Huntsville

Proving Grounds Proposal

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CRP

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Huntsville, AL is the ideal DOT Autonomous Vehicle Proving Ground

Project Description

The City of Huntsville, the Chamber of Commerce of Huntsville-Madison County, and the University of Alabama in Huntsville (UAH) will partner with Local Motors, an autonomous vehicle (AV) manufacturer in Knoxville, TN, to pilot the use of OLLI AVs for public transportation in Cummings Research Park (CRP) in Huntsville, AL.

The designation as a DOT Autonomous Vehicle Proving Ground will allow the City, Chamber, UAH, and CRP to share safety plans and safety data related to this pilot project with a DOT Community of Practice. This exchange of policies, best practices, and procedures for safety in AV roll out will enhance the pilot project, the region, and the DOT's efforts to create broadly applicable AV safety guidelines.

Eligibility

As the nation's second largest research park, Cummings Research Park (CRP) has 300 companies, 29,000 employees and more than 11,500 students working, playing and living in CRP in Huntsville, Alabama.

CRP is an eligible site for designation as an Autonomous Vehicle Proving Ground. Among the entities listed in the DOT's Solicitation of Proposals, CRP operates as both a 'city urban core' and a 'corporate campus.'

CRP is an ideal site for an Autonomous Vehicle Proving Ground because CRP is making the impossible possible from the very beginning. One of the first challenges that CRP faced was to put man into outer space. Thanks to Huntsville engineers, the United States won the Space Race and the Saturn V rocket, developed here in Huntsville, put man on the moon. Now, the 3,843-acre park is home to more than 300 biotech, defense, and cyber security companies. They are helping solve some of the world's hardest problems such as diagnosing rare diseases, bringing a Quadcopter to life through modeling and simulation, or protecting companies and citizens alike from outside cyber threats.

Advancing autonomous driving technology is another problem that CRP is willing to solve. Companies that want to deploy automated vehicle technology have the ability to secure high-bay space for vehicle storage and testing, use the existing road infrastructure throughout the park for

tests of any distance and to collaborate with existing companies and universities to help advance their technology.

Project History

The City of Huntsville is conducting a comprehensive planning effort called The BIG Picture. This roadmap for Huntsville's future includes upgrades to quality of life, land use, transportation infrastructure, public health, and economic development. Public transportation is a focus area of the BIG Picture, due to public demand and the nature of Huntsville's geography.

The City of Huntsville is a sprawling city. Our land area of 214 square miles is bigger than Atlanta, GA; Denver, CO; Las Vegas, NV; or even Philadelphia, PA. The City of Huntsville's population, just under 200,000, is considerably less than these major metropolises. Huntsville is currently growing in population faster than any other major city in Alabama. Urban sprawl presents a transportation challenge for Huntsville's residents. There are few ways to get around besides relying on a personal vehicle.

The BIG Picture works closely with community partners like the Huntsville-Madison County Chamber of Commerce to generate long-term plans to attract and accommodate future Huntsville residents. The BIG Picture complements several area-specific plans, such as the CRP Master Plan, developed by the Chamber of Commerce.

Over the last five years, our community and CRP have witnessed a shift in lifestyle and transportation amenities that prospective companies were considering in communities where they chose to grow or to locate. Employees at these companies were making job decisions based on those amenities surrounding their potential employer locations as well.

These shifts, coupled with growth in several technology clusters in CRP, led the Chamber to develop a 60-year comprehensive master plan this year that serves to activate CRP's 3,843 acres by connecting companies, employees and students within the Park; to programmed work, live, play areas; and to surrounding areas like Downtown and Redstone Arsenal.

In developing the new comprehensive master plan for CRP, the Chamber and the City conducted 36 public outreach events and activities from 2015-2016. Through these outreach events, the Chamber and the City collected more than 64 different feedback topics. On online and mobile platforms, the master plan and design guidelines were viewed 7,228 times and had 25,654 impressions, and the master plan also produced 23 news stories.

The greatest change in our Park will be in our physical infrastructure-to transition the Park from primarily vehicle-focused to multi-modal transportation options. This transition will also include the incorporation of public transit in CRP.

Discussions with Local Motors representatives presented an exciting opportunity to provide unique, futuristic, innovative transportation options to CRP. The Olli autonomous vehicles fit the

character of the Rocket City's engineering heart in CRP. The use of these vehicles will respond to transportation problems stated by businesses, students, and employees of the park:

- The need for an internal bus system running through the Park;
- Parking concerns all throughout the park;
- Not enough time to drive out of the park to get lunch over their lunch hours;
- Inefficient time spent traveling from campus to campus within the park;

Of course, any project introducing new transportation options for the public must deeply consider public safety as a priority in its implementation.

