



USF TECHNOLOGY TRANSFER
BIOPARTNERING

**MedTech / Tools /
Sensors / Devices**



USF offers exciting opportunities for collaboration.

Looking for a technology to commercialize? USF has over 600 technologies available for licensing. The following is a sample of USF technologies available for partnering:

AI Diagnostic Technologies

Simultaneous Crossed And Parallel Polarized Light Viewing/Imaging Through A Split Polarizer

USF Tech ID# 21B119

Overview: This polarizer eliminates the need to switch between states by interacting with the device and performing complex decision-making regarding what orientation illustrates the subject most appropriate for the given application. This technology addresses the problem of obtaining multiple acquisitions for polarized light imaging systems and allows for hands-free viewing and examination.

Advantages:

- Multiple polarization states in a single filter allow for simultaneous surface and sub-surface viewing/imaging of semi-transparent or layer-based materials
- Eliminates the need to switch or rotate between the states of the polarizer or interact with the device, reducing the need for complex decision-making
- Multiple uses including but not limited to: cosmetics, forensics, skin disease, skin-of-color, microscopy, ophthalmology, dentistry, botany, entomology, petrology, remote sensing, food& industrial material analysis, archeology& fine arts, agriculture& invasive species identification, security & surveillance

Bio Acoustic Signal Feature Extraction and Pattern Recognition Framework

USF Tech ID# 18A113

Overview: A machine learning framework to identify the patterns of cardiac sounds. The acoustic sounds are obtained from the body site and are preprocessed to identify the denoised heart sound using a segmentation and wavelet decomposition framework. To characterize the healthy and unhealthy heart sounds, multiscale energy features were developed and obtained for the segmented denoised heart signals.

Advantages:

- Accurate abnormality classification
- Accurate sinus rhythm recognition
- Novel feature extraction and machine framework
- Quantitatively validated results

AI Diagnostic Technologies

Lightweight Denoising Algorithm for Medical Imaging

USF Tech ID# 22A116

Overview: This invention develops a computationally lightweight algorithm and provides a rapid and adaptive denoising strategy to handle these artifacts. A PY file is developed which imports libraries for feature extraction and image composition.

Advantages:

- Provides a fast and lean solution to denoise medical images
- Could improve diagnostic accuracy and thus increased efficiency of the resulting treatment
- Denoising is based on patient's individual imaging features without need for pretraining or transfer learning

Deep Learning Based Classification of Global Microglia Proliferation

USF Tech ID# 22A088

Overview: An alternative method has been purposed that uses Deep Learning at low magnification. This method uses an ensemble of snapshots to automatically classify mouse brains as having high or low density of cells based on the classification of images at low magnification with minimal expert time requirement. It has been seen on a novel dataset of 14 mice that this method gives quick and accurate estimates of cell density at low magnification. This approach could potentially benefit a wide variety of studies across the diverse disciplines of neuroscience.

Advantages:

- Minimal expert time requirement
- Solves problem at low magnification
- Provides quick and accurate estimates of cell density



AI Neuroimaging Technologies

Pathlength Resolved Diffuse Correlation Spectroscopy

USF Tech ID# 20B147

Overview: As an alternate to Diffuse Correlation Spectroscopy (DCS), researchers have developed a method that uses readily available laser sources and detectors and can be implemented as an add-on to existing DCS instruments to impart pathlength and depth sensitivity.

Advantages:

- Superior signal-to-noise ratio
- Can sample deeper tissues in vivo
- Based on CW operation that does not require calibration
- Easy to use and low cost

AI Neuroimaging Technologies

Noninvasive System and Method for Mapping Epileptic Networks and Surgical Planning

USF Tech ID# 17A101

Overview: This mapping method that automatically processes and merges non-concurrent EEG data and rsfMRI data to create a 3D map of the patient's functional brain network. This first of its kind software could drastically increase the success of resective neurosurgery for epilepsy patients.

Advantages:

- Automatically map patient's unique brain network from non-concurrent data
- Calculate surgery success chance
- Plans surgery and describes to surgeon on 3D map of patient's brain



Medical Diagnostic Technologies

AI Based Model to Predict Conversion Time of MCI Patient to AD Patient

USF Tech ID# 21A090

Overview: An artificial intelligence (AI) model created from data in a study to predict how long it takes for a patient with MCI to convert into the Alzheimer's Disease stage. The model will also determine risk factors, and interactions among the risk factors, that contribute to a conversion time of MCI to Alzheimer's disease (AD).

