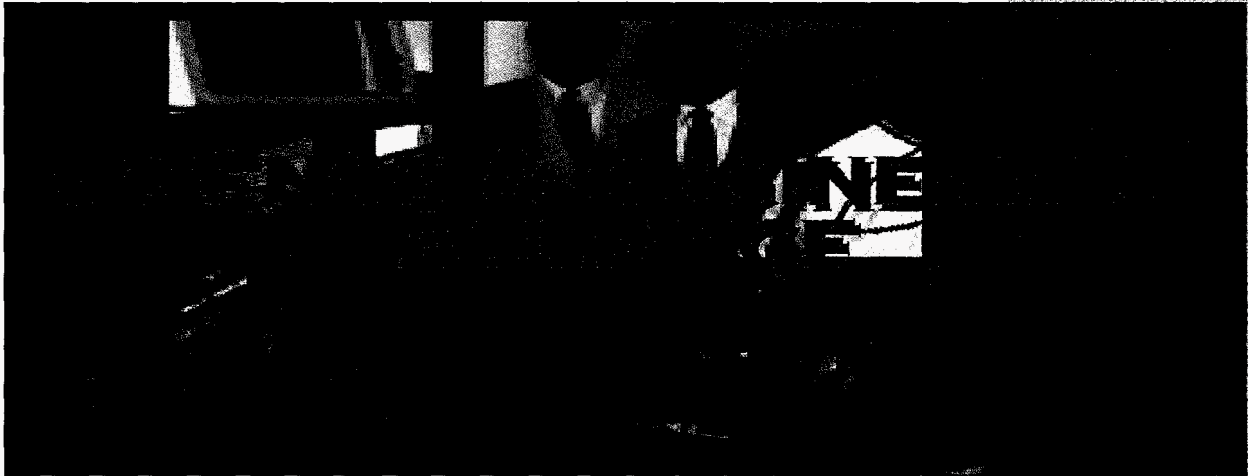


FG03-92 ER75833

DOE/ER/75833--T5-PT.1



**Infrastructure Development of the
Science and Engineering Alliance (IDSEA)**

ANNUAL REPORT

1995 - 1996

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ANNUAL REPORT

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This document was prepared as an account of work sponsored by the U.S. Department of Energy (DOE) under grant number DE-FG03-92ER75833. The views and opinions of authors expressed herein do not necessarily state or reflect those of the DOE or Lawrence Livermore National Laboratory.

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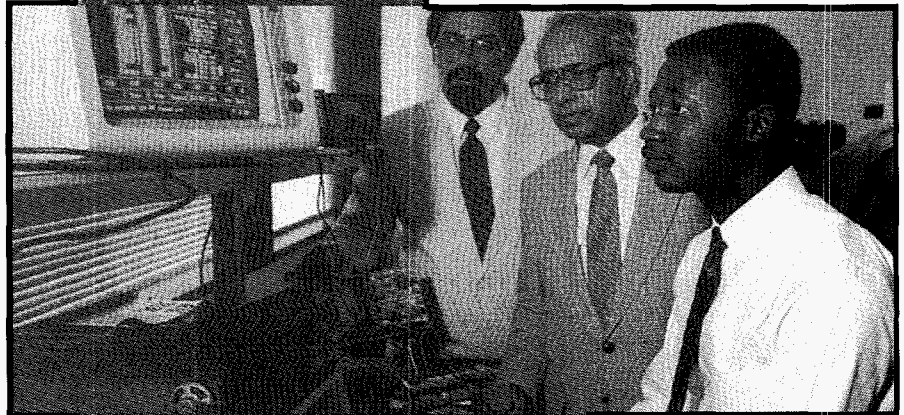
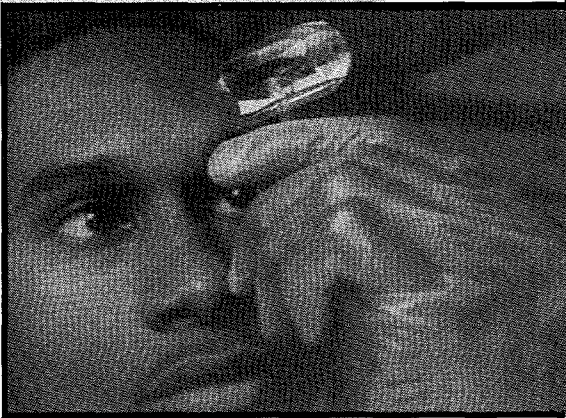
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ANNUAL REPORT



INTRODUCTION

Purpose

This document is intended to serve two purposes: (1) a program status report on the progress the Science and Engineering Alliance (SEA) made since receiving initial Department of Energy (DOE) support for infrastructure development; and (2) a summary report of the activities administered by the SEA compiled in a single document under the auspices of the SEA Program. In 1995, a universal resource locator (URL) on the World Wide Web (WWW) was established for easy access to pertinent information about the SEA Program. The information pointed to by the URL is updated periodically, and the interested reader is urged to access the WWW for more information.

<http://www.llnl.gov/sea/>

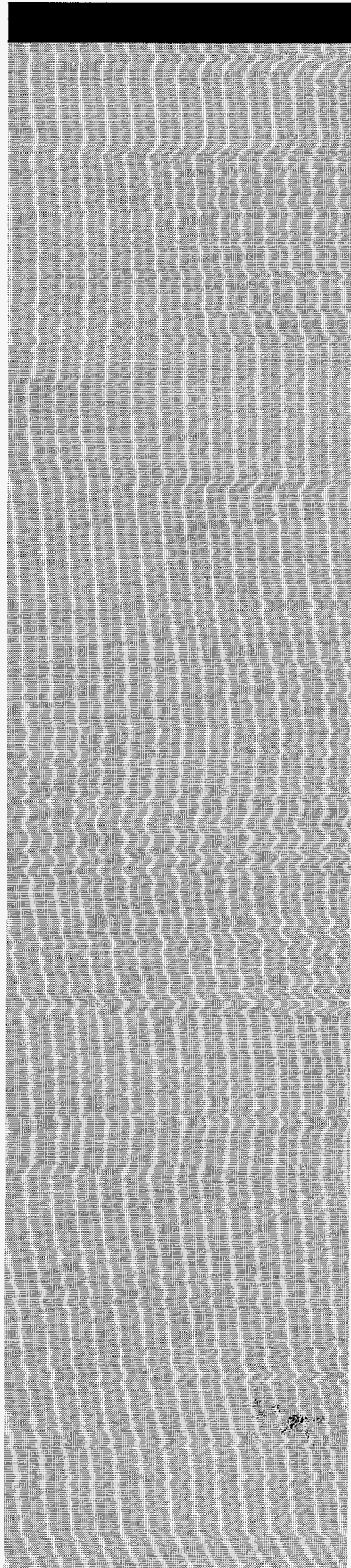
Background

The *Science and Engineering Alliance (SEA)* is a university-government-industry partnership that seek ways to enhance the research and teaching capability of its members. The *SEA* partnership is the outgrowth of a series of meetings in 1990 between the presidents of:

- Alabama A&M University (Normal, AL);
- Jackson State University (Jackson, MS);
- Prairie View A&M University (Prairie, TX);
- Southern University and A&M College (Baton Rouge, LA);

and

the laboratory associated director of:



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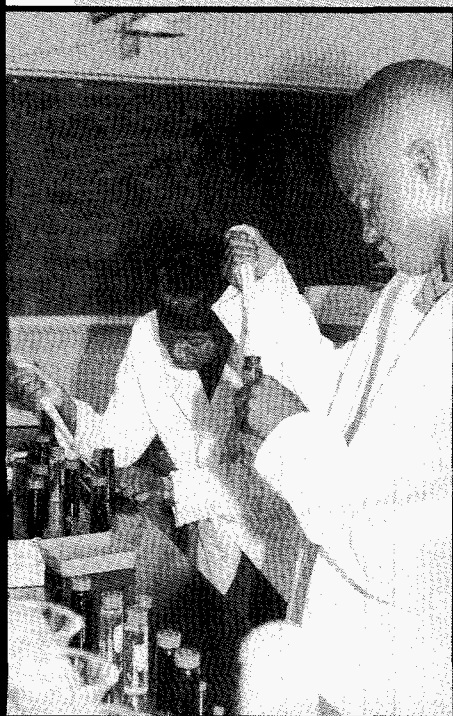
- Lawrence Livermore National Laboratory (LLNL)
(Livermore, CA).

The meetings, spurred in large part by the reduction in resources for education and the government's and industry's commitment to improve science and mathematics education, set the stage for development of innovative partnerships aimed at expanding the pool of technical talent for the nation's future workforce.

The *SEA* was formally established in a signing ceremony and reception on February 21, 1990, by the presidents of the four Historically Black Colleges and Universities (HBCUs), in Room 334 of the Cannon House Office Building in Washington, D.C. On June 26 of the same year, the *SEA* signed an agreement with LLNL to establish programs for advancing knowledge in the physical sciences and engineering. An executive director (ED) was hired October 1, 1990, and charged with the responsibility of developing, implementing and institutionalizing the *SEA*, and moving it forward.

