NASA
HBCU/MSI
Technology Infusion Road Tour

Challenger Learning Center/Florida A&M University
Tallahassee, Florida
September 27-29, 2016

Southern University and A&M College

Southern University and A&M College

innovative Business Partnering

My Contact Information:

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Presentation Outline

SU Background

University Facts, Location, Mission, and Programs

Why Southern Fits

- *SU Contracting*
- *Who Has Done Business With Us*
- *Capabilities Matrix Example*

Selected SU Contracting Example

Selected SU Research Capabilities

Southern University

Largest HBCU System in the Country

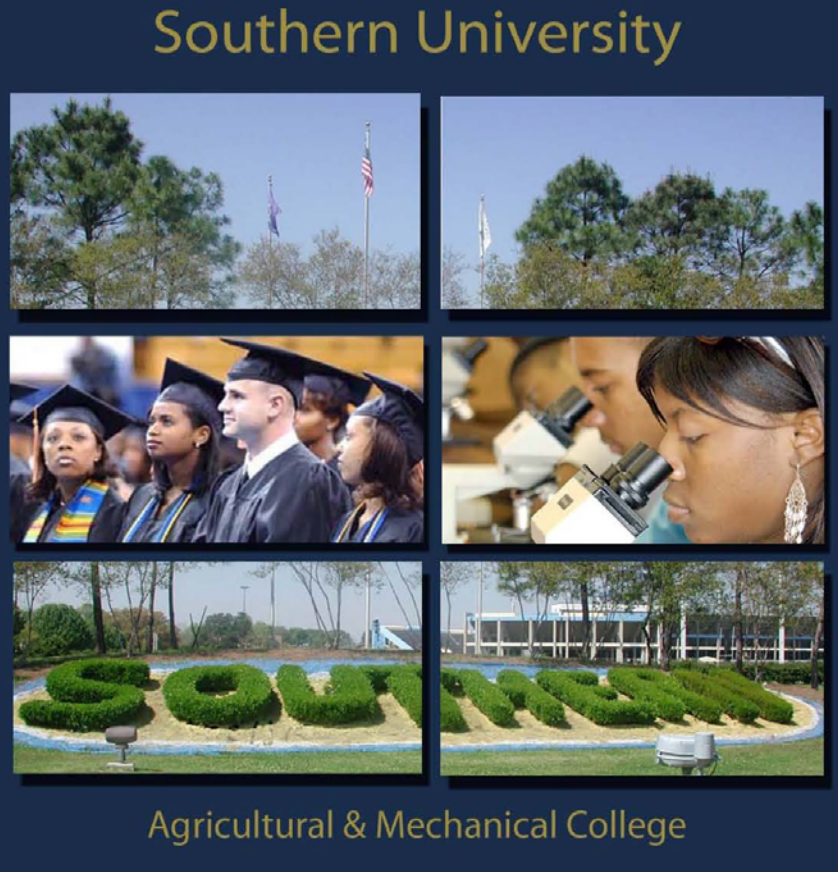
Largest HBCU (Historically Black College and Universities) System in the country

Five Institutions, located on three campuses:

- Baton Rouge Campus
- New Orleans Campus
- Shreveport Campus
- Law Center
- Agricultural Research Center

System Facts

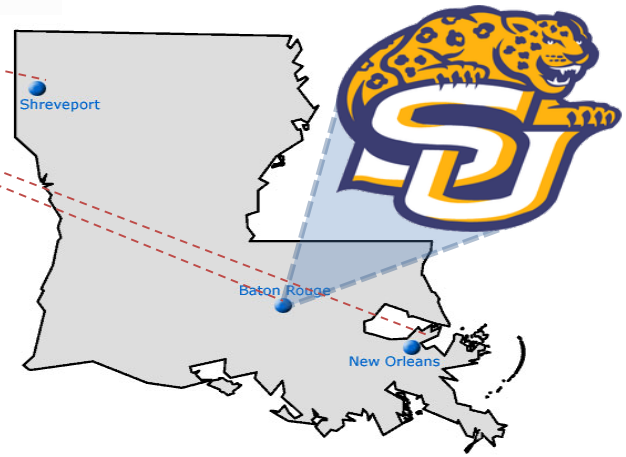
1881 opened in New Orleans, La
1890 Agricultural and Mechanical Department established
1891 recognition as a Land Grant College



