Amazon video_FAV_sb 874

Uploaded by: Boston, Frank

Position: FAV


prime

Amazon FAV SB874

Uploaded by: Massey, Jennie
Position: FAV

Testimony from Amazon in Support of Senate Bill 874 before the Maryland Judicial Proceedings Committee
February 27, 2020

Thank you Chairman Smith, Senator Feldman and members of the committee for the opportunity to participate in today's hearing. My name is Jennie Massey and I lead state and local public policy at Amazon. I am excited to join you today in support of Amazon Scout, our personal delivery device.

Amazon is proud of its growth in Maryland. In fact, we have invested over $3B in our people and operations since 2010. We have over 7,000 full-time employees (and growing) including employees at fulfillment and sortation centers across the state.

That is why I am excited to be here today to support Senate Bill 874 which creates a Personal Delivery Device statute allowing devices like Amazon Scout to operate in Maryland.

Amazon launched Scout – a fully electric, autonomous delivery system in January 2019. Our device is the size of a cooler that you would bring to the beach, and operates at about the same speed as the average person walks.

Scout is 100% electric and is helping Amazon drive towards our goal of reducing greenhouse gas emissions.

Safety is Amazon's top priority, and Scout has been designed for safety and accessibility. Scout is able to stop, or safely navigate around pedestrians, pets, and obstacles. Scout will provide visual and audio cues to alert people sharing the sidewalk of its presence. Scout will also instantly stop if something crosses in front of it.

Scout is currently operating in two markets in Washington and California. In our current operating areas, customers and neighbors (and local pets!) are at first curious about Scout, but, we've seen that the device quickly becomes a normal part of the neighborhood.

We are starting in a suburban areas but hope to expand to additional areas in the future. Suburban sidewalks are some of the least utilized infrastructure in certain regions, and this is a safe, innovative, and environmentally friendly last-mile delivery option.

We are excited that other states are considering similar legislation. Virginia recently passed personal delivery device legislation in both the House and Senate.

Thank you for the opportunity to share more information about Scout and I ask for your support of Senate Bill 874.

https://www.youtube.com/watch?v=peaKnkNX4vc

FedEx_FWA_SB874
Uploaded by: Pauchnik, Scott
Position: FWA

Roxo™ the FedEx SameDay Bot

OVERVIEW

In February 2019, FedEx unveiled a prototype of the FedEx SameDay Bot - an autonomous delivery device representing the latest evolution in ongoing FedEx innovation. Designed in response to the rapid growth of e-commerce, the complexities and expense of last mile delivery, and our commitment to environmental sustainability and public safety, the bot's purpose is to travel at moderate speeds on sidewalks and along roadsides to deliver smaller shipments safely to customers at their homes and businesses.

In collaboration with world-renowned inventor Dean Kamen, this effort brings together the extraordinary technological expertise of DEKA Research & Development Corp. and the 45 years of global logistics and innovation expertise of FedEx. The bot is expected to be an important piece of the FedEx ecosystem and serves as the most recent demonstration of FedEx's higher goal—to connect people and possibilities around the world.

FAST FACTS & KEY DIFFERENTIATORS

The FedEx SameDay Bot is being designed to include many features to help customers while performing safe and reliable deliveries, including:

- A mobile base with more than 10 million hours of reliable, real-world operation reported
- Capable of operating on both sidewalks and along roadsides
- Maintaining stability while negotiating curbs, unpaved surfaces, tight turns, even short flights of terrace/ deep steps to front porches
- Gyroscopic technology maintains level cargo level
- Capable of operation in inclement weather conditions
- Zero-emission, battery powered
- Bot Dimensions: 39L x 29W x 51.50H
- The bot weighs approximately 450 lbs. with a 100 lbs. payload capacity
- Sophisticated set of sensors and technologies to keep pedestrians and surrounding vehicles safe
- Advanced machine learning algorithms to help detect and avoid obstacles, plot a safe path, and follow road and safety rules

- Turn signals, lights and a signaling screen to clearly communicate its intent to pedestrians, cyclists and vehicles around it
- Taller profile for visibility to pedestrians, children, animals and drivers
- The bot can travel about 8 miles round trip on a full charge; distance may increase based on ongoing testing and development
- Remotely monitored at all times with the capability of being remotely operated

Key Differentiators:

The FedEx SameDay Bot is intended as an industry disruptor - combining the extraordinary logistics expertise of FedEx with the world-renowned innovation of DEKA to deliver the next evolution for e-commerce: autonomous same day delivery.

