



Academic Year Undergraduate Research

AYUR

AYUR Goal

AYUR provides an entry point into the iAAMCS PhD in computing pipeline for undergraduate African American students, especially those not likely enrolled at research universities.

The Goal is:

To expose **second semester freshmen** and **sophomore** African American computing students to research.

AYUR Objectives

The objectives of the Academic Year Undergraduate Research Program are to:

- Develop preliminary undergraduate research competence in a computing area such as robotics, game programming, mobile applications, or other computing research area
- Increase critical inquiry and critical thinking associated with conducting research via focused faculty mentoring at the home institution
- Increase active engagement through a research related experiences (presentations, competitions, etc.)
- Encourage AYUR students to pursue other iAAMCS opportunities: DREU, DLS, DFWW, Computing Competitions, Tapia Conference, and ultimately enroll in graduate school.
- Develop a repository of models of effective undergraduate research mentoring

Faculty Mentor Selection Criteria

The AYUR Faculty Mentor:

- Must be engaged in research
- Must demonstrate publications/presentations
- Must be willing to provide weekly mentoring to undergraduate computing student(s)
- Must agree to conduct a research methods workshop/recruitment activity each fall
- Must agree to identify a computing research project that will engage the beginning researcher and submit the AYUR application documents

Student Selection Criteria

The AYUR Student:

- Must be a second semester freshman or sophomore computing student
- Must agree to meet with and work with the home institution faculty mentor weekly
- Must agree to submit weekly progress reports to the faculty mentor
- Must agree to submit a paper or presentation at the end of the project to the project leader

AYUR Time Line

Summer:

- Recruit faculty mentors

- Begin the application process (project definition, etc.)

Fall:

- Mentors conduct research methods workshop

- Recruit students and begin the mentoring process

- Complete application process (Oct/Nov)

Spring:

- Engage selected students in mentored research

- Provide opportunity for student to present research

- Submit student and faculty reports

AYUR

Faculty/Student

Recruitment

Computing Research

Engagement

Mentoring Lessons Learned

Dissemination

Traditional BS Origins of African American S&E PhD Recipients



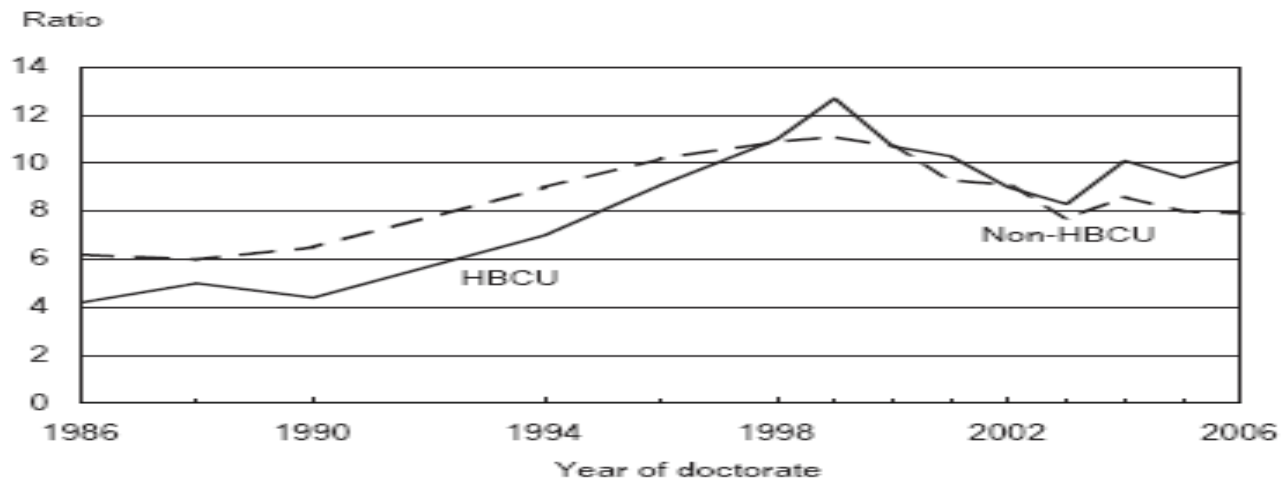
Black S&E doctorate recipients from U.S. universities complete their undergraduate education at a wide variety of types of institutions in the United States.