University Information

UNIVERSITY NAME:	Southern University and A&M College	**ADDRESS:**	Southern University Baton Rouge, LA 70813
PRESIDENT:	Dr. Ray Belton (President/Chancellor)	**PHONE:**	(225) 771-3890
EMAIL:	ray_belton@subr.edu	**ESTABLISHED:**	1881
WEB SITE:	www.subr.edu	**MASCOT:**	Jaguars

Southern University Location



Web Address:
www.subr.edu

SU Mission & Research Vision

SU INSTITUTIONAL MISSION

To provide opportunities for a diverse student population to achieve a high-quality, global educational experience, to engage in scholarly, research, and creative activities, and to give meaningful public service to the community, the state, the nation, and the world so that Southern University graduates are competent, informed, and productive citizens.

SU RESEARCH VISION

The vision for research at Southern University and A&M College is to build and sustain an infrastructure that encourages greater participation by faculty in sponsored and elective research and related activities. The ultimate measurable outcomes of achieving this vision are that such research efforts would result in:

- an increased number of publications in refereed journals
- greater and more significant opportunities for its graduate and undergraduate students to participate in scholarly activities and research with their professors
- and building nationally reputable and competitive academic departments, colleges, schools, and centers through grantsmanship and contracting.

SELECTED STEM DEGREE PROGRAMS

ENGINEERING:

Civil Engineering
Electrical Engineering
Mechanical Engineering
Electronics Engineering Technology
Master of Engineering

COMPUTER SCIENCE

BS - Bachelor's Degree Program

- Scientific Option
- Information Systems Option
- E-Business Concentration
- Supply Chain Management Concentration
- CS Minor

MS - Master's Degree Program

- Programming Languages Software Engr.
- Operating Systems and Architecture
- Algorithms and Theory of Computing
- Digital Data Communications
- Database Management and Data Mining

ACCREDITATION STATUS

All Computer Science, Engineering and Technology Programs are Accredited by:

Accreditation Board for Engineering and Technology

Southern University and A&M College

why We Fit

Southern University & Contracting

SU Has More Than 16 Years of Experience

Southern University began its **contracting** career in 1999, and has since continued to build its expertise and contract service offerings to over 20 government and industry contractors. Throughout its contracting history, SU has been awarded more than $25 million in contracts from various agencies including: the US Army Corps of Engineers (Department of Defense), NASA, EPA, and the National Geospatial Agency.

Why SU Contracting?

Southern University uses a 6-step contracting flow model to ensure:

- Utilization of its Historically Black College and University capacity;
- Leveraged capability with Federal and corporate investments;
- Development of infrastructure resources and capacity to support services for multiple agencies;
- Formation collaborative relationships with small businesses large corporations, organizations, and other HBCU's to support team for proposal development opportunities; and
- World class team has expertise and past performance to meet challenges such as planning, analytical laboratory services, engineering, logistical, communication, integration, and research and development.

Southern University 6 - Step Flow Model

1. **Agency Scope of Work**
   Request for Proposal (RFP)
2. **Assembly of Response Team**
   University, large, small, private business (teaming agreement)
3. **Contract/Subcontract Initiation**
   University Support Services (Office of Grants, Comptroller, Purchasing)
4. **Invoicing**
   Prime/Subcontractor
5. **Deliverables**
   Final Reports
6. **Closeout**
   University, Prime, Sub

Southern University - Business Partnering

Who Has Done Business With Us?

Government Agencies

NASA
NSF
Office of Naval Research
USDA
USD of Air Force
USD or Army
US Department of Commerce
USDoED
USDOE
USDHHS
USHUD
US Department of State

Southern University - Business Partnering

Who Has Done Business With Us?