- The bot is designed to take advantage of existing capabilities from FedEx including:
  - Courier routing capabilities
  - FedEx SameDay City service
- DEKA is known for inventing life-changing products
  - Wearable infusion pumps
  - In-home dialysis systems
  - Prosthetic limbs
  - iBot ™ Personal Mobility System
  - Segway®
- The bot base is derived from the iBot wheelchair base originally designed to provide mobility and dignity to paraplegic veterans, which DEKA reports has already undergone 10 million hours of reliable, real-world operation.

FedEx is working alongside major national retailers to determine the needs of different customers with many types of products to deliver.

- An auto parts store is a business-to-business example where many of their top customers are auto repair shops near their individual stores. For them, this technology is an opportunity to quickly deliver needed parts to these auto repair shops.
- A restaurant is looking at the bot as an option for deliveries, such as hot pizza, from its restaurants.
- General merchandise stores are exploring opportunities to deliver items from its stores to customers nearby the same day.
- A home improvement is considering ways to dispatch material to a nearby contractor in needs of supplies quickly.

- Grocers are interested in different ways to quickly fulfill curbside delivery of food items to customers that are on the go.

Long term, this innovation could help make mobility more accessible for people with disabilities.

- Production of the Bot could lead to lower production costs for the iBOT wheelchair technology potentially making it more accessible for those who need it for their own mobility.
- It is a further example of how FedEx works to connect people and possibilities.

HEADLINES & MESSAGING

The FedEx SameDay Bot is designed to change the face of same day service and last-mile delivery.

- FedEx has long offered FedEx SameDay City local delivery in select markets around the United States.
- The FedEx SameDay Bot represents a new opportunity to grow this offering.
- The FedEx SameDay Bot would help address challenges associated with last mile delivery.
    - Example: Logistics through autonomous devices can reduce the number of vehicles on the road and ease traffic congestion. Instead of using a full-size vehicle, the smaller FedEx bot can be used to more efficiently deliver smaller payloads such as pizzas and other on-demand merchandise.
- With the growth of e-commerce, we're always looking for new innovative ways to deliver goods ordered online with the same reliability you know and expect from FedEx. Last-mile delivery is a critical piece of the portfolio with important considerations.
    - Business-to-consumer commerce and residential deliveries are increase volume, but can be hard on costs
    - These deliveries require more time, fuel and miles driven between stops, only allowing delivery of fewer pieces per stop than with business-to-business
- We constantly test and develop solutions to meet growing customer needs in an ever-changing marketplace.
    - As e-commerce continues to grow, consumers want:
        - Convenience
        - Visibility and control of their package deliveries
        - Fast shipping options to match the way they shop
        - Safety and security of their packages
    - FedEx continues to address these demands with customized solutions:
        - FedEx Delivery Manager

        - FedEx Hold at Location and FedEx Onsite
        - FedEx anticipates that more than 90 percent of Americans will live within five miles of a FedEx hold location by the end of 2020.
        - FedEx Cross Border provides shoppers and merchants with efficient and seamless ways to conduct international transactions.
- Ongoing investments in network capacity, automation and technology have helped FedEx build an extraordinarily flexible and responsive network.

The FedEx SameDay Bot represents the next evolution in how outstanding service can be delivered, based on an existing logistics ecosystem 45 years in the making.

