Alabama Alliance for Students with Disabilities in STEM (AASD-STEM)
2nd Annual Conference

March 31, 2012 * Auburn University Hotel and Conference Center * Time: 8:15 a.m.-3:15 p.m.

Theme: Broadening the Participation of Students with Disabilities in Science, Technology, Engineering, and Mathematics: Challenges and Promising Practices.

Time	Activity	Description				Location
8:15-8:30 AM	Registration	Registration and Continental Breakfast				Pre-Function Foyer
8:30 -8:45- AM	Overview of the AASD-STEM Program	**Opening Session** Opening Remarks Dr. Overtoun Jenda, Associate Provost for Diversity and Multicultural Affairs				Auditorium
8:45-9:45 AM	Research Presentation	***Studying with Technology*** Laura Parks, M.Ed. Technology Assistance for Special Consumers (STAR) (Tamara Massey)				Auditorium
9:45-9:55 AM	**BREAK**	**BREAK**				**BREAK**
9:55-10:25 AM	Mini Grant Research Presentation	***EEG For Accessibility*** Dr. David Umphress, John Weaver and William Clark Department of Computer Science and Software Engineering, Auburn University (Dr. Marghitu)				Auditorium
10:30-11:15 AM	Advocacy Presentation	***The Fundamentals of Being an Effective Advocate*** Mr. Graham Sisson The Governor's Office on Disability (Dr. Dunn)				Auditorium
11:20-12:10 PM	Breakout Sessions STEM Research Presentations	Psychology: Dr. Clarissa Arms Chavez **Auburn Montgomery** (Dr. Ray)	Biological Sciences: Dr. Gerald Griffin **Tuskegee University** (Dr. Qazi)	Computer Science: Dr. Rajendran Swamidurai **Alabama State University** (Dr. Pettis)	Industrial Design: Asst. Prof Jerrod Windham **Auburn University** (Dr. Marghitu)	Ballroom B (left & right) Seminar Room Governor's Room
12:15-1:30 PM	**LUNCH**	Hotel and Conference Center Ballroom ***Luncheon Speaker*** Mr. James Majors (Auburn '11) (Dr. Chidume)				Ballroom A (right)
1:30-2:00 PM	Poster Session	Presented by Internship Recipients and Other Students				Governor's Room
2:00-3:00 PM	Student Presentations	Student Presentations (10-12 minutes)				Auditorium
3:00-3:15 PM	Closing	Evaluation and Closing Remarks (Dr. Pettis)				Auditorium

AASD-STEM CONFERENCE PRESENTERS AND THEIR TOPICS

Laura Parks, M.Ed.: *Studying with Technology*
Laura Parks is an Assistive Technology Specialist for the Technology Assistance for Special Consumers (T.A.S.C.) program of United Cerebral Palsy of Huntsville and Tennessee Valley. She will provide information about technology tools that can assist students in the areas of math and science.

Dr. David Umphress, John Weaver and William Clark**:** *EEG for Accessibility*
Department of Computer Science and Software Engineering
This project will discuss research that increases accessibility using electroencephalography to open doors.

Mr. Graham Sisson**: The Fundamentals of Being an Effective Advocate**
Mr. Graham Sisson is a licensed attorney and the Executive Director for the Governor's Office on Disability (GOOD). He will discuss strategies for becoming an effective advocate.

BREAKOUT SESSIONS

From immigration to sleep: The science behind stereotyping and prejudice
Dr. Clarissa Arms-Chavez, Assistant Professor, Department of Psychology Auburn Montgomery

Overcoming Obstacles and Accomplishing Objectives: A Neurovirology Story
Dr. Gerald Griffin, Department of Biology, Tuskegee University

Computing Disciplines, Majors, and Career Opportunities
Dr. Rajendran Swamidurai, Department of Mathematics & Computer Science, Alabama State University

Industrial Design
Asst. Professor Jerrod Windham, Department of Architecture and Industrial Design, Auburn University

LUNCHEON SPEAKER

Mr. James Majors (MS, Auburn 2011)**,** Software Developer, Greenway Medical Technologies

STUDENT PRESENTATIONS

Presenter: Brandon Rives, Department of Computer Science, Tuskegee University
Analysis of communications between cores in clusters with multi-core and multi-CPU compute nodes
Since the last few years clusters consist of multi-core and multi-CPU nodes, introducing communication complexity hitherto not present in single CPU single core node clusters. Several factors impact on the communication speeds between cores in a cluster.

