During the 2011/2012 fiscal year, the USF Matching Grants Research Program awarded 19 new projects with 16 companies. The awards totaled $904,121 from the Florida High Tech Corridor Council with industry partners providing cash of $1,160,187, representing a match ratio of 1:1.28. Additionally, industry sponsors provided $2,780,485 worth of in-kind support for a total investment of $4,844,793 in the program. The average total project value was $254,989 with an average award of $47,585. These projects supported 36 students and 25 faculty members. Projects were awarded to the College of Engineering (14), College of Arts & Sciences (3), USF Poly Technic College of Technology and Innovation (1), and Mote Marine Laboratory (1).

Collins, Lori and Doering, Travis, “The 3D Spatial Technologies Training Collaborative”
Department: Alliance for Integrated Spatial technologies
Sector: Modeling, Simulation, and Training
Partner: FARO Technologies, Inc
Location: Lake Mary, Seminole County
FHTCC Award: $ 33,792  Cash Match: $ 67,584   In-Kind Match: $ 227,500
Total Project Value: $328,876
Students: 3
Faculty: 2
Abstract:
This proposal is a collaboration between the Alliance for Integrated Spatial Technologies (AIST-a core research facility in the College of Arts & Sciences) and FARO Technologies, Inc (a global leader in the design and manufacturing of 3D laser scanning equipment). AIST will generate a revenue stream from the development and implementation of a training program for FARO clients and USF faculty and students will have access to the latest laser scanning technology for research and instructional purposes.

Fan, Lingling, “Smart Grid Functionality of PV-Battery Systems”
Department: Electrical Engineering
Sector: Sustainable Energy
Partner: Progress Energy Florida, Inc.
Location: Lake Mary, Seminole County
FHTCC Award: $ 25,000  Cash Match: $ 75,000   In-Kind Match: $ 25,000
Total Project Value: $125,000
Students: 2
Faculty: 2
Abstract:
Real-time Monitoring and Control for PV and Battery Systems This project aims to install and configure a supervisory control and data acquisition (SCADA) system for two solar PV/battery systems at the USF St. Petersburg campus. With the SCADA system, remote monitoring and
control will be performed at the USF Tampa smart grid lab. The system will provide smart grid functions such as daily peak load shaving to relieve the need of generating power from expensive gas fired peak generators. The entire system will help provide green energy and reduce CO2 emission.

Goldgof, Dmitry, “A Fully Automatic System for Verified Computerized Stereoanalysis”
Department: Computer Science Engineering
Sector: Life Sciences
Partner: Stereology Resource Center, Inc.
Location: St. Petersburg, Pinellas County
FHTCC Award: $ 143,201   Cash Match: $ 144,028   In-Kind Match: $ 174,500
Total Project Value: $461,729
Students: 2
Faculty: 2
Abstract:
In response to the strong demand in the biomedical research community for a fully automatic computerized approach to quantify biological microstructures in tissue sections or digital images, USF and SRC will develop an automatic system to allow users to quantify biological parameters of interest on stained tissue sections.

Goswami, Yogi, “Comparative Assessment and Reliability of CTD Sensors”
Department: Chemical Engineering
Sector: Nanotechnology
Partner: JCG Technologies, Inc.
Location: Clearwater, Pinellas County
FHTCC Award: $ 7,082   Cash Match: $ 57,424
Total Project Value: $64,506
Students: 1
Faculty: 1
Abstract:
This project will help develop a thin film technology for windows which will reduce the air conditioning load on residential and commercial buildings by as much as 20%. This project will develop very low cost thin film coatings on glass, which will change color as needed without any external energy input.

Gupta, Vinay, “Photodegradation Rate Measurements for Low Cost Self Cleaning Cement Surfaces”
Department: Chemical Engineering
Sector: Nanotechnology/ Sustainable Energy
Partner: armONx, Inc.
Location: Tampa, Hillsborough County
FHTCC Award: $ 5,000   Cash Match: $ 5,000   In-Kind Match: $ 5,000
Total Project Value: $15,000
Students: 2  
Faculty: 1  
Abstract: 
The main aim of the proposed research is to measure photodegradation on cement/concrete surfaces treated with formulas prepared by armONx.