- FedEx is looking to deliver on the customer expectations of visibility, convenience and speed with the FedEx SameDay Bot and answer the call for innovation mandated by the rise in business-to-consumer shipping.
- We are drawing on our existing expertise in logistics, dispatch, route mapping, safety, security, and customer service.
    - The technological development of the bot draws from a variety of internal FedEx innovations, including:
        - Route mapping capabilities
        - FedEx Delivery Manager
        - FedEx SameDay service
- We recognized a need within the industry.
    - FedEx is collaborating with master problem solvers at DEKA, who is helping to create this autonomous device.
    - The bot is a further enhancement of autonomous navigation with testing having occurred in Memphis, Plano, Frisco, and Manchester last summer. A further test is scheduled this summer involving deliveries between FedEx Office locations
        - Speed, range, and cargo hold are being designed to best meet a variety of same-day and last mile use cases.

Safety has always been the top priority for FedEx.

- The bot uses DEKA's established iBOT electric wheelchair base capable of negotiating rough terrain, traversing steps and steep inclines.
- DEKA reports that the iBOT mobility base has surpassed 10 million hours of reliable real-world operation.
- The FedEx SameDay Bot will be approximately double human weight at 450 lbs. Coupled with a moderate speed of movement, the bot is designed for safety in the event of a collision.
- The bot will use an array of redundant sensors to maintain 360-degree awareness of its surroundings when in motion.

- State-of-the-art onboard processors are being purpose-built for self-driving devices to give the bot the ever-improving artificial intelligence (AI) to understand its environment and location through its sensors, and choose the safest path or course of action.
- The bot remains connected to a remotely located 'control tower'. Remote operators will have the ability to intervene, see the surroundings through the bot's cameras, and take over control of the bot if needed. Operators can also communicate with people around the bot including first responders through a speaker and microphone.
- Unlike some smaller sidewalk robots, the FedEx bot's relatively tall profile makes it easily visible at eye-level to pedestrians, bicyclists and motorists.
- Turn signals, lights and a signaling screen can clearly communicate its intent to pedestrians, cyclists and vehicles around it.
- All of the bot's electronic and mechanical systems will meet the safety and integrity standards such as ISO, ASIL and SAE.

Innovation has been part of the FedEx DNA since day one, and it continues to be an integral part of the FedEx culture and business strategy.

- Our purpose is to connect people with possibilities, and we know technology helps us do that in a big way.

- FedEx has a legacy of firsts in our industry.
    - FedEx originated the first near real-time, package tracking because we knew that information about the package was as important as the package itself.
    - FedEx developed the first transportation related interactive website in 1994, allowing customers to track their own packages at home on **www.fedex.com.**
    - FedEx has incorporated predictive modeling, advanced mapping and artificial intelligence to improve forecasting, operations and customer service.
    - FedEx has integrated advanced automation, robotics and autonomous mobility devices into various operations to improve speed, efficiency, reliability and safety.
    - At FedEx, safe operations are top priority. We take seriously our responsibility to operate on our roads in the safest possible manner.
    - Autonomous technology continues to evolve, in part due to advanced driver assist technologies that are required for safety and in use today.
        - We support more testing and research to advance transportation technologies and regulations to improve safety and efficiency for all drivers.

    - On autonomous vehicles and devices, specifically, we think the technology is promising and may impact transportation in the future.
        - FedEx is a vocal advocate for modernizing technologies that enhance the next generation of transportation vehicles and devices.
        - We support new technologies and updated regulations that will improve safety and efficiency on our roads.
- As with the development of any autonomous vehicle and device, extensive testing of the FedEx SameDay Bot in both private and public environments will be conducted to generate enough data to 'train' the self-driving software, validate safe performance, and comply with all applicable safety regulations and guidelines.

FAQs

1. **What is special about the FedEx Bot?**

   The FedEx SameDay Bot combines the unique expertise of FedEx—the largest express transportation company in the world—with that of DEKA—one of the most prominent research and development firms of our time—using feedback from a stable of major national retailers.