Mandatory Criteria

It is the opinion of all parties involved in this pilot program that no one entity can serve the function of "Safety" for our AV Proving Ground. The scope of safety concerns in relationship to this pilot project is far too vast for a single law enforcement officer, city planner, traffic engineer, university professor, or public transit official to take on singular responsibility.

As such, for the purposes of this AV pilot program, the City of Huntsville, Chamber of Commerce, and the University of Alabama in Huntsville will assemble a Proving Ground Safety Team. Members of the Safety Team will include representatives from City of Huntsville departments of:

- Legal
- Huntsville Police Department (HPD)
- Parking & Public Transit
- Traffic Engineering
- Urban Development & Planning

The Chamber of Commerce of Huntsville-Madison County and a representative from the CRP Board will conduct these meetings. Representatives from UAH and Local Motors will also sit in on these meetings, as necessary, to keep abreast of the safety issues and policies related to the pilot project.

This holistic approach to safety planning and implementation will see that all legal, physical, technical, and social aspects of safety are considered during our AV pilot program at our DOT designated AV Proving Ground.

The Proving Ground Safety Team will be responsible for maintaining a safety management plan, in partnership with University of Alabama in Huntsville's AV research team and the Local Motors liaison to the City of Huntsville. This new, unique document will draw on the City of Huntsville's Department of Parking and Public Transit safety procedures for the city's fixed

route public transit system as well as HPD traffic safety measures and Local Motors' OLLI vehicle safety features to create a plan specific to the safety of our pilot program in CRP.

The Parking and Public Transit Department will provide a staff member to function as the Dedicated Safety Officer for the DOT Proving Ground and attend quarterly Safety Officer meetings with the DOT Community of Practice's other Safety Officers. This staff member is John Autry, Public Transit Manager, 256-427-6826, John.Autry@huntsvilleal.gov. While this Dedicated Safety Officer does not possess vehicle safety expertise, specifically, he will be responsible for reporting the status of the Proving Ground Safety Team's efforts, their safety management plan, lessons learned, and other safety topics to the DOT Community of Practice. If the DOT's required functions of the Safety Officer move beyond a liaison role into more technical territory, the Proving Ground Safety Team will communicate with DOT and the Community of Practice about appointing a Safety Officer with the needed specific knowledge base, as necessary.

The Proving Ground Safety Team will support the Safety Officer in providing detailed safety data to the DOT. The University of Alabama in Huntsville (UAH) is committed to safety data generation and publication as well, (see UAH letter of support).

Additionally, safety is a primary concern of our private sector partner Local Motors. The Olli AV has the following "triple redundant" safety features:

- Lidar, cameras, and proximity sensors to see and navigate its environment
- Tied to an IOT system (i.e. Watson, Alexa) that monitors traffic, route, and customer interface via video and audio
- Live monitoring of Olli via off-site service

Local Motors is committed to safety as part of their autonomous vehicle business plan. Their work with other roll-outs of Olli AVs has included rigorous public safety measures and data collection.

For the pilot project of Olli AV implementation in CRP, Local Motors has a dedicated staff member to liaison with the City and CRP on safety planning, safety practices, and the dissemination of safety data to the public. This staff member will work closely with our Dedicated Safety Officer to provide information to the DOT's Community of Practice.

Proposed Contributions

The City of Huntsville will partner with Local Motors to pilot an automated vehicle program in CRP, specifically for Olli mini-bus vehicles. Running these vehicles on call in CRP will generate data about trips, riders, hazards, lessons learned, and safety issues encountered. This information

can be presented in user-friendly format by the City of Huntsville Geographic Information Systems Department (GIS).

Huntsville's GIS capabilities in public data sharing and visualization of complex data sets via mapping software are widely praised. In 2008, Mayor Battle introduced a series of economic development initiatives to expand the city's primarily DOD contracting economy. One of these was Geo Huntsville, to promote Huntsville's unique capacity for geospatial technologies.

Cummings Research Park has existing infrastructure to replicate multiple environments for autonomous transportation testing. In several areas in CRP West, companies and organization are able to mimic rural settings by using greenfield sites that are located along a portion of Explorer Boulevard with low-level traffic volume. In CRP East, more dense environments exist that could replicate suburban and urban settings. Also located in CRP East is the University of Alabama in Huntsville. UAH's 3 mile densely-populated campus with more than 8,500 students could potentially be used for testing autonomous vehicles on a university campus as well. The Chamber of Commerce has already approached several companies that are potentially willing to offer their private roads for test tracks as well.