Jun, Tan, “HUCBC Modulation of Alzheimer's-Like Pathology and Behavioral Changes”  
Department: Psychiatry  
Sector: Life Sciences  
Partner: Saneron Ccel Therapeutics, Inc  
Location: Tampa, Hillsborough County  
FHTCC Award: $209,601  Cash Match: $209,601  In-Kind Match: $1,406,212  
Total Project Value: $1,825,414  
Students: 3  
Faculty: 1  
Abstract: 
Human umbilical cord blood cells (HUCBC, U-CORD-CELL™) have emerged as very effective and relatively safe immune system modulator and neuroprotector. Although we previously showed their safety and efficacy in an animal model of Alzheimer’s disease, we did not look at the long term effects on safety nor the potential of starting this treatment regimen at different disease stages. Here we plan to fully characterize the optimal dosing time points and duration which provide maximal anti-AD like effects behaviorally and histologically. We will administer multiple low dose injections of U-CORD-CELL™ to AD transgenic PSAPP mice at different disease stages and subject the animals to our established behavioral and histological analyses. Further the safety of these cells as a potential therapeutic approach will be examined in two species. Because it is our long-term goal to move U-CORD-CELL™ into human trials for patients with mild to moderate AD, the proposal culminates in a completed investigational new drug (IND) application for submission to the FDA.

Luer ,Carl, “Membrane Targets in Tumor Cells vs. Normal Cells Exposed to Shark Immune Cell-Derived Anti-tumor Compounds”  
Department: MOTE Marine Laboratory  
Sector: Life Sciences  
Partner: MOTE Marine Laboratory  
Location: Sarasota, Sarasota County  
FHTCC Award: $50,000  Cash Match: $50,000  In-Kind Match: $50,000  
Total Project Value: $150,000  
Students: 1  
Abstract: 
The Scope of Work outlined here represents a continuation of FHT 11-23. The long-term goal of the research is to identify novel anti-tumor compounds from the protein-enriched culture medium from short-term cultures of shark immune cells possessing potent antitumor activity against a variety of human tumor cell lines, with the potential for development into improved therapies for cancer treatment.
Mumcu, Gokhan, “*Miniature X-band Filters with Coupled Metamaterial Resonators*”
Department: Electrical Engineering
Sector: Nanotechnology
Partner: Raytheon Corporation
Location: St. Petersburg, Pinellas County
FHTCC Award: $20,000  Cash Match: $40,000  In-Kind Match: $20,000
Total Project Value: $80,000
Students: 2
Faculty: 1
Abstract:
To address the issues associated with high frequency filter implementations, in this effort, we will investigate new solutions for miniature X-band filters using electrically small metamaterial resonators.

Mumcu, Gokhan, “*Metamaterial based Antennas & Coupling Reduction for Miniature Anti-Jam GPS Arrays*”
Department: Electrical Engineering
Sector: Microelectronics
Partner: Raytheon Corporation
Location: St. Petersburg, Pinellas County
FHTCC Award: $20,000  Cash Match: $40,000  In-Kind Match: $20,000
Total Project Value: $80,000
Students: 2
Faculty: 1
Abstract:
Previous phases of this project employed a new antenna miniaturization technique to develop small dual-band GPS antennas. In current effort, Raytheon and USF will fabricate and test full scale GPS arrays consisting of 4 to 6 antenna elements. If funded through the FHTCC matching grants, the volumetrically loaded coupled double loop GPS antenna concept will be investigated in further detail (through the use of multilayered superstrate antenna topologies and experiments) to achieve more size reduction.

Philippidis, George, “*Development of a Microalgae Production Platform*”
Department: Engineering & Applied Science-College of Tech & Innovation at USF Polytechnic
Sector: Sustainable Energy
Partner: Culture Fuels, Inc
Location: Lakeland, Polk County
FHTCC Award: $45,000  Cash Match: $45,000  In-Kind Match: $45,400
Total Project Value: $135,400
Students: 1
Faculty: 1
Abstract:
In partnership with algae experts at the University of South Florida Polytechnic, the company wishes to perform extensive scale-up testing of its system in Lakeland with actual algae strains from its commercial partners to demonstrate long-term operational robustness, high yields, and cost effectiveness.