The *SEA* program continues to evolve into a very successful interdisciplinary program. It is a model inter-HBCU collaboration, and an excellent example of how cooperation between universities and a national laboratory can capitalize on their individual strengths to expand research opportunities for minority students and researchers. The members are committed to developing collaborative research programs, enhance teaching techniques, and modify science and engineering curriculum to improve student training.

During the past seven years, the ED has given numerous presentations on the *SEA* to various groups. These groups continue to cite the success of the *SEA*, and call for the federal



BACKGROUND

government and private industry to provide more support so that greater services can be delivered through the program.

This Final Report presents to DOE, the results of their initial investment in the infrastructure development of the SEA, and highlights anticipated objectives holding great promise for the continued growth and development of the SEA mission.

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INTRODUCTION 3



On Feb. 21, 1990, the presidents of Alabama A&M University, Jackson State University, Prairie View A&M University, and Southern University and A&M College signed the agreement formally establishing the Science and Engineering Alliance. The signing ceremony was held in the Cannon House Office Building in Washington, D.C.

PROGRAM SUMMARIES

Infrastructure Development of the Science and Engineering Alliance (IDSEA)

Co-PIs: Willie Trotty^a, Robert Shepard^b

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In the first quarter of 1991, the SEA executive director and steering committee developed a 'blueprint' for increasing the participation of underrepresented groups in science and technology. The blueprint formed the basis for initiating an infrastructure development program to enhance the collective capabilities of the member institutions. By effectively linking the member institutions, the SEA can help ensure an adequate supply of quality African-American scientists and engineers for now and into the next century. Also, the linkage provide a more effective and efficient means of meeting the research and development needs of the public and private sector.

Therefore, the blueprint focused on the members working together to:

- undertake tasks of higher risk with higher payoff;
- enhance student marketability;
- expose the ability of HBCUs to conduct technology transfer;
- reduce costs; and
- make more efficient use of limited resources.

In the second quarter of 1991, LLNL implemented an element of the blueprint in the form of a summer research program for SEA

faculty and students. In the last quarter of 1991, the blueprint was formed into a proposal entitled "*Infrastructure Development of the Science and Engineering Alliance (IDSEA)*." IDSEA is organized around five major mission areas:

- Develop and implement new initiatives that will foster collaborations among the members and strengthen faculty and student development;
- Create partnerships that build on the members' existing technical capabilities as a basis for improving the research infrastructure;
- Establish faculty and student internships and coops;
- Provide financial support to undergraduate and promising high students in the form of scholarships and incentive awards; and
- Prepare existing and prospective K-12 teacher to teach science and mathematics more effectively.

In January 1992, the IDSEA proposal was submitted to the U.S. Department of Energy's (DOE) Office of Science Education for funding consideration. Following peer review and subsequent modifications, DOE funded the IDSEA proposal in September 1992 for three years at a revised funding level of \$888,746. The funding supported start-up activities over the period of September 1992 to October 1996 (the fourth year was a no-cost extension to the existing three-year grant).

IDSEA was used to leverage funding for several new long-range research collaborations among the SEA members. These include:

- SEA High Performance Computing and Communication Program (funded by DOE);
- Installation of a Synchrotron Radiation Beamline Facility at the J. Bennett Johnston, Sr. Center for Advanced



Microstructure Devices (CAMD) for the Science and Engineering Alliance (funded by DOE);

- Synthetic Simultaneity: A Teleoperations Method for Remote Control of Extremely Distant Vehicles (funded by NASA); and
- Community Environmental Justice Awareness and Training (funded by EPA).

Other activities flowed from the IDSEA effort. A Technical Assistant (TA) initiative was implemented to support smaller HBCUs. This initiative was instrumental in SEA securing EPA funding to conduct a scientific awareness workshop for culturally diverse colleges and universities.

Funds from the IDSEA were used to augment the teacher enhancement workshops supported by a grant from the Department of Education's Fund for Improvement of Postsecondary Education (FIPSE). Also, the IDSEA funds provided financial support for students in the form of scholarships and incentive awards.

In response to a peer reviewers' comment that the IDSEA appeared to be simply a loose connection of institutions, a distant learning course was developed and implemented. The course uses technology to better serve the needs of the SEA students. The distant learning technology allows students to benefit from the best that each member has to offer, without transporting students over long distances.

The Appendix section contains additional details.

SEA High Performance Computing and Communication (HPCC)

PI: Kunal Ghosh

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In February 1993, SEA scientists involved in high performance computing and communications (HPCC) research met at Jackson State University to develop a framework for moving forward with an expanded collaborative initiative. An SEA-HPCC Design Team was formed. By March 1993, abstracts were submitted by the SEA scientists. By May 1993, a "Talking Paper for Marketing Purposes (TPMP) was completed. The TPMP was composed of an executive summary, expertise tables, and was classified into six sub-areas of research:

- Global Change;
- Biotechnology and Biomedical;
- Data Acquisition, Storage, Processing and Integration;
- Toxic Waste;
- High Performance Computational Issues in Materials Science and High Energy Physics; and
- Outreach.

In June 1993, the executive director began marketing the TPMP. In January 1994, DOE showed interest and chose one project from each institution as possible candidates for funding. In April 1994, the SEA-HPCC proposal was officially submitted to the DOE. Following peer review and modifications, the SEA-HPCC initiative was funded by DOE's Office of Scientific Computing for three years at a revised funding level of \$1,069,200.

The HPCC proposal development process became the standard process for developing other SEA research initiatives.

The current SEA-HPCC project funded by DOE is entitled "Database Creation, Management, and Integration: Novel Methodologies, Techniques and Technologies." It has four sub-projects that are briefly described below:

Scientific Database Management System

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The goal of this project is to address the issues pertaining to the "information age," where vast quantities of information speed along data superhighways, supercomputers, and terabit memories are under construction. There is a high probability that conventional Scientific Data Base Management Systems (SDBMS) will prove woefully inadequate.

In this case, it makes sense to use the technology of modern data communication storage, and processing for SDBMS. The goal of this project is to use optics and optical SDBMS technology to replace conventional SDBMS. We seek dramatic improvements in access time. This is being accomplished through four tasks:

- Develop the logic for optical parallel SDBMS;
- Demonstrate recall via Joint Transform Correlators;
- Demonstrate parallel search of SDBMSs by Adaptive Resonance; and
- Artificial neural network application

The expected outcomes will be a much faster search of ultra large SDBMS and a convenient crisp and fuzzy logic in parallel

to control the SDBMS. In the long term, we expect to solve all of the SDBMS problems in this grant, and we hope to point the way to future research and keep HBCUs involved in this forefront effort.

Integrated Scientific Simulation Environment Based on Distributed Computing

PI: Gwang Jung

Institution: Jackson State University

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The goal of this project is to design, implement, test, and evaluate an Integrated Scientific Simulation Environment (ISSE). If successful, the ISSE design will provide program development tools, scientific visualization/graphics/image processing tools, bibliographical reference tools, and video/image retrieval tools in one screen with multiple windows for the entire life cycle of scientific simulation. By having such an integrated environment, the vast human resources and effort required for developing such models can be dramatically reduced.

In addition, high quality and reliable simulation results can be effectively obtained. ISSE should work on any platform connected to the network, and should utilize various hardware/software resources available on any other platforms connected to the network.

Data Management and Database Creation

PI: Anil Kumar

Institution: Prairie View A&M University

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This project addresses the issues of data management, database creation, and database management with specific implementation strategies in selected practical situations. The purpose of this project is fourfold:

- To apply principles of data collection, data storage, data retrieval and data transfer to create database prototypes for several explicit physical problems;
- Validate and verify prototypes, then implement the prototypes on various platforms operating under custom-built (object-oriented databases - OODBs with the appropriate safety and password protocols) and public domain software (such as ORACLE);
- Effect technology transfer of the prototypes to DOE and industry; and
- Educate and train graduate and undergraduate students, especially African American and other minorities, in this important area.

Several relevant aspects of software engineering are being addressed in regards to centralized vs. distributed data storage:

- Reliability and tolerance to corruptibility of the databases due to distributed architectures;
- Effect of network reliability on the database reliability in distributed systems;
- Validation and verification;
- Reusability of the databases;

- Recommendations regarding optimal testbeds; and
- Capability to adapt to various network protocols.

While research is a major aspect of this project, the underlying philosophy is also functional, viz., to find the best system of what seems stable today and use it for building of prototypes of databases and interoperable configurations.