Partners and Subcontractors

Archaeological Research Center
Bio Engineering
Boeing
Century Link
Ecological Specialists, Inc.
EM Assist
General Dynamics
Green Briar Wetland Services
Halcrow
HDR Engineering
IBM
Jacobs Engineering
Johnson & Johnson
Lockheed-Martin
Lucent Technology
MEL, Inc.
National Great Rivers Education and Research Center
Proctor & Gamble
Professional Engineering Consultants
Raytheon
Shaw Coastal
Shaw Environmental and Infrastructure
Spark-Hound
Texas Instruments

SU Capabilities Matrix Example

Southern University College of Science and Engineering
Small/Diverse Business & Strategic Alliances

Specific Areas of Expertise	Faculty Researcher Name
• Sense & Avoid for Unmanned Airborne Vehicles (On-/Off-board)	• Jiecai Luo
• Rapid multispectrum image comparison and change identification	• Zhengmao Ye
• Image Fusion/Exploitation & Large Area Displays	• Fred Lacy
• Electronics Based Sensors	
• Bio Sensors	• M. A. Salam
• Low cost radar sensor, sensor array, PED	• Shuju Bai
• Multispectrum image comparison	• Shizhong Yang
• Light weight power conversion.	

SU Capabilities Matrix Example

Southern University College of Engineering
Small/Diverse Business & Strategic Alliances

Specific Areas of Expertise	Faculty Researcher Name
• Shape memory polymer based self-healing composites • Adhesively bonded composite joints • Composite sandwich structures.	•Guoqiang Li
• Miniaturized robotics	•Ebrahim Khosravi
• Nano-composites • Advanced Composite materials • Morphing Polymers. • Photo voltaic	•Fareed Dawan
• Smart Composites. • Mechanical Characterization	•Samuel Ibekwe
•Thermal Barrier Coating for Aircraft Engines •Heat Sinks for Micro-electronics	• Shizhong Yang • Patrick Mensah

Southern University Government & Industry Contracting

one Success Story

NASA Michoud Facility

SU, Jacobs and NASA sign MOU – 2008

Areas of Support:

- Environmental program management and technical support
- Energy conservation technical support (assessments)
- Medical support, coordinated with medical services team mate
- Engineering and operational support
- Senior University membership in a MAF Operations Advisory Council
- Procurement of engineering, technical, support La Universities

NASA Michoud Facility

SU, Jacobs and NASA sign MOU – 2008

Basic Ordering Agreement – Support Services HBCU-BOA-00

- more than 13 Task Orders issued

Areas of Support

- Environmental program management and technical support
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SU/Jacobs Partnership at NASA Michoud Facility

Task Order No.	Description	Task Order Amount
HBCU-BOA-00-001	Team Principle	$303,546.00
HBCU-BOA-00-002	Environnemental Resource Documentation (LPDES Permit)	$28,820.00
HBCU-BOA-00-003	MAF Laboratory Signage Compliance	$20,000.00
HBCU-BOA-00-004	Original Chemical Handling Report	$35,000.00
HBCU-BOA-00-005	Modified Chemical Handling Report	$10,000.00
HBCU-BOA-00-006	Human Resources Administrative Support	$25,000.00
HBCU-BOA-00-007	Energy / Water Conversation Audit	$224,000.00

Southern University and A&M College

technical & Research Capabilities

FACILITIES

P.B.S. Pinchback Hall

117,000 Square feet

60% Lab Space

Moore Hall

Classrooms and Laboratories for EE & EET

FACILITIES

- Classrooms - 5 Multimedia-ready, 1 High Tech, 3 traditional, 2 dual-use, and 6 lab/lecture rooms
- Laboratory Facilities - 33 Instructional Labs, 16 Research Labs with State-of-the-Art Equipment
- Computing Facilities - ~ 500 Computers for Faculty & Students Loaded with Engineering Software Packages
- Courseware Studio - Equipped with the Latest Software & Hardware for Professional Preparation of Course Presentation Materials
- E-Mail & Internet Services - Accessible in All Labs, Offices, and Classrooms Enabling Us to Explore the Far Reaches of Cyberspace
- Interactive Learning - Integrating Innovative Techniques into Instruction Such as **CAVE (Computer Assisted Virtual Environment) ~ a 3D Virtual Reality System**

FACILITIES

- **Classrooms -** 5 Multimedia-ready & 4 lab/lecture rooms
- **4 Research Labs Bio -** Robo, HPC, Sensor
- **Computing Facilities-**
  - 200 Computers for Faculty & Students
- **Clusters**
  - HP blades. 96 processors in total. Will upgrade to 120 processors
- **Servers and workstations**
  - 2 servers.12 cores each.
  - 15 workstations
- **LONI -** Free access to LONI facility
- **SEDE -** Free access to EXEDE facility
- **Courseware Studio -** Latest Software & Hardware for Course Presentation Materials
- **Wireless Internet Services**
- **Local DNS VM and E-Mail**

LABORATORIES

Solaris Lab 146
SUN Ray

Student Lab 121

Classroom
Lab 114

Programming
Lab 125

Conference
Lab 119

Graduate Research
Lab 127

STRATEGIC AREAS OF ENGINEERING RESEARCH

- Computation, communication, and information,
- Advanced materials,
- Nanomaterials, nanoscience, and devices, and
- Energy and the environment.

