial Catheter For the Delivery of Therapeutic Agents to the CNS

- Improved intracranial catheter device
- Specific and targeted delivery of drugs to the brain
- Simultaneous infusion of multiple therapeutic agents
- Accurate insertion of catheter and minimal scarring or brain trauma
- **Prototype Available**

**USF Tech ID# 08B128**

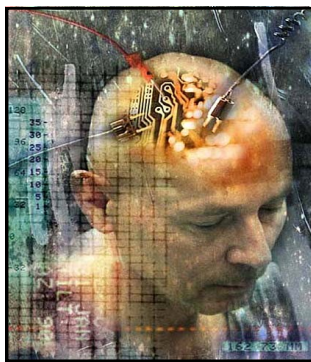
**US Patent# 9,072,863**



**Long-Term Implantable Silicon Carbide Neural Interface Device**

- Novel material that has the ability to increase the biocompatibility of brain machine interface devices
- Assists patients suffering from damage to the CNS or peripheral nervous system
- Biocompatible and chemically resistant; useful as long term implant
- **Preclinical/Animal Testing**

**USF Tech ID# 09B123 & 11A055**  
**US Patent# 9,211,401**

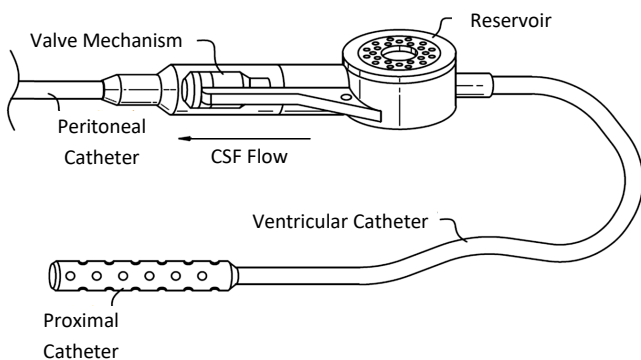


**Graphene Electrodes on a Planar Cubic Silicon Carbide Long Term Implantable Neuronal Prosthetic Device**

- 3C-SiC and Graphene have high degrees of biocompatibility
- Graphene has zero band gap and can be tuned using addition of graphitic layers
- Graphene has double the surface area of carbon nanotubes
- **Preclinical/Animal Testing**

**USF Tech ID# 10B087**  
**US Patent# 8,751,015**

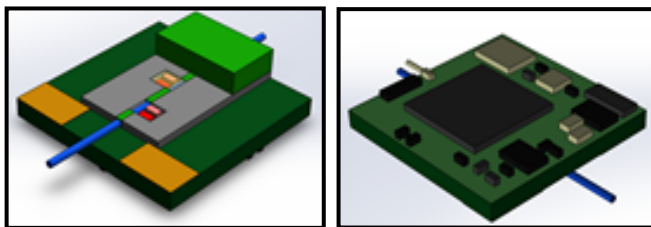
A simulation of the neuronal prosthetic device in the human brain.



**Novel Shunt Catheter System with Inline Filter**

- Inline filter to keep large particles from occluding the shut valve
- Open-tube shunt with built-in stylet for controlled drainage
- Provides the ability to flush the system transcutaneously
- Compatible with all systems currently in use
- **In Development**

**USF Tech ID# 14A009**  
**US Patent# 9,364,647**



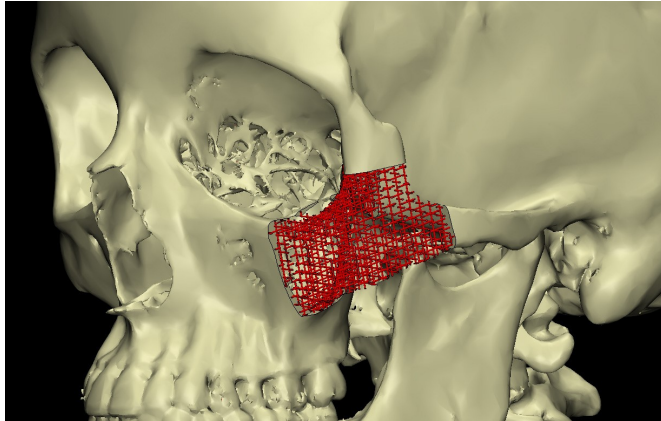
Superior and inferior view of the fully integrated device.