High Performance Computing in High- T_c

PI: Jiang-Di Fan

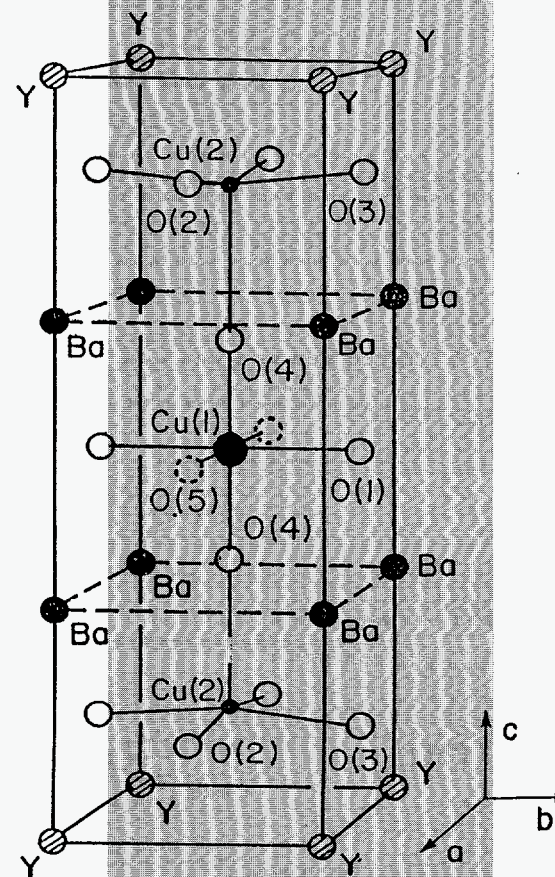
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This project studies high-performance computing of high temperature superconductivity. This represents an expansion of a project supported by the Air Force Office of Scientific Research for the past three years. In that project, a breakthrough was made in high- T_c by finding out an amazingly good pair interaction potential in a layered two-dimensional system. In the current project, researchers intend to make numerical and simulation computations of four important physical quantities:

- Transition temperature T_c ;
- Order parameter ;
- Transport properties of high- T_c in the normal state; and
- Magnetic ordering of high- T_c superconductors.

By the end of the project, researchers hope to use theory, supported by both analytical and computational results, as a realistic model to explain high temperature superconductivity.



Molecular dynamics (MD) simulation study of the two-dimensional (2D) lattice structure of the Cu-1 plane in $YBa_2Cu_3O_{6+x}$ (YBCO).

Summary of the SEA HPCC Program

To ensure that the SEA activity is in accord with DOE's overall HPCC mission, the SEA PIs and Lawrence Berkeley National Laboratory (LBNL) met on January 27-28, 1997, to forge a partnership between the two groups. Several areas were identified as showing potential for collaboration between LBNL and the SEA. The SEA is developing its draft proposals for LBNL review. The final proposal submitted to DOE will reflect the synergy of the SEA effort, and its relationship to the LBNL HPCC program.

Installation of a Synchrotron Radiation Beamline Facility at the J. Bennett Johnston, Sr. Center for Advanced Microstructure and Devices (CAMD) for the Science and Engineering Alliance

PD: Robert Gooden

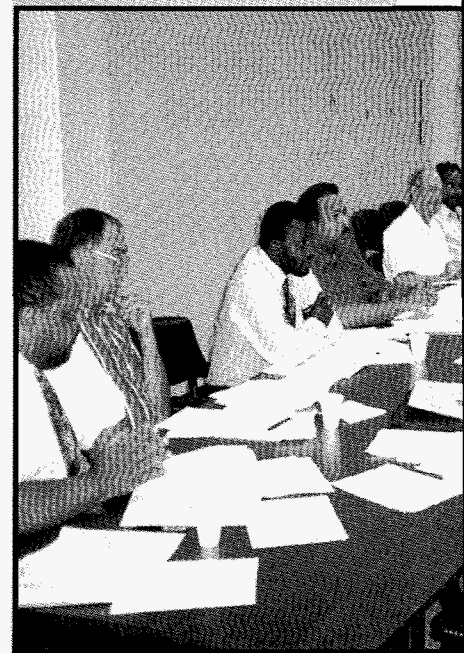
Institution: Southern University and A&M College

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The Office of Energy Research of the Department of Energy (DOE) funded a proposal to support a number of research projects to be carried out, in part, using the existing beamline facilities at The J. Bennett Johnston, Sr. Center for Advanced Microstructures and Devices (CAMD) in Baton Rouge, Louisiana. The grant award totaled \$600,000 over a three-year period. The research projects of this grant, and new term renewals, are focused in four areas:

- X-ray Optics;
- Materials Science;
- EXAFS and Other X-ray Analyses; and
- Electronic Device Development.

Depending on the success of this initial phase, the long-term goal is to install a dedicated synchrotron radiation beamline at CAMD for the SEA. A brief summary of the currently funded projects follows.



Structural Studies of Solid Polymer Electrolytes and Intercalation Cathode Materials of Solid State Batteries

PIs: Rambabu Bobba^a, P.M. Lam^a, T.H. Wang^a, P.J. Schilling^b

Institutions: ^aSouthern University and A&M College

^bLouisiana State University

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The primary goal of this effort is to explore new and improved ionic conductors and mixed conducting materials for lithium batteries. EXAFS and XANES, using synchrotron radiation, has permitted the in situ study of electrochemical systems and to probe structural changes of materials during charge/discharge cycles.

Accelerated Illumination of Fluorinated Amorphous Silicon

PIs: Hylton G. McWhinney, T.N. Fogerty, R. Wilkins

Institution: Prairie View A&M University

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Fluorinated amorphous silicon films are prepared from silane and fluorine sources using plasma-assisted vapor deposition. Such materials are of interest in photovoltaic applications. The long term stability of these materials must be established in order to determine their potential for devices. A high intensity solar simulator using synchrotron radiation will allow the determination of stability under radiation to be established for these materials. Also, structural changes due to exposure will be explored.

High Resolution X-ray Imaging Experiments

PIs: Paul J. Ebert^a, Daniel J. Dietrich^b

Institutions: ^aNOLASCO-Science Consultants

^bLawrence Livermore National Laboratory

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The development of an X-ray microscope will open a broader areas of scientific study, including intracellular imaging. This research is involved in studying the X-ray optical properties of opaque spheres and etched nuclear particle tracks. Synchrotron radiation is a convenient, intense X-ray source for magnification.

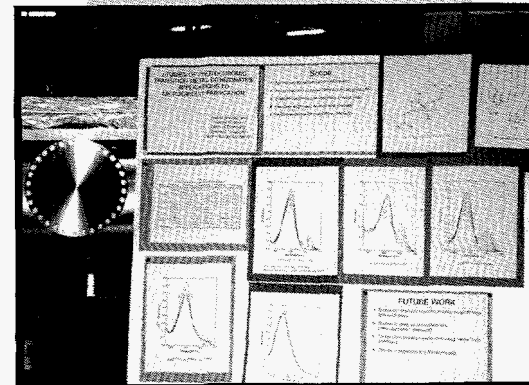
Materials for Photolithography and Other Photopatterning Applications

PI: Robert Gooden

Institution: Southern University and A&M College

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As features for microelectronic circuits continue to shrink, new materials must be developed to produce the increasingly smaller devices. Deep UV (below 200 nm) photolithography appears to be the choice for the next stage of microcircuit fabrication. This project will explore materials of utility in lithography, such as photoresists and alignment aids. Synchrotron radiation is a most versatile source of intense deep UV radiation for fundamental studies of the patterning properties materials.



EXAFS Analysis of Sulfur K-edge in Rock-Forming Minerals--Greenockite, Chalcopyrite and Stannite

PI: Innocent Aluka

Institution: Prairie View A&M University

Crystalline and glassy minerals are found in West Texas rocks reflecting geological origins of upper mantle magma. The elemental and structural content of these rocks is facilitated using EXAFS and other X-ray diagnostic methods. This project involves both field sample collection and laboratory analysis, primarily at CAMD.

Investigations of Synchrotron Radiation Irradiated Surfaces and Interfaces in MOS Structures

PIs: Pradeep K. Bhattacharya, J.A. Anderson, A. Singh

Institution: Southern University and A&M College

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This project focuses on the investigation of the annealing of metal oxide semiconductor structures, the interfacial diagnostics of virgin, X-ray and process-induced damaged gate oxides, and a study of X-ray synchrotron radiation effects on metal oxide field effect transistors.

The Small Business Technology Transfer (STTR) Program

Introduction

The Small Business Technology Transfer (STTR) pilot program awards contracts to small business concerns for cooperative research and development with a research institution through a uniform, three-phase process. STTR, though modeled after the Small Business Innovation Research (SBIR) program, it differs from SBIR in several aspects.

Unlike SBIR:

- Universities, Federally Funded Research and Development Centers (FFRDCs), and non-profits can participate in the STTR program.
- Principal Investigators (PIs) are not required to be employed by the small business concern.
- STTR initiatives are directed to private sector, with Phases I and II being product development oriented, and Phase III commercialization oriented.

Phase I projects identify the merit and feasibility of the idea. Phase II projects demonstrates that the idea works and has promise. Phase III projects continues in pursuit of full commercialization. Phases I and II are funded by NASA at an upper limit of \$100,000 and \$500,000 respectively. Phase III is supported by private funding.

In 1996, NASA's Office of Space Access and Technology funded an SEA initiative through its STTR pilot program. SEA member, Alabama A&M University (AAMU), teamed with Systems

Engineering and Management Associates, Inc. (SEMA) of Alexandria, Virginia, on a Phase I project. Following peer review, the STTR Phase I initiative was funded by NASA for one-year at a funding level of \$100,000. SEMA serves as the Small Business Concern (SBC) and AAMU the Research Institution (RI).

