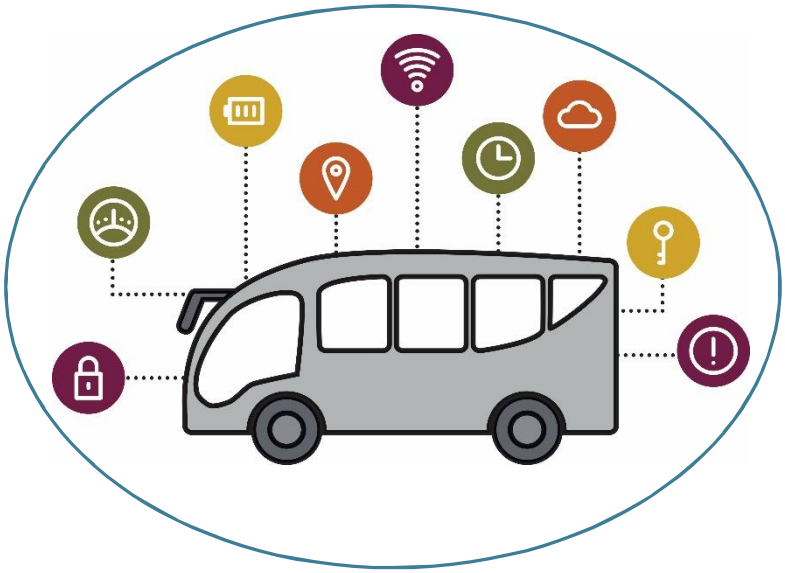
Part 1 – PROJECT NARRATIVE AND TECHNICAL APPROACH

Introduction

U.S. Department of Transportation

Notice of Funding Opportunity
(NOFO) Number 693JJ319NF00001



Automated Driving System (ADS) Demonstration Grants

Application – North Carolina DOT

March 2019

Cover Letter

March 21, 2019

U.S. Department of Transportation (USDOT)
Federal Highway Administration (FHWA)
1200 New Jersey Avenue, SE; Mail Drop: E62-204
Washington DC 20590
Attn: Sarah Tarpgaard, HCFA-32

Re: NOFO # 693JJ319NF00001

Ms. Tarpgaard and Members of the Selection Committee:

North Carolina is known for its top-tier universities, rich quality of life, and strong business climate. The state is an ideal environment to deploy an autonomous transit vehicle, similar to that of the Local Motors Olli shuttle.

North Carolina is highly interested in autonomous vehicle (AV) technology. Transit has emerged as an area best suited for early adoption of the technology. Many North Carolina municipalities and partners are interested in partnering with the North Carolina Department of Transportation (NCDOT) to explore what potential AV technology can and will be available.

In an effort to be on the forefront of AV technology, North Carolina took an initial approach to identify multiple locations across the state that are viable options to not only promote AV transit, but also showcase how the technology will revolutionize transit. AV technology can help connect people, and North Carolina wants to expand upon the connectivity while maintaining a level of safety. North Carolina would like to enhance the research and data that can be used to build upon and create better, safer vehicles for future deployment within the transit realm.

NCDOT is excited about the opportunity from the USDOT to obtain funding needed to research the use of L4, Local Motors Olli shuttles, using a number of potential use cases submitted by various municipalities and universities. We are ready and willing to demonstrate the full potential of the AV shuttles in multiple scenarios and establish a comprehensive approach to safely advancing autonomous technology in North Carolina.

Sincerely,

Stephanie Sudano, Multimodal Transportation Special Project Engineer, NCDOT

Summary Table	
Project Name/Title	North Carolina Autonomous Vehicle Community Pilots
Eligible Entity Applying to Receive Federal Funding (Prime Applicant's Legal Name and Address)	North Carolina Department of Transportation (NCDOT) 1550 Mail Service Center Raleigh, NC 27699-1501
Point of Contact (Name/Title; Email; Phone Number)	Stephanie Sudano, Multimodal Transportation Special Project Engineer; ssudano@ncdot.gov; 919 707 2611
Proposed Location (State(s) and Municipalities) for the Demonstration	North Carolina statewide, with potential locations in City of Fayetteville, NC; City of Greenville, NC; North Carolina State University, Raleigh, NC
Proposed Technologies for the Demonstration (briefly list)	Autonomous Vehicle
Proposed duration of the Demonstration (period of performance)	36 months
Federal Funding Amount Requested	$2,871,000
Non-Federal Cost Share Amount Proposed, if applicable	$0
Total Project Cost (Federal Share + Non-Federal Cost Share, if applicable)	$2,871,000

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1. EXECUTIVE SUMMARY

North Carolina was recently selected as the first southern state to receive a fleet of Olli, a 3-D printed, Level 4 autonomous electric shuttle. In partnership with Local Motors, NCDOT is planning a series of pilots to test implementation and usage of the Olli as a fixed-route shuttle in multiple rural, suburban and urban sites.

With a tentative launch date of November 2019, the two-year pilot program will allow NCDOT to test autonomous vehicle (AV) transit in communities with diverse demographics, road design and user needs. Data on Olli performance and user behavior will be collected from these diverse environments, building knowledge about best practices. The process will create an immediate feedback loop to improve Olli performance. In addition, the pilot program will draw on the experience of all NCDOT divisions and modes, while also building skills and expertise in AV planning and implementation. The project will consider what, if any, impacts the Olli has on the performance of the roadways on which it is operating.

NCDOT's goal with this project is to test deployment in various community settings to understand the factors influencing success, the rate of adoption and public acceptance of AV technology, as well as physical constraints and demands of the technology. The data and lessons learned will help NCDOT consider future applications and prepare for AV transit and other emerging transportation technologies. In addition, the pilot program will expose communities across North Carolina to the benefits of AV transit, allowing an opportunity to test the value to its citizens without significant up-front investment.

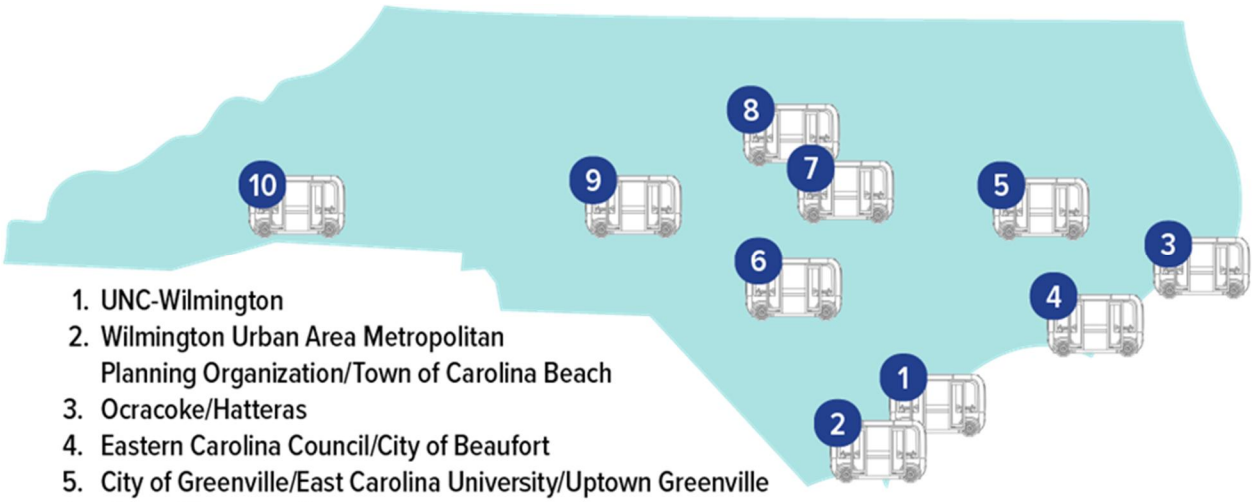
Research and data opportunities around user motivation and acceptance also abound during this project. Rider surveys will be utilized to understand the type of transportation replaced by the Olli shuttle, whether the user would have otherwise walked, biked, used other transit or driven a personal vehicle. Rider surveys will also research how quickly the new technology becomes normalized. Questions will help NCDOT staff and other researchers understand when the technology converts from a novelty to a standard, recognized transit choice. Data will help to draw out the factors behind this shift and what it means for AV transit as well as other emerging technologies.

The "Autonomous Vehicle Community Pilots" project will align with NCDOT's strategic focus on leveraging multimodal investments to impact economic development and community revitalization. NCDOT will be gathering research through this project on how we can grow North Carolina's supply chain and workforce around AV technology. This project will also aim to support the interest of Governor Cooper and the General Assembly in growing rural economies by seeking specific deployments in cities of 10,000 to 25,000 people that were once vibrant centers of commerce. These deployments will allow NCDOT to study how multimodal investments can revitalize a community, spur additional investment and provide services to allow seniors to age in place. Priority will also be given to local government partners that seek to tie land use to

transportation and invest in we will be looking for local government partners that seek to tie land use to transportation and invest in “last mile” solutions, such as additional crosswalks and signals, scooters, bikes and other strategies.

NCDOT will deploy Olli as a fixed-route transit circulator across the state. The final locations for the pilot program are still being finalized, but a number of compelling use cases have already been compiled by NCDOT. These use cases include:

- Providing on-campus transit for faculty and staff at the University of North Carolina at Wilmington, North Carolina Central University and Western Carolina University;
- Reducing traffic congestion by connecting popular tourist spots at the resort town of Carolina Beach;
- Connecting Greenville’s uptown core, Eastern Carolina University’s Main Campus and the ECU medical campus;
- Fueling economic development in Fayetteville by connecting the new $38 million Houston Astros-affiliated baseball stadium, a downtown park and government offices;
- Fostering innovation by providing transportation options to the more than 18,000 students, faculty and workers at NC State University’s Centennial Campus, a unique collaboration of university, public, and private partners; and
- Connecting students, faculty and residents at Pfeiffer University in rural Stanly County with the central business district, providing access to restaurants, grocery stores and medical services.



1. UNC-Wilmington
2. Wilmington Urban Area Metropolitan Planning Organization/Town of Carolina Beach
3. Ocracoke/Hatteras
4. Eastern Carolina Council/City of Beaufort
5. City of Greenville/East Carolina University/Uptown Greenville
6. City of Fayetteville
7. North Carolina State University
8. North Carolina Central University
9. Village of Misenheimer/Pheiffer University
10. Southwestern Commission/Western Carolina University

a. Vision, Goals, and Objectives

The goals of the project are to:

1. Educate the public on the advancement of AV technology while also maintaining the safety of its ridership
2. Collaborate with multiple municipalities, transit agencies, and universities on deployment of an Olli
3. Analyze the data to be provided to USDOT, NCDOT, and the municipalities to determine whether an Olli is beneficial, needs additional research, or may a bit early, especially for rural areas
4. Evaluate ways in which an Olli could be an enhancement to help revitalize communities by workers and/or aging populations to places they need to go
5. Collect data on receptiveness of individuals to this new technology
6. Evaluate use of AV technology at special events as well as day to day

Overall, the project should be able to provide real-life environment data in rural areas outside of the enclosed testing environments. And although new technology is being deployed, we would still want to see increased or maintained ridership.

b. Key Partners

As noted above, NCDOT reached out to various transit agencies across the state to inquire about their desire to participate in testing an AV. Eight municipalities or universities identified their desire to partner and provided use cases for NCDOT to consider. Three examples of the use cases make up our approach to the demonstration: City of Greenville, City of Fayetteville, and North Carolina State University (NCSU). NCDOT will use Kimley-Horn to assist with data analytics, a before and after study, and program management of the AV transit deployment.

The key individuals include:

- Stephanie Sudano, Multimodal Transportation Special Project Engineer, NCDOT
- Ryan Purtle, Greenville Urban Area MPO Director/Transportation Planner, City of Greenville
- Lamont Jackson, Transit Manager, City of Greenville
- Randy Hume, Transit Director, City of Fayetteville
- Lauren Joyner, Assistant Director, Development Planning and Management University Real Estate & Development, NCSU

Outside of those listed above, each municipality will identify additional key stakeholders or team members to assist with data collection, data storage, and overall operation of the Olli. Also, Local Motors has agreed to provide at least two Olli shuttles to NCDOT.

c. Issues and Challenges

Each of the use cases identifies potential issues and challenges associated with the areas. However, overall, North Carolina is primarily a rural state with urban pockets. Most research across the country has either been completed on an educational campus or within urban, highly dense areas. But what about the rural areas across the country that have high populations, such as coastal locations or western/mountain locations? These visible areas have similar challenges as an urban locality, just in shorter durations.

The potential barrier would include any possible policy preventing the Olli shuttle on the road network. However, preliminary review of the policies, there does not appear to be one in place to prevent. Also, municipality partners have expressed that they will ensure any policy to accommodate the Olli on the road network is updated. Otherwise there should be no performance issues related to the route and demonstration of the Olli shuttle.