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computation, Communication & Information

CCI Groups

- **LONI Institute**
  - 3 Faculty Members with Computational Background in Materials Science & Engineering Computer Science, and Biology
  - Collaboration of Six Louisiana Institutions
- **Applied Sensor Technology Group**
  - Automatic Target Recognition (ATR), Electro-Optics/Infrared (EO/IR), and Radio Frequency (RF)
  - Wireless Sensor Networks
- **Simulation (CAVE)**

Immersive Virtual Environment

The CAVE is a room-sized advanced visualization solution that combines high-resolution DLP™ based stereoscopic projection technology and 3-D computer graphics to create the illusion of complete sense of presence in a virtual environment. The CAVE allows multiple users to immerse themselves fully in the same virtual environment at the same time.

Components

Graphics Computers

The Centre for Immersive Virtual Environments main computer is a 10 processor Windows 2000 Cluster with 4 graphics pipelines..

Stereo Glasses & Head-Mounted Display (HMD)

Interactive & Cyber Gloves:

An Interactive Glove features advanced fiber-optic flex sensors to generate finger-bend data. Move easily through the virtual world by combining hand gestures with the pitch and roll of the user's hand

LONI Participant Schools

Louisiana State University; Louisiana Tech;
Southern University ; Tulane;
University of Louisiana at Lafayette;
University of New Orleans

Research Areas

Computational Materials

Materials Theory, Modeling, Computation & Analysis; Surfaces, Interfaces and Nanostructures; System On-Chip Design and Integration; Computational Modeling of Mechanical Behavior of Polymer Nanocomposites; Micro Electro-Mechanical Systems; Polymer Design and Synthesis

Computational Biology

Metagenomics; Pulmonary Mechanics; Computational Biofluid Mechanics; DNA-based Detection; Phlogenomic Protein Identification; Understanding the Infection Mechanism

Computational Science

Cactus Toolkit for Multi-Scale Simulations; SAGA; Distributed Data Management; Scheduling Services; Algorithms for Medical Data Integration, Mining and Discovery

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advanced Materials

Composite Materials

Recent Projects

- Smart Adhesively Bonded High-Performance Joints for Composite Structures
- Testing and Modeling of Blast Response of Functionally Graded Composite Armor
- Elimination of Deck Joints Using a Corrosion Resistant FRP Approach
- Molecular Dynamic Simulation of Impact on Composite Material
- Development of Advanced Grid Stiffened FRP Tube-Encased Concrete Columns
- Composite Columns and Poles for Infrastructure and Homeland Security Applications
- High-Velocity Impact of Composite Cryotanks Subjected to Various Projectiles

Materials Characterization

Our state-of-the-art characterization capability can be utilized as a stand-alone service or as part of a larger research and development initiative.

Capabilities Include:

- SEM (Scanning Electron Microscopy)
- Chemical Analysis
- XPS (X-ray Photoelectron Spectroscopy)
- Hardness Testing
- Mechanical Testing
- Defect Analysis

Materials Selection

Identify and select the appropriate material systems based on the application's operating conditions, and the cost, availability, and manufacturability of the feasible material systems.

