milo: autonomous shuttle program
• Program Basics
• Routes
• Vehicle Specifications
• Procurement and Project Timing
• Insurance
• Deployment Environment
• Resource Considerations
• Maintenance Considerations
• Operations Considerations
• Milo is the first autonomous shuttle offered by a municipal government to the public on a continuous basis

• Two main goals – testing the technology in a real world environment and public education on autonomous vehicles

• Project partners include the City of Arlington, the Arlington Convention and Visitors’ Bureau, EasyMile, and First Transit
• Milo operates before and after major events at Globe Life Park and AT&T Stadium in Arlington’s Entertainment District

• Milo operates solely on an off-street trail that is 10’ wide, with no other vehicular traffic

• Milo does interact with pedestrians and bicyclists on the trail

• Pilot project is based on a 6 month lease with a 6 month renewal option

• Milo operates with a certified, trained operator on board at all times
• Vehicles are approximately 7’ X 12’ X 9’

• 220V power source or 110V with transformer required
• EasyMile visited Arlington in February 2017 for a public demonstration

• City pursued a sole-source procurement with EasyMile based on their provision of a wheelchair ramp

• City Council approved a 6-month lease for two vehicles with EasyMile in March 2017

• Vehicles arrived in May 2017

• Vehicle set-up, route mapping, and staff training occurred June-August 2017

• Service launched late August 2017
• Securing the correct types of insurance was one of the biggest challenges for the project

• Vehicles are insured with General Liability & Auto Liability policies carried by EasyMile

• Operations are insured with Auto Liability, General Liability, and Workers’ Compensation policies carried by First Transit
Costs not included in the vehicle lease:

- NRTK subscription (satellite-based localization)
- Vehicle wrap
- Data plan
- SIM cards
- Mowing and landscaping issues
- Pavement additions
- Towing & transport
- 3rd party operators & maintenance
- Voltage transformers
- Additional training
- Signage and brochures
• Vehicles took about 5 days to wrap due to non-standard shape & size

• Site assessment and physical adjustments caused delays

• Vehicle set-up and localization issues caused delays (faulty LIDAR, physical environment)

• Route mapping, staff training, and trajectory fine-tuning is very time-intensive

• Staff time spent on project greatly exceeded expectations
• The deployment environment is the most critical element to a successful program

• EasyMile vehicles are very sensitive to their environments

• Space requirements:
  • At least 10’ width of pathway
  • Minimum clearance of 18” from lower safety lasers – free of obstacles and landscaping
  • Height clearance of 11’

• Localization considerations:
  • Few if any underpasses
  • Minimize sharp turns
  • Regular stationary vertical elements
  • Low level of tree cover
• EasyMile conducts a Site Assessment Report for each project location and recommends alterations to the environment

• Very important to implement these recommendations for a successful deployment

• Arlington examples:
  • Addition of large rocks to assist with safety
  • Addition of birdhouses to provide stationary vertical elements for localization
  • Frequent maintenance of landscaping next to trail – cannot allow grass/shrubs to get too high
Other Alterations to Physical Environment:

• Installation of signage and concrete decals to mark station locations and warn pedestrians and bicyclists of Milo operation on the trail

• Additional concrete poured to add to trail, to create station pads, and to create a vehicle passing area

• Pathway underneath a roadway bridge had to be lowered 1 foot
• Storage – covered space and electricity access

• Cleaning – plan for spills, bodily fluids, blood-borne pathogens, exterior cleaning is a challenge

• Repairs and maintenance – often requires specialized parts and knowledge

• Maintenance expertise not currently readily available in United States

• Transport – must be loaded onto a flatbed tow truck or special trailer; requires trained operator and is expensive
• The City, through the CVB, elected to contract out operations to First Transit

• Milo must have a trained operator on board at all times to monitor possible obstacles and technical issues, and provide customer service

• Specialized training required – training is expensive and takes time

• These are hourly wage positions and tend to have high turnover

• Technical and customer service skills very important
• Public safety plan – make fire and police aware of operations and basic functions of vehicle

• Establish numbers to call for maintenance & emergencies

• Plan for two way communications between operators and chief operator

• Operating two vehicles in platooning or passing mode (both operating on same trail) requires 3 people – one chief operator and two operators
AT&T Stadium & Globe Life Park Event Service:

- 30 events since August 26

Public Demonstration Rides:
- 9 demos from August to January

Group Demonstration Rides:
- 7 demos from September to December

Special Events:
- 3 community events in October & November

Total Ridership: over 740
I enjoyed riding Milo.

I would ride Milo again.

I felt safe riding Milo.

I support AV technology.

n = 168
Phase 2 Testing

• Hope to test AVs in an on-street environment in Arlington

• Currently exploring available technology, vehicle options, and locations

• Potential to access up to $350,000 in CMAQ funding for on-street testing