**A Scalable Peristaltic Micropump with 3D-Printed Features and Phase Change Actuation for Numerous Applications**

- Scalable micropump: integrated electronics and wireless control
- Inexpensive, low fabrication complexity, and highly reliable
- Can be sterilized for chemical, pharmaceutical, and food industries
- Medical applications include drug delivery; drug administration for protective and restorative auditory disorder biotherapies

**USF Tech ID# 16A030**  
**Patent Pending**





**Osteoconductive and Osteoinductive Implant for Augmentation, Stabilization, or Defect Reconstruction**

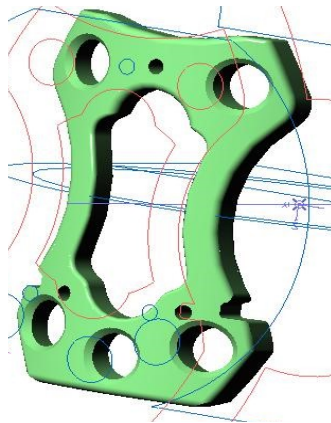
- Reconstructive alternative for bone replacement
- Customizable Implant made from resorbable malleable material
- Can incorporate into the osseous structure
- Capacity to be produced via 3D printing

**USF Tech ID# 15A013**

**US Patent# 9,775,712**

**Technology Description:**

Researchers at the University of South Florida have developed an implant made from a unique combination of several compounds independently FDA-approved and used as implantable materials, that may be used to buttress, augment, or replace the native bony skeleton. This novel implant is osteoinductive, osteoconductive, resorbable and allows for customizable shape and structure to improve its function and overall outcome. This provides a patient with a reconstructive alternative for bone replacement with or without autologous bone grafting. It is applicable to the field of dentistry, orthopedics, spinal implants, bone graft substitutes, biomaterials, bone repair and regeneration.

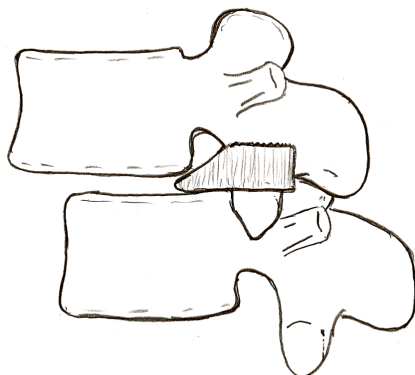


**Cervical Plating System for Improved Spinal Fixation**

- Cervical plate system to improve spinal fixation with vertebral fusion surgeries
- Designed for use with an interbody cage
- Facilitates anti-subsidence and resists cage rotation
- Drill guides allow installation of screws at precise angles and positions

**USF Tech ID# 06A015**

**US Patent# 7,963,980**



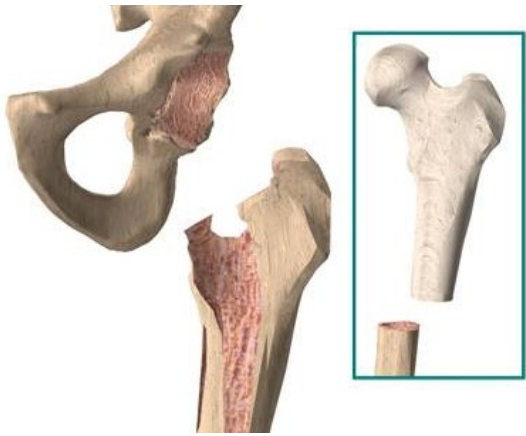
An asymmetric self-distracting cage

**Asymmetric Disc Distracting Cage**

- Superior interbody cage design that allows for better surgical outcomes
- Cage is self-distracting
- Asymmetric leading edge allows for easy insertion
- Risk of end plate fracture and nerve root damage greatly reduced