Another potential barrier is the support involved from a potential partner. NCDOT would like to research the AV technology deployed within rural areas, and some areas may be hesitant to consider how their city can help to improve the mobility of the public using an an Olli deployment.

d. Geographic Areas

The focus will be across the state of North Carolina, with an emphasis in the more rural areas, such as in the eastern and western parts of the state.

e. Proposed Period of Performance

NCDOT is proposing a 36-month study period (3 years) of the Olli deployments. The schedule would include the preliminary data gathering, identification of locations, and the final evaluation of the deployments following.

Timeframe	Action
2019	
April 1	NCDOT identified Committee
June	Initial deployment identified
September 1	Start of the “before” study in the initial location (2 months)
November 1	NCDOT received Ollis – deployed in respective locations
2020	
February 1	Start the “during” evaluation of initial locations (2 months)
February	Second deployments identified
March 1	Start of the “before” study in the second locations (2 months)
July 1	Ollis moved to new locations
August 1	Start the “after” study of the initial locations (2 months)
October 1	Start the “during” evaluation of second locations (2 months)
November	Third deployments identified
2021	
January 1	Start of the “before” study in the third locations (2 months)
March 1	Ollis moved to new locations
April 1	Start the “after” study of the second locations (2 months)
June 1	Start the “ during” evaluation of third locations (2 months)
November 1	Ollis are returned
December 1	Start the “after” study of the third locations (2 months)
2022	
April	Evaluation of the deployments finalized

2. GOALS

NCDOT's research project, noted earlier, would include six goals:

1. Educate the public on the advancement of AV technology while also maintaining the safety of its ridership
2. Collaborate with multiple municipalities, transit agencies, and universities on deployment of an Olli
3. Analyze the data to be provided to USDOT, NCDOT, and the municipalities to determine whether an Olli is beneficial, needs additional research, or may a bit early, especially for rural areas
4. Evaluate ways in which an Olli could be an enhancement to help revitalize communities by workers and/or aging populations to places they need to go
5. Collect data on receptiveness of individuals to this new technology
6. Evaluate use of AV technology at special events as well as day to day

These three goals are in line with both the NCDOT's Public Transportation Strategic Plan goals and the USDOT ADS Demonstration Grants Notice of Funding Opportunity.

The North Carolina Department of Transportation (NCDOT) completed its Public Transportation Strategic Plan in 2018, and the vision that resulted from the plan was titled "Connecting North Carolina to Opportunities." The three strategic goals included:

1. Combatting Traffic and Peak Period Delays
2. Embracing Innovation and Technologies
3. Connecting North Carolinians to Opportunities

The USDOT has continued to strive toward improving the awareness of connected and autonomous vehicles. This would include the type of technology to distribute safety messages to data sharing and liability, stressing USDOT's main priority: safety.

USDOT's main priority with addressing new technology is safety. In partnerships with other agencies, such as National Highway Traffic Safety Administration (NHTSA), USDOT is looking to ***ensure new technology is deployed in a safe manner***, minimizing any potential dangers that may arise. This demonstration would help to provide data USDOT can use for addressing any safety issues prior to an extensive deployment of the technology.

The ***data collected and analyzed from NCDOT's demonstrations could be used to identify potential SCORE (strength, challenges, opportunities, risks, and expectations)*** of the integration of ADS technology. This information could be used for additional legislation across the nation or provide a roadmap for states in identifying specific policies to implement.

USDOT ADS Demonstration Grants provides NCDOT an opportunity to ***collaborate with local agencies and universities*** for physical demonstrations on their road network. The local agencies will be rural, urban, suburban—collecting data to provide for further research on not only how the vehicle operates on the road, but also the ethical use of an autonomous vehicle.

3. FOCUS AREAS

The focus of the deployment would include:

- Significant Public Benefit
- Economic Vitality
- Diversity of Projects
- Transportation-Challenged Populations

4. REQUIREMENTS

a. ADS Technology

This project pilots L4 ADS technology in the form of the Olli shuttle, testing usefulness, efficiency and adoption at pilot sites of varying geography, population and roadway design.

b. Physical Demonstration

Physical demonstration is the focus of these pilot projects. Testing the technology in various environments and populations in order to understand challenges, future applications and usefulness.

c. Data Sharing

NCDOT understands and agrees to the data sharing requirements established in this grant program. If an award is made, NCDOT will ensure the appropriate data are accessible to USDOT for the required time period.

d. Input/Output User Interface

Currently, the Olli does not have a user interface for riders to access and insert new destinations. However, it is Local Motors' plan to have this capability in place in 2020, reinforcing the vital research these deployments will have in the development of ADS technology.

e. Scalability

The structure of this project, with a series of deployments in communities across the state, lends itself to scaling across the country. The data gathered, and lessons learned in each community will be applicable to other similar communities and road environments. Documentation of the implementation process, safety issues addressed, and adoption success will be valuable in establishing future projects, both with the Olli and other AV transit. NCDOT is committed to working with other jurisdictions, transportation agencies and partners to share best practices derived from this project.

5. APPROACH

a. Technical Approach

NCDOT is requesting grant funding for leasing two Olli shuttles from Local Motors to deploy within various municipalities or areas across the state. Each participant would develop a strategy for demonstrating this technology within their respective geographic

area. The use cases proposed would include the partners involved, route, storage capabilities, performance metrics and availability, and their commitment to engaging and embracing the future of transit technology.

Each of the identified locations would encompass the same elements that are included in the examples provided within this grant application: challenges/barriers, partners, focus, etc. The full list and information of the use cases is provided in Attachment A. NCDOT would develop a leadership committee that would review the use cases provided and determine the best location for an Olli—mainly concentrating on the rural areas. Additionally, NCDOT also would be looking at special events, such as the Republican National Convention (RNC), NCDOT Technology Summit, and the High Point Furniture Market. The shuttles will be moved approximately three times within two years.

Data will be captured by each municipality in a variety of ways. This data would be made available to NCDOT, Local Motors (if they choose), and the USDOT. Performance, ridership, and the flexibility of riders will all be accounted for during the deployments. Prior to each deployment, a before study will be completed; a follow-up study will be conducted once the vehicles have been moved to new locations.

Although North Carolina is open for AV business, people are still skeptical. NCDOT would like to be on the forefront of moving and connecting people to places and opportunities to help its citizens lead healthier, happier lives.

Communities providing multiple modes of transportation to their citizens positively affects the health of that community and overall economic growth. It enhances the vitality of the community.

North Carolina is no stranger to identifying multiple methods of transportation. North Carolina's transit system comprises of seven types of systems.

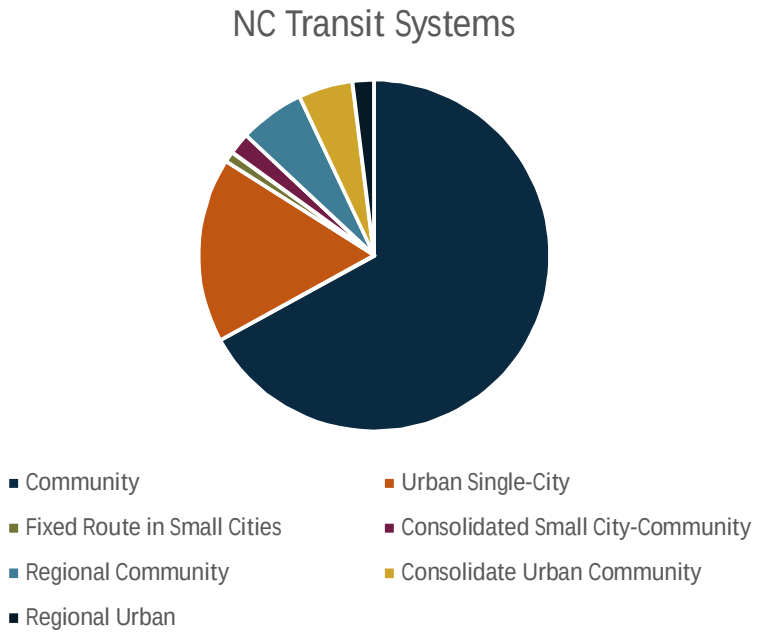


Figure 1. NC Seven Transit Systems

Each of these systems is used to connect people. NCDOT invests resources to enhance the transit services in North Carolina. They have:

- Served more than 70 million passengers in 2017
- Used more than $125 million in state and federal funds to support transit operations across the state. This "funding supported 11,000 transit-related jobs, resulting in $556 million in wages"[1].
- North Carolina invested $52.4 million in state operating funds in 2017

Figure 2. Vision of Transit in NCDOT
(source: NCDOT Public Transportation Strategic Plan)

During a March 2018 public transit workshop, three actions were identified with a multitude of themes from the stakeholders. The themes overlap and can be identified not only in North Carolina, but in other areas or states across the country.

[1] https://www.ncdot.gov/divisions/public-transit/Pages/transit-benefits.aspx

STRATEGY	ACTION	RESOURCES
Building Thriving, Healthy Communities	• Shuttle services to access healthy foods and increase individual mobility options • Integrate land use and transit planning • Improve transitions between urban and regional transit systems • NC Council on Developmental Disabilities funding partnerships to improve transportation and better access to housing	• Support building partnerships • New policy and incentives that support TOD and affordable housing • Support for transit/bike/ped facilities • Disseminating information about transit availability and benefits
Improving Access to Jobs and Economic Development	• Improve first/last mile connections • Connect rural NC to job centers • Better integrate transit in local development processes • Engage wider range of stakeholders in transit decision making • Help health and social services providers better understand transit resources	• Improved data on trip origins and destinations • Trip planners • Uncover passenger and employer needs • Communicating transit needs and available services • Foster partnerships
Connecting Communities to Opportunities	• Work with partners to promote bike/ped connections • Reach target audiences with information about available services and resources • Use League of Municipalities to educate public officials regarding transit availability and benefits	• Help health advocates better understand transit resources • Joint funding opportunities and supporting public-private partnerships • Educating consumers and decision makers

Figure 3. Public Transit Strategic Planning Themes (source: NCDOT Public Transportation Strategic Plan)

Each of the three themes can be enhanced by an AV transit shuttle vehicle. Continued research in this environment can grow the enhancements needed to be able to provide the resources for taking action toward the themes identified during the summit.

NCDOT is proposing a 36-month study period (3 years) to deploy, study, and provide recommendations in respect to AV transit technology. In this course of time, the shuttle(s) may be moved up to three times. Each move would require coordination with Local Motors to reprogram the new fixed route into the mapping system.

The Olli follows a fixed route programmed into the vehicle. All users would not have an opportunity to change the final location—they are fixed routes. The routes would be considered viable routes for economic growth and enrichment of the community. The routes would be provided to the user prior to the completion of the trip. This will give the user an opportunity to decide whether the route is the one they need.

b. Legal. Regulatory, Environmental, and/or Other Obstacles

North Carolina does not have any legislation in place that would prevent an Olli from driving on public roads. All demonstrations would be legally permitted. The demonstration does not require any exemptions from Federal Motor Vehicle Safety Standards (FMVSS) or the Buy American Act. The Ollis are built in the United States.

c. Commitment to Provide Data and Participate in Safety Evaluation

With most testing occurring in urban areas, the rural area testing will provide additional data points that can be used in areas across the country, such as northern Michigan, southern Illinois, and Maine. The idea for rural deployment is to gather and analyze the

data, and then the data can be used to improve the technology. All data collected would be provided to NCDOT, Local Motors (as needed), and USDOT.

NCDOT understands that the public would place a larger emphasis on performance measures and the ability to demonstrate the impact of programs to support funding and policy related decisions. Specific performance measures for each deployment will be developed and will draw upon the experience of developing a performance monitoring component to the Olli deployments. The performance measures component will identify the baseline values, the source of the data, and targets by which individual results can be evaluated for success, such as an increase to the level of service or mobility within the community.

d. Approach to Risk Identification, Mitigation, and Management

Appropriate strategies will be undertaken to identify and manage risk both at the state and local levels. Working closely with roadway design and engineering at NCDOT will be important in understanding risks and ensuring safety. In addition, risk mitigation will factor into location selection as roadway design must be suitable for safe operation of the Olli shuttle. On-the-ground monitoring as well as careful controls and regulations from NCDOT leadership will assist with this effort. Public education and outreach will also assist in risk management.

e. Approach to Contribute and Manage Non-Federal Resources (Cost Share)

Not applicable.

The use cases are included below.

City of Greenville/East Carolina University (ECU)/Uptown Greenville

Description

The City of Greenville, ECU, and Uptown Greenville would like to formally request consideration for an Olli for testing. This partnership is interested in locating Olli in the Urban Core of Greenville, home to ECU's Main Campus, with a potential connection to the ECU Medical Campus in an effort to provide mobility solutions to citizens and students alike. Olli also will serve as an opportunity to begin changing the traditional single vehicle mode choice in the area while enhancing our traditional transit system by connecting our new transit center, the G.K. Butterfield Transportation Center, to critical medical services, education, employment, and recreation opportunities as Olli would provide a first mile/last mile solution.

