Program Progress Performance Report for
University Transportation Centers

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Project Title: Center for Advanced Transportation Mobility

Center Director Name, Title, and Contact Information

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North Carolina Agricultural and Technical State University

1601 E. Market Street, Greensboro, NC 27411

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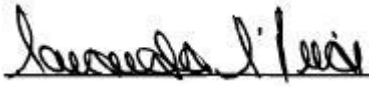

Dr. Maranda McBride, Director, Center for Advanced Transportation Mobility

1. ACCOMPLISHMENTS:

What are the major goals of the program?

The Center for Advanced Transportation Mobility (CATM) will employ multidisciplinary approaches and processes to design, develop, and implement innovative solutions to the transportation needs of vulnerable populations. CATM will utilize the knowledge, skills, and expertise of its affiliates and partners to identify the needs of individuals who are often underrepresented in the design process due to specific physical and/or mental conditions or their socio/economic status. These collaborations will be leveraged to develop and implement comprehensive research, education, workforce development, and technology transfer programs that improve access to transportation for vulnerable users.

CATM endeavors to enhance the transportation industry by achieving the following goals:

1) Develop innovative assistive technologies to enable safe and efficient mobility for individuals with special needs (Research).
2) Develop forward-looking optimization tools to effectively manage transportation system disruptions (Research).
3) Promote equity by increasing access to transportation educational and workforce development opportunities for underserved populations (Education, Outreach, and Workforce Development).
4) Disseminate knowledge about the transportation industry to a broad range of stakeholders using multiple technology transfer methods (Technology Transfer).

The overall goal of the center is to develop and implement research, education, outreach, workforce development, and technology transfer programs focused on the need for improved mobility across multiple modes of transportation – primarily highway, rail, and air. In an effort to accomplish this goal, several activities took place during this reporting period. Table 1 provides a list of these activities and their status as of May 30, 2017.

Table 1: Progress of period 1 activities

Research	**Status**	**% Complete**
Kickoff meeting with initial project teams	Complete	100%
Revise budgets	Complete	100%
Research project subcontracts	Behind schedule	80%
Education, Outreach, and Workforce Development Activities		
Develop community college curriculum	Behind schedule	0%
Take NC A&T students to TRB conference	Complete	100%
Create application packets for undergraduate Summer Research Internship (SRI)	Complete	100%
Develop flyers to market the SRI program	Complete	100%
Distribute call for SRI program participants	Complete	100%
Review SRI program applications	Complete	100%
Select SRI program participants	Complete	100%
Distribute application packets for TRB Minority Research Fellowship	Complete	100%
Review TRB Minority Research Fellowship applications	Complete	100%
Select 2017 TRB Minority Research Fellowship participants	Complete	100%
Create application packets for Summer High School Transportation Institute (STI)	Complete	100%
Create brochure for STI	Complete	100%
Disseminated packets for STI applicants	Complete	100%

Review STI applications	Complete	100%
Select STI participants	Complete	100%
Technology Transfer Activities		
Set date for CATM annual symposium	Complete	100%
Obtain keynote speaker for CATM annual symposium	Complete	100%
Secure venue for CATM annual symposium	Complete	100%
Complete announcements for CATM annual symposium	On schedule	70%
Send out announcement for CATM annual symposium	Forthcoming	0%
Complete planning for CATM annual symposium	On schedule	30%
Set date for STI 25th Anniversary Celebration	Complete	100%
Secure venue for STI 25th Anniversary Celebration	Behind schedule	75%
Complete planning for STI 25th Anniversary Celebration	On schedule	50%
US DOT Reporting Activities		
Create data management plan	Complete	100%
Create center website	Complete	100%
Post key center personnel directory	Complete	100%
Post research project descriptions on website	Complete	100%
UTC Program kick-off meeting	Complete	100%
Submit research project descriptions to RiP	Complete	100%

What was accomplished under these goals?