Synthetic Simultaneity: A Teleoperations Method for Remote Control of Extremely Distant Vehicles

Co-PIs: John Caulfield^a, Marius Schamschula^a, Ben Consilvio^b

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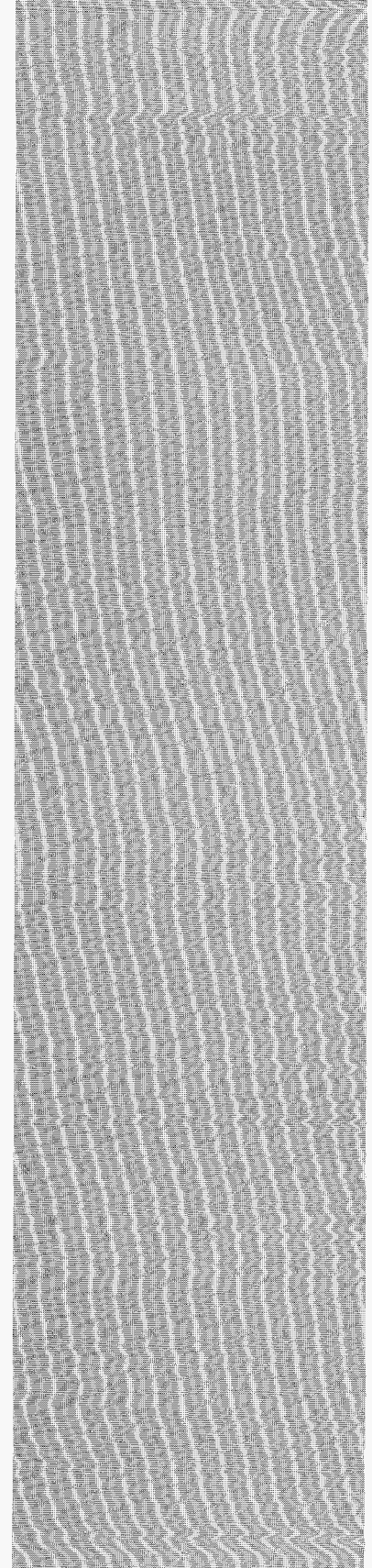
To operate a rover on another planet such as Mars is a problem. The problem is compounded by time delays of 30 minutes to almost two hours. It is helpful to assist an operator by giving views projected forward in time. In the case of a Mars rover, this might be tens of minutes. A Mars rover does not operate blindly. The overall route is planned using catography derived from orbiter photographs. These maps have a resolution on the order of meters, not good enough to make proper route planning decisions. Routes, however, are designed this way for the present mission to Mars. The rover relies on its onboard cameras and computer to make adjustments for obstacles. The pattern recognition and processing power of a rover is limited, and often there is no rule in the control algorithm for a given situation. This is the situation where a human must be in the loop.

Computer Generated Terrain
Based on NASA Imagery

In this project, the researchers have developed a Synthetic Simultaneity paradigm as a way of involving a human operator. It takes orbiter cartography to establish a rough terrain database, augments this database with pictures from the rover, and then uses the terrain database to forward project the rover's position in time and render a 3-D scene for the operator.

During NASA's 1996 Inspection Day at Johnson Space Center (JSC) in Houston, TX, the SEA/SEMA researchers demonstrated the issues involved in operating a robot or rover with time delayed video. Using a pair of Connectix QuickCam digital cameras for the display, the researchers introduced a time delay of about a second. This is similar to one expected for a Moon rover. The relatively low frame rate produced by these cameras is also indicative of a problem caused by low transmitter power of a Mars rover. The rover used in the Inspection Day was a toy, but the pictures and digital movies showed a number of problems faced by an autonomous rover. These include shadows, concave shapes, horizon lines, etc. The group also displayed a mock-up of the operator console.

For more information, please visit our web site:
<http://www.caos.aamu.edu/~maris/SySim.html>. It displays some 3-D rendered "Synthetic" Martian terrain, both as still photographs and as a QuickTime movie.



Community Environmental Justice Awareness Training (CEJAT) Project

Co-PIs: Connie Wilson-Jordan^a, Bennie Henderson^b, John Williams^c, Robert Ford^d

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The Community Environmental Justice Awareness Training (CEJAT) project is a multi-state community environmental justice and empowerment initiative. Objectives of the project include:

- Identification of target low-income and minority communities in Huntsville, AL (AAMU), Jackson, MS (JSU), Prairie View, TX (PVAMU), and Baton Rouge, LA (SUBR);
- Conducting environmental justice town meetings designed to bring a greater awareness of environmental health issues to the local communities;
- Conducting train-the-trainer workshops for community groups; and
- Introducing community residents to Geographical Information System (GIS) and other technology tools for assessing current conditions and planning strategies for mitigating disparate community impacts.

Additionally, through CEJAT, the SEA examines the environmental justice movement in the United States and the role of Historically Black Colleges and Universities (HBCUs) in assuring environmental justice and community empowerment in Black communities. CEJAT was supported by the EPA at an initial funding level of \$200,000.



A Project Conducted by

Alabama A&M University
Jackson State University
Southern University
Prairie View A&M University

High School Teacher Enhancement in the Sciences

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As part of an effort to improve the teaching of science in a four-State region (Alabama, Mississippi, Louisiana, and Texas), the Science and Engineering Alliance (SEA) initiated a series of teacher enhancement workshops in science. The workshops focus on problem solving through experience gained in laboratory, field work, classroom discussions and interactions/debates, critical analysis of the literature, appreciation of the application of mathematics in science, and interactions with experts in various fields of science.

The project lead to development of the "**Science Resource Guide - Teaching Science In the 21st Century.**" This reference was developed to assist the novice and experienced teachers. The Guide incorporates practical applications of contemporary science education reform and strategies. The Guide was prepared under the direction of the Southern University's Project Director for the SEA Funds for the Improvement of Postsecondary Education (FIPSE) project, with input from workshop participants and other high school science teachers.

The Guide was reviewed by education specialists from Southern University and Louisiana State University. The Resource Guide is "*teacher friendly.*"



Scientific Awareness Workshop for Culturally Diverse Colleges and Universities

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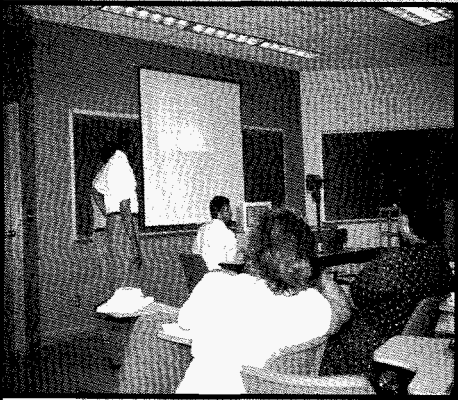
On April 22-23, 1996, the Science and Engineering Alliance (SEA) conducted a scientific awareness workshop for 20 small and rural, United Negro College Fund (UNCF) Historically Black Colleges and Universities (HBCUs). The workshop was held on the campus of Saint Augustine's College in Raleigh, NC. The workshop opened with presentations by EPA administrators, Dr. Robert Huggett, Assistant Administrator for EPA's Office of Research and Development, and Mr. Timothy Fields, Deputy Assistant Administrator for EPA's Office of Solid Waste & Emergency Response. The two speakers described EPA's expectations of excellence from academic institutions involved in Agency funded projects. Included in their presentations was an overview of the eight (8) high priority technical areas of concern and interest to EPA. Mr. Clyde Bishop, Environmental Scientist, EPA, provided additional technical details on EPA's program.

The initial task was to conduct a workshop for science faculty members and individual identified as the institution's Federal Grants Officer. The purpose of this initial phase was twofold:

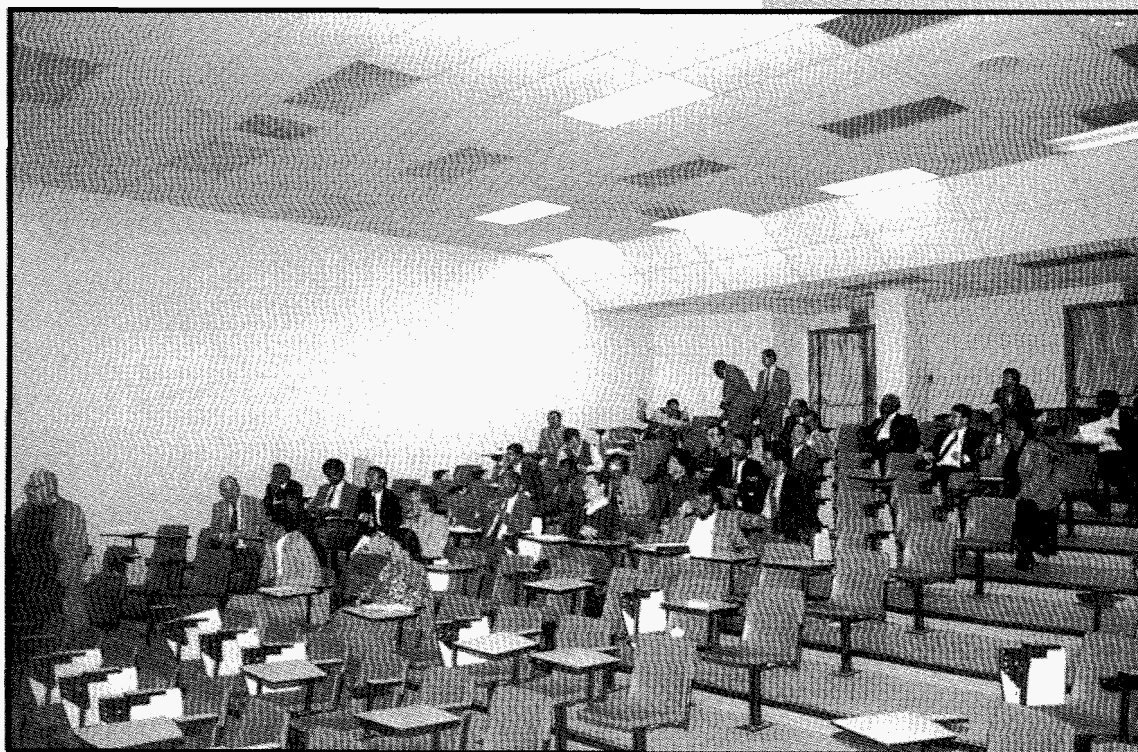
1. To acquaint the participants with the methods, procedures and techniques for securing scientific grants, individually and through cooperative partnerships; and
2. Establish an annual workshop on preparing grants and and cooperative agreements in support of EPA's technical mission.

