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 recently ranked in the Top 20 of American Universities for technology transfer by the prestigious Milken Institute. With 114 new utility patents issued in 2016, USF ranks fifth among American public universities and 11th among universities worldwide in generating new U.S. patents, according to the National Academy of Inventors (NAI) and Intellectual Property Owners Association (IPO). This past year, the university had a record 133 license and option agreements, ranking 9th nationally among individually reporting schools (comparison to the most recent available published data – AUTM 2015 survey). USF also had 9 new startup companies in FY 2016, and has facilitated the formation of 50 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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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 Patents# 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

Body area ECG sensor network. Note: black dots represent sensor locations.
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# 04A0057
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
- 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

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
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
Patent Pending

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
Patent Pending

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

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
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
- 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**

**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**

**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**

**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**
### 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**

### 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**

### 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
Patent Pending

Intraluminal Bowel Occluding Catheter

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

USF Tech ID# 13B150
Patent Pending

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
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

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

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

Modified Stretchable Band (Esmarch) for Limb Hemoevacuation
- 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
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
### 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**  
**Patent Pending**
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
Patent Pending

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 10B140
Patent Pending

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
Anesthesia Questionnaire
- On-line questionnaire for patients having procedures performed in the Morsani Surgery Center
- Interfaces with perioperative system and becomes part of the patients record
- Collect patient info preemptively so patients can be evaluated before the day of procedure

**USF Tech ID# 11A045**
**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

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<table>
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<th>Technology</th>
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<tr>
<td><strong>Portable System and Application to Facilitate Rehabilitation Exercise</strong></td>
<td>Smart phone application that monitors, assists, and provides feedback to a user working through physical therapy&lt;br&gt;More cost effective and easier than traditional options&lt;br&gt;Improve Patient Compliance&lt;br&gt;Improve mobility and enhance overall health</td>
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**USF Tech ID# 16A065**<br>Patent Pending

| **QR Code Based Medication Adherence App** | Solution of the issue of low compliance in medication consumption by patients<br>Synergy of automated prompts and behavior management that results in high medication compliance<br>Fuses behavioral technology with automation |

**USF Tech ID# 16B117**<br>Patent Pending

| **Asthma Self-Management Mobile App for Adolescents** | Platform-independent mobile app for adolescent asthma self-management tailored to user preferences<br>Helps adolescents understand and track their asthma, identify triggers and note changes with asthma severity or medicine effectiveness |

**USF Tech ID# 16B129**<br>Patent Pending

| **Wheelchair Navigation Assistance in Busy Environments** | Wheelchair navigation device augments user input to avoid obstacles<br>Actively avoids obstacles<br>Does not require additional user input<br>System maintains user navigational freedom |

**USF Tech ID# 16B170**<br>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
- 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 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
- Minimize tissue trauma

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

**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

**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 Mocellation 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
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

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

Graphic 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
Fully Implantable Long Term Silicon Carbide (SiC) RF Antenna For Continuous Sensing/Monitoring
- Long Term glucose monitoring
- Improved sensing potentiality with silicon carbide
- Reduce chronic diabetic complications

USF Tech ID# 11B150
Patent Pending

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

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
Patent Pending

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
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

Assymetric 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

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
Patent Pending

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.
**Apparatus for Osteotomy and Graft Preparation**

**Bone Allograft Jig**
- System designed to increase surgical accuracy
- Obtains desired final length and exact cuts for an accurate alignment
- Prevents malrotation of osteotomized ends

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

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**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

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**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

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**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
Patent Pending

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**

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**
**Patent Pending**
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
Patent Pending

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
Patent Pending

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 n 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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