**USF Tech ID# 07B090**

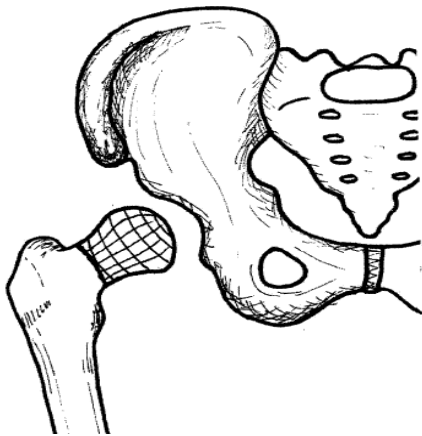
**US Patent# 8,734,521**



**Apparatus for Osteotomy and Graft Preparation Bone Allograft Jig**

- System designed to increase surgical accuracy
- Obtains desired final length and exact cuts for a accurate alignment
- Prevents malrotation of osteotomized ends

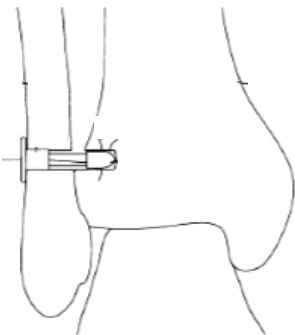
**USF Tech ID# 09A051**  
**US Patent# 8,920,426**



**Injectable Hip Hemiarthroplasty**

- Novel device for minimally invasive replacement of hip hemiarthroplasty
- Immediate fixation of the fracture and weight bearing
- No violation of hip capsule = less risk of fracture

**USF Tech ID# 09B088**  
**US Patent# 8,715,365; 9,089,432**



**Ankle Syndesmosis Fixation System**

- Allows for better fixation in ankle injuries
- Increased ankle stabilization
- Less surgical time and decreased technical difficulty

**USF Tech ID# 09B091**  
**US Patent# 9,277,912**

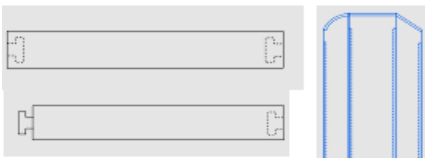
Ankle syndesmosis fixation using the novel system.

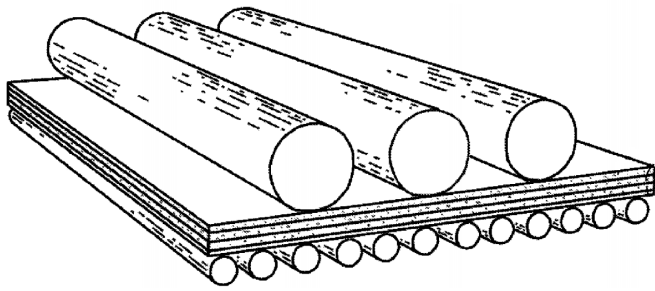


**Osteotomes with Linking Capability**

- Ensures that osteotomes will remain parallel during surgery
- Improves accuracy of osteotomies
- Limits potential injuries

**USF Tech ID# 10A050**  
**US Patent# 9,011,446**



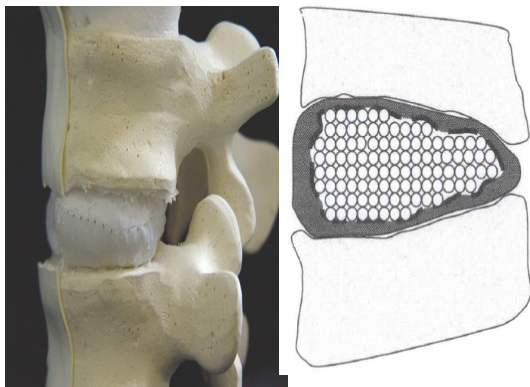


Isometric view of a structural bone growth mass formed using articulating sheet

**Compressor for Bone Fusion and Filling**

- Method of producing bone filling material that maintains high integrity for bone fusion
- Uses biological as well as synthetic materials
- Can be sterilized by variety of methods