The lessons learned as a result of the workshop include:

1. Rather than developing proposals in the initial workshop, identify the capability and interest of each participant and their institution. Once this is completed, develop collaborative proposals for submission to EPA.
2. The SEA Project Team should not rely totally on the baseline survey data to establish partnerships among the participants. Participant input revealed that some institutions have developed strong non-technical working relationships at the president-to-president level. Participants believe that when possible, existing executive relationships should be the basis for developing technical partnerships. They noted that relationships at this level shows institutional commitment to the effort.
3. New program initiatives in technical areas like environmental science, environmental justice, etc., are underway at some institutions. These activities should be factored into the workshop proposal development strategy.
4. A need to re-convene the participants and factor in Items 1, 2, and 3 above, and proceed to develop partnerships among schools and complete collaborative proposals for submission to EPA.
5. Some institutions are not linked to the government's FEDIX/MOLIS nor MUSPIN databases.



1. Executive Summary from High School Teacher Enhancement Workshops held during the summer at each of the SEA institutions.
2. Executive Summary from the Scientific Awareness Workshop for Culturally Diverse Colleges and Universities.
3. Evaluation of Distant Learning Course in Molecular Biology.
4. Listing of new collaborations between LLNL technical staff and SEA faculty and students. The new projects resulted from experience gained by SEA faculty and students while participating in summer research program at LLNL.
5. Listing of the 150 SEA undergraduate scholarship and high school incentive award recipients.



HIGH SCHOOL TEACHER ENHANCEMENT IN THE SCIENCES

Science and Engineering Alliance, Inc.
1522 K Street, N.W.
Suite 210
Washington, DC 20005

Robert L. Shepard, Ph.D.
202/842-0388

EXECUTIVE SUMMARY

Project Overview

As part of an effort to improve the teaching of science in a four-State region (Alabama, Mississippi, Louisiana, and Texas), the Science and Engineering Alliance (SEA) initiated a series of teacher enhancement workshops in science. The workshops focus on teaching problem solving through experience gained in laboratory, field work, classroom discussions and interactions/debates, critical analysis of the literature, obtaining a greater appreciation of the application of mathematics in science, and interactions with experts in various fields of science.

Fund for the Improvement of Postsecondary Education (FIPSE) funded the workshops. The U.S. Department of Energy's (DOE) Office of Science and University Education supplied some funds to augment the FIPSE support.

The SEA member institutions hosting the workshops were Alabama

A&M University (Normal, AL), Jackson State University (Jackson, MS), Prairie View A&M University (Prairie View, TX), and Southern University and A&M College (Baton Rouge, LA).

Background, Origin, and Purpose

The general belief is that the U.S. educational system needs to be strengthened. To remain competitive requires an educated public that is aware of the basic concepts upon which technology is built. The system must also be capable of producing scientists and engineers that can contribute to the technological competitiveness of the nation.

According to studies reported on by the National Science Foundation (NSF), the teachers' educational background, specifically whether they have an undergraduate or a graduate major in the field of

instruction, is the most widely used indicator of a teachers' understanding of and expertise in their field (NSF, Science & Engineering Indicators -- 1996). Thus, it is widely accepted that teacher competence is related to subject matter knowledge.

The SEA supports these conclusions, and thus, developed a series of summer science enhancement workshops to strengthen high school teachers that are teaching science and mathematics in high schools in the four-State region.

Therefore, the impetus for the workshops was:

- The charged environment that surrounds the issues pertaining to the serious deficiency in the U.S. educational system in all academic disciplines; and
- A natural extension of the partnership that exist between the SEA institutions and the K-12 school districts in various regions within the four-State region.

The workshops focused on teaching problem solving through a variety of means. This included experience gained in laboratory, field work, classroom discussions and interactions/debates, critical analysis of the literature, gaining a greater appreciation of the application of mathematics in science,

and interaction with experts in various fields of science.

Project Description

The workshops covered physical, biological, and earth sciences. To assess the impact of the workshops, the same 80+ teachers that participated in the initial sessions were involved throughout the program.

The workshops used SEA faculty from the departments of biology, physics, mathematics, chemistry, environmental science, earth science and physical science. The SEA faculty members worked directly with the high school science and mathematics teachers. In addition, technical experts from Lawrence Livermore National Laboratory (LLNL) conducted several of the workshops, lectures, and demonstrations for the high school teachers.

The workshop format included lecture/discussions and exploration/laboratory demonstrations, and were coordinated by an SEA faculty member and two workshop participants designated as lead teachers. Lead teachers were identified for each of the three areas, i.e., a lead teacher for physical science, one for biological science, and another for earth science. Lead teachers assisted in facilitating and coordinating workshop activities.

Also, lead teachers were tasked with holding mini-discussions for

their fellow teachers who did not participate in the workshops. The lead teachers were selected based on the relative strengths of their application and recommendations. Additional lead teachers were chosen over the next two years based on the outstanding leadership ability these teachers displayed in the initial workshops.

Evaluation: What Worked and Did not Work

The SEA used an evaluation team comprised of experts from SEA institutions' Department of Education. The evaluation team assessed the impact of the workshops at the campus level and the collective impact of the total SEA workshop project on a regional basis. The collective responses to the evaluations were overwhelmingly high, ranging from an average of 88% - 100% for each instrument.

Following the 1994 workshops, administrators from the four-State region were asked to do a qualitative assessment of the science and mathematics activities at their school. Principals and counselors indicated that while it was too early to assess the full impact on student test scores, they all witnessed greater enthusiasm toward science and mathematics on the part of both the students and teachers. This was an indication the Workshops were of some value.

Impact or Changes from Grant Activities

Five years following the initial funding by FIPSE and DOE, the SEA continues to seek additional support to continue and institutionalize the summer workshops. According to the studies on teacher qualifications, it appears that the workshops are still necessary. The workshops are a good investment.

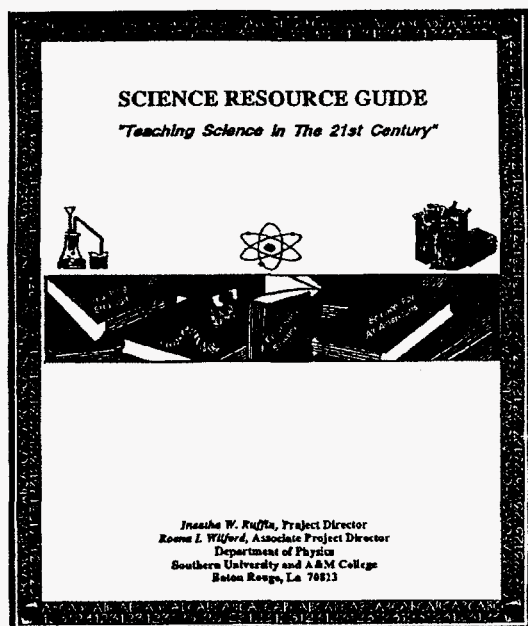


Progress Since the Grant Ended

This project led to the development of the "Science Resource Guide - Teaching Science In the 21st Century." This reference was developed to assist the novice, re-assigned and experienced instructor of high school science with practical applications of contemporary science education re-

form and strategies. The Guide was prepared under the direction of the Southern University's Project Director for the SEA FIPSE project, with input from participants in our workshops and other high school science teachers.

HIGH SCHOOL TEACHERS ENHANCEMENT IN SCIENCES



The Guide was reviewed by education specialists from Southern University and Louisiana State University. The Resource Guide is "*teacher friendly*." A complimentary copy of the Resource Guide was provided to each of the participants of the High School Teachers Enhancements in Science Workshops (1992-1995) and to selected schools located in the rural parishes of the State of Louisiana.

The schools selected to received a copy of the Resource Guide was based on an article that appeared in the Baton Rouge Newspaper (Morning Advocate) on July 30,

1995, listing each parish and the number of faculty not certified. Eleven parishes with the highest percent uncertified teachers were sent several copies of the Guide. Written permission was given to them to make copies of the guide for their use. High school science teachers outside of the 11 parishes have seen the Guide and have requested and received a copy.