Presenter: Daniel Pulliam, Department of Chemical Engineering, Auburn University
Pressure Profiling a Neutral Gas Discharge Preceding a Plasma Jet
The Field Reversed Experiment-Liner (FRX-L) at the Los Alamos National Laboratory aims to produce a plasma suitable for nuclear fusion using pulsed-power technology created by the Department of Energy's Defense Programs. To fulfill this objective, the operation of the FRX-L plasma guns must maximize the discharge of ionized plasma and minimize the neutral gas particles surrounding the plasma jet. A system employing an ionization gauge was designed and created to measure the pressure of the neutral gas discharge preceding the plasma jet. The goal of this project was to determine the conditions that optimize the ionization of the neutral gas discharge to obtain suitable plasma for the FRX-L using this custom made pressure measurement system. Additionally, this project analyzed visible light spectroscopy data to determine the plasma's temperature and any contamination present.

Presenter: Joanie M. Keel, Department of Aerospace Science Engineering, Tuskegee University
The Tuskegee University Unmanned Aerial Vehicle (UAV) Research Project
The purpose of this research is for students to further learn about the design, construction, and function of unmanned aerial vehicles (UAV). As a team we constructed a UAV and uploaded the navigation software onto the remote of the plane. We also conducted a flight test on it and although unsuccessful, we were able to see the components of the plane that needed alterations. Also we constructed a force transducer to measure the acts of force and torque on a UAV during it's take off into flight.

Presenter: Joseph Shanahan, Department of Computer Science & Software Engineering, Auburn University
Web Accessibility Analysis of Popular Content Management Systems Including Students with Disabilities
On July 26, 2011, The White House recommitted itself to enforcing and protecting civil rights with a special focus on Section 508: a web accessibility requirement for both inside and outside the government. This work presents data results from a web accessibility analysis of popular content management systems (CMS): Wordpress, Joomla, Drupal, Plone, Microsoft Sharepoint, YouTube, and Facebook. This analysis rates each of the CMS's based on their conformance to accessibility standards and evaluation tools including Section 508, WCAG, WAVE, Jaws Screen Reader, and color-blind testing. Data tables that outlines the performance of popular content management systems and a Boolean test that determines whether or not they pass the most important accessibility standards. And more information is included about content management trends, the importance of accessible CMS's and a vision of an accessible internet. There are legislative demands and user demands that are requiring web developers to take accessibility seriously. This study is a comprehensive investigation of these important web accessibility issues. *[This study was supported, in part, by a grant from NSF/AASD-STEM during a summer internship program].*

Presenter: Venus Welch-White, Department of Food Science & Nutrition, Tuskegee University
The Impact of Propylthiouracil (PTU) and High Fat Diets in Rat Animal Model
The association of adverse health with higher fat diets has long been recognized; however information on the relationship of high fat diets and thyroid function is limited. The purpose of this study is to conduct a comparative analysis of the physiological differences between rats fed various concentrations of saturated and unsaturated fat diets in a normal and a thyroid compromised rat. Adult male Sprague Dawley rats (n=100) were exposed to one control or four diet groups; Control 12% Fat, a 25% saturated and unsaturated, and a 35% saturated and unsaturated, respectively. Each diet group contained ten normal and ten altered thyroid animals. A chemical induced thyroidectomy was obtained through the addition of .05% propylthiouracil (PTU) in the drinking water. The study was conducted over a period of 8 weeks. Preliminary data indicates the body weights and body length of the normal animals were higher than in the altered thyroid groups. HbA1C values were within normal range. This study may provide a foundation for development in an experimental model for future studies which evaluate the impact of a high fat diet, thyroid and metabolic function.

POSTER PRESENTATIONS

The effects of time and familiarity on ethnic typicality ratings
Jessica N. Sessions, psychology graduate student Auburn Montgomery
(Dr. Clarissa Arms-Chavez, assistant professor of psychology)
The current study explored the relationship between time and familiarity on ratings of ethnic typicality. Participants were exposed to individuating information about African American and European American targets at time 1. During this exposure, participants were asked to form an impression about each target and rate how typical they perceived each target to be for their respective ethnic group. The participants then returned 48 hours later and completed the same typicality rating task about the exposure targets. In addition, participants were also asked to rate how typical they perceived novel targets to be for their respective ethnic groups. It was predicted that time and familiarity would influence the typicality ratings for the exposure targets. Thus, at time 2, participants would rate exposure targets as more atypical for their respective ethnic groups when compared to time 1. In addition, it was predicted that participants would rate exposure targets as more typical for their respective ethnic groups at time 1 versus more atypical during time 2. This was based on the expectation that the

participants would have become familiar with the exposure targets and would be more likely to individuate the target based on the information learned rather than stereotypical information. While the results of the study did not show a significant difference between the typicality ratings of the exposure targets between time 1 and 2, there was a significant difference found between the typicality ratings of the exposure targets compared to the novel targets.