By understanding the need for high-speed internet services for large data transfers, the City of Huntsville and Huntsville Utilities are in the process of laying out a fiber network throughout Huntsville. The City of Huntsville recently announced a partnership with Google Fiber to provide gigabit service to residential and small business users. Google Fiber will begin providing service in 2017 and will be complete by 2020. Other gigabit service providers in Huntsville include Comcast, AT&T, and Southern Light Fiber. These providers will be available to companies looking to conduct AV research.

The initiative works to bring awareness to the professional expertise that exists in the area, identify job opportunities that continue to build the economic base, and ultimately establish the Huntsville region as a major corridor for geospatial excellence. The collaborative body of Geo Huntsville and the Huntsville GIS department will create meaningful data experiences for the public related to the AV pilot project in CRP.

Also in 2008, Mayor Battle began a Cyber Huntsville economic initiative to build the cyber security industry in Huntsville. Cyber security and hacking pose concerns for many people in relationship to the safety of autonomous vehicles. With eight years of investment, Huntsville is the premier location in the United States and the world for cyber security research and development. This initiative began with the first annual Cyber Huntsville Symposium in 2008 and continues today. Recently, representatives from the University of Hawaii were in town to learn more about the cyber security education program developed in our K-12 schools and its interaction with UAH and community colleges in the area. During the visit, Mayor Battle said: "Huntsville's landmark efforts in cyber security – from Cyber Huntsville to our summits and academic programs – have garnered national attention. … today Huntsville has one of the most

active cyber programs in the world. We've become the model for others to follow." As such, cyber security experts will be asked to weigh in on the safety of Local Motors' Olli autonomous vehicles in CRP during our pilot project.

The Tennessee Valley Authority (TVA) provides electricity for business customers and local power distributors in parts of seven southeastern states. TVA partners with Huntsville Utilities to provide low-cost, sustainable power to the area's customers. Recently, TVA designated the City of Huntsville with the Platinum designation in its Valley Sustainable Communities Program. The Platinum designation is the highest level designation that a community can receive. In addition to providing power, TVA also has an Economic Development division, which focuses on growing the employment within the region. TVA partners with the City of Huntsville and the Chamber of Commerce of assist companies that are locating or expanding operations in Huntsville. These services could be available to companies conducting AV research. TVA will also contribute to help conduct marketing efforts to bring companies involved with autonomous transportation to Huntsville.

Reports and data on cyber security with relationship to the Olli vehicles will be made available to the DOT Community of Practice and the public by our partners in CRP, as well as our city's Safety Team for the AV Proving Ground project.

Commitment to Safety

The City of Huntsville and the Chamber of Commerce of Huntsville-Madison County are committed to safety in relationship to our AV pilot project in CRP. The Dedicated Safety Officer discussed above is a member of a Proving Ground Safety Team that will meet quarterly in relationship to our AV pilot project in CRP. Members of the Safety Team include representatives from City of Huntsville departments of Legal, Parking & Public Transit, Traffic Engineering, Planning, and the Huntsville Police Department (HPD). A representative from UAH and Chamber of Commerce will also sit in on these meetings, to keep abreast of the safety issues and policies related to the pilot project.

Additionally, Local Motors (LM) implements a series of "triple redundant" safety features on their Olli vehicles. Brad Rutherford, with the LM Micro Factory in Knoxville, TN says this of triple redundancy:

> "It uses Lidar and cameras and proximity sensors to allow it to see and navigate its environment. It is also tied to an IOT system ie(Watson, Alexia) that monitors traffic, route, and customer interface via video and audio. The final layer is the live monitoring of Olli via off site service to make sure it is doing what it is supposed to do. We have also installed several safety stop switches inside Olli for emergencies. Olli is a low speed shuttle that will not exceed 25 M.P.H. To further enhance Olli we are working with several companies to tie Olli to local traffic

> infrastructure to allow for even better monitoring and optimization. It is also important to understand that we will work very closely with the local site manager for the first few months to ensure it is preforming well. We also have in our model to include a ride steward to be on board Olli for the first few months to ensure safety. Local Motors is committed to ensure the safety of general public as we head down the path of autonomous vehicle integration."

All aspects of safety in relationship to the pilot project including legal, traffic, social, and engineering safety will be addressed by the Proving Ground Safety Team. Results and all data associated with the pilot project will be shared with the DOT's Community of Practice and the public. The University of Alabama in Huntsville will contribute to the Proving Ground's research, data, and publication sharing.