Reliability and Failure Analysis

Identifying and Eliminating Potential Failures

NSF-Center for Research Excellence in Science & Technology (CREST)

Next Generation Composites Crest Center, or NextGenC^3

NanoMaterials, NanoScience and Devices

Class 100 Cleanroom

- UV exposure station / mask aligner
- Photoresist spin coater
- Convection oven
- wet bench/fume hood
- RF and DC sputtering/deposition system
- Film thickness ellipsometer / profiler
- Low and High Temperature ovens

Research Project

- Piezoelectric Microcantilevers for Detection of Single Cells, and Micro-fabricated Reactive Oxygen Sensors

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Energy & The Environment

Energy Research & Education

- **Clean Power and Energy Research Consortium (CPERC)**
  - Gas Turbine Systems (Reduction of fuel consumption, Improving reliability, Incorporating MEMS technology)
  - Clean Energy (Emission Reductions, Emission Monitoring Fuel Cells and Fuel cell/gas turbine hybrid cycles
  - Alternative Fuels (Biomass including sugar cane bagasse, land-fill gas, wood wastes, rice hulls, and corn cobs)
  - Energy Conservation (Cogeneration...)
  - Energy Education (workshop and short courses)
- **Energy Auditing Using Predictive Engineering**

Environmental Research & Education

Recent projects

- Planning and Investigation Water Management Units
- Preliminary Planning and Investigation Swamp Water Management Units
- Wastewater Treatment Academic Training Center

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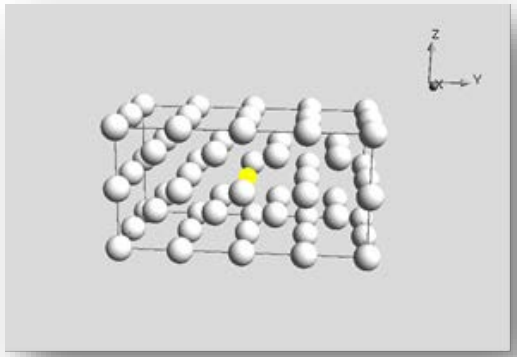
HPC Research

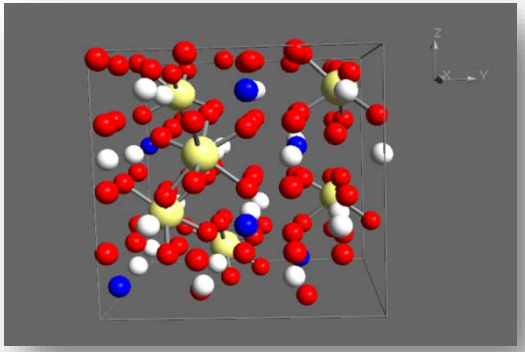
HPC High Temperature Materials Design

- High Performance Computing Algorithms
- Cr-Y Alloy System
- Thermal Barrier Coating for Nb-Based Alloys
- Oxide Dispersion Strengthened Alloy Design
- Novel Thermal Barrier Coating for Turbine