Monte Carlo Simulation of Mass and Heat Diffusion
Timothy Hornsby, Mathematics/Engineering student Auburn Montgomery
(Dr. Luis Cueva-Parra, assistant professor of mathematics)

Study of thermo-physical properties of nano-colloids was conducted using Monte Carlo/ Metropolis Method. Phase change morphology and thermal conductivity were the main topics of this study. Base fluids included Dodecane and Icosane and the considered nano-particles were of cooper oxide. This project comprised the development of a model for the colloid and its corresponding software for the simulation using the Monte Carlo/Metropolis Algorithm. Additionally, an implementation for the visualization was considered. We will evaluate existing visualization codes for their potential to complement with our simulation software. At present the simulation does model the diffusion of heat throughout a volume. The program lacks the representation of mass particles. The first obstacle we encountered was choosing an appropriate random number generator for this application. The obstacle to overcome is to accurately calculate the energy in the system at each time- step of the program. We expect this to be resolved soon. When the array is constructed for the mass particles the program will accurately represent the Brownian motion of the particles. A visualization of the behavior of a closed system of particles will then be produced. This result can then be applied to simulations that consider heat transfer within mixtures of base fluids with nano-particles.

Alarm substance induced behavioral responses in mosquitofish (Gambusia holbrooki)
Payton Laura Spencer, Physical Science/pre-Pharmacy student Auburn Montgomery
(Dr. John Aho, Associate Professor)

A wide range of aquatic organisms release chemical cues that may serve as alarm signals. Many studies have documented the antipredator function for such alarm substances for both the signal producer and signal receiver. Alarm signal receivers typically respond upon detecting such chemical alarm cues: freezing, area avoidance, shoaling, increased shelter use, decreased foraging activity and movement. Receivers may alter life history traits, morphology, or other demographic attributes. Despite the large number of studies on responses of fishes to chemical alarm substances, no studies have addressed whether males and females respond differentially to conspecific alarm substances. No studies have also addressed whether reproductive state of the fish (immature, mature, gravid) impacts the production of chemical alarm substance or the receipt of the signal. Moreover, few studies have focused on a group of fishes known as live-bearers, family Poeciliidae. In our investigation, we demonstrated that mosquitofish, Gambusia holbrooki (Poeciliidae), exposed in the laboratory to mosquitofish skin extract and pretty shiner (Lythurus bellus, Cyprinidae) skin extract altered location in the test chambers, significantly decreased activity and increased shoaling behavior. Response was greatest to conspecific extract compared to heterospecific extract suggesting chemical alarm cues are partially conserved across a wide range of fishes. Although we were unable to detect gender differences in response to conspecific skin extract, we did note differences ion the intensity of the response depending on the reproductive state of the individual. No change in fish behavior was noted in response to introducing distilled water into the test chamber. Although we had anticipated gravid females to be the most responsive and males the least, we detected few differences among males, immature, mature and gravid females to skin extracts made from these male, immature and mature females. Extract made from gravid females exhibited a lower intensity of response (activity, locational shift, and shoaling) to all groups of fish exposed suggesting a possible cost of reproduction in the production of alarm substance.

Pressure Profiling a Neutral Gas Discharge Preceding a Plasma Jet
Daniel Pulliam, Chemical Engineering student Auburn University

The Field Reversed Experiment-Liner (FRX-L) at the Los Alamos National Laboratory aims to produce a plasma suitable for nuclear fusion using pulsed-power technology created by the Department of Energy's Defense Programs. To fulfill this objective, the operation of the FRX-L plasma guns must maximize the discharge of ionized

plasma and minimize the neutral gas particles surrounding the plasma jet. A system employing an ionization gauge was designed and created to measure the pressure of the neutral gas discharge preceding the plasma jet. The goal of this project was to determine the conditions that optimize the ionization of the neutral gas discharge to obtain suitable plasma for the FRX-L using this custom made pressure measurement system. Additionally, this project analyzed visible light spectroscopy data to determine the plasma's temperature and any contamination present.