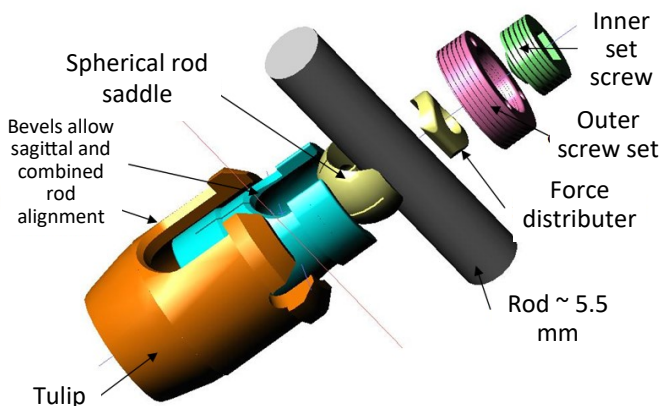
**USF Tech ID# 04A048**  
**US Patent# 8,579,986**



**Prosthesis for Spine Discs**

- New device that replaces the damaged spinal disc
- Implanted device can be converted to a fusion element
- Composed of an outer woven fabric that encloses a hydraulic element
- The hydraulic element can be implanted pre-operatively, inter-operatively, or post-operatively

**USF Tech ID# 04A059**  
**US Patent# 8,110,003; 8,540,771**

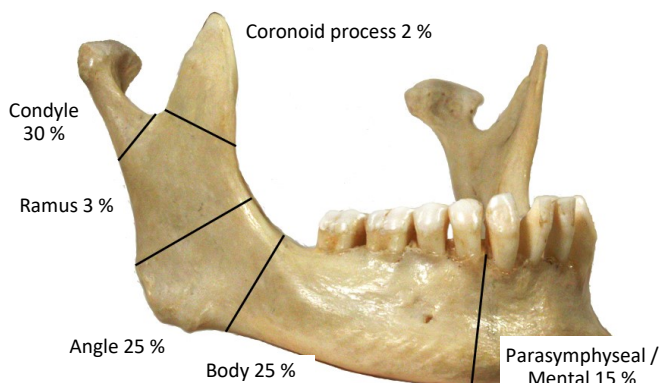


**Globus Adaptation Sphere Saddle**

- New design of pedicle screw for spinal implant surgery
- Implantable osteosurgical screw device
- Improvement of the polyaxial screw head type

**USF Tech ID# 15B122**  
**US Patent# 9,968,378**

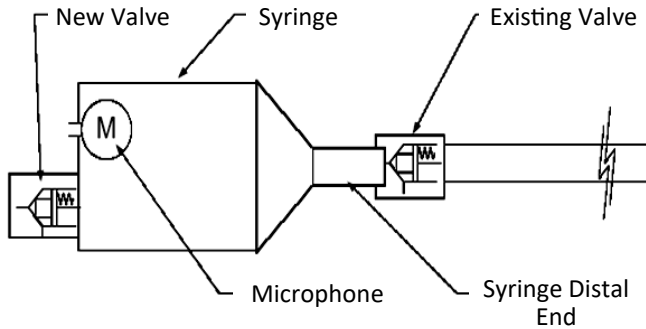
**Mandibular Fractures—Frequency By Location**



**Custom Off the Shelf Splint for Edentulous Patients**

- An off-the-shelf oral splint
- To assist in reduction and provide maintenance of reduction of maxillary and mandibular fractures
- For edentulous or partially edentulous patients

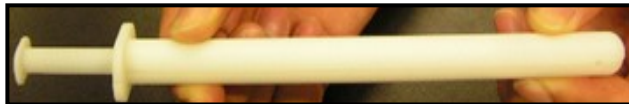
**USF Tech ID# 16B115**  
**Patent Pending**