Of those with known U.S. baccalaureate institutions, in 2006 a third earned their bachelor's degrees from an HBCU institution and the remainder earned their bachelor's degrees from non-HBCU institutions.

-NSF National Center for Science and Engineering Statistics (NCSES) 2008

Baccalaureate-Origin Institutions of Black S&E Doctorate Recipients Normalized for Bachelor's Degrees Awarded

FIGURE 2. Black S&E doctorate recipients per thousand black bachelor's degrees awarded in all fields 9 years earlier, by HBCU and non-HBCU institutions: Selected years, 1986–2006



HBCU = historically black college or university.

NOTES: Includes only U.S. citizens and permanent residents. Bachelor's degree data by race were not collected in 1978, 1980, 1982–84, 1986, and 1988.

SOURCES: National Science Foundation, Division of Science Resources Statistics, Survey of Earned Doctorates, 1977–2006 and National Center for Education Statistics, IPEDs Completions Survey, 1977–1997.

Proven Results of the Effectiveness of Research as a Retention Tool

HBCUs engaged undergraduate students in research long before it became popular and an effective retention and engagement tool.

The Meyerhoff Scholars Program at the University of Maryland, Baltimore County is widely viewed as a national model of a program that enhances the number of underrepresented minority students who pursue science, technology, engineering and mathematics (STEM) PhDs.

AYUR Participation

- Open to any African American Undergraduate Computing Student
- Initial AYUR Target – Critical Mass of Undergraduate African American Computing Students
- Seek a wide range of institutions
- Seek representation from throughout the regions of the United States

Participants

2013-2014

INSTITUTION	STATE
Albany State University	Georgia
Clafin University	South Carolina
Elizabeth City State University	North Carolina
Fort Valley State University	Georgia
Grambling State University	Louisiana
Morehouse College	Georgia
Praire View A&M University	Texas
Talladega College	Alabama
University of Maryland Eastern Shore	Maryland
University of District of Columbia	District of Columbia
Winston Salem State University	North Carolina