Investigation of Response of Precast Sandwich Panels to Impact Loads
Martina Svyantek, Civil Engineering graduate student Auburn University

Due to the current world climate, terrorist threats are becoming a more important aspect of building design. Currently, the design methodology for precast concrete sandwich panels is vague and dissuades builders from their use in building applications that might be subjected to impact loads from blasts. The purpose of this research is to investigate current design restrictions, with the idea of later research being conducted through the use of experimental and numerical models of innovative resistance methods. *[This study was supported, in part, by a grant from NSF/AASD-STEM during a summer internship program].*

2011 Internship in Educational and Assistive Technology Lab at Auburn University
Cassandra Stephens Computer Science & Software Engineering student Auburn University

During Summer 2011, my internship at Auburn University included various activities. Among these were learning Kodu and Alice, object oriented software programs that are used in RoboCamp - a robotics and game programming camp offered for children K12 every semester at Auburn University. I also participated in a teachers' workshop organized by Computer Science and Software Engineering Department in collaboration with Microsoft Co., and NSF Access Computing Alliance. In addition, I evaluated the accessibility of an Auburn graduate student's master's project website. I also was exposed to many different aspects of Computer Science through interaction with other students from the undergraduate to doctorate level. This internship provided me with an introspective look at Computer Science. *[This study was supported, in part, by a grant from NSF/AASD-STEM during a summer internship program].*

User Research of an Educational Web-Based Learning Environment: Preliminary Findings and Experiences
Candice Adams Computer Science & Software Engineering graduate student Auburn University

Increasing the use of technology is essential for the vitality of today's classroom because technology creates an environment that fosters positive attitudes toward learning and increase technologically literacy among K-12 students. Web-based applications that are centered on classroom lessons are effective at increasing literacy because it heightens students' motivation and interaction with technology. This paper will address the effect technology can have on advancing computer literacy when incorporated into the classroom through web-based learning environments. Moreover, it will take you behind the scenes from design to implementation of ChemiNet which is a web-based learning environment to support introductory Chemistry.

The influence of Herpes Simplex Virus Type I infection on neuronal activation
Anthony Holliman and Gerald D. Griffin, Department of Biology, Tuskegee University

Herpes Simplex Virus Type I infects 60% of the U.S. population. HSV-1 forms a latent infection in cells of the nervous system (neurons). It is in neurons that the virus goes latent but can also reactivate, leading to a number of neurological disorders. HSV-1 is a leading cause of blindness and encephalitis. Currently, no cure or vaccine is available. While neuronal activity has been linked to the virulence of HSV-1, the interactions between the nervous system and the virus are unclear. Understanding these interactions may lead to better therapies for HSV-1 infection and its subsequent neuropathologies. Thus, the over-arching goal of this study is to test if HSV-1 regulates neuronal activity. To do this, cell culture and animal experiments will be performed. This project will test if HSV-1 activates the α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptor, a specific type of receptor that mediates excitatory neurotransmission. The results of this work will highlight mechanisms by which the nervous system and HSV-1 interact with one another. Additionally, better understanding neuronal-viral interactions will give insights of how to better employ HSV-1 as a vector to treat neurogenetic disorders such as Huntington's disease, Charcot-Marie-Tooth disease, Parksinon's disease, Tuberous Sclerosis Complex, and the mucopolysaccharidoses.

Investigation of Microfluidics and NEPCM for High Heat Flux Microelectronics Cooling

Julaunica Tigner[1,2], Alexandria Bufford[3], Dr. Tamara Floyd Smith[4]

Department of Mechanical Engineering, Tuskegee University[1], Department of Materials Science and Engineering, Tuskegee University[2], Auburn High School, Auburn, AL[3], Department of Chemical Engineering, Tuskegee University[4]

The growing demand for microelectronic systems to be smaller and faster has increased the energy released by these devices in the form of heat. Microelectronic systems such as laptop computers are not exempted from these demands. The primary, traditional technologies currently used to remove heat generated in these devices are fins and fans. In this study, traditional cooling methods were compared to more novel methods like microchannel (MCs) cooling using flowing water and cooling using phase change materials (PCMs) like paraffins with the addition of nanoparticles. Temporal and steady state data were obtained. The results of the study indicate that the fan, fin, microchannels and nanoparticle enhanced phase change materials (NEPCM) achieved cooling levels of 3°C, 6°C, 5°C, and 5°C respectively. The results obtained to date suggest that microchannel cooling and NEPCM are promising methods for cooling high heat flux microelectronic systems. In addition to conducting experiments, this study includes analytical modeling based on assuming that the simulated microelectronic system is isothermal and heat is lost from the system by free convection. Using these assumptions, a simple ordinary differential equation (ODE) describes the system and integration of the ODE yields an expression for temperature as a function of time that can be compared to both the temporal and steady state experimental data. Currently, the consistency of the model with the experiments depends heavily on the assumption/calculation of the free convection heat transfer coefficient.