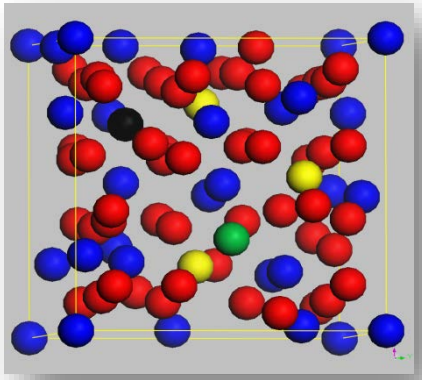
HPC Material Simulation



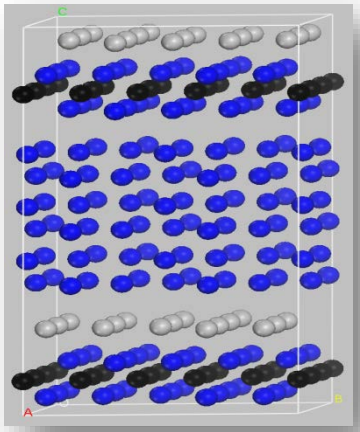
Cr-Y alloy and oxidation

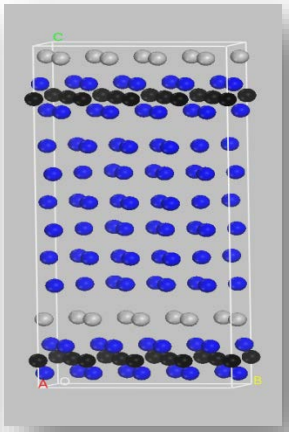


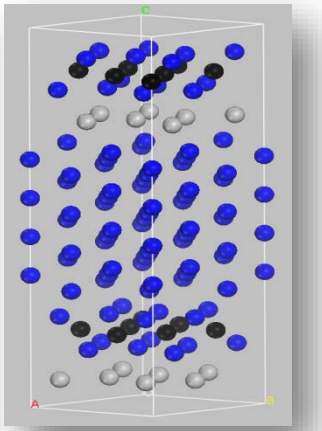
Ta doped YSZ optical property study



Gd-Yb-Y-ZrO2







Nb2AlC/Nb Alloy

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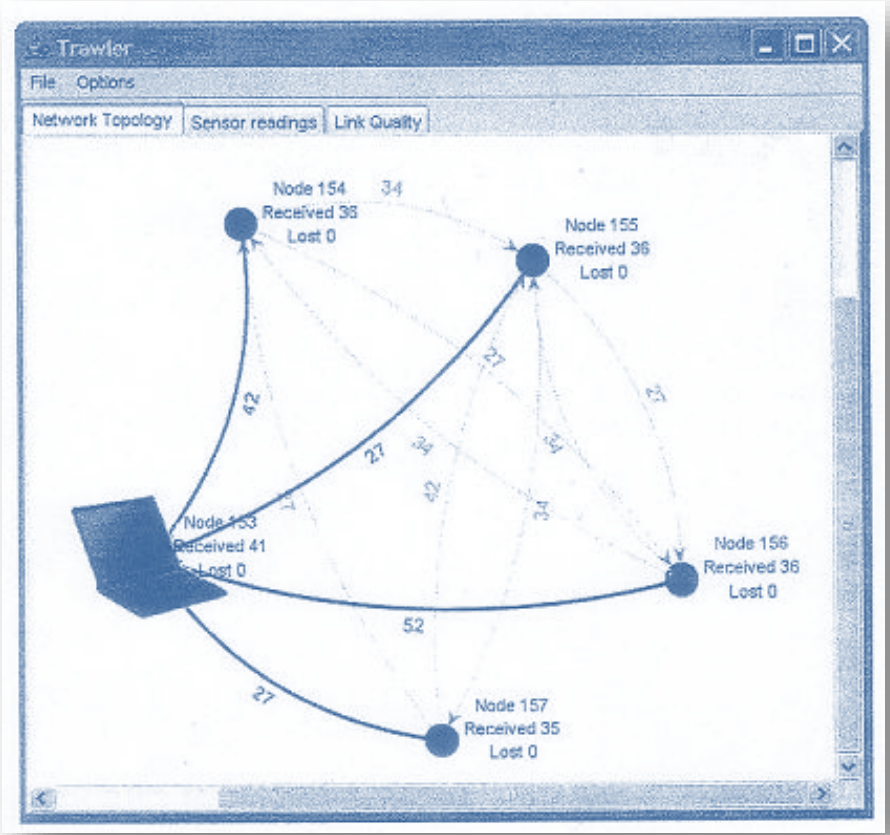
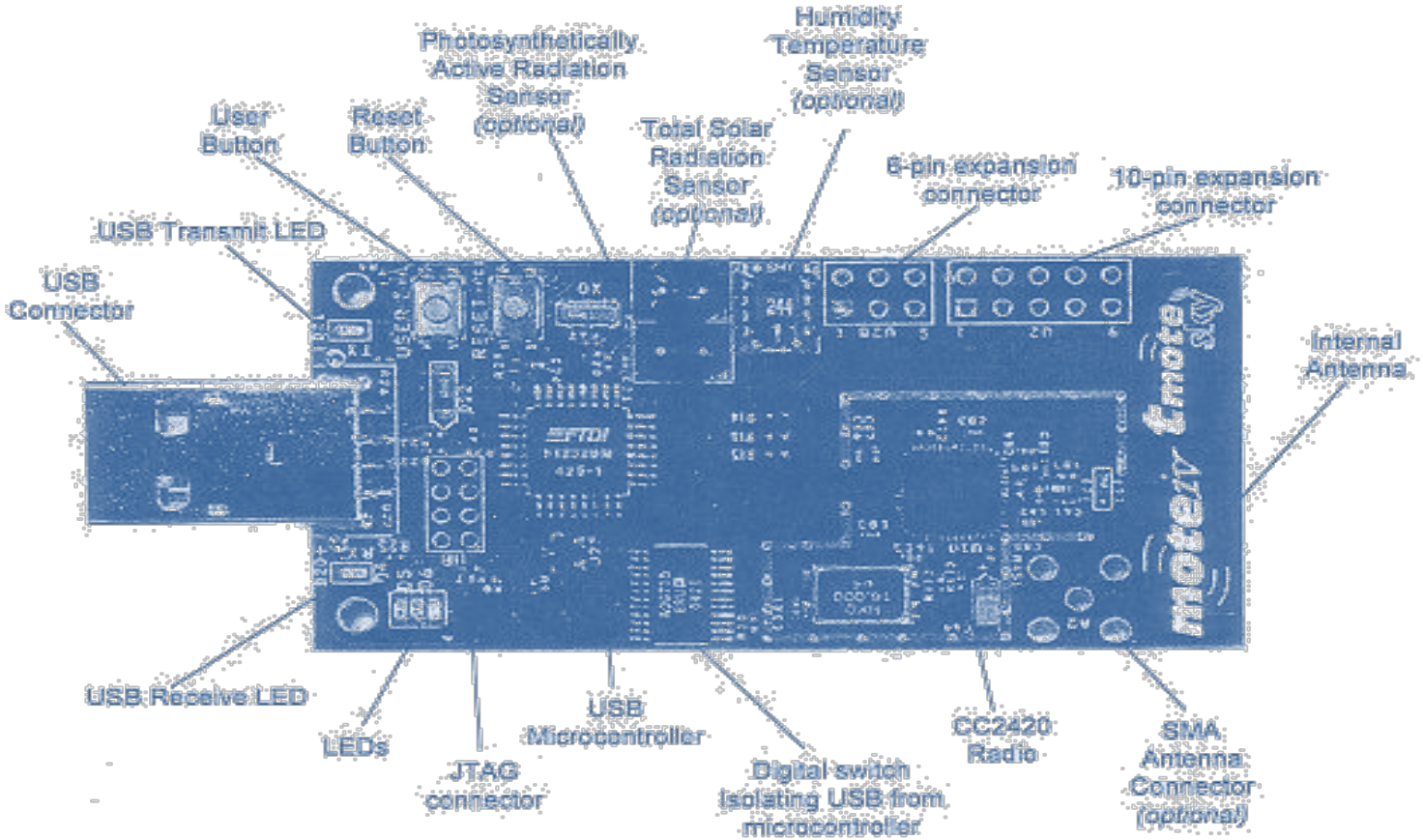
sensor Network

