

Connected Coast Initiative

Mississippi Gulf Coast Community College (MGCCC)

NSF ATE Proposal #2000073

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OVERVIEW

- MGCCC was awarded a small ATE grant titled “Training Technicians to Install and Maintain Connected Technologies in Business and Smart Homes,” which began in the Summer of 2020 as a joint effort of our Information Systems and Construction Engineering Technology departments, as well as Electrical and HVAC.
- The Connected Coast Initiative (CCI) was created in an effort to increase the quality and quantity of skilled interdisciplinary technicians for both the residential and commercial fields through technician education in both the classroom and real-world applications.
- IoT projects might include smart street lights, intelligent parking, inventory automation, security, and lighting, as well as other connected devices for smart homes.

GOALS

The original goals of the CCI project were to:

1. Modify and design new curriculum for two IoT certificates
2. Train faculty to deliver quality instruction in IoT
3. Recruit and retain more females and other underrepresented groups.

GOAL 1: MODIFY AND DESIGN NEW CURRICULUM FOR TWO IOT CERTIFICATES

When the proposal was submitted, our original intent was to create TWO certificates:

- 30-hour certificate related to business and industrial networking technologies where we would recruit new students as well as current students in our existing Information Technology
- 16-hour certificate related to residential smart home technologies and some commercial applications where we would recruit students in programs such as Electrical, HVAC, and Construction Engineering

However, after further research, the PI and Co-Pis determined it best to create ONE 16-hour certificate for ALL students and then also implement IoT into our existing Information Systems Technology programs such as Computer Networking, Cybersecurity, Computer Programming/Coding, and Data Analytics.

16-HOUR CERTIFICATE (PENDING APPROVAL)

The following four courses have been submitted for approval to the Mississippi Community College Board (MCCB):

- Introduction to IoT (4 hours)
- Fundamentals of IoT: Connecting Things (4 hours)
- IoT Installations (4 hours)
- Special Projects in IoT (4 hours)

COURSE 2: INTRODUCTION TO IOT

- Course Description: This course provides an introduction to the Internet of Things (IoT). Students will discover how standard business processes are being transformed, learn how the IoT is bridging the gap between operational and information technology systems, and gain an understanding of the security concerns that must be considered when implementing IoT solutions.
- MGCCC is a Cisco Networking Academy, and we will utilize Cisco's Introduction to IoT curriculum, as well as some additional electronics tutorials and IoT labs.

COURSE 3: FUNDAMENTALS OF IOT: CONNECTING THINGS

- Course Description: This course covers the development and creation of devices for a network. Topics include designing electronic circuits to writing code, the IoT provides the platform for various types of professionals to develop, build, and implement devices to be integrated into a network. It will explore devices and their connection to the IoT (Internet of Things). Students participating in this course will be engaged through hands on activities and labs. The use of multiple electronic components, devices, and microcontrollers will allow students to create working prototypes of IoT devices and/or systems to interface with networks.
- This course will utilize Cisco's Fundamentals of IoT: Connecting Things curriculum.

COURSE 3: IOT INSTALLATIONS

- Course Description: In this course, students will learn to install and configure various Internet of Things (IoT) devices and sensors to be used in both smart homes and commercial settings. Focus will be placed on IoT devices used for safety, efficiency, and entertainment.
- Small-scale “trainer boards” and full-scale workstations resembling the walls of an actual home will be built and utilized inside our Construction Engineering shop. Each student will have their own “trainer board,” and there will be 8-10 full-scale workstations to accommodating 2-3 students each.

COURSE 4: SPECIAL PROJECTS IN IOT

- **Course Description:** This course will allow students to build on their Internet of Things (IoT) knowledge and work in a group setting to engage in the process of developing an IoT solution. Students will work together to produce a viable concept design of an IoT device or system based on either instructor assignment or their own creative ideas. They will then build, test, and evaluate the functionality and security of the system. The instructor will work closely with the group to select a topic and establish criteria for completion of the project.
- This will serve as our capstone course, and we are planning for students to work on a project for either one of our industry partners or for our own college campus.

IOT IMPLEMENTATION INTO INFORMATION SYSTEMS TECHNOLOGY COURSES

- As mentioned previously, rather than create a 30-hour IoT certificate geared towards Information Systems students, we decided to implement IoT into our existing Information Systems programs.
- The IoT Fundamentals: Connecting Things course was approved as a required course for the Computer Networking Technology program. Co-PI Gruich developed and taught this course for the first time in the Spring 2021 semester utilizing Cisco's IoT Fundamentals curriculum.
- IoT was incorporated into two modules of our Data Analytics Technology's Data Visualization course in the Fall of 2020. Further IoT integration into Cybersecurity and Computer Programming are currently being researched.

GOAL 2: TRAIN FACULTY TO DELIVER QUALITY INSTRUCTION IN IOT

- Five faculty and one adjunct participated in onsite training by Cisco Systems in Summer 2020 including the IoT Fundamentals: Connecting Things course and the Big Data Analytics course. The IoT Security course was completed in a virtual format throughout the Fall 2020 semester.
- All participants completed the courses and passed the final exams, which allows each of them to teach the courses through Cisco's Networking Academy platform.
- Equipment was purchased for the training classes to include: Raspberry Pis, Arduinos, breadboards, and various sensors.

GOAL 3: RECRUIT AND RETAIN MORE FEMALES AND OTHER UNDERREPRESENTED GROUPS.

- We will be focusing on this goal throughout the upcoming Fall semester in preparation for the first offering of the IoT Certificate in the Spring of 2022.
- At this time, we have taken photos of students using Raspberry Pis and breadboards to be used on rack cards for the IoT certificate.
- MGCCC plans to continue its annual conference in March for non-traditional students. This is typically a recruiting event for high school females, though we did have some males attend last year.

CONFERENCES

The PI and Co-Pis were able to participate in two virtual conferences:

- HI-TEC, July 2020
- ATE PI Conference, October 2020

TRAVEL

- Due to the COVID-19 pandemic, travel was restricted at MGCCC for our first year.
- We had planned to travel to Reynolds Landing, a smart-home community near Birmingham sponsored by Alabama Power; however, we were forced to conduct the meeting virtually.
- Though it was postponed, we were finally able to travel to the New Orleans Real-Time Crime Center in June 2021 where we were given an extensive tour and interviewed two key individuals.
- We have tentative plans for September to travel to Florida International University in Miami to observe and discuss their Bachelor of Science in Internet of Things program.

PARTICIPANT SUPPORT

- Our grant budget includes student field trips to both Reynolds Landing in Birmingham and the New Orleans Real-Time Crime Center in New Orleans. The budget allows for approximately 10 students and several faculty members to participate in each trip.
- After visiting the Real-Time Crime Center, the PI and Co-Pis decided it would be better for the entire class of 20-25 students to visit the Real-Time Crime Center than allowing only 10 students to take both trips. This will allow all students to participate.

CHALLENGES

- The COVID-19 pandemic limited travel opportunities early on which could have given better insight into writing course objectives.
- We have had difficulty finding a certification authority to align with our objectives.
- Crossing disciplines with Information Systems and other technical programs such as Construction Engineering, Electrical, and HVAC has been challenging due to the limited IT knowledge in some of the disciplines.
- It has also been challenging to narrow the focus of our IoT certificate from the many paths available.

CONTACT INFORMATION

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