Focus Area: Transportation-Challenged Population; Economic Vitality

Partnership

The partnership of the City, ECU, and Uptown Greenville view Olli as the first step to introducing autonomous vehicle technology to the City and rural eastern North Carolina. Olli will serve to connect citizens and students with medical services, education, employment, and recreation opportunities with an innovative technology that provides

an alternative source of transportation that would lead to a positive impact on congestion and traffic operations in the urban core and University area. The City's G.K. Butterfield Transportation Center will provide safe and secure storage and charging of the Olli vehicle, providing our traditional transit users other options to travel to the businesses in Uptown Greenville or educational opportunities on ECU's campus.

Route

The specific area intended for the pilot program is the Uptown Core know as Uptown Greenville, ECU's Main Campus, and the ECU Medical Campus located within a few miles of the Core. The intended area would include 5th Street, which connects the Uptown Area and ECU's Main and Medical Campuses. In addition to 5th Street, the roads contained within the two ECU campuses and the Uptown Core also will be a part of the route. The partnership also will include West Greenville, which is the area of the City between the Uptown Core and ECU's Medical Campus. The intention of including these specific areas of the City is to provide Local Motors with a significant cross section of data across several socio-economic factors, including income, employment, vehicle ownership, and age. Interaction with traffic will be specifically with vehicles at low speeds along two- to three-lane roadways. The heaviest anticipated traffic interaction is at the intersection of 5th Street and Memorial Drive, where the Olli will make through movements at a signalized intersection to access the Medical Campus. The route as shown would start at the G.K. Butterfield Transportation Center, head east, connect to ECU's Main Campus, and continue through the residential student area adjacent to campus. The route will then head north on El Street then west on 1st Street, then follow South Greene Street until turning west on 5th Street. The route will continue west across the intersection of 5th Street and Memorial Drive turning into the Medical Campus on Health Science Drive and retracing the route back to the G.K. Butterfield Transportation Center. The total route is approximately 5 miles long through mostly low traffic, low speed areas.

Performance

As the City continues to build the traditional transit system and investment/support for alternative modes, it is critical to understand how a technology can influence mode choice. The City will host a survey for Olli users to capture and track as many data sets as possible. The City will provide all data, summarized and raw, to Local Motors and to USDOT. This is the key step to our partnership's plan for measuring success, including overall ridership, number of multimodal connections, and transit/Olli trips gained that would otherwise use other modes of transportation.

Barriers

There are currently no barriers to deployment as the City will update any policy to accommodate the Olli deployment within the proposed area. City of Greenville staff will be the key contacts for the pilot program and have City resources necessary to support the pilot program. The City Transportation Planner will serve as the key contact and pilot program manager and be supported by the City Public Works and Transit

Divisions. Additionally, ECU and Uptown Greenville will support the data gathering and marketing components to provide a large cross section of participants from various socio-economic backgrounds.

Storage

The Uptown Core of the City of Greenville and ECU Campuses provide a unique opportunity to test Olli in small urban setting that is anchored by a large university (approximately 30,000 students). Eastern North Carolina has traditionally been slower to develop and implement innovative technology into their transportation systems, and this pilot program is viewed as a prime opportunity to change that narrative. The program will have a dedicated support team to serve whatever needs are required during the program. The City of Greenville also recently completed construction and opening of a new transit center that will serve as a safe and secure base from which the Olli can be launched and charged. The City also will seek to use this program as an education opportunity for the students of ECU. The City will use the program as a pilot to test the capacity for small shuttles in the city; Olli can be that shuttle in the future.

The City of Greenville, ECU, and Uptown Greenville thank you for your time and considerations.

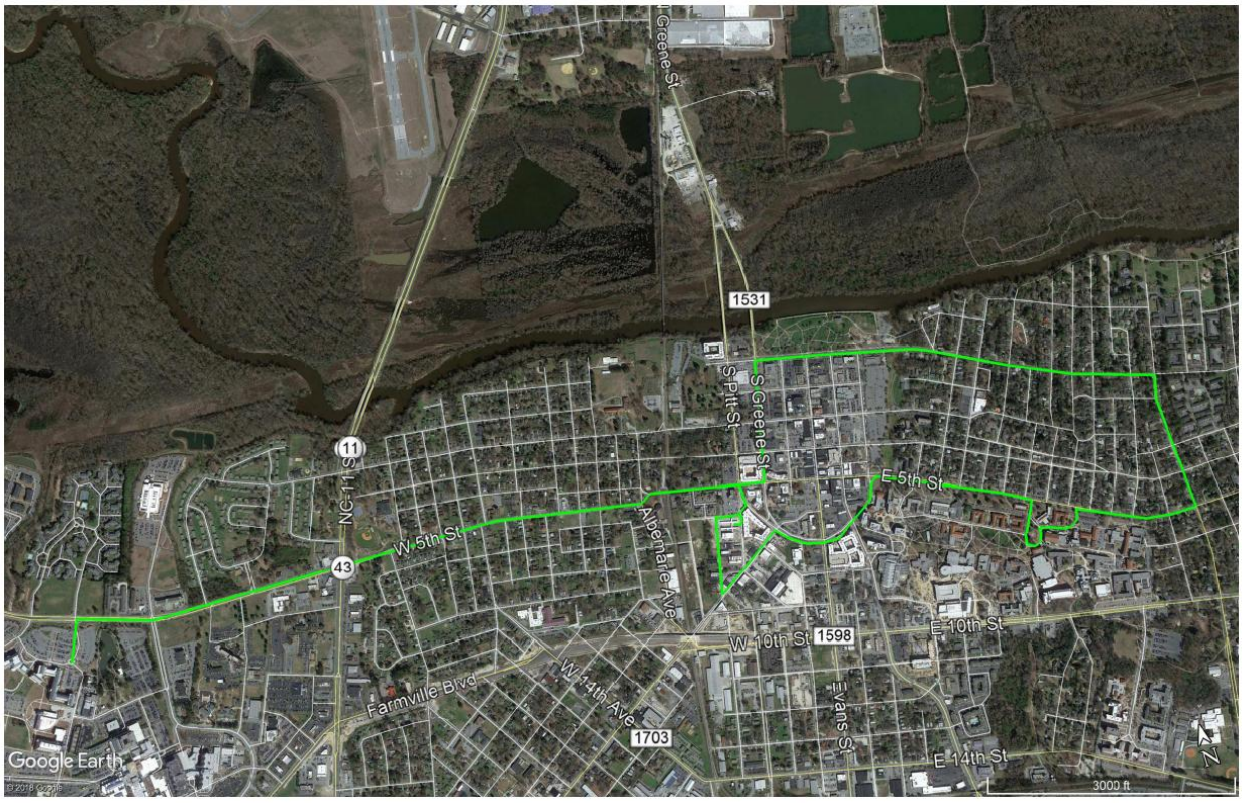


Figure 4. Greenville Olli Route Map

City of Fayetteville

Who We Are

The City of Fayetteville is the sixth largest city in North Carolina and is undergoing a catalytic change in its downtown region. This change and growth started with the building of a $38 million Houston Astros-affiliated baseball stadium, a $65 million public-private partnership that has resulted in the renovation of an historic hotel that will be transformed into 59 high-end apartments, and the building of a flagship hotel and parking garage. These investments have spurred new interest from smaller businesses as the downtown area grows as a major destination for visitors in southeast North Carolina.

Downtown Fayetteville has transformed itself from having an undesirable reputation of unsightly clubs and dilapidated buildings beginning in 2000 with the building of the Army's Airborne and Special Operations museum, which attracts hundreds of thousands of visitors each year, the opening of Festival Park in 2007, and the North Carolina Veterans Park in 2011. Festival Park is host to numerous festivals that are gained statewide acclaim in addition to the monthly 4th Fridays and Fayetteville after Five concerts. These features make downtown a family-friendly, fun place to be and are an integral part of why Downtown Fayetteville has become the number one destination in Cumberland County. The latest developments—the baseball stadium, The Gathering at Prince Charles, and the hotel/office space—are just the next large additions to our downtown area.

Focus Area: Transportation-Challenged Population; Economic Vitality; Significant Public Benefit

Our Project

Fayetteville's proposed project is a collaboration with the City of Fayetteville, the Cool Springs Downtown District, and the Fayetteville Area System of Transit. The proposed shuttle route will operate along an approximate 2/3-mile segment of Hay Street, our main street. One end will serve the area of the new ballpark, Gathering Place, City Hall, and the Festival Park entry, and the other end will serve near the Visitor's Bureau and County Office Complex. Between these terminal points, most of Hay Street is a tree-lined brick street with wide sidewalks and a 15 mph speed limit designed to promote pedestrian activity. Attractions in between include restaurants, art galleries and studios, antique shops, gift specialty stores, cozy coffee shops, and lively cultural and entertainment centers. The Olli project will provide a vital downtown link. Currently, transit buses are not permitted to operate on most of this route, although it is the spine of Downtown Fayetteville.

Route

While we have parking available for our patrons within a 5-minute walk of most of the downtown area, the addition of an autonomous vehicle shuttle will greatly assist in lessening the vehicle footprint and associated emissions in our area, as well as make it

easier for patrons to traverse the downtown area. Further, the Olli shuttle will be an attraction in and of itself.

The round-trip distance for the proposed route is 1.2 miles. The eastern end of the route near the Visitors Bureau and several fine restaurants has a traffic circle. The shuttle will traverse another traffic circle at the Market House. Except for three intersections, the cross streets are narrow, low-speed streets that yield to Hay Street traffic. There is one intersection that is currently controlled with traffic signals. For the period of the Olli demonstration, we propose to turn those signals to flashing and temporarily install four-way stop signs. If this was unacceptable, we have an alternate plan that will shorten the route slightly, but still serve the heart of Hay Street business district. (See attached map.)

Marketing and Promoting

The Cool Springs Downtown District will be responsible for marketing and promoting the shuttle. The organization's mission is to create and sustain an arts and entertainment district emanating from the central core of the City. They envision the district as a vibrant center of artistic, cultural, civic and commercial activity; a place where people live, work, frequently visit and loyally patronize; a robust generator of economic prosperity for all residents of Fayetteville and Cumberland County.

Storage and Charging

Storage and charging for the vehicles during the demonstration will likely take place in the City's Donaldson Street parking lot. The City currently provides free charging stations for EVs on the lower level of its existing downtown parking garage, but we are unsure at this time if the Olli vehicles can navigate the garage entry. If they can, we will use the garage for storage and charging. Both locations are within a block of Hay Street.

Target Market

Our target market are visitors attending the numerous events and venues Downtown Fayetteville has available. Although not providing a direct connection, the shuttle will operate within two blocks of the new FAST Transit Center, which provides intercity connections with Greyhound and MegaBus, in addition to being the primarily hub for local transit buses. The route is within one block of Fayetteville's Amtrak station.

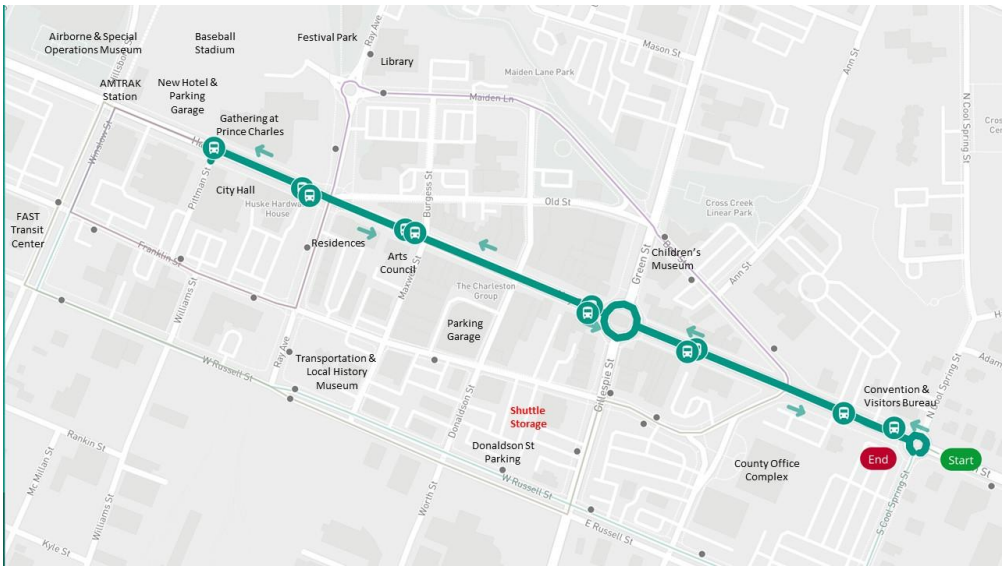


Figure 5. Fayetteville Olli Route Map

NCSU

Description

NCSU's Centennial Campus is a cutting-edge innovation district. The campus is a collaboration of University, public, and private partners working together to promote the University's research and academic mission as well as the economic development of the region and state. In addition to students, faculty, and staff from across all 12 of the University's colleges, Centennial Campus is home to the College of Engineering (recently ranked 12th by the *U.S. News & World Report* in public university engineering programs), the Wilson College of Textiles, 20 of the university's 42 Centers and Institutes, 75+ private companies, and a number of private residents. The full-time population of the campus is more than 18,000 people.

