Advancing USF Innovation

Medical Devices
The Technology Transfer Office (TTO) was established in 1990 to facilitate the commercialization of university intellectual property, including patents and copyrights.

The TTO works with researchers and students in every college to ready new inventions for the patenting process and potential licensing opportunities. 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.

Our office has a knowledgeable and professional staff with specialized backgrounds, who work in collaborative teams in the areas of marketing, patent prosecution and licensing to direct the movement of new ideas, discoveries and innovation into the commercial and public sectors. TTO endeavors to educate and promote innovation, the result of which is products, jobs and technologies utilized in the public interest.

USF was ranked in the Top 20 of American Universities for technology transfer by the prestigious Milken Institute. With 116 new utility patents issued in 2017, USF ranks fifth among American public universities and 12th among universities worldwide in generating new U.S. patents, according to the National Academy of Inventors (NAI) and Intellectual Property Owners Association (IPO). In FY 2018, the university had 127 license and option agreements. USF also had 10 new startup companies in FY 2018, and has facilitated the formation of 51 startup companies in the last 5 years. TTO endeavors to educate and promote innovation, the result of which is products, jobs and technologies utilized in the public interest.

[http://www.usf.edu/research-innovation/pl/]
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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

Technology Description:
Researchers at USF have designed a surgical tool with the ability to deliver precise and effective dosage quantities when regionally concentrated through direct vaginal delivery. The device allows for accurate dosage delivery to identified cancerous cells anywhere in the peritoneal cavity. This technology not only has the potential to be used for the treatment of ovarian cancer, but may also treat other diseases of the peritoneal cavity.

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

Technology Description:
USF researchers have designed a method to enable selective distribution of therapeutics within the spinal cord directly to the target area of interest. This will allow the delivery of wide range of potentially therapeutic agents such as pharmacologics, cells, gene therapy etc. Direct delivery of therapeutics into discrete regions of the spinal cord will achieve improved motor function outcomes in patients, as well as circumvent deleterious side effects associated with administered agents entering into extra-spinal cord organs. Localized delivery of therapeutics will also allow lower doses of therapeutics for effective treatment of the spinal cord.
Targeted Delivery of Molecules Using Impedance-Based Monitoring at Elevated Temperatures

- Controls drug and gene delivery
- Enhanced targeting and dosing control
- Increased safety and reliability
- Significant improvement on reproducibility

USF Tech ID# 17B182
Patent Pending

Technology Description:
Researchers at USF have developed a novel method of thermal assisted gene electrotransfer (TAGET) which allows the use of lower applied voltages, which decreases the adverse effects on the tissue while maintaining gene expression. This method maintains gene expression levels while utilizing 50% lower applied voltage. Furthermore, this method does not result in temperature increases above those induced by the exogenous heating source. This method greatly increases the reproducibility, and can improve the delivery of gene therapies.

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
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

Electroporation Device and Method for Delivering Molecules into a Target Cell
- Improved device for manipulating a molecule in vivo relative to a target tissue
- Potential to be used as part of a system for reducing tumor size
- May be used for effecting in vivo gene transfer to cells

USF Tech ID# 00B044
US Patent# 6,778,853; 7,781,195

Method for Using Electric Fields to Facilitate the Entry of Molecules into Cells in Vivo
- More complete delivery of molecule to cell than can be accomplished by standard delivery mechanisms
- Electric field facilitates the uptake of a molecule by a cell
- In Development

USF Tech ID# 01A043
US Patent# 7,879,610; 7,713,740
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

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

Method of Electrogenically Controlling Pump Molecules
- Novel technique to effectively control functions of the Na/K pump molecule
- Can lead to the development of practical, therapeutic technique for patients with dysfunctions of electrogenic pump molecules
- Related diseases and processes include diabetes, wound healing, hypoxia cell healing, and brain, cardiac and aging related diseases

USF Tech ID# 06A018
US Patent# 8,073,549
Helium Plasma Generation Method for the Manipulation of Molecules and Cells
- A pen-like device that uses non-thermal helium plasma to deliver drugs, small molecules, proteins and genes
- Improved delivery technique
- No effect on cell viability
- Applicable to a wide range of molecules and cells/tissues
- In Development

USF Tech ID# 07B099
US Patent# 8,455,228

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

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

Technology Description:
Researchers at USF have developed an adaptive user-guided assistive listening system that uses signal processing algorithms for sound classification and enhancement. The system also leverages multiple microphones and delay-sum beamforming techniques to reduce the impact of room acoustics and coherent/incoherent noise sources. Included is a novel and sophisticated interface for user-guidance to a target talker that has the potential to greatly enhance ALS performance in multi-talker environments. Additionally, the device will work with many wireless (e.g., Bluetooth) compatible listener devices, including earphones, headsets, hearing aids, and cochlear implants. This invention will benefit individuals who experience communication difficulty in small to medium sized group listening scenarios.