2. **How much revenue do you expect this to generate?**

   We view this as a new market for FedEx with tremendous potential.

3. **How many bots do you have today? What are the plans for numbers of bots? How many, by when?**

   The bot is now a prototype. When testing is complete, we hope to produce these to fill the serve the needs created by local same day delivery needs

4. **How do the economics work? Does the customer pay FedEx for each shipment?**

   Service features are still being developed.

5. **If so, what are the expected prices in comparison to other forms of transportation?**

   Last mile delivery is one of the priciest and most complex parts of the delivery process. A key goal of this technology is to design it in such a way to reduce those costs and be a more cost-effective solution.

6. **Will there be any erosion from existing FedEx services?**

The FedEx SameDay Bot addresses a new market for FedEx, complementary to existing FedEx services and not as a replacement.

7. **What cities are participating in the test?**
Testing has already been conducted in Memphis, TN; Manchester, NH; Plano and Frisco, TX. Additional testing is scheduled to continue in both Memphis and Texas.

12. **Long term regulatory plan for a multi-city offering?**
We are working diligently with the regulatory authorities

13. **How is a shipment request/order placed?**
Service features are still being developed.

14. **What type of mapping is the bot using?**
The bot will make use of high definition mapping technology and routing applications already in use to map geographic areas for deliveries.

15. **Is this just point to point? Can the bot do multiple stops?**
The bot will begin with one point-to-point stop, but we will be exploring other opportunities.

16. **Battery...what kind of battery, what's the battery life? How/where will batteries be charged?**
The Bot will be zero-emission and we are exploring multiple options for the most efficient charging for the needs of the bot.

17. **What's the definition of success, and what are the next phases? How long until this is a commercial offering?**
This is true innovation. We are continuing to test this Spring and will move as quickly as reasonable to broader testing and commercial launch, while continuing to meet safety,
customer and regulatory needs.

18. **Where are these bots kept in the downtime? How are they maintained? Repaired? Are they secured at night?**
The current plan is for the bots to be maintained and repaired by FedEx, and secured when not out on a mission.

SAFETY

1. **How is the safety of pedestrians and others being addressed?**
   Safe operation is essential in the development of the bot. Unlike some smaller sidewalk robots, the FedEx SameDay Bot's relatively tall profile is designed to make it easily visible at eye level to pedestrians, bicyclists and motorists. Turn signals, lights and a signaling screen can communicate its intent to pedestrians, cyclists and vehicles around it. Remote operators can intervene, see the surroundings through the bot's cameras, and take over control of the bot if needed. Operators may also communicate with people around the bot including first responders through a speaker and microphone.

2. **What is the power source?**
   A zero-emission, environmentally-friendly battery.

3. **What work has been done with local authorities regarding the bot traveling on sidewalks or roads?**
   FedEx is working with local governments and regulatory agencies to address their requirements.

4. **How are you making the general population aware that they will see these in use? How to navigate around the bot?**
   The rollout will be a collaborative effort likely involving several channels and including FedEx and local city governments.

SECURITY

1. **How secure is the bot?**
   FedEx can connect to the bot at all times. We will know when it stops, starts and is providing service.

2. **Will these devices be vulnerable to criminal activity, such as theft of packages or the theft of an entire bot itself?**
   We will have full visibility of the bot when it is in operation. The bot will remain constantly connected to a remote 'control tower'. Remote operators can intervene, see the surroundings through the bot's cameras, and take over full driving control of the bot if needed. Operators can also communicate with people around the bot including first responders through a speaker and microphone.

3. **How are shipments secured inside the bot to avoid theft?**
   The device is being designed to have multiple layers of security measures and protocols in place to protect the device and its cargo. For security reasons, I can't share the specifics of those measures, but security is a priority in the development of the bot.