Focus Area: Economic Vitality; Diversity of Projects; Significant Public Benefit

Partnership

This is a strong opportunity for an initial partnership between Olli, NCSU, and NCDOT to test the application of this new technology in a landscape and climate typical of North Carolina. Additionally, anchors along the proposed route have expressed interest in this type of service, including the StateView Hotel, an Autograph Collection hotel used by many business travelers to the campus. The proposed route will showcase the technology in a premier setting to potential innovators, researchers, collaborators, sponsors, and partners. The performance metrics will not only inform all partners about the opportunities and constraints of the technology within North Carolina, but also potentially garner interest in further development and application of the technology in North Carolina through additional potential sponsorships and partnerships.

Resources

A majority of the population, resources, and amenities within the campus lie along or within a 1/4-mile walking distance of the 1-mile stretch of the campus's main street, Main Campus Drive, identified as the potential Olli route. While the campus is served by the University's robust and popular transit service, the Wolfline, the current transit focuses on service between campuses rather than within Centennial Campus itself. NCSU envisions the Olli Fleet as a potential supplement and expansion of this service that specifically focuses on providing an intercampus linkage between primary amenity, office, and classroom destinations along Main Campus Drive. Given the 1-mile length of the total route, density of population served, and the scattering of destinations along the route, NCSU anticipates that ridership will rival the strength of its Wolfline, which consistently has the most robust transit ridership of any transit service in the region. Main Campus Drive is a private 25-mph two-lane road owned and maintained by the University. It meets all of Olli's criteria for operation outlined in the Fleet Challenge Guidebook. The University owns and operates a number of buildings and parking structures near the route that offer opportunity for convenient and secure storage of the vehicles while not in use.

NCSU believes this is a great opportunity for its Centennial Campus. We look forward to exploring this opportunity with you further.

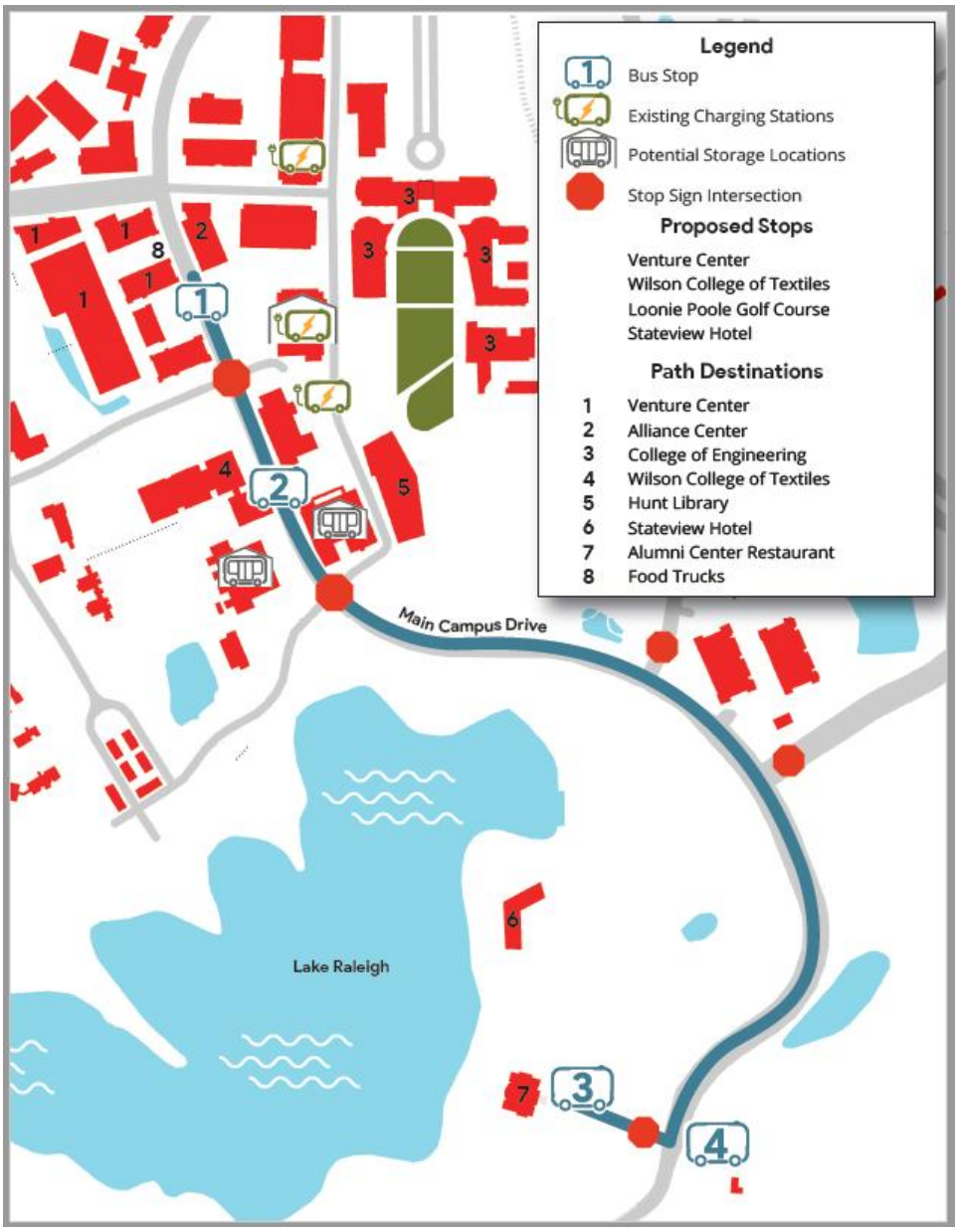
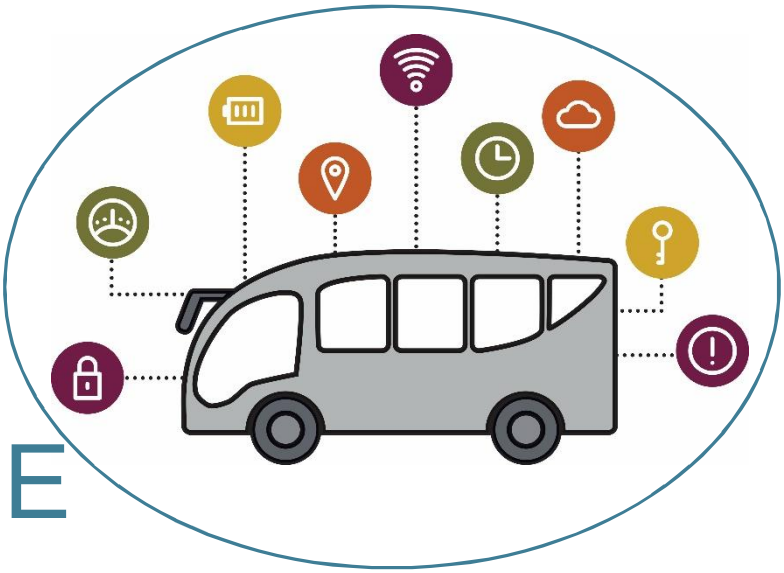


Figure 6. NCSU Olli Route Map

Attachment A – North Carolina Olli Challenge Use Cases

OLLI CHALLENGE



North Carolina Use Cases

December 2018

Introduction

Local Motors advertised their first Olli Challenge earlier this year within the Phoenix and Sacramento areas. Candidates within those cities were able to apply answering a few questions regarding how their organization or partnership would use the Olli Shuttle, contribute to the costs, support and approve regulatory requirements, and support and provide an environment for a successful deployment.

The applications were reviewed by a panel of judges and two organizations were selected earlier in December—Sacramento State University (Sacramento, CA) and East Valley Institute of Technology (EVIT) (Phoenix, AZ). Each will receive two shuttles for three months early 2019.

Local Motors has launched their second challenge within the Washington D.C. area. Applications are due February 6th. Local Motors plans to have additional challenges in other areas within and outside the United States.

Organizations interested in becoming a Challenge area may apply on the Local Motors Fleet Challenge website at https://localmotors.com/fleet-challenge/. Local Motors has provided a web-based form for other areas in the country to submit use cases. These use cases are used by Local Motors to corroborate the want from local municipalities, campuses, and partners to deploy autonomous vehicle technology in their areas.

North Carolina is highly interested in autonomous vehicle technology. Transit has emerged as an area best suited for early adoption of the technology. Many North Carolina municipalities and partners are interested in the Challenge and would appreciate the opportunity to apply Olli Challenge.

Use Cases in North Carolina

As noted above, many local municipalities and partners that are interested in Olli coming to North Carolina have submitted use cases to Local Motors. The following use case were submitted on the Local Motors website and each includes a contact person, motivation, and a route.

UNC-Wilmington

Contact

Scott Holzberger, Alternative Transportation Coordinator

holzbergers@uncw.edu 910.962.7784

Description

This use case will provide information on the purpose of the Olli transportation system. The goal is to provide a cost effective, sustainable, modern form of transportation for students, staff and faculty, which coordinates with UNC-Wilmington's mission statement— "Our culture reflects our values of diversity and globalization, ethics and integrity, and excellence and innovation."

Level

The use of Olli will be a high-level project of great interest to the Alternative Transportation Department of UNC-Wilmington that we would like to see implemented and used regularly on our campus.

Trigger

This case study has been created after being involved with an NCDOT webinar and receiving follow-up emails that have continually kept this case study in the fore front.

Primary Actor

UNC-Wilmington students, staff, and faculty.

Additional/Supporting Actors

- UNC-Wilmington Facilities
- UNC-Wilmington Parking
- UNC-Wilmington Purchasing
- UNC-Wilmington Chancellor and Vice Chancellors

Stakeholders

- UNC Board of Governors
- UNC-Wilmington Board of Trustees
- NCDOT
- New Hanover County
- City of Wilmington
- Other UNC campuses

Preconditions

The final proposal must be accepted through the University's administration and Board of Trustees.

Main Success Scenario

1. Explain that the benefit of Olli outweighs the current forms of transportation
2. Explain that there will be a cost benefit over the current forms of transportation
3. Explain that the system will be safe to use for users and non-users
4. Explain the ability to improve and maintain the system with little to no interruption and cost
5. Explain that the initial cost will have an overwhelmingly positive influence on the campus, environment, and budget in the short- and long-term
6. Coordinate implementation with several entities on UNC-Wilmington's campus

Success End Condition

The use of the Olli transportation is proven to be a safe, cost-effective, sustainable, dependable, user-friendly alternative means of transit to negotiate UNC-Wilmington's campus and immediately surrounding areas that meets the University's mission statement and goals.

Failure End Condition

If the Olli system should not function as designed at any time, there would be a major disruption in the daily routines for the students, staff, and faculty. This disruption would hinder the ability of the affected parties to keep schedules and remain prompt.

Frequency

The frequency of the Olli system will be solely dependent on the perception of safety, dependability, and affordability. Assuming the program has a proven record, the frequency can be greater than a couple of hundred riders per hour.

Special Requirements

There are a few obstacles that would need to be overcome. The first is the issue of speed bumps. The Olli unit appears to have a low profile and may find the speed bumps and raised sidewalks on campus a hindrance and connectivity issues may arise on certain parts of the campus. The coverage area on campus is broad; however, there are "dead spots" on campus that may need to be addressed so the Olli can function properly. An area for downtime and charging will need to be identified. Having a covered area with charging stations will need to be designed and built. The ability for users to identify themselves as students, faculty, and staff in critical as the Olli will be used only by those groups.

Performance

It is expected that the Olli transportation system will function with as little down time as possible and with minimal maintenance. The Olli system will be expected to make timely transportation of the riders. Understandably, there is the possibility for occasional delays due to uncontrollable circumstances.

Safety

Olli is expected to be safe for all involved. Olli will prove itself as a pioneering entity in market safety. It is expected that safety is paramount to any other feature of the program.

Accessibility

The ability for a user to not only enter and exit Olli is important, but also their ability to understand the use of its features is important. The ability for the ADA community to use Olli is a must and Olli must be accessible by all users regardless of their ability. In addition, Olli must accommodate other alternative forms of transportation, such as bicycles and skateboards. Having a location for stowing this type of equipment is beneficial, thus allowing all perspective riders' access to Olli.