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

Technology Description:
Researchers at USF have designed a robotic, resistive, low cost and safe rehabilitation device to assist with triceps extension and positional control. By means of a joystick, the patient can control the motion of the arm with incredible accuracy, with the device able to handle resistances up to 14 lbs. Additionally, the device is equipped with a kill switch that prevents hyperextension. This device has the potential to restore movement in the limbs of individuals with either full or partial impairment. Assisted drive allows for a single muscle to be rehabilitated while preventing atrophy in the others. Direct drive allows the device to remain fully engaged at all times, while resistive-rehabilitation drive can be applied for strengthening of muscles.
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**

**Technology Description:**
Researchers at USF have invented a novel glucose monitoring system with the antenna on the external surface of the body. The glucose concentration in the blood is determined by the sensor on the blood vessel with shift in the resonant frequency. These variations of resonant frequency are displayed in glucose levels. With the implementation of this system architecture, an accurate, real-time assessment of glucose levels in the blood can be made using a single antenna patch.

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**
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

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

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.

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**

**Technology Description:**
University of South Florida researchers have developed a device that provides a much safer and efficient endoscopic tissue removal system for removal of large tissue masses during minimally invasive surgery in a contained environment. This new tissue removal system can be used either through a laparoscopic abdominal incision or through a colpotomy incision in the vagina which would allow for a much larger than a traditional laparoscopic morcellator device and thus significantly increase efficiency of the tissue removal function.
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**

**Technology Description:**
University of South Florida researchers have developed a novel method which will allow for the monitoring of glucose via an implantable passive antenna. This relieves patients from constant pricking, reduces overall costs, and still gives a reliable and accurate result.

This device is composed of two main sections: 1) A passive antenna made from biocompatible silicon carbide (SiC), modeled to a desired frequency, which is permanently implanted subcutaneously. 2) An external-to-the-body transmitting antenna is used to detect changes in the blood glucose level by sending a radio signal at the frequency of the implanted passive antenna. Changes in the glucose level lead to modifications in the signal and can be used to determine the blood glucose level externally.

Novel Collagen-Based Material for Corneal Replacements

- Biomaterial for creation of synthetic corneal replacements
- Made from easily obtained natural material
- Lack of inflammatory response
- Less expensive than current corneal replacement tissue
- Prototype Available

**USF Tech ID# 06A025**
**US Patent# 8,518,306; 9,517,598**

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**

A depiction of the passive sensing continuous glucose monitoring system.
Trans-Endoscopic Hydraulic Balloon Apparatus

- Prefilled and preassembled balloon dilation system consisting of a fluid reservoir in fluid communication with an inflatable end
- Graduated markings on fluid reservoir show balloon volume without visualization
- Less exposure to radiation
- Pre-assembled

USF Tech ID# 07B134
US Patent# 9,623,214; 9,126,024

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

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

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
<table>
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<tr>
<th>Device Type</th>
<th>Description</th>
<th>USF Tech ID</th>
<th>Patent Status</th>
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<tr>
<td>Intraluminal Bowel Occluding Catheter</td>
<td>Prevents loss of endoluminal insufflation, improves safety of complex interventional intraluminal procedures, internally occludes any gastrointestinal cavity to which it is able to conform.</td>
<td>13B150</td>
<td>Patent Pending</td>
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<tr>
<td>Minimally Invasive Networked Surgical System and Method</td>
<td>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.</td>
<td>13B191</td>
<td>US Patent #9,743,823</td>
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<td>The Carrion Cast: For The Treatment of Penile Implant Infections</td>
<td>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.</td>
<td>13B195</td>
<td>US Patent # 9,839,718</td>
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<tr>
<td>User-Controlled Urination Management System</td>
<td>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.</td>
<td>16B164</td>
<td>Patent Pending</td>
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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

Technology Description:
Researchers at USF have invented a novel respiratory monitoring device, based on a microwire coil magneto-LC resonance sensor. This sensor detects a position varying source of a small magnetic field for real-time respiratory monitors of a patient.