MODULATION OF MiRNA EXPRESSION IN PROSTATE CANCER CELLS BY THE DIETARY FLAVONOID QUERCETIN

Lachundra Mosley, Department of Biology, Tuskegee University

Prostate cancer is the most common cancer and the second leading cause of cancer-related death in men in the United States. African American men have higher incidence rates, and at least double the mortality rates compared with men of other racial and ethnic groups. There is a growing interest to lower this health disparity and prevent prostate cancer through dietary adjustments or supplements. Quercetin is a widely available dietary polyphenolic flavonoid that is abundant in the skins of fruits and vegetables, and has anti-cancer activities. Even though research on flavonoids and their anti-cancer potential is ongoing, the mechanisms behind their abilities to inhibit carcinogenic processes are not fully understood. We proposed that microRNA (miRNA) modulation is a potential candidate mechanism. We hypothesized that dietary polyphenols could modulate miRNA expression or biogenesis to influence prostate cancer biology. Therefore, we aimed to identify the expressions of miRNAs which are modulated by quercetin, and to characterize the cellular functions they regulate. In this study, we examined the potential of quercetin to modulate miRNA expression in prostate cells. To address this, we first profiled the expression of diverse miRNAs in quercetin-treated cells by using miRNA profiling PCR array technology. MicroRNAs that are strongly and consistently modulated by the treatment were validated in further steps and their targets identified. Changes in similarly treated normal prostate epithelial cells were also compared to those from cancer cells. Preliminary results indicate that quercetin modulates the expression of miRNAs that regulate cell proliferation (CDKN1A, Cyclins D1 and G1, c-MYB, CDKN1B, and ER-α), and self-renewal (stemness; OCT3/4 NANOG, ZEB1/2,). While further studies are warranted, these observations suggest that dietary compounds may exert their chemopreventive functions through miRNA-mediated epigenetic pathways in conjunction with other suggested mechanisms.

Synergistic Effects of Zn-doping and High Energy Ball Milling on the TiO_2 Photocatalytic Nanoparticles

Timothy T. Powell, Bria Moore, P.C. Sharma, Sesha Srinivasan, Dept. of Physics, Tuskegee University

This paper aims to improve the photocatalytic performances of titanium dioxide (TiO_2) nanoparticles by simultaneous zinc doping and high energy ball milling. The photocatalytic degradation behavior of Zn doped TiO_2 have been improved by at least two times because of the increase in specific surface area and decrease in average crystallite size of the nanoparticles obtained in the ball milling process. It has also been observed that the energy band gap of the TiO_2 increases from 3.2 eV (electron Volt) to 3.35 eV as calculated from Kubelka-Munk equation of UV-Visible spectra. Various metrological techniques were employed such as X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDS) to characterize and explore the structural,

microstructural, morphological, and chemical information of the as-milled Zn-doped TiO_2 samples. The photocatalytic degradation reactions of Methyl Orange (MO), an azo-dye using both the UV-Visible light and ball milled Zn doped TiO_2 photocatalysts are discussed in this presentation.

Development of Goddard's Key Personnel Mobile Application and Innovation for Customer Satisfaction

Brandon Rives, Department of Computer Science, Tuskegee University, Angela Grant, NASA GSFC 761.

Innovation is one of the prevalent challenges companies face today. Although innovation is often necessary, it is not usually favored by the people directly affected by it. This project focuses on application innovation in reference to the Key Personnel Application (KPA) development and the Customer Survey Tool (CST) implementation. The goals of this project are to empirically design and develop the new Goddard Key Personnel Application, research and employ an automated survey collaborative tool, and use various reconnaissance methods to understand the culture altering process involved with modernization. I have currently investigated the lack in customer contentment, and identified ways to improve the branch level and upper management communication in situations of drastic needs. I have also taken the missing pieces in customer satisfaction and formed a group of vendors that fulfills NASA's customer expectations. Also, KPA's user interface has been developed and documentation is being written. Currently, I am working on the backend of the KPA in terms of networking, information assurance, establishing maintenance procedures, security protocol, and data storage. As for the CST, the vendor which met my requirements and our customer's expectations has been chosen and is undergoing procedures of implementation. These key implementations will assist the Communications and Security Services Division (CSSD), improving their services, technology, emergency preparedness, and customer satisfaction in the most effortless and efficient way possible.