Since CATM is a new center under the UTC program, there were several items that had to be performed in order to establish the center on NC A&T's campus. The first order of business was revising the budgets based on the funds awarded through the UTC Program. Once the new center budget was submitted to UTC Program officials and approved, the internal budget was created and access to the accounts granted to the center staff. A kickoff meeting including the center director and contracts and grants was held to go over the General Provisions and Grant Deliverables and Reporting Requirements for the UTC program. Subcontracts were sent out to each of the consortium members. All subcontracts were executed except for UDC's subcontract. UDC's administrators have not yet signed the subcontract.

During the reporting period of November 30, 2016- May 30, 2017 CATM engaged in research, education, outreach, workforce development, and technology transfer activities that are in line with the strategic plan of the center. Below are the specific accomplishments made during this reporting period for each category of engagement.

<u>Research</u>

Per the proposal submitted in response to the UTC Program FY2016 Solicitation, the four initial projects outlined were initiated. Table 2 provides a list of these projects along with the primary research priority areas that are addressed by each project and the link to the project descriptions.

Table 2: Year 1 projects and associated research priority areas

Project Title	Research Priority Area(s)	Project Link
Automated Last Mile Connectivity for Vulnerable Road Users	IM, RC, PS	https://www.ncat.edu/cobe/transportation-institute/catm/1-last-mile-abstract.pdf
Public Dialysis Transport Efficiency using Digital Media	IM, TS	https://www.ncat.edu/cobe/transportation-institute/catm/catm_documents/2-paratransitabstract.pdf
Development, Design, and Calibration of the Vulnerable Road User Mobility Assistance Platform (VRU-MAP)	IM, PS	https://www.ncat.edu/cobe/transportation-institute/catm/catm_documents/3-vrumap-abstract.pdf
Multi-scale Models for Transportation Systems under Emergency Conditions	IM, RC, TS	https://www.ncat.edu/cobe/transportation-institute/catm/catm_documents/4_2-emergencyabstract.pdf

IM = Improving mobility of people and goods; RC = Reducing congestion; PS = Promoting safety; ID = Improving durability and extending the life of transportation infrastructure; PE = Preserving the environment; TS = Preserving the existing transportation system

All project teams have been formed. Three of the four teams consist of researchers from at least two consortium member institutions. There were a total of 9 students working as research assistants on these projects during the reporting period. Table 3 provides a breakdown of these students by classification and gender.

Table 3: Demographics of student research assistants

Classification	Male	Female	Total
Undergraduate	1	0	1
Master's	2	2	4
Doctoral	3	1	4

In addition to the four research projects currently being funded through the UTC grant, other research projects are currently active within CATM. Table 4 provides a list of these projects and the agencies that fund them.

Table 4: Additional transportation research project

Project Title	Funding Agency
Improving Customer Service at North Carolina License Plate Agency Offices	NC DOT
Can you hear it now? A study of personal listening devices and pedestrian safety	Southeastern Transportation Center
Antecedents of Distracted Driving: Role of Cognitive Factors	None

Education

As proposed in our strategic plan, a variety of educational initiatives will take place within the center. During the reporting period, NC A&T students participated in experiential learning activities which included the 2017 Transportation Research Board (TRB) meeting and the Southeastern Transportation Center (STC) Student Spotlight Event held at the TRB meeting. NC A&T students were cited for Noteworthy Student Accomplishments and Student TRB Presenters. These students were funded through the STC award.

Two NC A&T civil engineering students received the Transportation Research Board (TRB) Minority Student Transportation Research Fellowship. These students presented their transportation research paper written during the summer of 2016 at the 2017 TRB meeting. Each student was assigned a faculty mentor to guide them through the writing process. The fellowship provided travel funds for the students and their faculty mentor to attend TRB meeting.

Three NC A&T students were selected as Dwight David Eisenhower Transportation Fellows. These students participated in the Eisenhower Showcase and Poster Sessions at the TRB meeting (see Figure 1 and Figure 2). Two of the students are transportation/supply chain undergraduates and one is a civil engineering master's degree student.