Issues and Next Steps

- UNC-Wilmington ID card use
- Low profile issues

Route


CAMPUS MAP | NORTH CAROLINA of WILMINGTON
UNCW Campus Map (PDF)
Emergency Call Box Locations (PDF)
Maps & Directions Home Page
BUILDING DIRECTORY
PARKING LOTS
CALL BOXES
EAST CAMPUS
SOUTH CAMPUS
WEST CAMPUS
NORTH CAMPUS
The yellow roadways would be the estimated routes that Olli would travel. A more formal routing would take place if Olli were awarded to our university.
Metered Parking
Visitor Parking
Visitor Parking / Information
Information Kiosk
Under Construction
Student Commuter Zone 1
Student Commuter Zone 2
Park & Ride McMillian
Faculty Staff Gated Lots
Visitor Lots
Student Resident Zone Lt Blue
Student Resident Zone Brown
Student Resident Zone Black
Student Resident Zone Gold
Seahawk Village Loop
Plyler Drive
Walton Drive
Wood Dale Drive
Hewlett Road
Reynolds Drive
Racine Drive
To Eastwood Road
Hamilton Drive
Wagoner Drive
Randall Drive
Campus Map
Tennis Courts
Greene Track & Field
Soccer Field
Campus Intramural Field
Brooks Memorial Field
Bluethenthal Wildflower Preserve
Recreational Fields
Amphitheatre
Campus Commons
Entrance
Lot A
Lot B
Lot C
Lot D
Lot E
Lot G
Lot K
Lot K Extension
Lot L
Lot P
Lot 0
Lot 0 Extension
Lot 1B
To I-40 and US 17
South College Road / Hwy 132
To Oleander Drive (U.S. 74 / 76)
601 South College Road • Wilmington, NC 28403-3297 • 910-962-3000 • www.uncw.edu
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Wilmington Urban Area Metropolitan Planning Organization (WMPO)/Town of Carolina Beach

Contact

Nick Cannon, Transportation Demand Management Coordinator

Nick.cannon@wilmingtonnc.gov 910.341.7806

Description

WMPO, on behalf of the Town of Carolina Beach, is pleased to submit this concept proposal for the Olli Fleet Challenge. This is a great opportunity for residents and visitors to take advantage of the safe, clean, and environmentally friendly alternative transportation choices that the Olli shuttles offer. At the same time, it would provide Local Motors the opportunity to vet their products in a smaller resort beach town as opposed to the larger urban areas in which Olli is currently operating.

We believe the three-month deployment trial is best suited for Carolina Beach during the peak summer season. From June to August the year-round population of 6,200 often swells to more than 30,000. During this period, traffic on the major arteries and some collector streets approaches gridlock. Much of this is due to vehicles traveling just a few miles to beach accesses and other attractions. To mitigate this congestion, we envision a continuous fixed route of shuttles picking up and dropping off users at our most popular service areas and destinations. This will greatly reduce automobile traffic and provide riders with relaxing, hassle-free, and autonomous mobility around the island community. Additionally, a program in Carolina Beach will get the best of both worlds—hosted in a small, all-American town but used by \tens of thousands of visitors from around the world.

Route

The shuttle route will include regular stops at the Town's popular central business district, including the newly renovated oceanfront Carolina Beach Boardwalk, ranked among the top three boardwalks in the country. The next stop will be Snow's Cut Crossing Shopping Center, the largest on the Island, followed by Carolina Beach State Park with more than 800,000 annual visitors; Mike Chappelle Park, the Town's largest park and trailhead for the Island Greenway; the Carolina Beach Fishing Pier; and four to five of the Town's most popular public beach accesses. (Proposed route map attached.)

Storage and Charging

Storage and charging for the units can be provided at a Town-owned public parking area adjacent to the downtown business district and marina. The Town Operations Department staff can assist with day-to-day logistics and coordination of the program. In terms of policy, the Town will develop and adopt provisions for the use and limitations of the units. Potential, but unconfirmed partnerships in the program may include the Town of Kure Beach, Carolina Beach State Park, Ft. Fisher Historic Site, and the North Carolina Aquarium.

City of Greenville/East Carolina University (ECU)/ Uptown Greenville

Contact

Ryan Purtle, Transportation Planner, City of Greenville

rpurtle@greenvillenc.gov 252.329.4476

Description

The City of Greenville, ECU, and the Uptown Greenville would like to formally request that they be considered for Local Motor's Phase 3 testing of Olli. This partnership is interested in locating Olli in the Urban Core of Greenville, home to ECU's Main Campus, with a potential connection to the ECU Medical Campus in an effort to provide mobility solutions to citizens and students alike. Olli also will serve as an opportunity to begin changing the traditional single vehicle mode choice in the area while also enhancing our traditional transit system by connecting our new transit center, the G.K. Butterfield Transportation Center, to critical medical services, education, employment, and recreation opportunities as Olli would provide a first mile/last mile solution.

Partnership

The partnership of the City, ECU, Uptown Greenville view Olli as the first step to introducing autonomous vehicle technology to the City and rural eastern North Carolina. Olli will serve to connect citizens and students with medical services, education, employment, and recreation opportunities with an innovative technology that provides an alternative source of transportation that would lead to a positive impact on congestion and traffic operations in the urban core and University area. The City's G.K. Butterfield Transportation Center, will provide safe and secure storage and charging of the Olli vehicle, providing our traditional transit users other options to travel to the businesses in Uptown Greenville or educational opportunities on ECU's campus.

Route

The specific area intended for the pilot program is the Uptown Core know as Uptown Greenville, ECU's Main Campus, and the ECU Medical Campus located within a few miles of the Core. The intended area would include 5th Street, which connects the Uptown Area and ECU's Main and Medical Campuses. In addition to 5th Street, the roads contained within the two ECU campuses and the Uptown Core also will be a part of the route. The partnership also will include West Greenville, which is the area of the City between the Uptown Core and ECU's Medical Campus. The intention of including these specific areas of the City is to provide Local Motors with a significant cross section of data across several socio-economic factors, including income, employment, vehicle ownership, and age. Interaction with traffic will be specifically with vehicles at low speeds along two- to three-lane roadways. The heaviest anticipated traffic interaction is at the intersection of 5th Street and Memorial Drive, where the Olli will make through movements at a signalized intersection to access the Medical Campus. The route as shown would start at the G.K. Butterfield Transportation Center, head east, connect to ECU's Main Campus, and continue through the residential student area adjacent to campus. The route will then head north on El Street then west on 1st Street, then follow South Greene Street until turning west on 5th Street. The route will continue west across the intersection of 5th Street and Memorial Drive turning into the Medical Campus on Health Science Drive and retracing the route back to the G.K. Butterfield Transportation Center. The total route is approximately 5 miles long through mostly low traffic low speed areas.

Performance

As the City continues to build the traditional transit system and investment/support for alternative modes, it is critical to understand how a technology can influence mode choice. The City will host a survey for Olli users to capture and track as many data sets as possible. The City will provide all data, summarized and raw, to Local Motors. This is the key step to our partnership's plan for measuring success, including overall ridership, number of multimodal connections, and transit/Olli trips gained that would otherwise use other modes of transportation.

Barriers

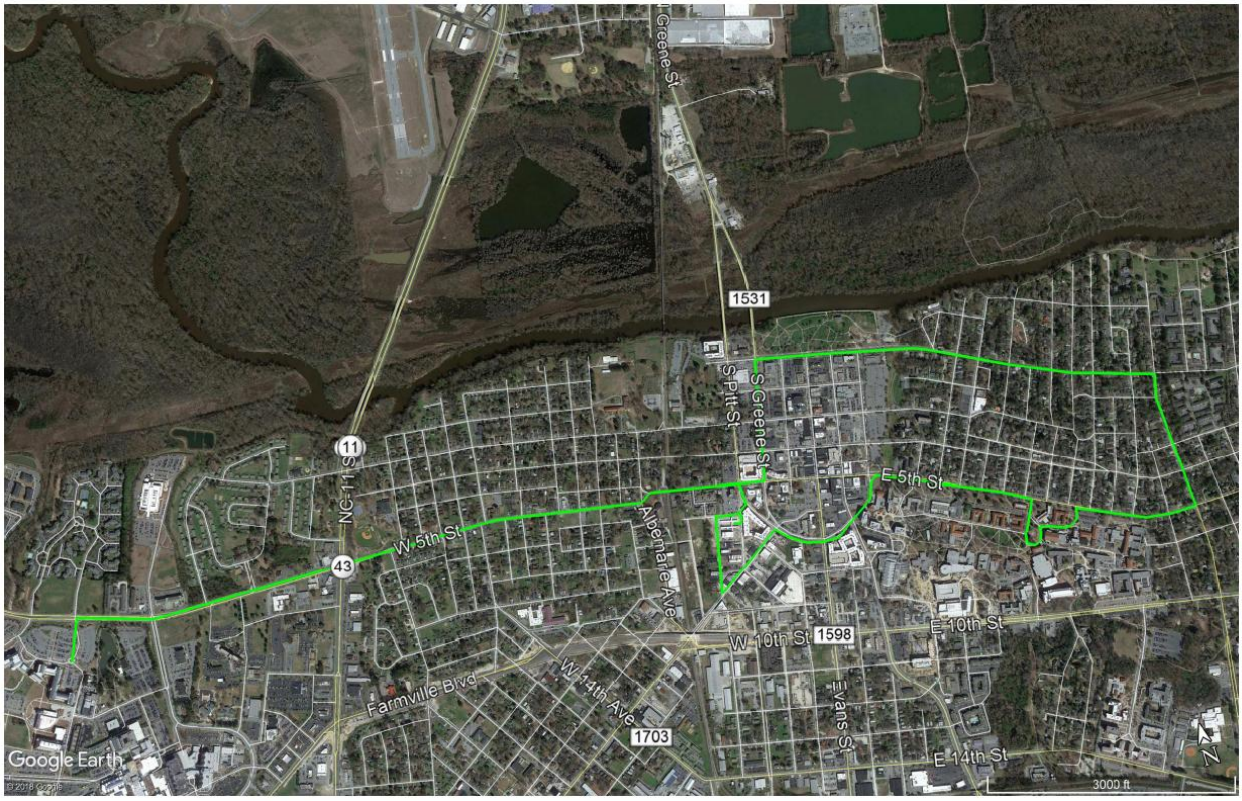
There are currently no barriers to deployment as the City will update any policy to accommodate the Olli deployment within the proposed area. City of Greenville staff will be the key contact for the pilot program and have City resources necessary to support the pilot program. The City Transportation Planner will serve as the key contact and pilot program manager and be supported by the City Public Works and Transit Divisions. Additionally, ECU and Uptown Greenville will support the data gathering and marketing components to provide a large cross section of participants from various socio-economic backgrounds.

Storage

The Uptown Core of the City of Greenville and ECU Campuses provide Local Motors with a unique opportunity to test Olli in small urban setting that is anchored by a large University (approx. 30,000 students). Eastern North Carolina has traditionally been slower to develop and implement innovative technology into their transportation systems and this pilot program is viewed as a prime opportunity to change that narrative. The Olli program will have a dedicated support team to serve whatever needs are required during the program. The City of Greenville also recently completed construction and opening of a brand-new transit center that will serve as a safe and secure base from which the Olli can be launched and charged from. The City also will seek to use this program as an education opportunity for the students of ECU. The City also will also like to use the program as pilot to test the capacity for small shuttles in the City, which Olli can be that shuttle in the future.

The City of Greenville, ECU, and Uptown Greenville thank you for your time and considerations. We hope that you will strongly consider our area for Phase 3 of the Olli Fleet Challenge.

Map


Greene St
1531
S Pitt St
S Greene St
E 5th St
11
NC-11 S
W 5th St
43
Albemarle Ave
W 10th St
1598
E 10th St
Farmville Blvd
W 14th Ave
1703
Evans St
E 14th St
Google Earth
3000 ft
N

City of Fayetteville

Contact

Randy Hume, Transit Director, City of Fayetteville

rhume@ci.fay.nc.us 910.433.1011

Who We Are

The City of Fayetteville is the 6th largest city in North Carolina and is undergoing a catalytic change in its downtown region. This change and growth started with the building of a $38 million Houston Astros-affiliated baseball stadium, a $65 million public-private partnership that has resulted in the renovation of an historic hotel that will be transformed into 59 high-end apartments, and the building of a flagship hotel and parking garage. These investments have spurred new interest from smaller businesses as the downtown area grows as a major destination for visitors in southeast North Carolina.

Downtown Fayetteville has transformed itself from having an undesirable reputation of unsightly clubs and dilapidated buildings beginning in 2000 with the building of the Army's Airborne and Special Operations museum which attracts hundreds of thousands of visitors each year, the opening of Festival Park on 2007, and the North Carolina Veterans Park in 2011. Festival Park is host to numerous festivals that are gained statewide acclaim in addition to the monthly 4th Fridays and Fayetteville after Five concerts. These features make downtown a family-friendly, fun place to be and are an integral part of why Downtown Fayetteville has become the number one destination in Cumberland County. The latest developments—the baseball stadium, The Gathering at Prince Charles, and the hotel/office space—are just the next large additions to our downtown area.