4. **How much and what kind of data will the bot be collecting throughout the delivery process? Will it include any personal customer data? Will the bot record footage of customers or their homes when it makes a delivery?**
   The bot is being designed to capture data and record footage necessary to safely complete deliveries. Data communication between bots and cloud ecosystems will use strong encryption to protect data integrity and privacy. Our data retention strategy is to store only what is necessary (e.g. future routing purposes, delivery status messages, proof of delivery, cargo security for claims or investigation support, etc.). Access to stored data will require authentication and authorization. We will comply with regulations, or in the absence of regulation, we will aim to comply with data security and privacy norms in the places we operate.
5. **How can we be sure that someone will not be able to hack the bot and perform rogue actions?**
   Because self-driving technology is still in fairly early stages, the full scope of autonomous device security risks is not yet understood. But as with any connected device, we know that we will need to be proactive about cyber security. FedEx and DEKA, will conduct development and testing with a safety and security-first mindset for all components of the Bot- including hardware, software and the methods and pathways of communication between the bot and our respective systems.
   The bot's sensors and the algorithms behind the sensors will be protected by multiple, complex communication layers with security. We are designing bot communications that can be authenticated, encrypted, and validated before they are acted upon by the bot. FedEx and DEKA will continually develop and test the bot control, communication and monitoring systems. Our approach to cybersecurity is informed by best practices from NIST's Cybersecurity Framework.

EMPLOYEE IMPACT

1. **Will FedEx bots eventually replace FedEx couriers or drivers?**
   - The bot is designed to deliver items such as pizzas, groceries and auto parts from the point of sale to a nearby home or business, in the same day. Those are not deliveries we normally make using FedEx Express and FedEx Ground. The purpose of our development and use of any autonomous device is to help supplement operational and service efficiency for our customers. In fact, we believe bots may create new jobs, such as high-tech machine experts, software developers, AV control tower and remote operators.
   - We believe that innovation will both improve existing jobs and create new career pathways. FedEx is working with other industry leaders to study the

impact of this, and other emerging technologies, on society and the American workforce to ensure the positive adoption of these innovations.

- The emphasis on the last mile delivery is a new business model for FedEx, and the SameDay Bot capabilities would supplement the services we already provide to our customers.

AMAZON SPECIFIC

1. **Was the bot developed because of Amazon Scout (or any other robot)?**
   No. We were already working on the FedEx Bot before the Scout was announced. We are constantly innovating at FedEx, and this is the next evolution for us. Innovation is part of the FedEx DNA and we are constantly looking at trends and the needs of our customers to determine new developments.

FEDEX_fwa_sb874
Uploaded by: Roddy, Pat
Position: FWA

SB 874 – FWA

Roxo™, the FedEx SameDay Bot, to Cover New Ground

Roxo, the FedEx SameDay Bot, represents the company's ongoing commitment to innovation. Being designed to engage the rapid growth of e-commerce and the complexities and expense of last-mile delivery, while continuing our commitment to environmental sustainability and public safety, Roxo looks to address each of these areas by autonomously and safely traveling at moderate speeds on sidewalks and along roadsides to deliver smaller shipments to customers at their homes and businesses when they need them.

Roxo has been tested on the streets of Manchester, NH; Memphis, TN; Plano, TX and Frisco, TX to gather real-world performance data in a variety of environments and scenarios.

A New Industry

The growth of e-commerce has exponentially increased the volume of online orders, not just for products from other cities, states or countries but from around the corner by people who need items delivered to their homes and places of business.

Retailers are looking for ways to fill these orders by delivering them directly to customers' homes or businesses the same day. On average, more than 60 percent of merchants' customers live within three miles of a store location, demonstrating the opportunity for on-demand, hyper-local delivery – like a last-minute supplies from a general merchandise retailer to a family working on a school project, or a part from an auto store to a nearby repair shop working on a customer's vehicle.

Roxo's purpose is to fill retailers' needs by further expanding the existing FedEx portfolio of services to enable local, last-mile deliveries that FedEx drivers and couriers do not generally make – increasing the volume of shipments FedEx carries, not redirecting existing volume.