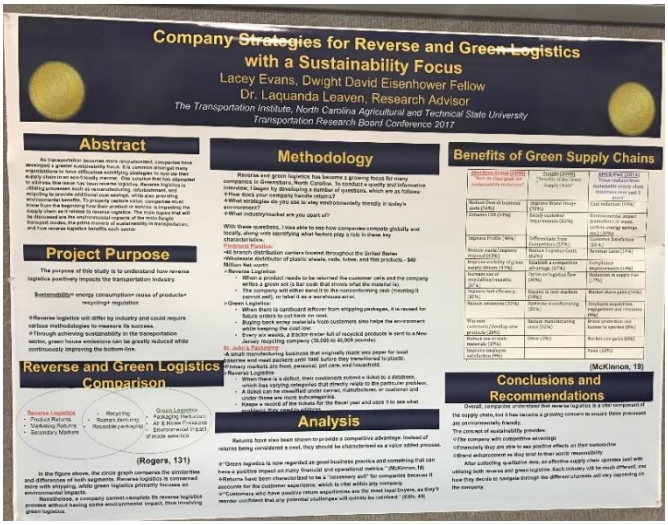

Figure 1: Poster presented by Eisenhower Fellow, Lacy Evans, at the 2017 TRB meeting

Figure 2: TRB and Eisenhower Fellows posing with CATM director at TRB poster session

CATM's Summer Transportation Research Internship program was developed during this reporting period. The eight-week program is designed to provide NC A&T undergraduate

students with practical research experience. Student are first required to participate in a week long research workshop during which they learn how to conduct scientific research including the literature review, data collection, data analysis, and presentation of results. The students then are assigned a transportation research project to work on for the duration of the program. Throughout the internship, students have the opportunity to participate in transportation academic enrichment activities that expose them to transportation professionals and various transportation career options.

Application packets were created and the call for applications went out in March 2017. The application review process and participant selection occurred in April. Four undergraduate business students from NC A&T were selected to participate in the program. Three of the students are supply chain management majors and the other is a management student. The internship program begins the first week in June 2017.

Workforce Development and Outreach

The application process for the 2017 Summer High School Transportation Institute commenced during this reporting period. Applications were sent out to high schools in a four-county area to seek rising high school juniors and seniors interested in attending the program. The Institute has a commuter format and is held for five and one-half weeks during the second session of summer school. Students take a for-credit English course during the second session of summer school; participate in lectures and interactive presentations that support academic and career choices in transportation, SAT preparation, and personal development sessions; and field trips to support classroom experience. Additionally, they study a different mode of transportation each week along with career choices in each mode. The application deadline was April 28, 2017 and the application review process resulted in the selection of 16 high school students. The NC A&T STI program is celebrating its 25th anniversary. This year's program begins on June 28th and will end with a special closing ceremony on August 4, 2017.

Center affiliates are collaborating with the Knox County School System in Knoxville, TN and the University of Tennessee-Knoxville to develop a transportation clearinghouse program. This project is funded by the Garrett A. Morgan Technology and Transportation Program (GAMTTEP). During this reporting period, NC A&T researchers added to the clearinghouse by developing monthly transportation blogs. These "Did you know" blogs provide information that communicate the importance of transportation in ways relatable to K-12 students and teachers. The monthly blogs will be posted on the http://gamttep.org website.

Technology Transfer

CATM will hold its first annual symposium on October 17, 2017. The planning for the symposium was initiated during this reporting period. A venue was chosen and the keynote speaker has been confirmed. After finalizing the design of the center's new logo, work began on the symposium announcement card. The card will be finalized once the registration website is completed.

What opportunities for training and professional development has the program provided?

During this reporting period, undergraduate and graduate students were given the opportunity to hone their research and presentation skills by conducting and presenting the results of their research at the 2017 TRB annual meeting. Cross-training took place for graduate students from different fields of study, including psychology, engineering, modeling and simulation. Both undergraduate and graduate students are obtaining research experience and professional development as they engage with researchers and faculty members on research projects.

Have the results been disseminated?

The CATM executive board convenes monthly via conference call in order to discuss upcoming events and deliverables. Representatives from each of the research project teams are also required to sit in on the call. Monthly and quarterly reports are submitted by research team leads in order to gauge the progress of each project. The results of CATM activities have thus far been disseminated through a master's thesis defense at ERAU. As each of the four initial projects progress, results of the studies will be disseminated via presentations and papers.