Participants

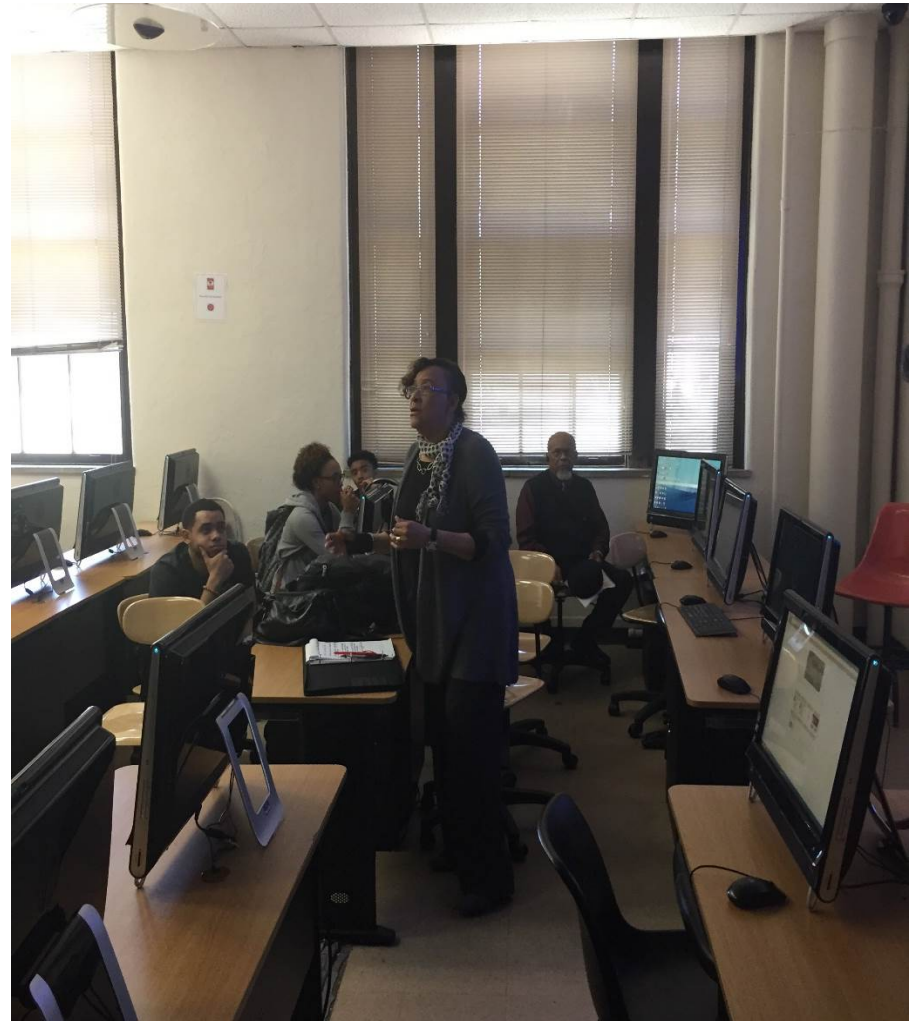
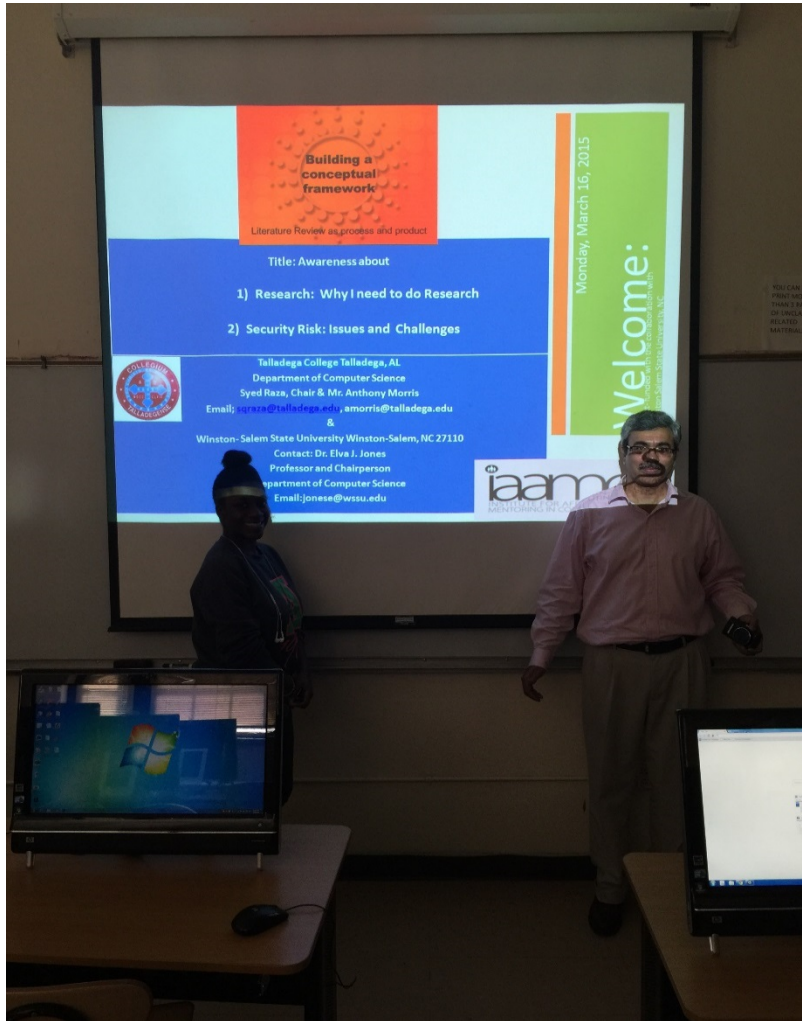
2014-2015

INSTITUTION	STATE
Albany State University	Georgia
Elizabeth City State University	North Carolina
Fort Valley State University	Georgia
Grambling State University	Louisiana
Morehouse College	Georgia
Prairie View A&M University	Texas
Talladega College	Alabama
Winston-Salem State University	North Carolina