Advantages:

- Predicts the time of conversion from MCI to AD stage with 93.5% accuracy
- Computes 95% or 99% confidence limits of predicted conversion time
- Accurate prediction based on AI

Mobile Phone Based Enzyme-Linked Immunosorbent Assay (MELISA)

USF Tech ID# 17B135

Overview: A new mobile system (MELISA) that can be used to complete all steps of the assay, including incubation and reading. The portable device can transfer test results via mobile phone. It weighs just one pound and can be fabricated at a low cost.

Advantages:

- Lightweight and cheaper production cost
- Can be used at point-of-care or in the field
- Completes all steps of ELISA

Medical Sensor System Technologies

Sensor System for Sedentary Behavior and Weight Monitoring

USF Tech ID# 18A026

Overview: Changes in weights, fluctuations in sedentary behaviors, and daytime somnolence of users can be an early indicator of adverse health events such as depression and worsening heart disease. This wireless sensor system helps to measure the weight of user. The system is placed under the support of the furniture without any need for modification to the furniture. The microprocessor used can be configured remotely without disturbing the user.

Advantages:

- Non-intrusive to user
- Continuous monitoring ability
- Maintenance-free
- Ideal for telemedicine application

Systems and Methods for Facilitating Exercise

USF Tech ID# 16A065

Overview: A novel smartphone application that allows physical therapy users to complete necessary exercises using sensors available inside their mobile phones. The application guides users through the exercises with on screen images that advance based on correct user movement. It also uses achievement tracking and goal sharing within the application.

Advantages:

- More cost effective and easier than traditional options
- Improve patient compliance
- Improves mobility and enhances overall health

Silicon Carbide Nanoparticles Fibrous Membrane for Implantable Glucose Sensor Integrated with Chronoamperometric Potentiostat

USF Tech ID# 20A054

Overview: A method for an integrated system with a CMOS based low-power, low-noise chronoamperometric potentiostat circuit and SiCNPs-ENFM based glucose sensor on a single chip. The sensing unit can detect micro amps of electrochemical current from the SiC-ENFM glucose sensor with better sensitivity, limit of detection, fast response time and durability, providing the base for future wearable and portable biosensors.

Advantages:

- Longer durability of sensor
- Better sensitivity providing better and more reliable results
- The SiCNPs-ENFM based sensor has lower power consumption thus making it cost effective

Medical Sensor System Technologies

Digital Timed Walk Assessment Device

USF Tech ID# 18B130

Overview: Electronic “eye” sensor which measure when a person passes the “baseline” and “endpoint” of a walk test. This system can be used with any measured walk. The device relies on a laser sensor connected to a computer or digital device.

Advantages:

- More consistent and accurate than a stopwatch
- More accurately measures the timed 25-foot walk
- Removes the possibility of human error



Software Modelling Technologies

A Software Model for Mapping Negative Epilepsy Network in Brain

USF Tech ID# 20B173

Overview: A software algorithm model that could help surgeons in successful epilepsy surgery resulting in seizure freedom in patients. This non-invasive technique performed with the help of on-the-desk equipment can generate a model of the negatively correlated epilepsy network which represents a protective anti-seizure network that needs to be preserved in surgery, as protection of the network may help to increase the efficacy of surgery.

Advantages:

- A non-invasive method that improves the chances of the cure of epilepsy
- Increases the efficacy of surgery by generating a negatively correlated epilepsy model which represents a protective anti-seizure network to be preserved in the surgery
- Uses readily available desktop equipment to produce the model



Surgical Tool Technologies

Customizable 3D-Printed Surgical Simulator for Craniofacial Procedures

USF Tech ID# 20B163

Overview: This method uses axial imaging data to design the simulation and also allows the model to be easily redesigned to represent disease-specific anatomy and even patient-specific anatomy to improve the simulation experience. This form of training can result in increased surgical competence, decreased medical errors, and ultimately improved patient care.