The teachers have indicated that the Guide is very informative, the activities included in the Guide have been useful in the classroom, and have given them ideas about additional activities.

The other SEA locations in the other three States are expected to use the Resource Guide to produce a similar resource for their region. Copies of the Resource Guide may be requested from:

Ineatha W. Ruffin
Department of Physics
Southern University and A&M
College
Baton Rouge, LA 70813
504/771-4130

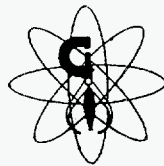
Scientific Awareness Workshop for Culturally Diversed Colleges and Universities

EXECUTIVE SUMMARY



Preliminary Report

Scientific Awareness Workshop for Culturally Diversed Colleges and Universities



SEA Workshop Team

Science and Engineering Alliance, Inc.

o The Science and Engineering Alliance (SEA) conducted Phase I of a scientific awareness workshop for 20 small and rural Historical Black Colleges and Universities (HBCUs) on the campus of Saint Augustine's College in Raleigh, North Carolina.

A total of thirty (30) HBCU science faculty and administrators participated in the workshop. Of the 30 participants, 19 were science faculty, 11 were personnel responsible for grant administration/sponsored programs, and one representative for the United Negro College Fund (UNCF). The science faculty represented Physics, Chemistry, Biology, Molecular Biology, Ecological Science Education, and Environmental Science.

Based on preliminary assessment of a few of the participants' surveys, some of the institutions are in various stages of developing new programs and curricula. For example, because of being located some 45 miles east of DOE's Savannah River Plant, Voorhees College in South Carolina is instituting a new Minor in Environmental Science. Additionally, other institutions are concerned about environmental protection in the low income, minority communities they serve. Several of the participants expressed a desire to use the SEA workshop to help them develop focused, community-based programs in the area called environmental justice. Therefore, when developing the partnership proposals, the SEA will examine EPA's Office of Sustainable Ecosystems and Communities' (OSEC) report entitled "*An Assessment of EPA Regional Offices' Community-Based Environmental Protection Needs*," to look for ways of incorporating the experience and working relationships that HBCUs have with their communities to address the needs and concerns raised in OSEC's report.

o Participants were satisfied with elements of the workshop and the practical information they can use in their work.

Some participants were knowledgeable of methods, procedures, and techniques for securing scientifically related grants from EPA and other federal agencies. Most were not knowledgeable of the high priority technical areas of interest and concern to the EPA. The majority of participants rated the workshop very high based on the contents meeting their expectation, and ultimately being of use in their work. Most rated the portion of the workshop on how to obtain up-to-date information on various agency initiatives via the Internet as highly useful, especially the two Internet addresses the SEA provided for accessing all of the federal agencies listed on the Internet: <http://www.lib.lsu.edu/gov/fedgov.html> and http://lcweb.loc.gov/global/executive/general_resources.html.

Several participants indicated the need to have the SEA organize similar workshops at the campus level for interested science faculty who could not attend the workshop in North Carolina. In the interim, participants spoke of the many useful ideas about grantsmanship they would take back to share with those science faculty that were not able to attend the workshop. Some participants stressed the need for the SEA to conduct broader-based workshops that would include NIH and other federal agencies.

o HBCU science faculty are positive to the idea of collaborations and partnerships.

Nearly all of the participants were in favor of developing partnerships and collaborations among themselves, with the SEA institutions, and with major universities. They viewed collaborations and partnerships as effective approaches to seeking grant support from the EPA. Some expressed the view that the Phase I workshop should have devoted time to actually developing the first draft proposals on projects of interest to the participants, and forming possible partnerships among the institutions represented. Some participants shared the difficulty of performing undergraduate research because of lack of funding and facilities. The core idea of colla-

borations and partnerships was viewed as the answer to the problems of limited funds and facilities.

o Participants need training, technical assistant, information, mentors, and other resources.

Participants expressed concern that some science faculty still may not understand how to develop their work into a competitive proposal. Thus, it was suggested that during Phase II the SEA consider assigning a project to small groups for them to develop a "mock" proposal. Additionally, it was expressed that in subsequent workshops that the SEA focus on providing in-depth information regarding what the institutions should do once a grant is funded. Training was requested on preparing proposals for future funding of projects that have received initial seed funding. Some participants are in the process of searching for mentors to establish research collaborations and viewed the work-shop as another resource.

o Science faculty need to better expose their individual capability and their institution's as well.

Most of the participants' individual nor institutional capability information is part of the Federal Information Exchange/Minority On-Line Information System (FEDIX/MOLIS) computer database. Nor is this information a part of the Fedix Alert Profile communications and connectivity database. Some have included their institutional information in the federal Minority University Space Interdisciplinary Network (MUSPIN) database. Participants requested the SEA with supporting the incorporation of their information into these federal databases.

For information on workshop evaluation and letters from participants, see the Appendix.

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SEA's Distant Learning Course in Modern Molecular Biology

Evaluation of Phase 1

July 25, 1996

Course Title: Special Topics in Modern Molecular Biology

Time: 1:00 PM - 2:00 PM -- Monday, Wednesday,
Friday (Spring 1996)

Participants: AAMU -- 11 Students
JSU -- 19 Students
PVAMU -- 6 Students
SUBR -- 14 Students

Author: Robert L. Shepard, Ph.D., Executive Director, SEA

Background: Three platforms were used to implement Phase 1 of the SEA distant learning course. These included (1) chat sessions across the Internet (included transmission of Power Point vu graphs), (2) video taping, and (3) televideoconferencing.

A course syllabus was developed for the course. Since four different institutions were involved in the design of the course, each institution was required to participate in a joint meeting to develop the detailed syllabus. This was necessary to assure that the course would meet the needs of all students. The course:

1. Was offered to senior level undergraduates and graduate students as a 3 credit course.
2. Lasted 16 weeks, and was taught 3 hours each week.
3. Offered the same time on all four SEA campuses. Time difference of Lawrence Livermore National Laboratory in the Pacific Time Zone was taken into consideration.
4. Will consist of 33% chat sessions using America on Line®, 33% video tapes, and 33% televideoconferencing. Thus, each institution was required to produce 4 video tapes.
5. Final exam was in one common central area for all the students, probably right after the regular semester final exams. Students will also present papers at this time, and get to meet each other. Students will receive certificates.

6. Students were taught how to use the Internet, and some of the assignments taught them how to find information on the Internet. Assignments were sent to students via E-mail.
7. Each institution should invest in a \$300 "See you, See me" camera on desk top and software to be used for office hours.

Outcome: Most of the course objectives were met. However, two activities were not implemented during Phase 1. These were the televideoconferencing portion and bringing the students together to take their final exam and meet each other face to face. Relative to the final exam, students were given a standard type exam at their respective location using the information disseminated in the course.

Identification of Problem(s) Needing Support: Relative to televideoconferencing, it was detected that a Multi-point Control Unit (MCU) was required in order to conduct four-way televideoconferencing. The schools, and LLNL, were limited to only point-to-point connection resulting in only one location interacting via televideoconferencing at any one time. The VTEL systems located at each SEA school currently use non-proprietary MCU. VTEL has not released their proprietary MCU. The industry standard is only proprietary MCUs.

VTEL now meets industry standard with its new Version 3.0 software. All of the SEA schools are using Version 2.0. To upgrade will cost from a few hundred dollars to several thousands, depending on the options that are needed. VTEL systems come with extended warranties. If the systems at the SEA schools are still under warranty, then the software upgrades will be done at not cost to the university. Each SEA university has committed to having Version 3.0 installed before the Fall '96 semester begins. This addition is expected to be implemented during Phase 2 of the distant learning course offering.

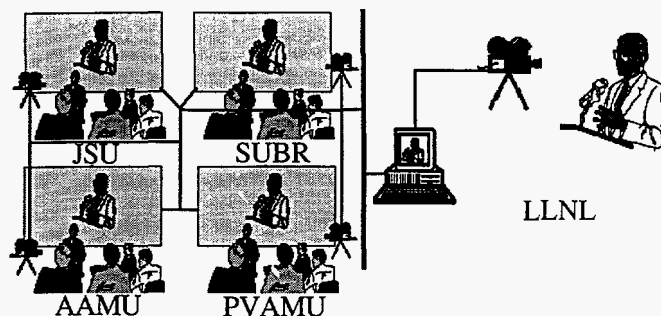
Overall, the course was a success (See Survey Form). A more accurate picture will emerge upon completion of the Course Survey Forms by the students. Also, with proper funding, students will be brought together in Phase 2 in a central location to administer the Final exam.

Relative to community involvement, using the EPA funded Environmental Justice Project (CEJAT) that are currently underway in the SEA region, cross training and regional interaction will be conducted using televideoconferencing (See Attached Press Release). This will enhance the effectiveness of the training, and provide the capability for the SEA to share critical environmental information across regional boundaries in a cost effective manner.