Dissemination of the education and workforce development activities were disseminated via the Transportation Institute newsletter. CATM is in the process of establishing its own newsletter and the results of center activities will be disseminated through it as well as the CATM website.

What do you plan to do during the next reporting period to accomplish these goals?

Below is a list of the primary tasks for the next reporting period

- Continue performing the activities required to achieve the objectives associated with each research project.
- Require timely submission of monthly and quarterly research progress reports in order to gauge the need for mitigation or contingency plans.
- Implement the first CATM Summer Transportation Internship Program.
- Implement the 25th NC A&T Summer High School Transportation Institute (STI).
- Hold the 25th Anniversary Celebration of the NC A&T Summer High School Transportation Institute.
- Continue monthly meetings with the executive board members, and research PIs and Co-PIs.
- Meet with external advisory committee members to discuss how CATM can help address transportation industry needs.
- Hire a communication specialist to maintain the CATM website, develop the CATM newsletter, and ensure timely communication of CATM activities through various media outlets.
- Continue assisting with the planning of the UTC Conference for the Southeastern Region.
- Participate in the UTC Conference for the Southeastern Region.
- Develop and distribute the request for proposals for Year 2 research project.
- Implement NC A&T Transportation Shark Tank Competition.

- Implement brown bag seminars to disseminate research activities.
- Conduct transportation industry and research laboratory visits for students.

2. PRODUCTS:

Publications, conference papers, and presentations

Since all CATM research projects are new and were initiated in February 2017, they have not yet resulted in any journal articles, conference presentations, or books as of the end of this reporting period. However, one graduate capstone report has resulted from the research efforts:

- Jie Chen, Effect of Number of Exits and Number of Passengers on the Efficiency of Airport Evacuation Using DES Model, Graduate Capstone Report, Master of Science in Aeronautics, College of Aviation, Embry-Riddle Aeronautical University, 2017.

In addition, several "closed session" presentations have been made to prospective partners in the Last Mile project, particularly those that may be able to provide an autonomous shuttle for collaborative evaluation.

Websites or other internet material

Access to the newly created CATM website was provided to the general public in January. The research abstracts for the funded projects were posted in March and Exhibit F for each project was posted in April. The website will be a great tool for disseminating the research, education, workforce development, and technology transfer activities that take place within the center.

Technologies or techniques

Figure 3 shows technologies that are currently being developed or considered for the VRU-MAP and Last Mile projects, respectively. On the left is a very early prototype of the VRU-MAP app which will be used for demonstrations in focus groups, iteration, and user testing. This particular display is a very early prototype of a navigation interface. Currently multiple options are being explored prior to settling on a demonstration interface and set of capabilities to use with the focus groups. On the left is a picture of a vehicle under consideration for the Last-Mile project. The vehicle pictured is manufactured by Local Motors.

Figure 3: Prototype of the VRU-MAP app (left). Prospective vehicle for Last-Mile project (care of Local Motors)

Inventions, patent applications, and/or licenses

Nothing to report – Since all CATM research projects are new and were not initiated until February 2017, they have not yet resulted in any of these products as of the end of this reporting period.

Other products

Data

- Pedestrian movement data collected from a local airport in the Daytona Beach area
- Pedestrian speeds under different conditions
- Elevator speeds and escalator speeds collected from literature search

Models

- Complied human dynamic models from literature search and review

3. PARTICIPANTS & COLLABORATING ORGANIZATIONS:

Organizations that have been involved as partners

Not including the center staff at NC A&T, Table 5 provides a list of the individuals who have been involved in the center activities during the reporting period and their associated organizations.