AYUR IMPACT

- Workshops
- Academic Year Research
- Professional Activities

AYUR Research Methods Workshop Talladega



iAAMCS AYUR PROJECT MEETING
PVAMU Team
Feb. 12, 2015
Dr. Y. Yang, CS Dept., PVAMU

A SMART “VIRTUAL EYE” MOBILE PROTOTYPE SYSTEM FOR THE VISUALLY IMPAIRED

Research questions:

- 1) What kind of information are critical to visually impaired people that can help navigate surroundings easier?
- 2) How to utilize ultrasound sensors to help detect objects in front of the visually impaired person? How precisely is it? What's the minimum distance of the object triggering the warning signal?
- 3) How to make the embedded sensor system to talk with smartphone?
- 4) How to program the smartphone to utilize its GPS function to provide (verbally tell) the user his/her moving direction and location?

OBSERVATIONS

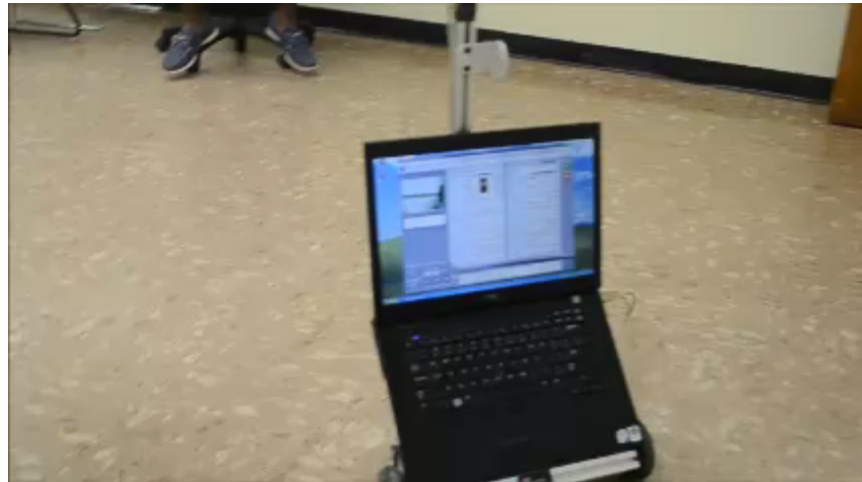
A NEW APPLICATION OF ROBOTIC PROGRAMMING - UMES

Tasks completed in the project:

- Learned Matlab programming environment.
- Learned the Serial/USB communication between the computer and the robot
- Learned the mobility of the robot: move forward, move backward, turns, speed control, breaking etc.
- Learned sensor data collection and processing: cliff sensor, bumpers, proximity sensors, etc.
- Developed and demonstrated basic robotic applications: tele-operation, wall following, following a predefined path, obstacle avoidance, basic image/signal processing for object recognition.

AYUR STUDENT RESEARCH OBSERVATIONS

JAVA COMMAND BEHAVIOR - ALBANY



AYUR Student Presentations WSSU Departmental Symposium



Lessons Learned

- The time line was modified to accommodate the various sponsored program requirement of institutions and to allow faculty mentors time to include entering freshmen in the pool. Two institutions were allowed to enroll upper level students during the first year. However, a benefit was Morehouse AYUR participants are now both PhD students at Clemson University, studying Human-Centered Computing under the direction of Shani Day.
- An objective was added to reflect the typical movement of AYUR students thru the pipeline

Lessons Learned

- An objective was added to reflect the expected movement of students thru the iAAMCS pipeline--
- Encourage AYUR students to pursue other iAAMCS opportunities:
DREU, DLS, DFWW, Computing Competitions, Tapia Conference, and ultimately enroll in graduate school and the PhD.

Lessons Learned

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Questions



Building

1. Install the Battery Box
2. Install the Servo Motors
3. Install the Rear SumoBot PCB Stand-offs
4. Install the Front SumoBot PCB Stand-offs
5. Mounting the PCB
6. Prepare the Wheels
7. Mount the Wheels
8. Mount the Scoop
9. Install Line Sensor Wires
10. Install the QTI Line Sensors
11. Mount the Turner Motors