Sunol, Aydin, “Development of Nano-composite Micro Foams”
Department: Chemical Engineering
Sector: Aerospace
Partner: Advanced Materials Technology, Inc
Location: Tampa, Hillsborough County
FHTCC Award: $54,530  Cash Match: $54,530  In-Kind Match: $134,530
Total Project Value: $243,590
Students: 4
Faculty: 1
Abstract:
The overall objective of this project is, together with Steven Institute of Technology (SIT) highly filled Materials Technology Center, to support AMT Inc’s Phase II NASA program in developing next generation foams for cryogenic (ultra-low temperature) insulation and structural applications. This will result in reducing the overall weight of space launch vehicles and make the vehicle more efficient for commercial applications.

Wang, Jing, “Injection-Moldable Low-K and Low-CTE Polymer Nanocomposites with Minimal; Cure Shrinkage for Integrated Ultra High Density Interconnects”
Department: Electrical Engineering
Sector: Microelectronics/Nanotechnology
Partner: The Charles Stark Draper Laboratories, Inc.
Location: St. Petersburg, Pinellas County
FHTCC Award: $70,000  Cash Match: $140,000  In-Kind Match: $106,580
Total Project Value: $316,580
Students: 3
Faculty: 3
Abstract:
The proposed work will partner USF with Draper Lab to meet the following primary objectives: 1) Advance the current state-of-the-art technology in the area of injection-moldable polymer nanocomposites with monodispersed dielectric particles to tailor the effective physical properties, such as cure shrinkage, coefficient of thermal expansion (CTE), dielectric constant, and so on, 2) develop experimental setups and methods for evaluating the target properties, such as cure shrinkage, coefficient of thermal expansion (CTE), dielectric constant; 3) demonstrate the employment of injection-moldable polymer nanocomposites in the multi-chip module (MCM) assembly currently being pursued by Draper Lab Through i-UHD process. The proposed effort would involve polymer processing with uniform dispersion of nanoparticles with tight particle size distribution, producing injection-moldable low-k polymer nanocomposites with tailored coefficient of thermal expansion and minimum cure shrinkage.
Wang, Jing, “Research and Training Internship for Enhanced Microwave and Millimeter-wave Circuit Design”
Department: Electrical Engineering
Sector: Microelectronics/Nanotechnology
Partner: Modelithics, Inc.
Location: Tampa, Hillsborough County
FHTCC Award: $26,197  Cash Match: $26,197   In-Kind Match: $26,200
Total Project Value: $78,594
Students: 1
Faculty: 1
Abstract:
The goal of this on-going project will be to characterize (measure) example microwave devices and construct and verify improved models for high frequency transistors, such as Heterojunction Bipolar Transistors (HBTs) as well as field effect transistors of multiple types such as GaN HEMT, SiC MESFET, GaAs pHEMT, and Silicon MOSFET (LDMOS and VMOS). These models are going to be tailored for use in circuit simulation software such as Agilent ADS. Both frequency and time domain simulation capability is of interest. A goal will be transfer of developed techniques and complete modeling examples to Modelithics through collaborative research interaction between Modelithics’ engineers and USF students/faculty.

Wang, Jing, “Simulation and Modeling of Ion Mobility Separative Capability”
Department: Electrical Engineering
Sector: Nanotechnology/Modeling, Simulation, and Training
Partner: The Charles Stark Draper Laboratories, Inc.
Location: Tampa, Hillsborough County
FHTCC Award: $11,105  Cash Match: $22,210   In-Kind Match: $96,120
Total Project Value: $129,435
Students: 2
Faculty: 1
Abstract:
The goal of this on-going project will be to characterize (measure) example microwave devices and construct and verify improved models for high frequency transistors, such as Heterojunction Bipolar Transistors (HBTs) as well as field effect transistors of multiple types such as GaN HEMT, SiC MESFET, GaAs pHEMT, and Silicon MOSFET (LDMOS and VMOS). These models are going to be tailored for use in circuit simulation software such as Agilent ADS. Both frequency and time domain simulation capability is of interest. A goal will be transfer of developed techniques and complete modeling examples to Modelithics through collaborative research interaction between Modelithics’ engineers and USF students/faculty.