Table 5: List of partners

Organization Name	Organization Location	*Partner's Contribution to the Project	Name (First and Last)	Partner University
Dept. of Economics	Greensboro, NC	Collaborative Research	Ryoichi Sakano, Ph.D.	NC A&T
Dept. of Marketing, Transportation, and Supply Chain	Greensboro, NC	Collaborative Research	Shengbin Wang, Ph.D.	NC A&T
Dept. of Marketing, Transportation, and Supply Chain	Greensboro, NC	Collaborative Research	Laquanda Leaven, Ph.D.	NC A&T
Dept. of Marketing, Transportation, and Supply Chain	Greensboro, NC	Collaborative Research	Omar Woodham, Ph.D.	NC A&T
Dept. of Management	Greensboro, NC	Collaborative Research	Jeanne Holmes, Ph.D.	NC A&T
Dept. of Management	Greensboro, NC	Collaborative Research	Mary Lind, Ph.D.	NC A&T
Dept. of Management	Greensboro, NC	Collaborative Research	Rhonda Hensley, Ph.D.	NC A&T
Dept. of Industrial and Systems Engineering	Greensboro, NC	Collaborative Research	Lauren Davis, Ph.D.	NC A&T
Dept. of Industrial and Systems Engineering	Greensboro, NC	Collaborative Research	Xiuli Qu, Ph.D.	NC A&T
Dept. of Industrial and Systems Engineering	Greensboro, NC	Collaborative Research	Younho Seong, Ph.D.	NC A&T
Dept. of Industrial and Systems Engineering	Greensboro, NC	Collaborative Research	Sachin Mhatre (doctoral student)	NC A&T
Dept. of Mechanical Engineering	Greensboro, NC	Collaborative Research	Sun Yi, Ph.D.	NC A&T
Dept. of Mechanical Engineering	Greensboro, NC	Collaborative Research	Devi Mounika Chilukuri (master's student)	NC A&T
Dept. of Mechanical Engineering	Greensboro, NC	Collaborative Research	Dekkata Sai Charan (master's student)	NC A&T
Dept. of Computational Science and Engineering	Greensboro, NC	Collaborative Research	Cynthia Glass (doctoral student)	NC A&T
Dept. of Computational Science and Engineering	Greensboro, NC	Collaborative Research	Mian Li (doctoral student)	NC A&T
Virginia Tech Transportation Institute	Blacksburg, VA	Facilities	Jon Antin, Ph.D.	Virginia Tech
Virginia Tech Transportation Institute	Blacksburg, VA	Collaborative Research	Andrew Alden, Ph.D.	Virginia Tech
Virginia Tech Transportation Institute	Blacksburg, VA	Collaborative Research	Kevin Grove, Ph.D.	Virginia Tech

Virginia Tech Transportation Institute	Blacksburg, VA	Collaborative Research	Justin Owens, Ph.D.	Virginia Tech
Virginia Tech Transportation Institute	Blacksburg, VA	Collaborative Research	Andrew Miller, Ph.D.	Virginia Tech
Virginia Tech Transportation Institute	Blacksburg, VA	Collaborative Research	Erin Mabry, Ph.D.	Virginia Tech
Dept. of Computer Science	Blacksburg, VA	Collaborative Research	Daniel Kavanaugh	Virginia Tech
Institute for Transportation Research and Education (ITRE)	Raleigh, NC	Financial support, Collaborative Research	James Martin, P.E.	NC State University
Institute for Transportation Research and Education (ITRE)	Raleigh, NC	Collaborative Research	Brittany Gaustad	NC State University
Savannah State University	Savannah, GA	Collaborative Research	Suman Niranjan, Ph.D.	Savannah State University
Dept. of Psychology	Birmingham, AL	Collaborative Research	David Schwebel, Ph.D.	University of Alabama - Birmingham
Dept. of Psychology	Birmingham, AL	Collaborative Research	Despina Stavrinos, Ph.D.	University of Alabama - Birmingham
Dept. of Graduate Studies, College of Aviation	Daytona Beach, FL	Collaborative Research	Dahai Liu, Ph.D.	Embry-Riddle Aeronautical University
Dept. of Aerospace Engineering	Daytona Beach, FL	Collaborative Research	Namilae Sirish, Ph.D.	Embry-Riddle Aeronautical University
Dept. of Aerospace Engineering	Daytona Beach, FL	Collaborative Research	Pierrot Derjany (doctoral student)	Embry-Riddle Aeronautical University
Dept. of Aeronautics	Daytona Beach, FL	Collaborative Research	Jie Chen (master's student)	Embry-Riddle Aeronautical University
Dept. of Aeronautics	Daytona Beach, FL	Collaborative Research	Yixuan Chen (master's student)	Embry-Riddle Aeronautical University
Center for Sustainable Development	Washington, DC	Collaborative Research	Dwane Jones, Ph.D.	University of the District of Columbia