Our Project

Fayetteville's proposed project is a collaboration with the City of Fayetteville, The Cool Springs Downtown District, and the Fayetteville Area System of Transit. The proposed shuttle route will operate along an approximate 2/3-mile segment of Hay Street, our main street. One end will serve the area of the new ballpark, Gathering Place, City Hall, and the Festival Park entry, and the other end will serve near the Visitor's Bureau and County Office Complex. Between these terminal points, most of Hay Street is a tree-lined brick street with wide sidewalks and a15 mph speed limit designed to promote pedestrian activity. Attractions in between include restaurants, art galleries and studios, antique shops, gift specialty stores, cozy coffee shops, and lively cultural and entertainment centers. The Olli project will provide a vital downtown link. Currently, transit buses are not permitted to operate on most of this route although it is the spine of downtown Fayetteville.

Route

While we have parking available for our patrons within a 5-minute walk of most of the downtown area, the addition of an autonomous vehicle shuttle will greatly assist in lessening the vehicle footprint and associated emissions in our area, as well as make it easier for patrons to traverse the downtown area. Further, the Olli shuttle will be an attraction in and of itself.

The round-trip distance for the proposed route is 1.2 miles. The eastern end of the route near the Visitors Bureau and several fine restaurants has a traffic circle. The shuttle will traverse another traffic circle at the Market House. Except for three intersections, the cross streets are narrow, low speed streets that yield to Hay Street traffic. There is one intersection that is currently controlled

with traffic signals. For the period of the Olli demonstration we propose to turn those signals to flashing and temporarily install 4-way stop signs. If this was unacceptable we have an alternate plan that will shorten the route slightly, but still serve the heart of Hay Street business district. (See attached map.)

Marketing and Promoting

The Cool Springs Downtown District will be responsible for marketing and promoting the shuttle. The organization's mission is to create and sustain an arts and entertainment district emanating from the central core of the City. They envision the district as a vibrant center of artistic, cultural, civic and commercial activity; a place where people live, work, frequently visit and loyally patronize; a robust generator of economic prosperity for all residents of Fayetteville and Cumberland County.

Storage and Charging

Storage and charging for the vehicles during the demonstration will likely take place in the City's Donaldson Street parking lot. The City currently provides free charging stations for EVs on the lower level of its existing downtown parking garage, but we are unsure at this time if the Olli vehicles can navigate the garage entry. If they can we will use the garage for storage and charging. Both locations are within a block of Hay Street.

Target Market

Out target market are visitors attending the numerous events and venues Downtown Fayetteville has available. Although not providing a direct connection, the shuttle will operate within two blocks of the new FAST Transit Center, which provides intercity connections with Greyhound and MegaBus, in addition to being the primarily hub for local transit buses. The route is within one block of Fayetteville's AMTRAK station.

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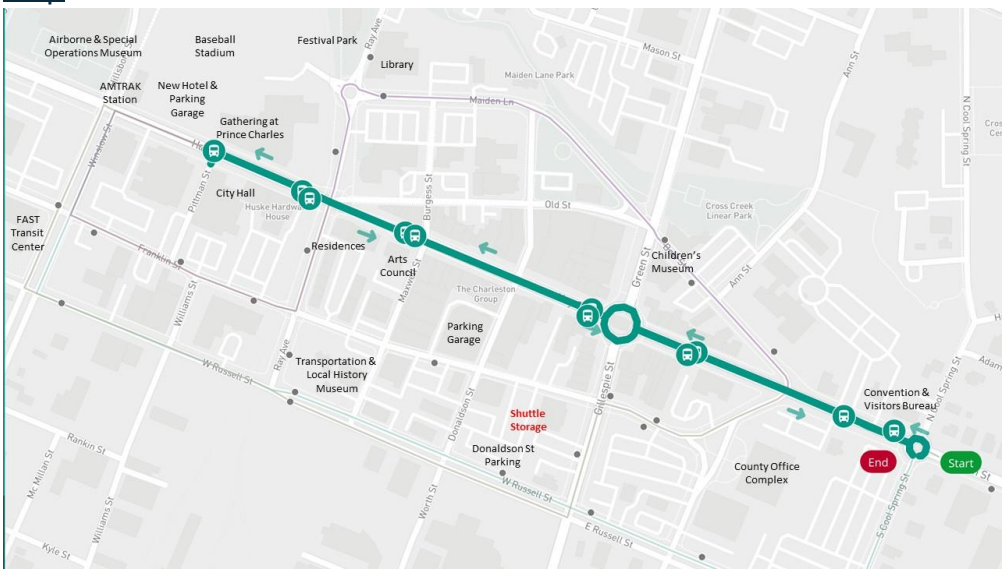

North Carolina State University (NCSU)

Contact

Lauren Joyner, Assistant Director, Development Planning and Management University Real Estate & Development

lljoyner@ncsu.edu 919.515.8022

Description

NCSU's Centennial Campus is a cutting-edge innovation district. The campus is a collaboration of University, public, and private partners working together to promote the University's research and academic mission as well as the economic development of the region and state. In addition to students, faculty, and staff from across all 12 of the University's colleges, Centennial Campus is home to the College of Engineering (recently ranked 12th by the US World and News Report in public university engineering programs), the Wilson College of Textiles, 20 of the university's 42 Centers and Institutes, 75+ private companies, and a number of private residents. The full-time population of the campus is more than 18,000 people.

Partnership

The Olli Fleet Challenge is a strong opportunity for an initial partnership between Olli, NCSU, and NCDOT to test the application of this new technology in a landscape and climate typical of North Carolina. Additionally, anchors along the proposed route have expressed interest in this type of service, including the StateView Hotel, an Autograph Collection hotel used by many business travelers to the campus. The proposed route will showcase the technology in a premier setting to potential innovators, researchers, collaborators, sponsors, and partners. The performance metrics will not only inform all partners about the opportunities and constraints of the technology within North Carolina, but also potentially garner interest into further development and application of the technology in North Carolina through additional potential sponsorships and partnerships.

Resources

A majority of the population, resources, and amenities within the campus lie along or within a 1/4-mile walking distance of the 1-mile stretch of the campus's main street, Main Campus Drive, identified as the potential Olli route. While the campus is served by the University's robust and popular transit service, the Wolfline, the current transit focuses on service between campuses rather than within Centennial Campus itself. NCSU envisions the Olli Fleet as a potential supplement and expansion of this service that specifically focuses on providing an intercampus linkage between primary amenity, office, and classroom destinations along Main Campus Drive. Given the 1-mile length of the total route, density of population served, and the scattering of destinations along the route, NCSU anticipates that ridership will rival the strength of its Wolfline, which consistently has the most robust transit ridership of any transit service in the region. Main Campus Drive is a private 25-mph two-lane road owned and maintained by the University. It meets all of Olli's criteria for operation outlined in the Fleet Challenge Guidebook. The University owns and operates a number of buildings and parking structures near the route that offer opportunity for convenient and secure storage of the vehicles while not in use.

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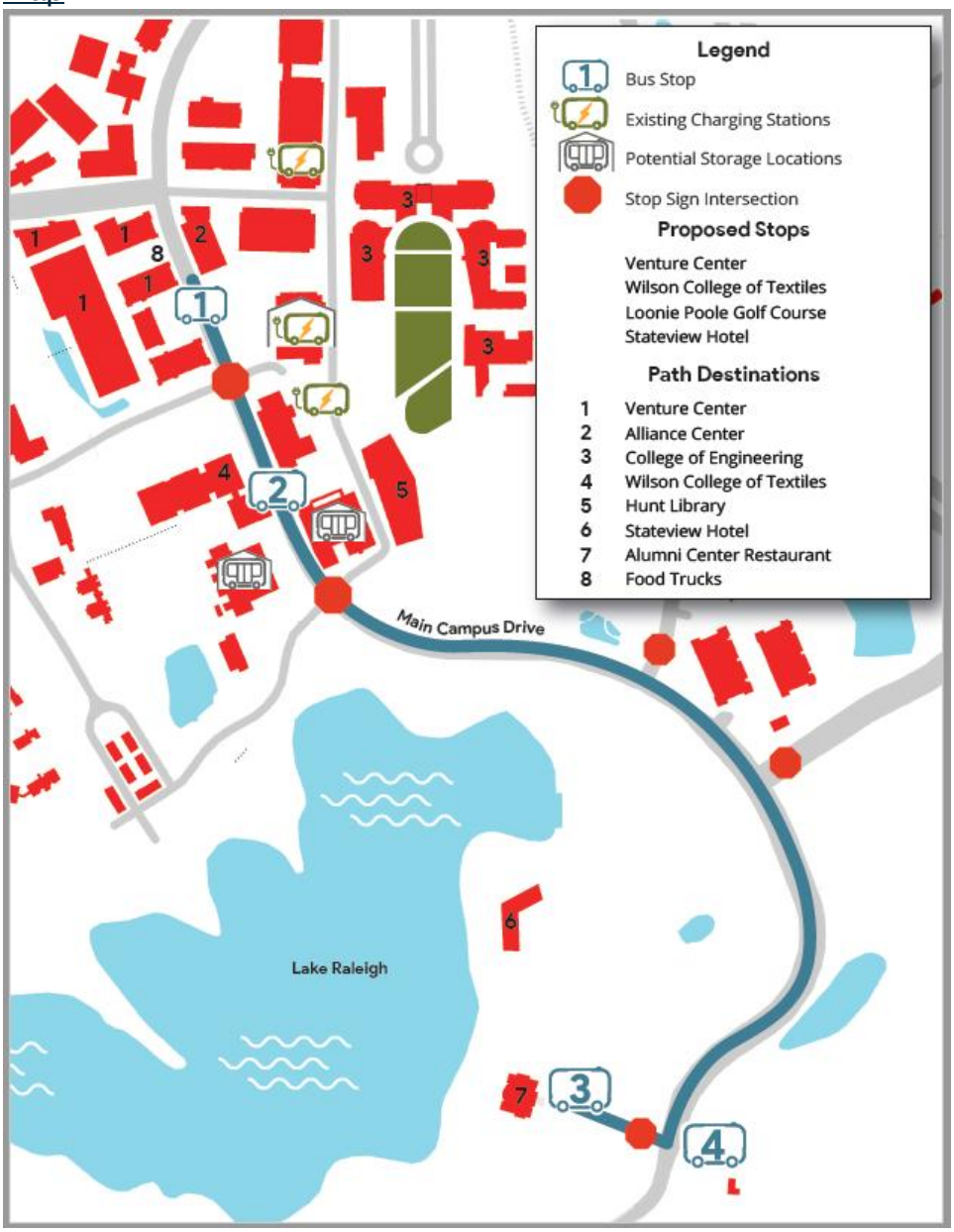


North Carolina Central University (NCCU)

Contact

Tom Ten Eyck, Transportation Demand Management Coordinator

tteneyck@nccu.edu 919.530.5560

General Information & Framing

Organization Name: North Carolina Central University Transportation Department

Organization Location: Durham, NC

NCCU seeks to add Olli to its transportation network by providing a route that will serve as a cross-campus connector. This would bridge the distance between two of our farthest located academic buildings—the NCCU Law School and the Mary Townes Science Building—as well as serve as the mode to circulate in areas that are currently underserved. This route also provides transit to an area where NCCU's current transit does not severe since the many of the routes serve the periphery of campus and are larger vehicles capable of picking up 25 or more students. The cross-campus connector will be used by faculty and staff members to cross the campus directly instead of choosing to take their personal vehicle and contributing to total vehicle miles travelled (VMTs) around campus.

The objectives behind deploying Olli are:

1. Support the Transportation Demand Management (TDM) goals of the campus program, the Eagle Commuter Assistance Program (E-CAP) by reducing trips in personal vehicles, especially simple trips across campus
2. Create a cross-campus connection to serve disparate points of campus
3. Add to the existing fleet, rather than replace a fleet vehicle, to better serve an absent route

The intended impact of Olli's addition to the University's fleet is based on the objectives above. NCCU has invested in a new TDM program to help reduce congestion in the region by offering alternatives to solo passenger car trips. As a University, our interest falls not only within commuting trips to campus, but also the trips while on campus. For many faculty and staff members on campus, getting from one corner of campus to the other usually means driving to the destination in their own vehicle. This cross-campus connection will provide an alternative that will replace the appeal of driving with a clean, quiet, and quick trip, unburdening the passenger with a need to find parking or the risk of accidents.

The novel nature of the deployment is that it acts as the shortest route for most direct access. Currently, employees can ride the Maroon and Grey shuttles that are offered to students at NCCU, but both routes circumnavigate the entire campus, meaning that if a user has a cross-campus destination, they may have a 15-minute trip before reaching their stop. With the addition of Olli, that trip time can be reduced by 50% by stopping at fewer points and acting as an express route to get to the other side of campus.