Description & Example

- Develop sensor network that will allow them to communicate with each other and work as a team.
- Each sensor node is a hardware unit having a small microprocessor and memory. The robot gather's environment data (sound, temperature, light, and humidity) with mounted sensors.



Sensor Module Description



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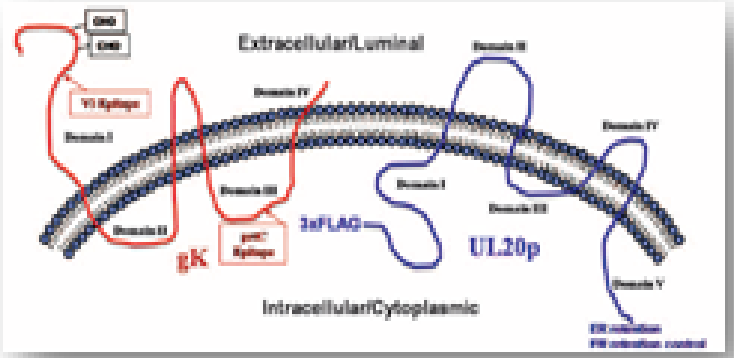
bio Informatics

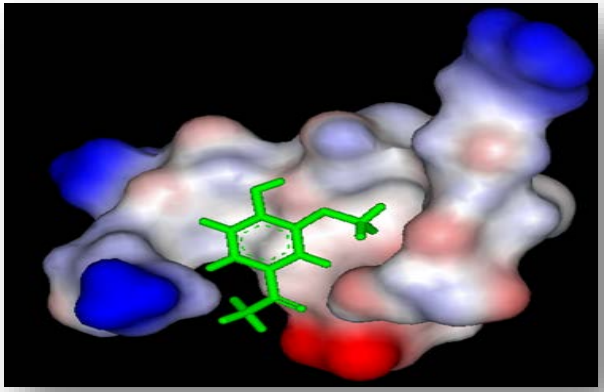
Bioinformatics & BioComputing

- **Develop computational framework for molecular dynamics simulation applications**
  - Begun work on a hadoop-based framework which will incorporate MPI to hadoop and handle data reuse in dynamics simulations
- **Model Protein-Substrate Interactions**
  - Modeling of interactions between enzyme and ligands to help drug design targeting some diseases
- **Implement Algorithms of Dynamics Simulation Sampling Methods on Various Computational Platforms**
  - Hadoop
  - Work Queue