**Novel Monitor for the Detection of Fetal Heart Tone and Mother's Heart Rate**

- Does not require placement of electronic instrumentation within the body
- Useful in many additional procedures
- **Preclinical/Animal Testing**
- **Prototype Available**

**USF Tech ID# 10A009**  
**US Patent# 9,504,440**



Inserting chamber and drug tubing releaser

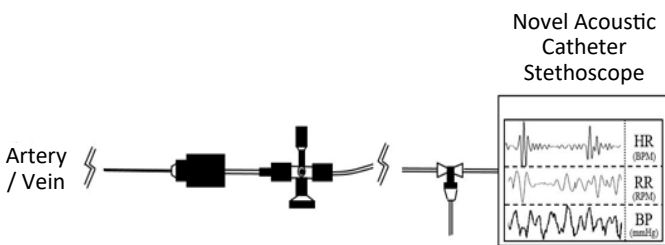


Inserting chamber, drug tubing releaser, and plunger

**Drug Delivery Device for Ovarian Cancer**

- Protects normal cells from toxic exposure
- Delivers directly to target site
- Tested in non-human primates
- **Prototype Available**

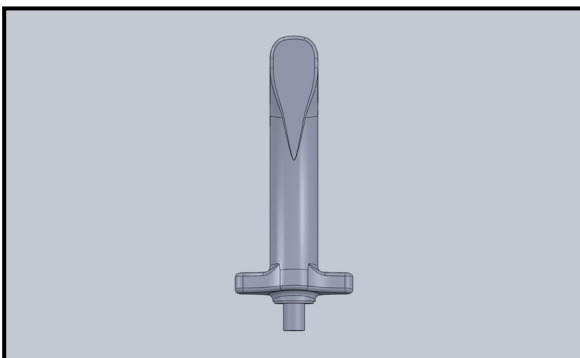
**USF Tech ID# 09A059**  
**US Patent# 9,155,872**



**Novel Acoustic Catheter Stethoscope Based Acquisition and Signal Processing Framework to Extract Multiple Bio-Signals**

- Measures multiple vital bio signals using a single assessment system
- Applicable to fetal monitoring in labor and delivery
- Can be used during any medical procedure

**USF Tech ID# 17A012**  
**Patent Pending**



The front view of the vaginal port obturator showing a semi-flat surface for suturing.

**Vaginal Port with Obturator**

- Designed for sacrocolpopexy procedure
- Reduces post-op pain, scarring and risk of hernia formation
- Enables both removal of abdominal/pelvic masses and allows instruments into the peritoneal cavity
- **Prototype Available**

**USF Tech ID# 13A020**  
**US Patent# 9,901,374**

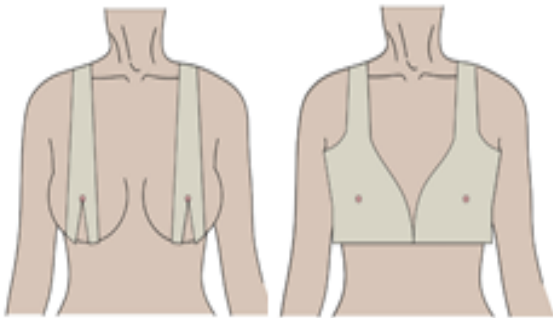


The mesh retention device attached to a positioning system

**Vaginal Positioning and Mesh Retention System**

- Method to treat pelvic organ prolapse using a vaginal positioning and mesh retention system
- Opening at tip allows mesh to be held in place by a catheter
- Mesh will not slip out of position
- Flat surface allows mesh to be sutured anteriorly or posteriorly
- **Prototype Available**

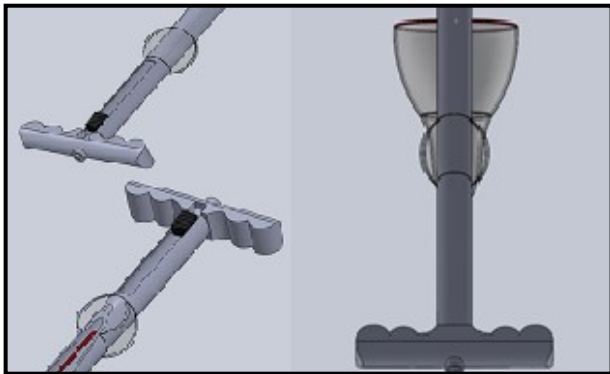
**USF Tech ID# 14A061**  
**US Patent# 9,414,904**