Conference of Minority Transportation Officials (COMTO)	Washington, DC	NC A&T Scholarship	Brad Mims	NC A&T
NC Department of Transportation	Raleigh, NC	Collaborative Research	Neil Mastin, P.E.	None
NC Department of Transportation	Raleigh, NC	Collaborative Research	John Kirby, P.E.	None
NC Department of Transportation	Raleigh, NC	Collaborative Research	Donna Boone	None
Knox County School System	Knoxville, TN	Collaborative Research	Brianna Fisher	None

Other collaborators or contacts involved

Dr. Elli Fini in the Civil Engineering department was instrumental in our participation in the TRB Minority Student Transportation Research Fellowship program. She served as a faculty research mentor for civil engineering students who wrote research papers that were presentation at the 2017 TRB meeting. She supported the oversight of the research progress and writing of the paper.

Dr. Laquanda Leaven and Dr. Kofi Obeng served as the Dwight D. Eisenhower Transportation Fellowship faculty research mentors for our Eisenhower Fellows. They mentored students during the writing process of the research papers, one of which was presented at the 2017 TRB annual meeting.

4. IMPACT:

Impact on the development of the principal discipline(s) of the program

Much of the effort within the Center this period was focused on establishing the research teams, initiating the research projects, and preparing for our summer programs. The goal has been to bring in individuals from multiple disciplines to work on Center related activities. While CATM is an interdisciplinary center, the principal disciplines represented by the teams within CATM are human factors and supply chain management. Due to the efforts of the center staff, these two disciplines have become more aware of the breadth of transportation industry. With the exception of one of our initial projects, each of our research teams consists of individuals from more than one discipline and the projects intertwine the subject matter associated with the disciplines. This has resulted in an increase in cross-disciplinary knowledge within each team.

During this reporting period, recruiting for the summer high school transportation institute (i.e., STI program) took place. The STI program draws high performing students from high schools primarily in the greater triad region in North Carolina. The principal discipline impacted by the STI program is supply chain management. Each week, a NC A&T supply chain management faculty member will provide instruction associated with a different mode of transportation and describes is overall connection to supply chain management. Through these efforts, the NC A&T supply chain management program experiences enrollment benefits each year due to the

introduction of this field of study to rising high school juniors and seniors through the STI program.

During this reporting period, the center also engaged in the recruiting process for their summer research internship (SRI) program. This year, three of the undergraduate students accepted into the SRI program were supply chain management students and the fourth is a management student. During the 8-week internship experience, students will go through a formal research workshop and then be assigned to an active transportation project. The projects will immerse them into the research process and teach them not only how to conduct scientific research but also learn something new about the transportation domain. Each student will work along faculty members who will guide their efforts and ensure that the tasks they are performing add value to the overall project. Some students will also be teamed up with graduate students in other disciplines so they will benefit from the multidisciplinary teamwork experience. Due to the majority of the students accepted into the program, the principal discipline impacted by this program will be supply chain management. These students are expected to return to their classes in the fall with a greater appreciation and understanding of the scientific research process which is something that they do not get in their traditional program. The critical thinking skills that they will develop during the course of the internship will enhance their ability to think through challenging supply chain scenarios and come up with effective solutions.

The specific projects associated with the center will also impact the principal disciplines. For instance, the research conducted for the Last Mile project will impact both the human factors and supply chain management disciplines by contributing to the knowledge and methods associated with applying automation technologies to special applications of transportation. More specifically, the research is expected to contribute to methods of using automation to move special goods and services in addition to special populations such as vulnerable road users (VRUs). The research conducted for the VRU-MAP project will impact the human factors discipline by enhancing the knowledge of the obstacles that people with disabilities encounter when moving through the built environment, particularly cities, as well as present a base of ideas of how to improve access and ways to overcome these obstacles.