Research Application and Data Sharing

Huntsville is home to five major institutes of higher education. The University of Alabama in Huntsville (UAH) is part of the Cummings Research Park campus. UAH was originally conceived by Werner Von Braun as an engineering institute and a feeder college from which the many high tech companies in CRP and on Redstone Arsenal might draw employees. Today, UAH has lived up to and exceeded that potential. UAH is a research-intensive, internationally recognized technological university serving Alabama and beyond. Its mission is to explore, discover, create, and communicate knowledge, while educating individuals in leadership, innovation, critical thinking, and civic responsibility and inspiring a passion for learning. As a Tier 1 national university, UAH is home to more than a dozen research centers and labs – not to mention the recipient of hundreds of millions of dollars in grants and contracts. UAH has a great deal of experience in recruiting the best and brightest faculty and students from around the globe to Huntsville, which has been recognized by *Forbes* (2013) as "One of the World's Ten Smartest Cities" and *USA Today* (2013) as "One of Ten Great Places to be Inspired by Innovation."

As a part of the DOT Autonomous Vehicle Proving Ground, UAH will participate in research, data sharing, and experimentation related to the operations and safety of Local Motors' Olli vehicles; see attached letter from UAH. Dr. Fahimi, in UAH's Mechanical Engineering Department, has committed to engage in this project and share data with the public and the DOT's Community of Practice. As a tier 1 research university, UAH faculty routinely share their research results through a variety of publications, national level conferences, and state-wide venues. The State of Alabama Science and Technology Roadmap (see http://alepscor.org/wp-content/uploads/2016/07/AESSTR_Final.pdf) presents the research capabilities of each of the research institutions within the State. UAH participates in numerous meetings with this group to share, coordinate, and partner on research projects. One of the State-wide priorities listed is the area of Transportation, which is a research interest across the state. Supported research priorities

include advanced manufacturing, energy, metal and advanced materials, plasma science and Information Technology.

The Chamber of Commerce of Huntsville-Madison County has also discussed research and data sharing support with several high-tech firms located in CRP. Many are interested in the ability to conduct testing on private roads on company campuses for testing. These pre-test private roads can be preliminary local proving grounds before the public roads in CRP are opened as the DOT's designated AV Proving Ground.

The Chamber will assist any company looking to do AV research as part of this pilot program in the DOT Proving Ground. These services include building and site selection, workforce recruitment, development partnerships with regional companies and education systems, relocation assistance for individuals moving to the area, marketing efforts, identifying business assistance for start-up operations, and more. The Chamber has a proven track record with working with companies, and is willing to partner with new companies through this effort.

Demonstrated Investments

The City, Chamber, and Local Motors have already made investments in this project. The City of Huntsville's Capital Improvement plan (see Budget and Capital Improvement Plan Attachment) includes $19.5 million dollars of investment in the CRP Master Plan for fiscal years 2017-2026. A portion of the funds designated for the CRP Master Plan will be used for transportation infrastructure upgrades throughout CRP. Within the master plan, there are several projects that have been identified as priority projects over the next five years, and the infrastructure upgrades will be included under this designation. The AV pilot program will be included in these infrastructure upgrades.

Erin Koshut, Cummings Research Park Director, and Will West, Economic Development Project Manager with the Huntsville/Madison County Chamber of Commerce, are committed to this project, and are willing to provide the necessary services for companies and organizations that are looking to conduct AV research within CRP.

The County Chamber of Commerce of Huntsville-Madison County is committed to the advancement of Cummings Research Park (CRP). The Chamber and the City conducted 36 public outreach events and activities from 2015-2016. Through these outreach events, the Chamber and the City collected more than 64 different feedback topics. On online and mobile platforms, the master plan and design guidelines were viewed 7,228 times and had 25,654 impressions, and the master plan also produced 23 news stories. One response was loud and clear: more transportation options at CRP. The OLLI vehicles produced by Local Motors may help to fill this need.

Local Motors is committed to this project in that the company is always looking to expand the autonomous vehicle market in the United States. Every opportunity to pilot their product in a new host community takes the US one step closer to an autonomous vehicle future and the vast expansion of demand for Local Motors' products.

Readiness

The DOT Autonomous Vehicle Proving Ground opportunity comes at the perfect time for the City of Huntsville. The city's first comprehensive planning effort in over 50 years, The BIG Picture, is revamping the Rocket City from the ground up. The BIG Picture is a planning effort that starts with the public.

The BIG Picture team developed core principles based on nearly two years of public input. The third of these principles states the city's goal to "Design a mobile and accessible transportation network." Transportation options are at the top of The BIG Picture's idea platform www.ImagineHuntsville.com where citizens submit ideas for Huntsville's future and vote on one another's ideas.