Wang, Jing, “Improved Device Fabrication Technology for High Frequency/High Q Resonator Filters”
Department: Electrical Engineering
Sector: Nanotechnology
Partner: Plasma-Therm, LLC
Location: St. Petersburg, Pinellas County
FHTCC Award: $ 15,000   Cash Match: $15,000   In-Kind Match: $21,250
Total Project Value: $51,250
Students: 2
Faculty: 1
Abstract:
The goal of this on-going project will be to characterize (measure) example microwave devices and construct and verify improved models for high frequency transistors, such as Heterojunction Bipolar Transistors (HBTs) as well as field effect transistors of multiple types such as GaN HEMT, SiC MESFET, GaAs pHEMT, and Silicon MOSFET (LDMOS and VMOS). These models are going to be tailored for use in circuit simulation software such as Agilent ADS. Both frequency and time domain simulation capability is of interest. A goal will be transfer of developed techniques and complete modeling examples to Modelithics through collaborative research interaction between Modelithics’ engineers and USF students/faculty.

Weller, Thomas, “3D MEM Phase Shifter Using Additive Manufacturing”
Department: Electrical Engineering
Sector: Microelectronics
Partner: Sciperio, Inc.
Location: Orlando, Orange County
FHTCC Award: $ 20,239   Cash Match: $20,239   In-Kind Match: $20,239
Total Project Value: $60,717
Students: 1
Faculty: 1
Abstract:
In this project the use of additive manufacturing techniques for the production of structurally-integrated electronics will be investigated. The electronics will comprise part of the radio frequency front-end of a phased array antenna system operating at 6 GHz. Such structurally-integrated electronics are often referred to as load-bearing antenna systems, and represent an advanced method of producing low cost, light weight and high performance radio frequency systems that are integral to the structure of, for example, an air frame. For example, in such a system, the wing of an aircraft provides both the conventional functionality of enabling flight while also functioning as a part of the electronics sub-system.

The University of South Florida is partnering with Sciperio in this Phase 1 SBIR project funded by the United States Air Force. USF’s role in the project is to design the multi-layer 6 GHz phase shifter and perform materials and circuit characterization. USF will also participate in the environmental testing of the developed circuits.

Weller, Thomas, “Conformal Antennas for Autonomous Supply Tracking”
Department: Electrical Engineering
Sector: Microelectronics
Partner: The Charles Stark Draper Laboratories, Inc. / Sciperio, Inc.
Location: St. Petersburg, Pinellas County
FHTCC Award: $ 95,954  Cash Match: $95,954   In-Kind Match: $345,954
Total Project Value: $537,862
Students: 2
Faculty: 2
Abstract:
In this research project, Conformal Antennas for Autonomous Supply Tracking, an investigation on light weight, textiles-based antennas and communications systems will be performed. The goal is to develop technology that enables high performance antennas to be realized on structures such as parachutes, sails and other objects of similar construction.

Witanachchi, Sarath, “Growth of Phosphor Nanoparticles and Embedding in Film Structures”
Department: Physics
Sector: Agritechnology
Partner: EngenNano Technology, Inc.
Location: Tampa, Hillsborough County
FHTCC Award: $ 32,000  Cash Match: $32,000   In-Kind Match: $32,000
Total Project Value: $96,000
Students: 1
Faculty: 2
Abstract:
In collaboration with researchers at USF, this project will develop a nanotechnology-based energy efficient grow-light. This product is expected to save millions of dollars in annual energy costs in greenhouse/urbane agriculture.

Zhang, Yu, “Intelligent Transportation System/Traffic Responsive Signal System”
Department: Civil & Environmental Engineering
Sector: Modeling, Simulation, and Training
Partner: Albeck Gerken, Inc.
Location: Tampa, Hillsborough County
FHTCC Award: $ 20,420  Cash Match: $20,420   In-Kind Match: $24,000
Total Project Value: $64,840
Students: 1
Faculty: 1
Abstract:
Traffic Responsive Signal System (TRSS) is an Intelligent Transportation System (ITS) responding to dynamic traffic patterns by collecting and processing traffic data and optimizing the day plan of signal systems. Dr. Yu Zhang, together with the Ph.D. student, Ms. Rui Guo, will assist Albeck Gerken, Inc. (AG henceforth), a local ITS company, in designing and improving advanced TRSS. The outcomes of this research project lead to effective operation of traffic signal system. The benefits of this research project include the alleviation of travelers’ delay, increasing of level of service of intersections, mitigation of Green House Gas emissions, and improvement of the reliability of transportation network.