By using innovative mathematical and experimental approaches in decision-making studies, the research associated with the Emergency project will advance several aspects of the human factors discipline. Specifically, it will advance knowledge in the field of human behavior and decision-making under emergency in terms of elucidating the dynamic nature of human movement processes under the influence of panic and stress. At this time, understanding the effect of panic on human decision-making and responses under these stressful conditions still extremely limited. This is largely due to the lack of ability to quantify the dynamic nature of human panic behavior, lack of in-depth understanding and inability to experiment these conditions directly and the difficulty of measurement of human panic behaviors by traditional methodologies. By using specific models such as a social forces models and queuing networks, this study provides a well-defined mathematical structure for researchers to systematically quantify the individual pedestrian behavior thus making predictions more meaningful.

Impact on other disciplines

While industrial engineering and supply chain management are the principal disciplines within the center, other disciplines represented include psychology, industrial engineering, management, economics, computer science, aeronautics, mechanical engineering, aerospace

engineering, and computational science and engineering. At NC A&T alone, faculty from six departments within two of the major colleges on campus (the College of Business and Economics and the College of Engineering) are currently engaged in center-funded projects. When the other member institutions are taken into account, the number of colleges/schools and departments with faculty members involved in center-funded projects increases substantially.

The college students engaged in CATM projects have the advantage of being paired with researchers who are not necessarily in their major field of study. This enables them to obtain cross-disciplinary training that further enhances the knowledge they obtain through the experience.

Based on the information obtained from the STI applications, the students accepted into the program intend to major in various fields of study, both inside and outside of transportation. Table 6 provides a list of the intended majors indicated on the applications of the STI applicants who were accepted into the 2017 program. Because the STI program introduces students to a variety of transportation career options, many are able to match their interests with careers within the transportation industry.

Table 6: Intended Majors of 2017 STI Applicants Accepted into the Program

Animal Science	Criminal Justice	Performing Arts
Architecture	Engineering	Pharmacy
Biology	Finance	Transportation Engineering
Business Administration	Human Resources	Transportation/Architecture
Computer Software Engineering	Law	Transportation/Urban Planning

As mentioned previously, the research conducted within the center will impact a multitude of areas. One example is the Last Mile project, which is expected to contribute to the areas of urban planning, commercial transportation, and economics. The methods, techniques, and products developed throughout the VRU-MAP project are expected to impact the discipline of computer science by incorporating various elements of augmented reality in novel ways in order to assist real-time navigation by vulnerable populations. In much the same way, the Public Dialysis Transport project is expected to result in new developments in information systems through the incorporation of digital media to assist with scheduling pickups.

The Emergency study will have an impact on a variety of fields, including aviation, psychology, human factors, and engineering. The manipulation of human behavior is general which will make it applicable for a variety situations, including building, auditorium, stadium and other similar environments. Moreover, this study will also apply a novel approach in investigating human behavior in the behavioral science domain. The data collected and generated from this study will enable many new statistical models to be applied, so a more in-depth analysis can be performed than was possible previously. This type of approach will also encourage researchers involved in similar behavior and social science studies to obtain more enriching data sources.

Impact on the development of transportation workforce development.

Several of the activities that took place during this reporting period will impact the development of the transportation workforce. For instance, in January the thirteen students who received funding to attend the TRB meeting had the opportunity to engage in networking and

professional development activities to reinforce their awareness of the various career options in transportation.

The “Did you know” blogs created for the Knox County Garrett Morgan project provide opportunities for K-12 students and teachers to learn more about transportation through stories and information that is relatable to these target groups. The blog posts enable youth to learn about the importance of transportation in all areas of life and will aid in developing a pipeline of future transportation professionals.

The undergraduate and graduate students assisting with the new research projects are being introduced to various facets of transportation. For example, students working on the Emergency project learned about the highway transportation system and North Carolina’s emergency management strategy. One of them has even chosen emergency transportation management as his dissertation topic. Several other students, such as the one shown in Figure 4, are learning how to apply their discipline-specific knowledge in the transportation domain.