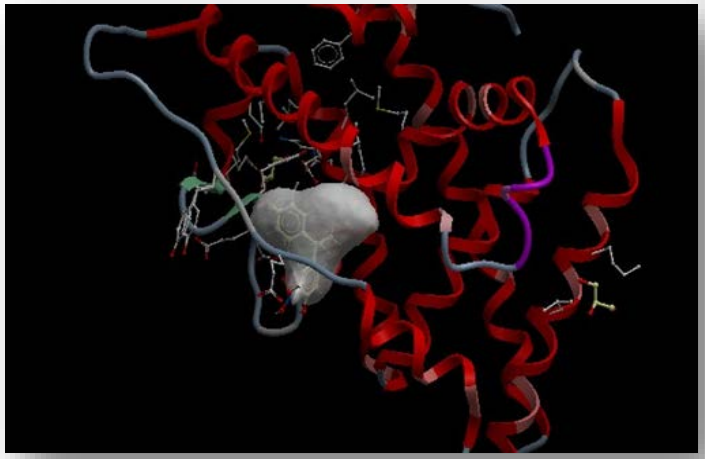
Computational Biomedical Projects



HSV gK/UL20p



Apocynin/1K4U



BPA /2E2R

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sensor & Robotics

Environmental, Fabrication & Monitoring Goals

- Temperature Changes
- Motion Detection
- Light Detection
- Object Detecting (walls, doors, etc.)
- Mapping
- Remote Monitoring and Control

Robotics Laboratory

- **Autonomous Control Concepts Testing**
- **Goals of Laboratory:**
  - Develop niche of expertise, and at the same time introduce students to state of the art robotics.
  - Enable students to bridge the gap between an academic and industrial environment, provide our student with the theoretical and practical training they need for their future career.
  - Teach the organization skills and work together to solve interdisciplinary problems. Provide them with advanced, up-to-date, hands-on training with robotics and other sensor network system.

INDUSTRY ...


CATERPILLAR
NS
NORFOLK SOUTHERN
DOW
Raytheon
BOEING
Pratt & Whitney
A United Technologies Company
ExxonMobil
GM
Entergy
THE POWER OF PEOPLE
UGS
Transforming the process of Innovation
DELPHI
ADTRAN
hp
invent
DUPONT
freescale
semiconductor
P&G
TEXACO
BASF
The Chemical Company
Ford
XEROX
ConocoPhillips
3M

GOVERNMENT …

LQESF

THE LOUISIANA QUALITY EDUCATION SUPPORT FUND 8(g)

Louisiana Board of Regents

EPSCoR
Experimental Program to Stimulate Competitive Research

Sandia National Laboratories

National Renewable Energy Laboratory (NREL)

Lawrence Livermore National Laboratory (LLNL)

Oak Ridge Institute for Science and Education (ORISE)

ARGONNE NATIONAL LABORATORY

NNSA
National Nuclear Security Administration

ACADEMIA

Louisiana State University
LSU

The J. Bennett Johnston, Sr.
CAMD
Center for Advanced Microstructures and Devices

ICED Louisiana Council of Engineering Deans

cperc
CLEAN POWER AND ENERGY RESEARCH CONSORTIUM

The CENTER for ENERGY and ENVIRONMENTAL STUDIES

Southern University and A&M College
Incorporated 1880
Relocated 1914
Baton Rouge, La.

Marquette University

MichiganTech

HBCUs
Council of Engineering Deans

NEEDS
National Engineering Education Delivery System

SYNTHESIS A National Engineering Education Coalition

NACME
National Action Council for Minorities in Engineering

AMIE
Advancing Minorities' Interest in Engineering

Black Engineer of the Year Awards Conference

Southern University and A&M College

innovative Business Partnering

For Contracting Opportunities, Contact:

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