A Sustainable Solution

FedEx is committed to connecting the world in responsible and resourceful ways. As customers expect more products to be delivered to their doors, Roxo endeavors to meet this growing demand while minimizing environmental impacts.

Using a **battery-powered, zero-emission** bot to deliver small items to local customers can lessen the impact of trucks and customer vehicles in supporting this hyper-local e-commerce market.

Drawing on Years of Expertise

Being developed in collaboration with world-renowned inventor Dean Kamen, this effort brings together the extraordinary technological expertise of DEKA Research & Development Corp. and the global logistics expertise of FedEx. Roxo uses DEKA's established iBOT electric wheelchair base capable of negotiating rough terrain, traversing steps and steep inclines. DEKA reports the iBOT base has surpassed **10 million hours of reliable real-world operation**.

Roxo is another piece of the larger FedEx logistics ecosystem continuously in development and serves as the most recent demonstration of the company's higher purpose – to connect people and possibilities around the world.

Roxo™ the FedEx SameDay Bot

OVERVIEW

In February 2019, FedEx unveiled a prototype of the FedEx SameDay Bot - an autonomous delivery device representing the latest evolution in ongoing FedEx innovation. Designed in response to the rapid growth of e-commerce, the complexities and expense of last mile delivery, and our commitment to environmental sustainability and public safety, the bot's purpose is to travel at moderate speeds on sidewalks and along roadsides to deliver smaller shipments safely to customers at their homes and businesses.

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The FedEx SameDay Bot is being designed to include many features to help customers while performing safe and reliable deliveries, including:

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- Gyroscopic technology maintains level cargo level
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- Bot Dimensions: 39L x 29W x 51.50H
- The bot weighs approximately 450 lbs. with a 100 lbs. payload capacity
- Sophisticated set of sensors and technologies to keep pedestrians and surrounding vehicles safe
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- Turn signals, lights and a signaling screen to clearly communicate its intent to pedestrians, cyclists and vehicles around it
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Key Differentiators:

The FedEx SameDay Bot is intended as an industry disruptor - combining the extraordinary logistics expertise of FedEx with the world-renowned innovation of DEKA to deliver the next evolution for e-commerce: autonomous same day delivery.

- The bot is designed to take advantage of existing capabilities from FedEx including:
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- On autonomous vehicles and devices, specifically, we think the technology is promising and may impact transportation in the future.
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- As with the development of any autonomous vehicle and device, extensive testing of the FedEx SameDay Bot in both private and public environments will be conducted to generate enough data to 'train' the self-driving software, validate safe performance, and comply with all applicable safety regulations and guidelines.

FAQs

1. **What is special about the FedEx Bot?**
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2. **How much revenue do you expect this to generate?**
   We view this as a new market for FedEx with tremendous potential.

3. **How many bots do you have today? What are the plans for numbers of bots? How many, by when?**
   The bot is now a prototype. When testing is complete, we hope to produce these to fill the serve the needs created by local same day delivery needs

4. **How do the economics work? Does the customer pay FedEx for each shipment?**
   Service features are still being developed.

5. **If so, what are the expected prices in comparison to other forms of transportation?**
   Last mile delivery is one of the priciest and most complex parts of the delivery process. A key goal of this technology is to design it in such a way to reduce those costs and be a more cost-effective solution.

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The FedEx SameDay Bot addresses a new market for FedEx, complementary to existing FedEx services and not as a replacement.

7. **What cities are participating in the test?**
Testing has already been conducted in Memphis, TN; Manchester, NH; Plano and Frisco, TX. Additional testing is scheduled to continue in both Memphis and Texas.

12. **Long term regulatory plan for a multi-city offering?**
We are working diligently with the regulatory authorities.

13. **How is a shipment request/order placed?**
Service features are still being developed.

14. **What type of mapping is the bot using?**
The bot will make use of high definition mapping technology and routing applications already in use to map geographic areas for deliveries.