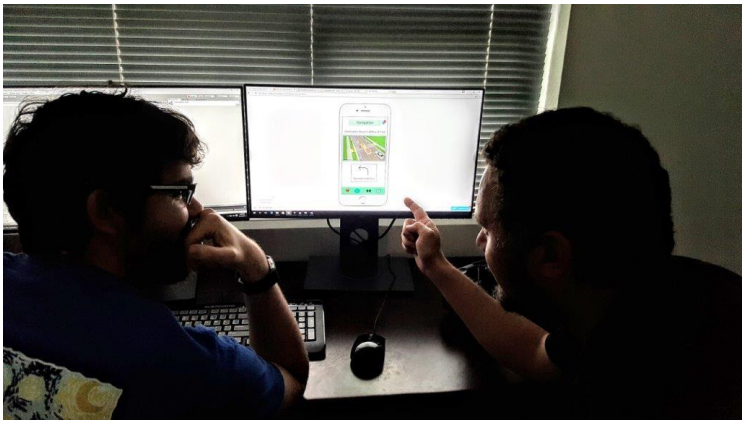

Figure 4: VTTI senior computer science undergraduate student assisting researcher with the coding of the VRU-MAP app prototypes.

While a significant amount of work went into the STI and STR programs during this reporting period, the impact of these programs will be described in the next reporting period since the programs do not officially begin until June.

Impact on physical, institutional, and informational resources at the university or other partner institutions

Anticipation of implementation of an autonomous shuttle for CATM evaluation has impacted the large-scale facility improvements that are currently underway at VTTI. This includes consideration of how an autonomous shuttle will be integrated into research and daily operations at the VTTI campus including the VA Smart Road and the Autonomous Village currently under construction.

As part of the Emergency project, new laboratory space, simulation equipment and software have been acquired at ERAU to support the research, including new desktop computers and simulation software (Anylogic).

Impact on technology transfer

The results of the Garret Morgan project will provide K-12 teachers with the educational resources they need to effectively incorporate transportation subject matter into their classes. This is expected to lead to the development of curriculum material designed specifically to teach transportation concepts.

Research associated with the Last Mile project is expected to be centered around a collaborative development effort between VTTI, NCAT, and an industry partner that provides access to a test vehicle. Integrating the industry partner during the initial phases of the project improves the likelihood of design recommendations resulting from the study being put into practice.

The VRU-MAP project is expected to provide the informational and conceptual foundation for products that may be further developed in government or industry contexts to assist VRUs with disabilities.

Impact on society beyond science and technology

The Last Mile research will improve the mobility and quality of life for VRUs, particularly those who desire to live in urban areas. The technology may also help VRUs share transportation infrastructure with other users, reducing costs within the system. In much the same way, the VRU-MAP project is intended to provide tangible benefits for the safe and convenient mobility of VRUs, particularly pedestrians and multi-modal transit users.

The transportation community will benefit from the results from the Emergency study by increasing safety across surface, air, and water transportation systems. By uncovering and educating the community about best practices related to emergent conditions mediation and crisis management, many lives will be saved the next time a natural or manmade disaster impacts critical transportation systems.

The Public Dialysis Transport project will impact society by providing better ways to schedule critical dialysis transport services. Individuals who depend on such services to obtain the medical services needed to prolong their lives will benefit from the efforts that agencies will take once the inefficiencies of their services are revealed.

The LPA project will help improve NC DMV processes in order to make the license plate transfer process more efficient. The process changes are expected to reduce some of the aggravation experienced by customers who have to return to the LPA more than once in order to complete their transactions due to lack of knowledge and long wait times.

5. CHANGES/PROBLEMS

During this reporting period, the only issue encountered involves our subcontract with UDC. In November, the center staff were informed that the UDC collaborator who assisted with the proposal was no longer affiliated with the university. Upon receipt of the UTC award notification, the process of identifying a new collaborator at UDC was initiated with the help of UDC's Acting Dean of Workforce Development and Lifelong Learning. In February, the center's director was informed that the Acting Dean had also left the university and the subcontract had not yet been approved by UDC officials. While a new collaborator has been identified, the subcontract has not yet been finalized. Based on recent conversations with the new collaborator, the subcontract is expected to be executed around mid-July.

6. SPECIAL REPORTING REQUIREMENTS

Nothing to report for this period.