The metric that NCCU is most interested in testing is whether personal car usage on campus is reduced during the work day due to the presence of Olli. Additional metrics that will determine success include:

- Number of riders on an hourly basis
- Number of riders going each direction
- Hours of the day when Olli has zero passengers
- Rider satisfaction with the cross-campus route (time, comfort)

As a Transportation Department on a college campus bisected by major arterial roadways, we are incredibly excited by the prospect of adding to the University's fleet in a way that is not currently available within our operating budget to serve a needed express campus route. Beyond the sheer pragmatism of the opportunity, we are excited by the chance to do this with a fixed vision on sustainability and efficiency.

The project lead is Mr. Cha'ssem Anderson, Transportation Director. Marketing efforts will be guided by Tom Ten Eyck, TDM Coordinator with the support and guidance from Ms. Kia Bell, Media Relations and Internal Communications Coordinator.

Deployment

Please see attached map with illustrations for the Olli route, the Olli charging route, major stops with signage about autonomous vehicles, minor stops, and parking lots.

Route Schedule: Monday to Friday from 8:00 AM to 6:00 PM

Route explanation: Starting at the Law School Circle, Olli will head westbound on Nelson St. until the stop sign at the junction of Nelson St. and Lincoln St., then turn right onto Lincoln St. and head north, then left/west on George St. until it crosses the front of the Student Union (minor stop). Olli will then continue westbound until the stop sign at the junction of George St. and Fayetteville St. and turn right onto Fayetteville St. and head north until the left turn onto Formosa Ave. Olli will then head west on Formosa Ave. until the junction of Formosa Ave. and Concord St., turn right onto Concord St., head north, then turn left/west onto Formosa Ave. Just past the small parking lot on the South Side of the Mary Townes Science Building and Biomedical Research Institute and Tech Enterprise (BRITE), Olli will turn right and stop at the major west end of the route. This area also will include signage explaining the autonomous vehicle testing taking place on campus. Ollie will continue west until the junction of Formosa Ave. and Pekoe Ave. the turn left onto Pekoe Ave. and continue to the juncture of Pekoe Ave. and Fayetteville St. This point will be directly south of the Public Safety building and the site of the second minor stop. Ollie will then turn right onto Fayetteville St. and head south until the junction of Fayetteville St. and Nelson St., then turn left onto Nelson St. and head east to the east end of the Nelson St. parking lot, the third and final minor stop, which also connects to the Julius L. Chambers Biomed/Biotech Research Building. Finally, Ollie will continue east to the Law School Circle, the end destination and major east end stop of this route and second location with signage explaining the autonomous vehicle testing taking place on campus.

The key purpose behind Olli is to serve as a fast cross-campus connector, connecting four major academic buildings with corresponding medium- to large-sized lots for employees. This will enable employees who have meetings across campus to directly attend those meetings without having to take the shuttle all the way around campus. This also can lessen congestion in some of the more crowded lots and permit those who park in lots away from their facility to continue parking on the periphery and have a quicker route to their building. The final purpose is to switch the mindset of

employees who choose to take their car to meetings that are across campus. Instead, Olli can serve as the intermediary so that parking lot use can be maximized.

Storage/Charging

Please see attached map with illustrations for the Olli route, the Olli charging route, major stops with signage about autonomous vehicles, minor stops, and parking lots. Olli's storage facility is the blue circle on the map, which represents the garage of the Physical Plant on campus.

Meeting Technical Requirements:

- The entire NCCU campus is covered by Verizon 4G LTE data from cell towers and there is wireless internet capacity across the entire campus.
- The entire route proposed for Olli's deployment is no higher than 25 mph on public and campus roadways.
- The grade of Olli's deployment route is less than 5% throughout the entire route and all pathways, including the route to the charging garage in the campus's Physical Plant, is completely paved and free of loose aggregate/debris at all times.
- The power setup in the Physical Plant garage can accommodate the charging needs of Olli with the main regulated between 360-440 and cords that are codified to carry up to 32 amps on the charge line.
- The route that Olli will follow is unencumbered by trees; the west end of the trip includes areas that have trees in the right-of-way directly off the street, but the canopy is not dense and will not cause obstructions in maneuvering or signal interference.
- As per the route hours of operation, Olli will only operate during daytime hours.

Riders

The target riders of Olli on NCCU's campus are employees that need to make cross-campus commutes to get to meetings, classes, or events. While we do not have the specific demographic information regarding household-level census data for our campus population, the current employee population on NCCU's campus includes 1,409 employees, 564 of which are faculty and 845 of which are staff.

The intended impact is to get employees out of their cars while on campus and using alternative methods to get across campus. The key goal is to help influence the decision of the employees to no longer take solo passenger cars to cross-campus destinations, but rather take Olli as a cleaner and less-congesting alternative. Right now, only a few members of the approximately 1,409 employees on NCCU's campus take any form of alternative transportation. While the focus of our Olli deployment is to influence car commuters to park and stay parked on campus, the eventual goal is to get these commuters to consider an alternative commute with the campus's program, the Eagle Commuter Assistance Program. With a successful deployment of Olli, we believe that the buy in for alternative commuting can help change the trend on campus as well as start the conversation about getting to and from campus.

We anticipate that during the hours of operation (M-F 8:00 AM – 6:00 PM), riders will ride at least twice daily with the average rider riding three round-trips per week (or six trips one direction). This is based on meeting schedules for the average employee and current trends in parking preferentially closer to the building in which the rider works. Some will ride Olli daily as a round trip, most likely the commuters who are parked farther off from their destinations. While commuters will

likely ride during the morning peak (7:30 AM – 9:00 AM) and evening peak (4:30 PM – 6:00 PM) to their destinations, those riding Olli for cross-campus meetings are expected to use the services throughout the day (10:00 AM – 4:00 PM). We also anticipate that during the commute times, Olli will be full at eight passengers per trip while the meeting crowds will average between four and six passengers.

Policy

While there is vehicular traffic on all parts of his route, the only road that is operated by NCDOT and sees high traffic volumes is Fayetteville St. From the right on George St. northbound on Fayetteville St. to the left on to Formosa Ave., Olli is only on Fayetteville St. for 0.1 miles; similarly, from the right on Pekoe Ave. southbound on Fayetteville St. to the left on to Nelson St., Olli is on Fayetteville St. for less than 0.1 miles.

On the western part of the route, Olli will see morning and afternoon traffic from the Early College High School campus that is housed on NCCU's campus. There is major bus traffic during the afternoon pickup between 3:00 – 3:45 PM that runs the span of Formosa Ave. at Concord St. northbound to Brant St. Other than this window of time, vehicular traffic on the west half of the route (all roads west of Fayetteville St.) is small with a few on-road spaces for parking vehicles.

On the eastern part of the route, there is modest on street parking on Nelson St. eastbound and on George St. westbound. There is no traffic in the Law School circle. Both Nelson St. and George St. have one-way traffic patterns, and George St. has a larger volume of pedestrian traffic as well as campus utility vehicles (vans, golf carts, six-wheel gators). Most of the traffic on George St. is intermittent and brief, while the parking on Nelson St. tends to be daily commuter parking. Nelson St. also is just north of the Nelson Parking Lot, the largest parking lot we hope to serve by moving employees from these spaces to their cross-campus locations.

According to House Bill 469/SL 2017-166, North Carolina permits Level 4 autonomous vehicles on all public highways and no local municipality may preempt this law. As such, we are permitted to operate a Class 4 vehicle on all roads within the route specified for Olli with no need for State exemptions. While NCCU's Transportation Department is the main applicant, we work closely with members of the City of Durham's Transportation Department including Director Terry Bellamy, Transportation Specialist Anne Phillips, Bicycle and Pedestrian Coordinator Dale McKeel, and Transportation Engineer Pete Nicholas. We have partnered with the City in previous efforts of mutual interest and we welcome the opportunity to further build upon our regional growth with an initiative of this magnitude for our campus and for the City of Durham.

Partnerships

Our key partners on campus include the Department of Environmental, Earth and Geospatial Sciences; Facility Services; the Campus Police Department; and the Division of Student Affairs. Our largest key partner outside of campus is the City of Durham's Transportation Department.

The Department of Environmental, Earth and Geospatial Sciences will work with us work to optimize the route for Olli and will help build metrics for assessing the environmental benefits provided by Olli. Aside from route optimization, their main metric will be to help gather data on the reduction of VMTs and the amount of greenhouse gasses (GHGs) reduced by using Olli.

Another key partner is Facility Services, who will help us house and charge Olli. Facility Services is equipped with garage facilities in which Olli can be protected from the elements while also receive sufficient charging capacity. The Transportation Department has already begun conversations with Facility Services to help meet campus sustainability goals by building EV charging stations on campus. Helping with an Olli deployment will act as a serious commitment to making those facilities available across campus.

A third key partner is the NCCU Campus Police Department, which is housed in the Public Safety Office (one of the eastbound stops before crossing Fayetteville St.). Campus Police will be able to support by helping set up the proper signage and control road traffic patterns as Olli is getting established on campus.

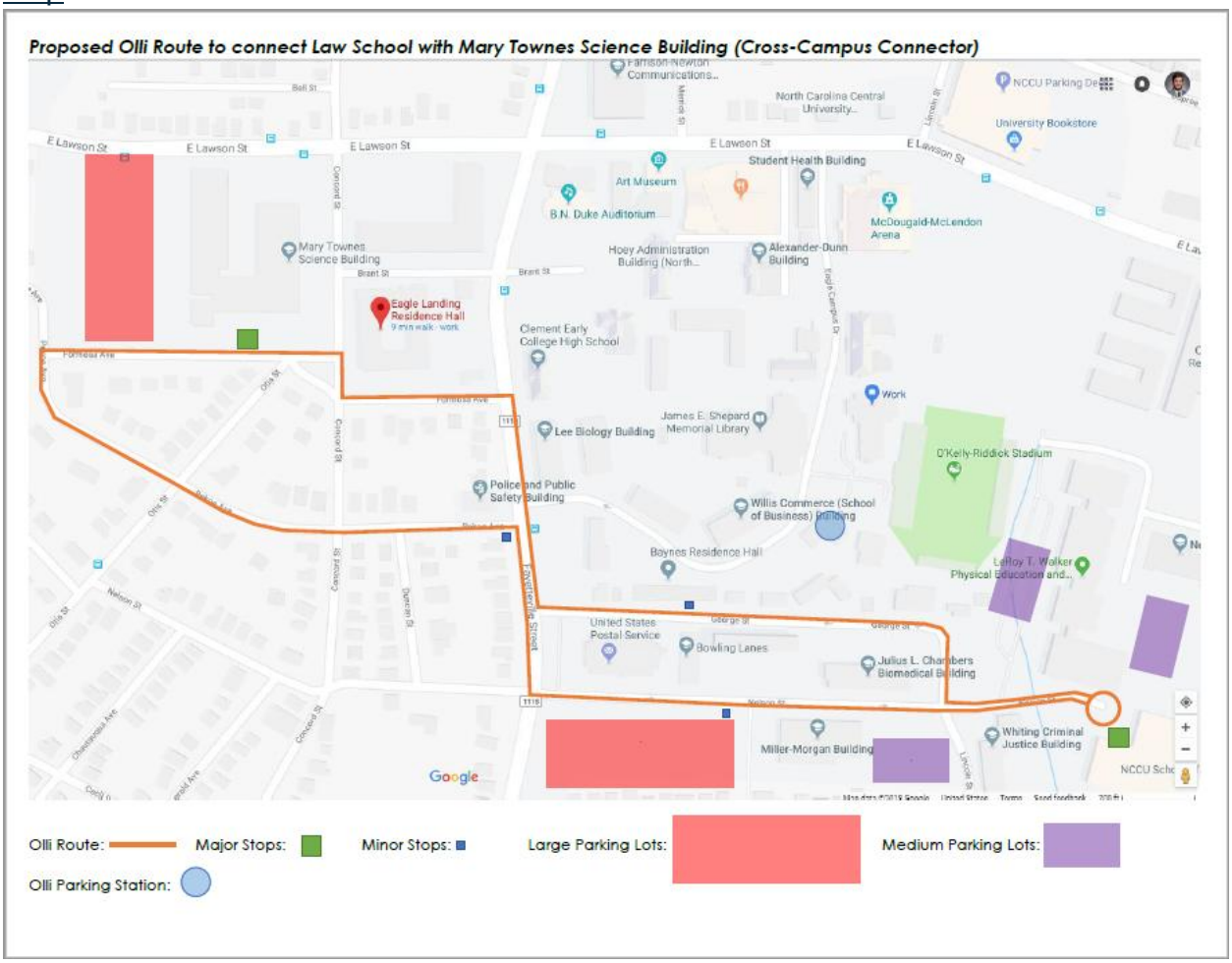
The last key on-campus partner is the Division of Student Affairs, which will help promote the program to employees, help communicate program goals, and find interested riders. Student Affairs has created a five-year plan with specific goals to help develop innovative and engaging experiences for students and the University community; the Olli Deployment on NCCU's campus will represent a high-impact program that can use the collaboration of students with employees to help move campus sustainability initiatives forward.