15. **Is this just point to point? Can the bot do multiple stops?**
The bot will begin with one point-to-point stop, but we will be exploring other opportunities.

16. **Battery...what kind of battery, what's the battery life? How/where will batteries be charged?**
The Bot will be zero-emission and we are exploring multiple options for the most efficient charging for the needs of the bot.

17. **What's the definition of success, and what are the next phases? How long until this is a commercial offering?**
This is true innovation. We are continuing to test this Spring and will move as quickly as reasonable to broader testing and commercial launch, while continuing to meet safety,
customer and regulatory needs.

18. **Where are these bots kept in the downtime? How are they maintained? Repaired? Are they secured at night?**
The current plan is for the bots to be maintained and repaired by FedEx, and secured when not out on a mission.

SAFETY

1. **How is the safety of pedestrians and others being addressed?**
   Safe operation is essential in the development of the bot. Unlike some smaller sidewalk robots, the FedEx SameDay Bot's relatively tall profile is designed to make it easily visible at eye level to pedestrians, bicyclists and motorists. Turn signals, lights and a signaling screen can communicate its intent to pedestrians, cyclists and vehicles around it. Remote operators can intervene, see the surroundings through the bot's cameras, and take over control of the bot if needed. Operators may also communicate with people around the bot including first responders through a speaker and microphone.

2. **What is the power source?**
   A zero-emission, environmentally-friendly battery.

3. **What work has been done with local authorities regarding the bot traveling on sidewalks or roads?**
   FedEx is working with local governments and regulatory agencies to address their requirements.

4. **How are you making the general population aware that they will see these in use? How to navigate around the bot?**
   The rollout will be a collaborative effort likely involving several channels and including FedEx and local city governments.

SECURITY

1. **How secure is the bot?**
   FedEx can connect to the bot at all times. We will know when it stops, starts and is providing service.

2. **Will these devices be vulnerable to criminal activity, such as theft of packages or the theft of an entire bot itself?**
   We will have full visibility of the bot when it is in operation. The bot will remain constantly connected to a remote 'control tower'. Remote operators can intervene, see the surroundings through the bot's cameras, and take over full driving control of the bot if needed. Operators can also communicate with people around the bot including first responders through a speaker and microphone.

3. **How are shipments secured inside the bot to avoid theft?**
   The device is being designed to have multiple layers of security measures and protocols in place to protect the device and its cargo. For security reasons, I can't share the specifics of those measures, but security is a priority in the development of the bot.

4. **How much and what kind of data will the bot be collecting throughout the delivery process? Will it include any personal customer data? Will the bot record footage of customers or their homes when it makes a delivery?**
   The bot is being designed to capture data and record footage necessary to safely complete deliveries. Data communication between bots and cloud ecosystems will use strong encryption to protect data integrity and privacy. Our data retention strategy is to store only what is necessary (e.g. future routing purposes, delivery status messages, proof of delivery, cargo security for claims or investigation support, etc.). Access to stored data will require authentication and authorization. We will comply with regulations, or in the absence of regulation, we will aim to comply with data security and privacy norms in the places we operate.
5. **How can we be sure that someone will not be able to hack the bot and perform rogue actions?**
   Because self-driving technology is still in fairly early stages, the full scope of autonomous device security risks is not yet understood. But as with any connected device, we know that we will need to be proactive about cyber security. FedEx and DEKA, will conduct development and testing with a safety and security-first mindset for all components of the Bot- including hardware, software and the methods and pathways of communication between the bot and our respective systems.
   The bot's sensors and the algorithms behind the sensors will be protected by multiple, complex communication layers with security. We are designing bot communications that can be authenticated, encrypted, and validated before they are acted upon by the bot. FedEx and DEKA will continually develop and test the bot control, communication and monitoring systems. Our approach to cybersecurity is informed by best practices from NIST's Cybersecurity Framework.