April 4, 1997

Current Status of Phase II: The course is currently underway for Spring '97. Prior to initiation of Phase II, Lawrence Livermore National Laboratory (LLNL) provided funds to the SEA Headquarters office for upgrading the video conferencing capability at each institution. Also, it was determined that the VTEL units at the SEA institutions were still under warranty. Therefore, the VTEL corporation upgraded the units from Version 2.0 to its Version 3.0 software at no cost to the institutions. At the start of the course, the SEA used the MCU bridging services of ACCESS International of Reston, Virginia, to handle the multi-point connections. Prairie View A&M University (PVAMU) recently installed its own MCU bridge. Tests are underway to transfer all bridging responsibility for the course to PVAMU. Once PVAMU's MCU bridging capability is fully implemented, the Distant Learning Course will have demonstrated that a

televideoconferencing linkage exist among the SEA member institutions. Having this capability will allow for a number of activities to be conducted among the institutions without the normal requirement of moving around large groups of people.



"Special Topics in Modern Molecular Biology"

*BIO 380-01

(Spring 1996)

Video Teleconferencing Course

M-W-F, 1:00 p.m.

JAP 228 (Dean's Conference Room)

- I. Introduction (Southern University at Baton Rouge (SUBR))
 - A. Molecular Genetics
 - B. DNA Technology
- II. Applications
 - A. Biomedical Sciences
 - 1. Chromosomes (Jackson State University (JSU))
 - 2. Forensic DNA Technology (Prairie View A&M University (PVAMU))
 - 3. Vaccines (SUBR)
 - 4. Hemoglobin (JSU)
 - 5. Gene Therapy (SUBR)
 - B. Environmental Sciences (Alabama A&M University [AAMU]/PVAMU)
 - 1. Bioremediation
 - C. Agriculture Sciences (AAMU)
 - 1. Genetic Engineering
 - a. Animals
 - b. Plants

*This course will substitute for Cell Biology (Bio 440).

Instructors: Dr. Mark Hardy, Dr. Balwant Sekhon, and Dr. Philip Jemilohun

Sponsored by The Science and Engineering Alliance (SEA) with support from the U.S. Department of Energy.

Collaborations Between SEA Faculty and Students and LLNL Technical Staff during Summer Program

Faculty and Student Research Projects:

"Development of Optrode Fiber Optic Chemical Sensors for Weapons Monitoring and Exhaust Gas Sensing"

Kevin Langry, LLNL & Rambabu Bobba, Southern University

"Sequencing the Sulfate Activation Locus from Thiobacillus Ferrooxidans, a Bacterium which Plays an Important Role in Commercial Mining Operations of Copper, Uranium and Gold Ores"

Emilio Garcia, LLNL (Human Genome Center) & Khairy Soliman, Alabama A&M University & student (Sophia Walker)

"Graphical User Interfaces (GUI's) and Implementation of a Neutral Particle Monte Carlo Code (MCNP) for Use on PC Platforms"

Tore Straume, LLNL & Carl Drake, Jackson State University & student (Ako Emanuel)

"Effects of Aerosol and Clouds Interactions on UV, PAR, and Crop Yields"

Allen Grossman, LLNL & Guo & Wang, Southern University

"In situ Bioremediation Techniques"

Mehdi Rashidi, LLNL & Larry Cole, Prairie View A&M University & student (Andrew Karanja)

Student Research Projects (participation in summer program with LLNL mentor, but without SEA faculty member):

"Mapping of the LLNL Site Elevations to Produce A Drainage Plan Adequate to Handle Heavy Rainfall Years"

Vanessa Turner, Alabama A&M University

"Validation of the Peregrine Code"

Paul Hillard, III, Southern University

"Bacteria Transport in Porous Media"

Adrienne Jordan, Prairie View A&M University

"A Graphical Interactive Tool for the Investigation of Global Volcanic Aerosol Distribution Using the LLNL 2-D Chemical-Radiative-Transport Model"

Jeremy Jackson, Southern University

SEA Scholarship/Incentive Awards Recipients

Complete Listing of students that received SEA awards between 1991 and 1997. As shown, most of the Incentive Award recipients continued their education at an SEA institution. In 1996, awards were not given. Instead, SEA initiated a series of student roundtable sessions on the topic of the impact of change.

NAME	Year of Award	Major	Award Type	High School	College/ University
Erika N. Brown	1991	Ph.D./MD	H.S. Incentive	Waller, TX	PVAMU
Eva McSheila Owens	1991	BS/Comp. Science	H.S. Incentive	Yazoo City, MS	JSU
Gloria Thomas	1991	Biomed. Engineering	H.S. Incentive	Scotlandville, LA	SUBR
Jennifer L. Williams	1991	Food Scientist	H.S. Incentive	Hazelwood, AL	AAMU
Ranti Bushura	1991	BS/Chem/Pharm.D	H.S. Incentive	Cardozo, D.C.	JSU
Dorkina Myrick	1991	MD.Ph.D. in Patho.	Undergraduate		PVAMU
Pamela Dickerson	1991	Food Science	Undergraduate		AAMU
Patrice McDaniel	1991	Research Scientist	Undergraduate		AAMU
Thaddeus F. Harrison	1991	Comp. Modeling	Undergraduate		JSU
Yolanda Griffin	1991	Ph.D. Comp. Sci.	Undergraduate		SUBR
Aisha Swinton	1992	N/A	H.S. Incentive	Callaway, MS	JSU
Caliph Johnson, II	1992	N/A	H.S. Incentive	Booker T. Washington, TX	
Craig Price	1992	MD. Mech. Eng.	H.S. Incentive	Booker T. Washington, TX	PVAMU
Kenyatta I. Morrison	1992	Elect. Eng./Law Sch.	H.S. Incentive	Scotlandville, LA	SUBR
Russell E. Caulfield	1992	Physics/ Math.	H.S. Incentive	Scotlandville, LA	SUBR
Vanessa M. Turner	1992	Civil Engineering	H.S. Incentive	Dothan, AL	AAMU
William Durr	1992	N/A	H.S. Incentive	Prentiss, MS	JSU
Yakisha Nicole Forrester	1992	BS/Physics	H.S. Incentive	Butler, AL	AAMU
Angelica Y. Dunlap	1992	MD./Ph.D./Sci.	Undergraduate		PVAMU
Ayesha X. Muhammad	1992	Genetics Research	Undergraduate		AAMU
Benny D. Cox II	1992	Ph.D./Physics	Undergraduate		SUBR
Bennyfer L. Bridgewater	1992	Ph.D./Engineering	Undergraduate		SUBR
Darlene Denise Davis	1992	Research Scientist	Undergraduate		AAMU
Koni Alaia Shaw	1992	Grad. School	Undergraduate		AAMU
LaJuan Jones	1992	Ph.D.	Undergraduate		
Latricia D. Edwards	1992	N/A	Undergraduate		SUBR
Niambi Sala White	1992	Biochemistry	Undergraduate		JSU
Nora Savage	1992	Masters/Civil Eng.	Undergraduate		PVAMU
Richard Crews	1992	Mechanical Engin.	Undergraduate		PVAMU
Tanya Monique Harris	1992	N/A	Undergraduate		JSU
Theodore Lyons, II	1992	Ph.D./Sci. Res.	Undergraduate		JSU
Illane Torres	1993	Chemistry/Biology	H.S. Incentive	Cardozo, D.C.	N/A
Iris Camicia Baker	1993	Env. Scientist	H.S. Incentive	J. O. Johnson, AL	AAMU
Keith I. Stokes	1993	Biology Pre. Med.	H.S. Incentive	Lanier, MS	JSU
Lakeshia Israel	1993	Physical Sci./Eng.	H.S. Incentive	Booker T. Washington, TX	PVAMU
Mamie E. Warren	1993	Mech. Engineering	H.S. Incentive	Booker T. Washington, TX	PVAMU
Melvin D. Robinson	1993	Engineering	H.S. Incentive	Caldwell Parish, LA	SUBR
Norman Atkins	1993	Biochemist	H.S. Incentive	Paramount, AL	AAMU
Raymond McClean	1993	Medical Research	H.S. Incentive	Richard Montg., MD	Howard
Riddell Flowers	1993	Chemist	H.S. Incentive	East Side, MS	JSU
Rosemary Spraggins	1993	N/A	H.S. Incentive	J. O. Johnson, AL	AAMU
Tainisha Nicole Butler	1993	Civil Engineering	H.S. Incentive	Booker T. Washington, TX	PVAMU
Tanita Graham	1993	Biology/Medicine	H.S. Incentive	Murrah, MS	JSU