Changes in rate or breathing pattern are typically associated with serious illnesses. These illnesses include but are not limited to obstructive sleep apnea, cardiovascular disease, Cheyne-stroke, and heart failure. Breathing patterns can also be useful for diagnostic and therapeutic purposes. Our novel real-time respiratory monitoring device for the purpose of monitoring respiratory rates and patterns in humans will help to identify abnormalities earlier in an attempt to improve therapeutic outcomes.

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

Quantitative phase microscopy by digital holography
A Comprehensive and Context-Sensitive Neonatal Pain Assessment Using Computer Vision

- A method of assessing infant pain in real time without the presence of a caregiver
- Enhanced pain assessment accuracy
- Multiple sources of information to determine pain

USF Tech ID#s 18A086; 18A087 & 18A088 Patent Pending

Technology Description:
Researchers at USF have developed a system for the enhanced assessment of infant pain. The facial recognition system analyzes multiple parameter measurements, such as the facial texture and the distance between facial landmarks of the infants expressions, to calculate the level of pain an infant is experiencing. The system is also capable of dynamically analyzing the recorded information, which means pain assessment is made in real-time. The system was able to assess infant pain with an accuracy of up to 96%. This invention is directly applicable to neonatal care and will enable the accurate and repeatable detection and measuring of infant pain.

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

Technology Description:
USF researchers have developed a novel acoustic catheter stethoscope with feature extraction and pattern recognition framework for biomedical acoustic signals. This device initially collects blood flow sounds and preprocesses these acoustic heart pulses. The, these gathered sounds are processed using the novel time-frequency feature extraction and cluster analysis based pattern recognition framework. Finally, the results are qualitatively and quantitatively validated via further computations.

The acoustic heart pulse feature extraction and pattern recognition framework.
**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

**Primary Care Toolkit for Early Skin Cancer Detection and Referral**
- Solution to the underdeveloped primary care early detection of skin cancer
- Simplified tool specifically designed for primary care specialists
- Reduce skin cancer morbidity and mortality by early detection

USF Tech ID# 10B099
Copyright TXu 1-719-712
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

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

**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
### 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 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

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
<table>
<thead>
<tr>
<th>Technology Area</th>
<th>Description</th>
</tr>
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</table>
| 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                                                                                                                   |
| 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 |
| 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 |
| 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# [Online ID Number]*  
*Patent Pending*
Thermally Compensated Fluorescence Decay Rate Temperature Sensor
- System for Measuring the True Temperature of a Surface
- For a multitude of applications including micro-soldering and microsurgery
- Precise temperature control prevents damage to delicate samples
- Accurate calibration for higher sensitivity

**USF Tech ID# 04A018**
**US Patent# 7,104,683**

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**

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**

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**
The design of the laparoscopic nitinol surgical grasper.

**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*
Minimally Invasive and Laparoscopic

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

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
- Used to secure a tendon in surgery
- Lower cost of surgery
- Reversible fixation
- Reduce complexity of surgery

USF Tech ID# 14A006
Patent Pending

Power Mocculation in a Protected Environment
- Device and method to allow for power moccellation 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

The urethral urinary catheter guidance assembly with the glide wire™

A perspective view of the tissue removal device.

The anchoring device in an ACL reconstruction procedure.

Contact us: 3802 Spectrum Blvd., Suite 100 Tampa, FL 33612 - 813.974.0994 patents@research.usf.edu | http://www.research.usf.edu/pl
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.

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
Novel Shunt Catheter System with Inline Filter
- Inline filter to keep large particles from occluding the shunt 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

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

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

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

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

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 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

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
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**

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**

Researchers at the University of South Florida have come up with a novel invention which provides a means by which the fetal heart tone, mother’s heart rate, mother’s labor contractions and ureter/bladder flow can be monitored using a standard catheter without the need of implanting or attaching sensors or instruments into or onto the baby’s or mother’s bodies.

A balloon is used to allow acoustic waves to travel to the microphone which would convert the vibrations to an electronic signal that can be recorded and displayed through a standard data acquisition system. This new method does not expose the baby to instrumentation that may cause injury or infection. Additionally, placement in the mother’s bladder improves the chances of measuring the fetal heart beat and contractions compared to any other method which uses external sensors.

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**

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**
**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

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**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

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**Transvagal 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

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**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
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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