**Hydrocolloid Bra for Enhanced Post-Mastectomy Reconstruction**

- Reduces the odds of necrotic or cellulitis complications following Nipple Sparing mastectomy
- Improves the odds of correct nipple positions
- Simple for surgeons to use and easy for patients to adhere to
- **Clinical Testing**

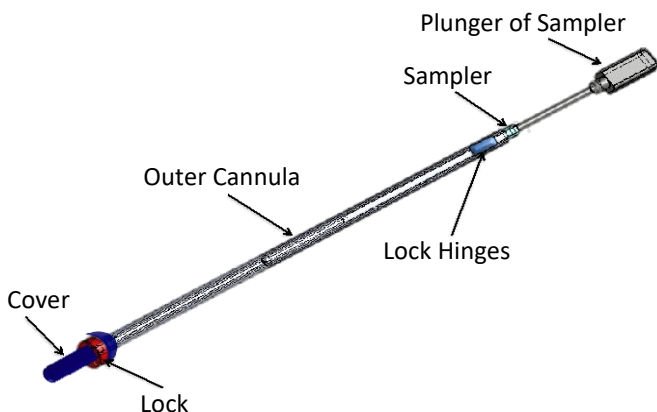
**USF Tech ID# 15A086**  
**Patent Pending**



**Transvaginal Specimen Extraction Device**

- Laparoscopic device to extract specimen from abdominal cavity through the vagina
- Enables minimally invasive laparoscopic surgery
- Minimal scarring and post-operative pain
- Faster recovery following surgery
- **Prototype Available**

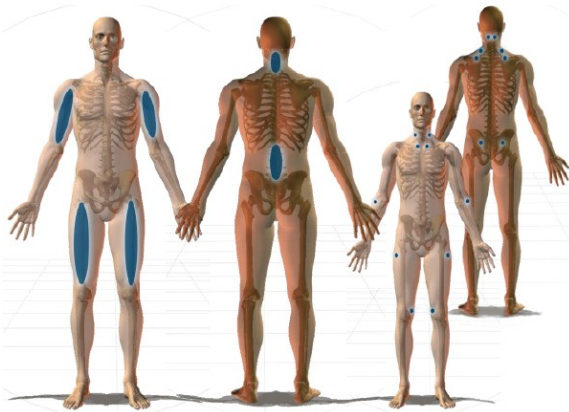
**USF Tech ID# 11B192**  
**US Patent# 9,789,268**



**Sterile Uterine Sample Cover**

- Safely and effectively collects uncontaminated samples from uterus
- Releases nano-encapsulated drugs at the site of infection for targeted drug delivery
- Allows characterizing and comparing intrauterine microbes with the vaginal flora

**USF Tech ID# 12A010**  
**US Patent# 9,730,679**



**Innovative Virtual Interactive Teaching Tool for Clinical Diagnosis of Musculoskeletal Diseases**

- Interactive tool to augment the clinical diagnosis of musculoskeletal diseases
- 30+ unique, fully interactive case studies enhance diagnostic skills
- Conducive to facilities with limited access to specialty resources

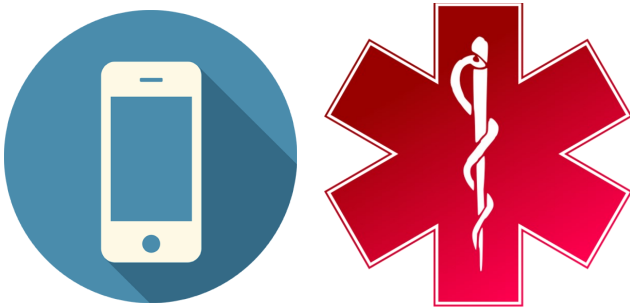
USF Tech ID# 11A054  
Copyright TX 7-463-727