NAME	Year of Award	Major	Award Type	High School	College/ University
Tracee W. Thomas	1993	Chem. Engineering	H.S. Incentive	Scotlandville H.S., LA	SUBR
Althea G. Bluiett	1993	Ph.D. Research	Undergraduate		PVAMU
Angela M. Leslie	1993	Ph.D.	Undergraduate		AAMU
Ayanna Y. Swinton	1993	N/A	Undergraduate		JSU
Bonique D. Pillot	1993	Ph.D./Physics	Undergraduate		SUBR
Caroline Cooper	1993	Research Career	Undergraduate		AAMU
Christina L Vaughn	1993	Veterinary Med.	Undergraduate		AAMU
Christopher Ford	1993	Plant Research	Undergraduate		AAMU
Danika Y. Moorer	1993	Ph.D.	Undergraduate		JSU
David Dubose	1993	Medicine	Undergraduate		JSU
Delicia E. Carey	1993	Ph.D.	Undergraduate		AAMU
Deshauda Tamita Graves	1993	Biology	Undergraduate		PVAMU
Donovan L. Hill	1993	Research Career	Undergraduate		AAMU
Ebonique C. Pillot	1993	Ph.D./Physics	Undergraduate		SUBR
Everett A. Larkin	1993	Ph.D./Engineering	Undergraduate		PVAMU
Jeffrey G. Scott	1993	N/A	Undergraduate		SUBR
Jenatta Freeman	1993	N/A	Undergraduate		AAMU
Juba Watss-Cain	1993	Ph.D./Physics	Undergraduate		PVAMU
Karl Duncan	1993	Ph.D./Teach @SUBR	Undergraduate		SUBR
Kassandra N. Guillory	1993	N/A	Undergraduate		SUBR
Kristina N. Carey	1993	Ph.D./Research	Undergraduate		SUBR
Larry Jolivette	1993	Research Career	Undergraduate		SUBR
Melynda Price	1993	Ph.D. in Physics	Undergraduate		PVAMU
Michelle Marie Collins	1993	Medical Research	Undergraduate		PVAMU
Montee R. Withers	1993	Design Engineer	Undergraduate		PVAMU
Natasha Taylor	1993	MS in Mathematics	Undergraduate		JSU
Penelope Randall	1993	Ph.D./Research	Undergraduate		SUBR
Robert L. Moore	1993	Medical Research	Undergraduate		JSU
Robert R. Richardson	1993	Research	Undergraduate		PVAMU
Sharonda C. Ivy	1993	Electrical Eng.	Undergraduate		JSU
Sophia Yvonn Walker	1993	Medical Research	Undergraduate		AAMU
Steven R. Cunningham	1993	Orthopedic Surgeon	Undergraduate		JSU
Thelonius Dominic Chestan	1993	Ph.D.	Undergraduate		AAMU
Titania E. Dumas	1993	Grad. School	Undergraduate		PVAMU
Vennetta Y. Thomas	1993	N/A	Undergraduate		SUBR
Victor T. Wyatt	1993	Biochemistry	Undergraduate		JSU
Yvette McGowan	1993	Computer Science	Undergraduate		JSU
Chantelle Lea McNeely	1994	Physics/Premed	H.S. Incentive	Glen Oaks, LA	SUBR
ChaRandle Stanlett Jordan	1994	Ph.D.	H.S. Incentive	Meridian, MS	JSU
Charles A. Gordon	1994	Biochemistry	H.S. Incentive	Woodrow Wilson, D.C.	Pittsburgh
Chrishanda N. Moore	1994	Food Science	H.S. Incentive	Marengo High, AL	AAMU
Christopher D. Harvey	1994	Medical Doctor	H.S. Incentive	Provine, AL	AAMU
DeAndra Kimbrough	1994	Chemical Eng.	H.S. Incentive	Marengo, AL	AAMU
Jason Myers	1994	N/A	H.S. Incentive	Richard Montg., MD	N/A
Katrina L. Carter	1994	Physics/Chem./Math	H.S. Incentive	Baker, LA	SUBR
Kenneth L. Johnson, Jr.	1994	Microbiology	H.S. Incentive	Oxon Hill, MD	Maryland
Kevin D. Edwards	1994	Engineering	H.S. Incentive	Benjamin Bannekar, D.C.	Columbia
Kinesha Latrece Harris	1994	Chemistry/Chem. Eng.	H.S. Incentive	Scotlandville, LA	SUBR
Qantas Paul Judge	1994	Ph.D	H.S. Incentive	Scotlandville, LA	SUBR

NAME	Year of Award	Major	Award Type	High School	College/ University
Sharon DaNette Collins	1994	Physical Therapist	H.S. Incentive	Murrah, MS	JSU
Tameka Glenez Hart	1994	N/A	H.S. Incentive	Lanier, MS	JSU
Tavares Thomas	1994	Chemical Eng.	H.S. Incentive	Marengo, AL	AAMU
Thurmasia Omari Love	1994	MD. Civil Eng.	H.S. Incentive	Scotlandville, LA	SUBR
Aaron Goode	1994	N/A	Undergraduate		AAMU
Albert Dewayne Perry	1994	Mech. Eng.	Undergraduate		PVAMU
Alonia S. McCorvey	1994	Ph.D.	Undergraduate		JSU
Charles Edward West	1994	Mgmt. Info. Sys.	Undergraduate		JSU
Dena Devon Bilbrew	1994	Masters Degree	Undergraduate		JSU
Dwala N. Foster	1994	Ph.D.	Undergraduate		SUBR
Gary E. Crombie	1994	Electrical Eng.	Undergraduate		PVAMU
Geralline G. Wilkerson	1994	Masters Degree	Undergraduate		JSU
Halisa D. Parks (deceased)	1994	Deceased	Undergraduate		PVAMU
JoAnn Jackson	1994	Research Doctor	Undergraduate		SUBR
Johnny Boggs	1994	Environmental Bus.	Undergraduate		AAMU
Joy O'Nae Spurlock	1994	Ph.D.	Undergraduate		SUBR
Lauri Monica Nelson	1994	Ph.D./Organic Chem.	Undergraduate		SUBR
Rhonda Stout	1994	N/A	Undergraduate		AAMU
Wichaune C. Porter	1994	N/A	Undergraduate		AAMU
Billy Williams	1995	N/A	H.S. Incentive	Booker T. Washington, TX	
Claude Curry	1995	N/A	H.S. Incentive	Piney Woods Ctry, MS	JSU
Damiya Whitaker	1995	Medicine	H.S. Incentive	Cardozo, D.C.	Maryland
Demeka Yvette Campbell	1995	Life Science	H.S. Incentive	Lee High School, AL	AAMU
Elizabeth Codjoe	1995	Sports Medicine	H.S. Incentive	T.C. Williams, VA	N/A
Emily Anadu	1995	N/A	H.S. Incentive	Booker T. Washington, TX	
Jaimel D. Fowler	1995	Undecided	H.S. Incentive	Booker T. Washington, TX	
Juba Jabulani Lomotey	1995	Physics	H.S. Incentive	Scotlandville, LA	SUBR
Kimberly Nicole Johnson	1995	Pre Med/Biology	H.S. Incentive	Provine, MS	JSU
LaKeisha Marie Bland	1995	Comp. Sci./Eng.	H.S. Incentive	Bailey Magnet, MS	JSU
LaKeisha Renee Hill	1995	Env. Science	H.S. Incentive	Sumter County, AL	AAMU
Marquis Deshun Rose	1995	Biology/Pre. Med.	H.S. Incentive	Provine High, MS	JSU
Nakiya Whitaker	1995	Engineering	H.S. Incentive	Cardozo, D.C.	Maryland
Oscar Julian Booker	1995	Pre. Med	H.S. Incentive	Carroll, LA	SUBR
Ovid Timothy Hughes	1995	Chemical Eng.	H.S. Incentive	Scotlandville, LA	Moorehouse
Rashaana Green	1995	N/A	H.S. Incentive	Booker T. Washington, TX	
Rashaune Denyse Payton	1995	Medicine	H.S. Incentive	Scotlandville, LA	SUBR
Roberto Hinds	1995	Chem. Engineering	H.S. Incentive	Frederick Douglas, MD	N/A
Roshonda Denise Lankford	1995	Biology	H.S. Incentive	Choetaw County, AL	AAMU
Roy Garrick Sims	1995	Mech. Engineering	H.S. Incentive	Carroll, LA	SUBR
Alton Marcello	1995	Chemistry	Undergraduate		PVAMU
Audra Robinson	1995	Ph.D.	Undergraduate		JSU
Carl R. Grant	1995	Physics/Comp. Sci.	Undergraduate		SUBR
Daniel E. Riley	1995	Mech. Engineering	Undergraduate		PVAMU
Darren Christopher Chung	1995	Biology	Undergraduate		PVAMU
George Richard White	1995	Masters Degree	Undergraduate		JSU
Jamila Rochelle Tillman	1995	Chemical Eng.	Undergraduate		SUBR
Kenya Denyse Curry	1995	BS/Ph.D. Physics	Undergraduate		AAMU
Kevin S. White	1995	Civil Engineering	Undergraduate		PVAMU
Lumumba Ato Barlow	1995	Mech. Engineering	Undergraduate		SUBR

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Patrick Vaughan Grayson	1995	Physics/Electrical Eng.	Undergraduate		AAMU
Rafael E. Luna	1995	Physics/Comp. Sci.	Undergraduate		SUBR
Shonda Lanette Stewart	1995	Masters Degree	Undergraduate		JSU
Tiffany Vidette Norris	1995	Ph.D.	Undergraduate		JSU
Vanessa A. Turner	1995	Civil Engineering	Undergraduate		AAMU
Yashika Nichole Forrester	1995	BS in Physics	Undergraduate		AAMU
Crystal Marshall	1997	Biotechnology	H.S. Incentive	T.C. Williams, VA	
Laelay Shimeles	1997	Electrical Eng.	H.S. Incentive	Cardozo, D.C.	
Shalanda Gerald	1997	Science	H.S. Incentive	Watkins Mill, MD	

Legend:

- AAMU** - Alabama A&M University
- JSU** - Jackson State University
- PVAMU** - Prairie View A&M University
- SUBR** - Southern University and A&M College