Transportation options are needed by many of Huntsville's residents. In fact, a diverse transportation network was listed in the United Way of Madison County's Community Needs Assessment of 2014 as the number one need among residents who are dependent on non-profit or faith-based services and public aid; above food, healthcare, shelter, and education. Without transportation to get to and from work, these other needs become moot.

The Rocket City is known for innovative missions, like building the first rocket to send a man to the moon. Huntsville has the highest number of advanced degrees per capita in the south east; a very well educated city.

As for legal readiness and authority to implement the AV pilot project, the city is aware of a gray area that pertains to AV legislation. The City of Huntsville currently does not have any local ordinances that would prevent the testing of autonomous vehicles on its roads. The City further commits that it will not adopt any ordinances that would prevent the operations of autonomous vehicles on its roads. However, the state of Alabama is still in the investigation stage of adopting autonomous vehicle policy. A Joint Legislative Committee to Study Self-Driving Vehicles was established by the Alabama Legislature in May, 2016. This committee shall report its findings and any proposed legislation not later than the tenth day of the 2017 Regular Session.

The Huntsville Legal Department intends to work with state legislators to ensure this Proving Ground operates with full authority under the law. This will be completed by the first quarter of 2018 when the Proving Ground will open and begin the Local Motors Olli pilot project in CRP.

Adherence to Laws, Regulations and Federal Policy

The Legal Department of the City of Huntsville is a member of our Proving Ground Safety Team for good reason. The gray area of legal authority described above will need to be resolved in 2017, so a designated DOT Proving Ground can begin functioning in CRP in January, 2018, as specified in the DOT request for proposals. The City of Huntsville's policy statement in relationship to this AV pilot project in CRP is as follows:

> "The City of Huntsville recognizes the transformative power that autonomous vehicles will have on transportation networks. The City further recognizes the prevailing trends in the automotive industry to develop, test, and field autonomous vehicles and that these testing operations will be important to this technology achieving critical milestones and, most importantly, proving this technology to be safe.
>
> The City of Huntsville currently does not have any local ordinances that would prevent the testing of autonomous vehicles on its roads. The City further commits that it will not adopt any ordinances that would prevent the operations of autonomous vehicles on its roads.
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> The use of autonomous vehicles in public spaces is something the City of Huntsville is accustomed to. It is quite common to see the testing of autonomous aerial vehicles operating in public spaces as part of the research conducted by the University of Alabama in Huntsville, which is part of FAA Unmanned Aerial System Center of Excellence.
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> The City of Huntsville recognizes and welcomes the use of unmanned aerial systems in the public space and is equally enthusiastic about autonomous vehicles and the promise that they can bring."

The Huntsville metropolitan area, including Madison County, the City of Madison, two small towns and a swath of land in Limestone County, is a designated Federal Highway Administration (FHWA) Transportation Management Area (TMA). As such, the City of Huntsville is the primary urban member of the Huntsville-Area Metropolitan Planning Organization (MPO). Accordingly, Huntsville is well versed in complying with FHWA and Federal Transit Authority (FTA) regulations, laws, and policies pertaining to public roads.

Local Motors, the manufacturer of OLLI vehicles to be tested on public roads in CRP, is well versed in federal regulations related to AVs. Attached is a letter from Local Motors to the National Highway Traffic Safety Administration (NHTSA) in relationship to the September 2016 "Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety." Per this letter, the pilot program for the proposed DOT designated AV Proving Ground in Huntsville, AL adheres to the primary subject areas outlined in NHTSA policy.

Why Huntsville is an ideal Autonomous Vehicle Proving Ground

As mentioned earlier in the document, CRP and Huntsville are known for solving complex problems to better the life of the community, the nation, and the world. Constantly looking on the horizon, community leaders understand that investing early benefits great results. For

example, the community is currently conducting a study on our airport runway to see if it can support the landing of a Sierra Nevada Dreamchaser space shuttle. Huntsville is the only community that is currently working with Sierra Nevada to get this study complete. If successful, Huntsville could be the leader in commercial space and science. Another example is the leadership from Mayor Battle on initiatives such as CyberHuntsville, GEO Huntsville, and Energy Huntsville, which were in response to the community and industry needs in Huntsville. Through these efforts, Huntsville is a leader in cybersecurity and energy efforts. Looking ahead is why CRP just completed its master plan process so the park can be successful over the next 40 to 60 years. Receiving the Proving Ground Designation would be another step forward to the future, and this designation fits the identity of Huntsville. Huntsville has transformed the world by sending man to the moon so autonomous transportation is our next frontier.