Advantages:

- Help increase surgical competence thus better surgical outcome
- Simulator provides disease/patient specific prototype
- Ability to help surgeons perform high risk operation with adequate practice

Surgical Tool Technologies

Intraocular Optic Capture Device (IOCD)

USF Tech ID# 19B164

Overview: A device called Intraocular Optic Capture Device (IOCD) was developed by USF researchers for IOL re-fixation. The first of its kind, this invention is designed to restore the function of a lens capsule, a support structure which is lost in patients with dislocated IOL's.

Advantages:

- Made of FDA approved material
- Minimal incision required
- Compatible with single-piece IOL's including premium lenses

Reversible Crimp Device for ACL Reconstruction Surgery

USF Tech ID# 14A006

Overview: A reversible anchoring device for use in ACL reconstruction surgeries that allows for unlimited excursion of the suture through the device. This differs from current devices that require a Chinese finger trap suture that has limited excursion and high complexity. The new device can be repositioned, if necessary, and locked by a cannulated system. This novel anchoring device will allow for more flexibility in performing ACL reconstruction surgery.

Advantages:

- Lower cost of surgery
- Reversible fixation
- Reduces the complexity of the surgery



Therapy Algorithm

Fluency Map Optimization in Intensity-Modulated Radiation Therapy Patient

USF Tech ID# 20B206

Overview: Cancerous tissues are fast proliferating cells that are more sensitive to radiation compared to healthy cells. A game theoretical approach is used to create a cooperative game by solely focusing on modeling the trade-offs occurring in the fluency map optimization problem. This approach can be used for computing an emission plan in IMRT and assures the deliverance of tumoricidal radiation doses to planning target volume with minimal impact on healthy organs.

Advantages:

- Better targeting of cancer cells and minimal risk to healthy organs
- Requires minimal human interaction
- Generates a meaningful interpretation of the radiation plan

Wearable Device Technologies

TussisWatch for Diagnosis of COPD or CHF

USF Tech ID# 19B162

Overview: TussisWatch, a smart-phone based system, can record and detect cough patterns indicative of COPD or CHF, using a two-level classification scheme. The proposed system is user-friendly and low-cost to enable self-diagnosis of COPD and CHF by patients. It has the potential to aid early access to healthcare and may also be used to educate patients on self-care at home.

Advantages:

- User-friendly and low-cost mobile application
- Enables early diagnosis of disease
- Sensitive, specific, and accurate results

Wearable Technology for Vestibular Diagnostics and Treatment

USF Tech ID# 21A073

Overview: A wearable device that addresses balance and spatial orientation using supplemental, Earth-referenced, audible sounds. This invention sends these sounds and real-time monitoring of a person's positional coordinates to a corresponding algorithm that adjusts the sounds to maintain balance and postural stability.

Advantages:

- Specifically provides treatment for multi-sensory integration deficits to minimize patients' postural instability and associated fall risks.
- Utilizes real-time monitoring of patient's vestibular system, head-related transfer functions, and an algorithm connecting the two to constantly self-correct.
- Promotes independence for patients with vestibular disorders and for older adults with age-related hearing or balance issues.



Wireless Monitoring Technologies

Vectorcardiogram (VCG) System and Method

USF Tech ID# 13B205

Overview: A small, wearable device and method for more accurately predicting heart disease and atrial fibrillation using a compact and wireless Integrated Vector Cardiogram System.

Advantages:

- Compact and less expensive
- Enables remote monitoring of patient
- More accurate data and predictions

Why Work With USF and the Technology Transfer Office?

USF Technology Transfer is committed to being the office of choice for our industry partners and envisions a future where every technology is given the opportunity to make a global impact.

- USF ranked 11th among American public universities and 23rd among all universities worldwide in generating new US Patents in CY 2021, according to the National Academy of Inventors (NAI) and Intellectual Property Owners Association (IPO). On a global scale, this is the 10th year USF has ranked in the top 25.
- USF facilitated the formation of 11 new startup companies in FY 2022 (ranking USF in the top 15 percent nationally for facilitating University startups).
- USF executed 99 options & licenses in FY 22 (ranking USF in the top 12 percent for executed agreements). 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 Tampa was ranked #19 among the "Best Universities for Technology Transfer, 2017" by the prestigious Milken Institute.
- USF's innovation and economic development efforts generate more than \$582 million in statewide impact.





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