**Interactive Immersive Biology Experience and Learning System**

- Revolutionary immersive learning platform for biology subjects
- Enables students to learn about the body, on one's own body itself
- Learning interaction speaks the name of an organ, prompting a student to point out the respective organ on self
- Demonstrations can be made to interested parties.
- **Prototype Available**

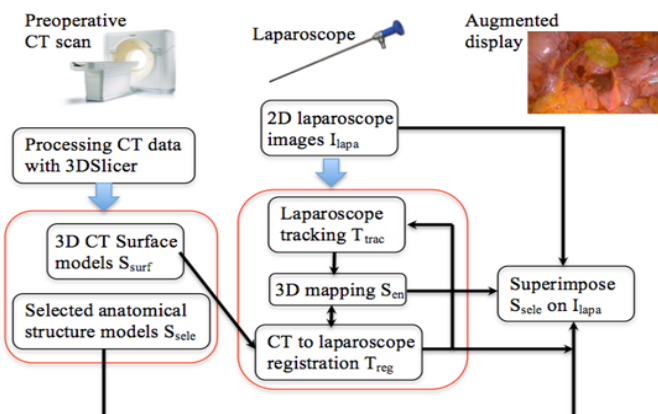
USF Tech ID# 11B124  
US Patent# 9,520,072



**Clinical Simulation for Health Care Professional Training—SIM DOC**

- Strategy game for mobile platforms
- Users tackle a variety of clinical problems faced in patient care
- Teaches users to make every day decisions about patient care related issues

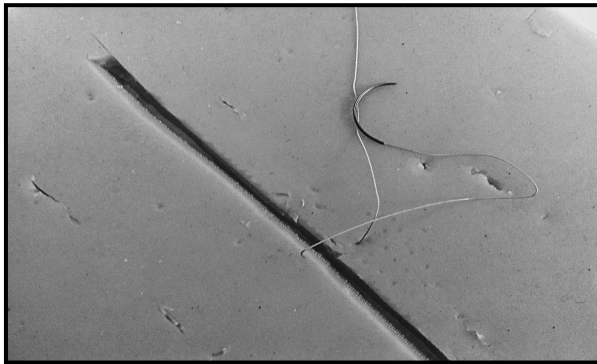
USF Tech ID# 13B120  
Patent Pending



**Augmented Reality for Improved Situational Awareness in Minimally Invasive Surgery**

- Method for improved situational awareness in minimally invasive surgery (MIS)
- Aids in mapping and identification of hidden surgical anatomy
- Maps vascular anatomy and helps to avoid injury

USF Tech ID #13B133  
US Patent# 9,547,940; 9,646,423

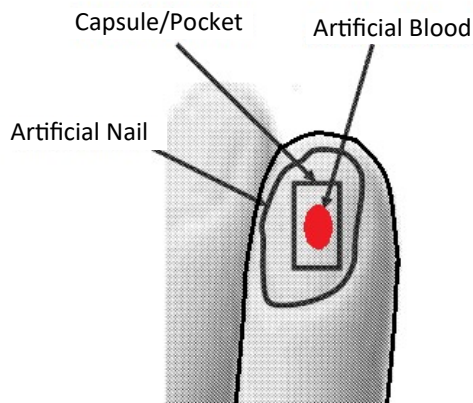


Suturing demonstration

### Synthetic Skin and Tissue Model

- Synthetic skin model for suturing and other practicum procedures
- Enhances surgical techniques
- Tolerates surgical tension and pulling
- Appropriate fascia, thickness, and consistency
- **Prototype Available**

**USF Tech ID# 13B160**  
**US Patent# 9,514,658**



### Model of Subungual Hematoma

- Model of subungual hematoma with silicone blood pocket for injections and an artificial nail to cover the blood pocket
- Useful for medical simulation of treating blood accumulation under finger or toe nail
- **In Development**

**USF Tech ID# 15B120**  
**Patent Pending**



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