Our key partner outside of the campus is the City of Durham Transportation Department. We will rely on them to ensure off-campus roadway signage is installed and that we are permitted within the City of Durham to operate Olli on public roads.

The key goal with Olli as a mobility solution is to simply start to see if we can encourage behavior changes within our employee community on campus. We know that there are multiple ways that people can get to a destination, and when pricing is full cost, we know that people will choose the one in which they are most comfortable, regardless of the impact it has on the environment and on others. NCCU is genuinely interested to bring this sophisticated technology to our campus and, coupled with meaningful marketing, we aim to help people see that Olli can be a convenient alternative option to using a solo passenger car on campus. In addition, if we can begin the conversation about Olli on campus, then perhaps we can use the capacity of our TDM program in addition to our Olli case study to make an argument for clean energy vehicles as our entire fleet.

In terms of what the University is seeking from autonomous vehicle use in general, we are most interested in seeing if they will simply work and deliver a more consistent level of service than what has been available previously. Without the presence of human error, we are hoping to see a safe, clean route that is driven with precision and accuracy and is consistent to the riding base so that users can adjust their personal habits. This would help the Transportation Department articulate a clearer aspiration to a new type of fleet on campus and can help with NCCU's TDM programming decide on what operations the University would like to run to meet our goals of reducing solo-passenger trips to and from campus.

Map


Proposed Olli Route to connect Law School with Mary Townes Science Building (Cross-Campus Connector)
E Lawson St
Student Health Building
Art Museum
B.N. Duke Auditorium
McDougald-McLendon Arena
Mary Townes Science Building
Hoey Administration Building (North...
Alexander-Dunn Building
Eagle Landing Residence Hall
9 min walk: work
Clement Early College High School
Work
James E. Shepard Memorial Library
Lee Biology Building
O'Kelly-Riddick Stadium
Police and Public Safety Building
Willis Commerce (School of Business) Building
Baynes Residence Hall
LeRoy T. Walker Physical Education and...
United States Postal Service
Bowling Lanes
Julius L. Chambers Biomedical Building
Miller-Morgan Building
Whiting Criminal Justice Building
Google
Olli Route:
Major Stops:
Minor Stops:
Large Parking Lots:
Medium Parking Lots:
Olli Parking Station:

Village of Misenheimer/Pheiffer University

Contact

Michael Herron, Mayor

mherron@villageofmisenheimernc.gov 704.322.7377

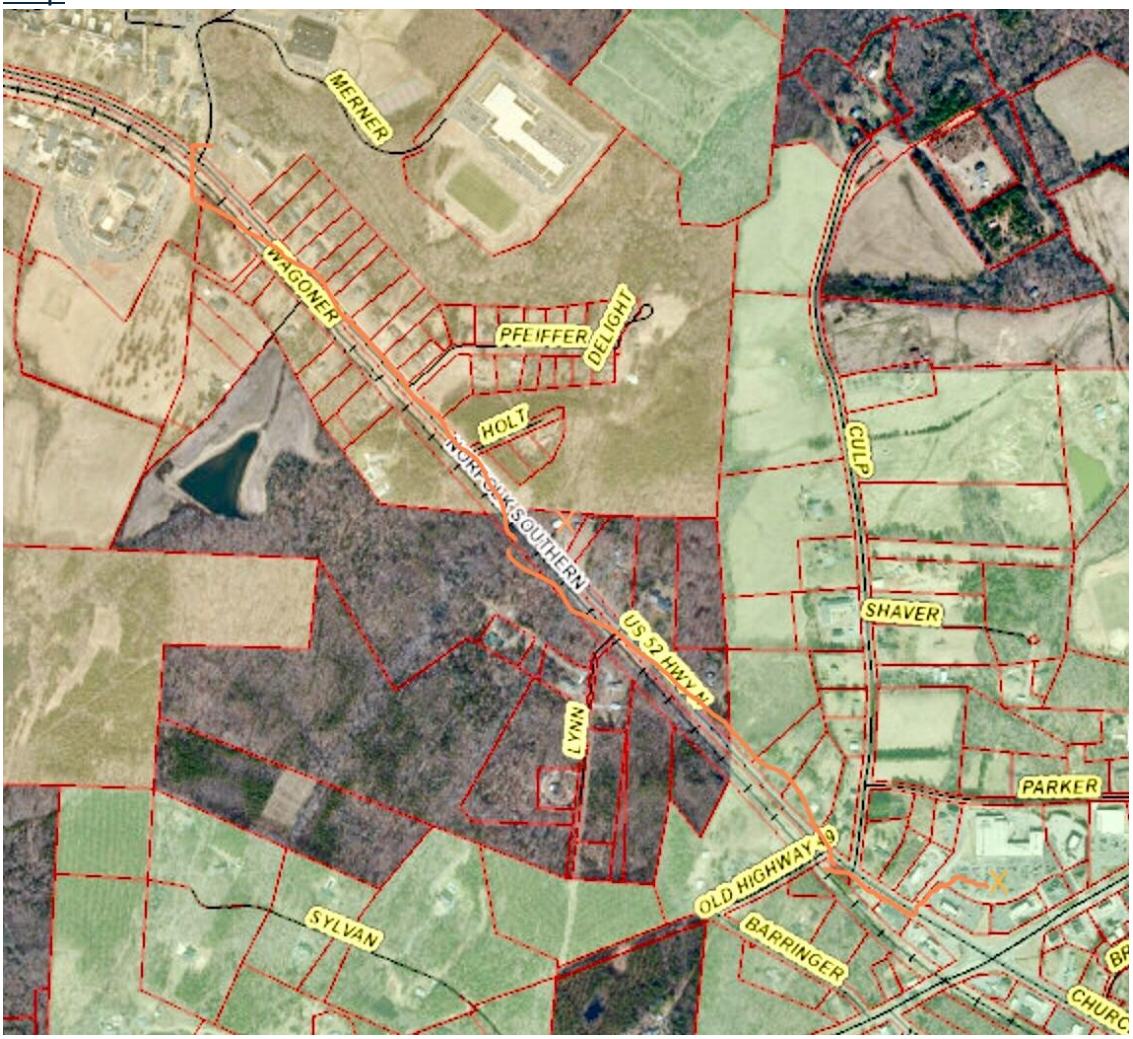
Description

The Village of Misenheimer is looking to connect students and staff at the Pfeiffer University campus to an activity center approximately 1.5 miles away. The activity center consists of restaurants, grocery stores, medical services, a post office, Town Hall, and retail. Pfeiffer is a private, Christian university located in Misenheimer on 340 acres. The University is a small institution with an enrollment of 739 undergraduate students with approximately 61 faculty and staff. These students and staff will use Olli to access this activity center. Olli will provide circulation within the campus and drive along US 52 to provide access to the activity center and the community. US 52 is a two-lane roadway with a speed limit of 35 mph. Olli will provide an additional travel choice for students and staff that reduces the need for single occupancy vehicles making multiple daily trips.

Misenheimer sees this as an opportunity to show how small fleets of CAVs can transform mobility in rural areas with terrain, climate conditions, and land uses typical of those in the Southeast United States. As a larger proportion of the population will have access to this service than would be the case in a larger metropolitan area, there is a greater opportunity to see how autonomous mobility may transform how communities define themselves to take advantage of this and other related technologies.

It is the Village's hope that use of Olli will be available to the public as well as University students, faculty, and staff. Storage of the Olli will depend on what is required. There are two hawk crosswalks across US 52 through campus that may warrant the need to accommodate Olli on the end of campus closest to Richfield to avoid passing through the crosswalk lights.

Map


MERNER
WAGONER
PFEIFFER
DELIGHT
HOLT
CULP
SHAVER
LYNN
PARKER
OLD HIGHWAY
SYLVAN
BARRINGER

Southwestern Commission/Western Carolina University

Contact

Rose Bauguess, Senior Planner

rose@regiona.org 828.586.1962

Description

Western Carolina University (WCU) is located in the Southern Appalachian Mountains of rural western North Carolina. The campus covers approximately 600 acres and serves more than 11,000 students. Approximately 4,500 students live on campus and the remainder commute. WCU's Millennial Initiative site is situated one mile away from the main campus and houses a new Health and Human Sciences Building as well as a popular mountain-biking trail.

CAT-TRAN, the Catamount On-Campus Transportation System, provides shuttle service for the University. They offer five routes with varying schedules and use the NextBus App to provide real-time location information to users. There is limited service on nights and weekends, and shuttles to nearby off-campus housing was discontinued due to limited funds.

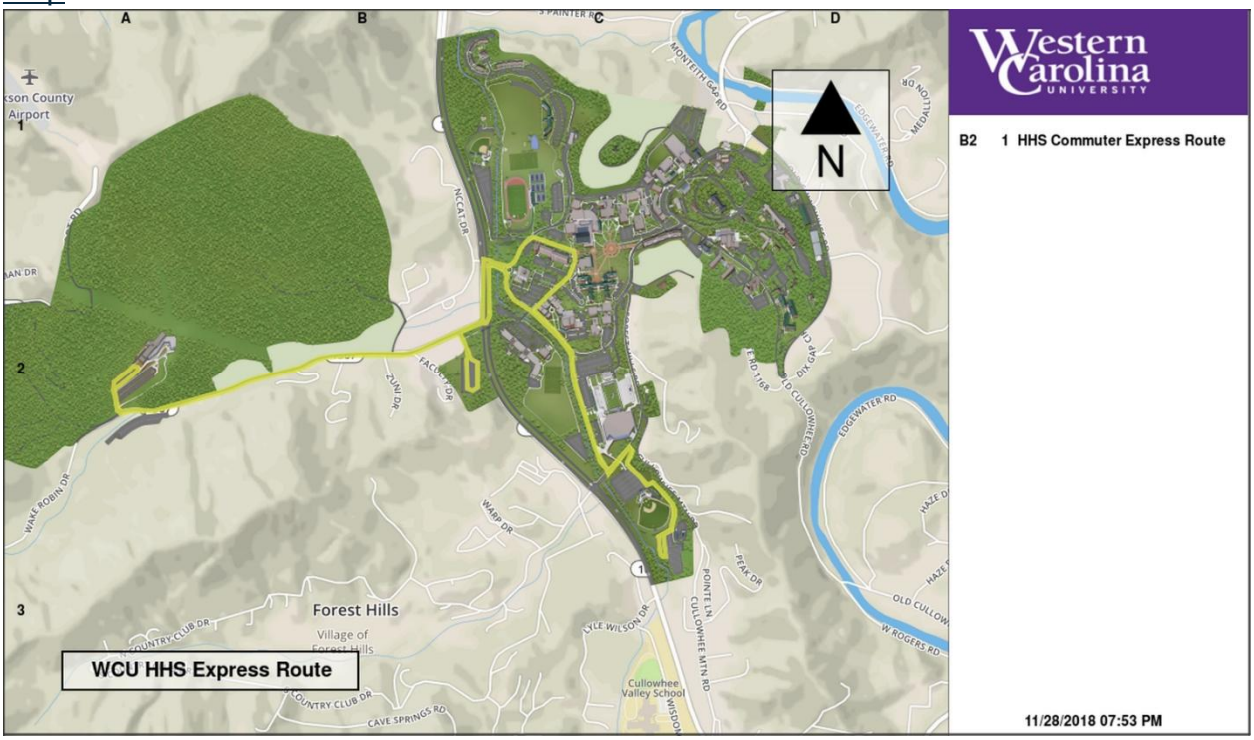
The Olli autonomous shuttle will be an invaluable addition to the CAT-TRAN shuttle service at WCU. It will enable extended hours of service during nights and weekends when the human-driven shuttles are out of service. It will be especially transformative in serving the commuter parking lots, the remote Health and Human Sciences Building, and off-campus housing located nearby. Bringing such innovative technology to this small rural university will be truly transformative for the community, spurring creativity and innovation.

Partners

Partners in this use case include:

- The Southwestern Commission's Southwestern Rural Planning Organization: www.regiona.org/transportation
- Western Carolina University's CAT-TRAN: www.wcu.edu/discover/campus-services-and-operations/parking-and-transportation/cat-tran/
- Jackson County Transit: www.jacksoncountytransit.com

Map



Conclusion

In total, eight organizations across North Carolina submitted use cases to Local Motors. Six of the use cases were for universities or a partnership between a university and a municipality for which the university is located. Only two were independent of a school. The use cases provided compelling accounts on how the shuttle would benefit their areas. It is hopeful Local Motors will use this information as reasoning to bring the Fleet Challenge to North Carolina.

Appendix: Opted-Out Agencies

The following have opted not submit a use case for Olli. However, each are interested in other opportunities should they arise.

- Ocracoke/Hatteras/Hyde County
- Eastern Carolina Council/City of Beaufort
- Onslow County