EMPLOYEE IMPACT

1. **Will FedEx bots eventually replace FedEx couriers or drivers?**
   - The bot is designed to deliver items such as pizzas, groceries and auto parts from the point of sale to a nearby home or business, in the same day. Those are not deliveries we normally make using FedEx Express and FedEx Ground. The purpose of our development and use of any autonomous device is to help supplement operational and service efficiency for our customers. In fact, we believe bots may create new jobs, such as high-tech machine experts, software developers, AV control tower and remote operators.
   - We believe that innovation will both improve existing jobs and create new career pathways. FedEx is working with other industry leaders to study the

impact of this, and other emerging technologies, on society and the American workforce to ensure the positive adoption of these innovations.

- The emphasis on the last mile delivery is a new business model for FedEx, and the SameDay Bot capabilities would supplement the services we already provide to our customers.

AMAZON SPECIFIC

1. **Was the bot developed because of Amazon Scout (or any other robot)?**
   No. We were already working on the FedEx Bot before the Scout was announced. We are constantly innovating at FedEx, and this is the next evolution for us. Innovation is part of the FedEx DNA and we are constantly looking at trends and the needs of our customers to determine new developments.

Offered by: FedEx

AMENDMENT TO SENATE BILL 874
(First Reading File Bill)

Amendment #1

On Page 3, in line 30 after the semi-colon insert "AND"; on Page 4 strike lines 1 and 2; on Page 4, in line 3, strike "(IV)".

Amendment #2

On Page 5, strike lines 8 and 9 and substitute "IF THE PERSONAL DELIVERY DEVICE IS BEING OPERATED BETWEEN SUNSET AND SUNRISE, A LIGHT ON BOTH THE FRONT AND REAR OF THE PERSONAL DELIVERY DEVICE THAT IS VISIBLE IN CLEAR WEATHER FROM A DISTANCE OF AT LEAST FIVE HUNDRED FEET TO THE FRONT AND REAR OF THE PERSONAL DELIVERY DEVICE WHEN DIRECTLY IN FRONT OF LOW BEAMS OF HEADLIGHTS ON A MOTOR VEHICLE.

MDOT MVA_INFO_SB0874
Uploaded by: MVA, MDOT
Position: INFO

February 27, 2020

The Honorable William C. Smith, Jr.
Chair, Senate Judicial Proceedings Committee
2 East Miller Senate Office Building
Annapolis MD 21401

Re: Letter of Information – Senate Bill 874 – Vehicle Laws – Personal Delivery Devices – Standards and Requirements

Dear Chair Smith and Committee Members:

The Maryland Department of Transportation (MDOT) takes no position on Senate Bill 874 but offers the following information for the Committee's consideration.

Senate Bill 874 establishes exceptions to motor vehicle registration requirements for personal delivery devices and authorizes personal delivery devices to operate on sidewalks, crosswalks, and highways. The bill establishes a standard whereby a personal delivery device may navigate with or without the active control or monitoring of an individual, may weigh up to 200 lbs. excluding cargo, and may travel up to 3.5 miles per hour on a sidewalk or crosswalk.

Since 2015, MDOT has supported a robust Connected and Automated Vehicle (CAV) Working Group which serves as the central point of coordination for the development and deployment of emerging CAV technologies in Maryland. Maryland's CAV Working Group has a broad cross section of stakeholders, including elected officials, representatives from state and local government, highway safety organizations, private sector, automotive industry and other transportation stakeholders. This group evaluates the latest research, including guidance from the American Association of Motor Vehicle Administrators (AAMVA), the U.S. Department of Transportation, tracks federal and state actions, and coordinates with all interested stakeholders. This collaborative program is setting a course for the future of automated and connected vehicles in Maryland which prioritizes the safety for all roadway users.

The MDOT, through the CAV Working Group, facilitates a permit process for parties interested in testing highly automated vehicles (HAV), and has designated a number of sites, owned by MDOT and its partners, for the testing of connected and automated vehicle technologies. Through the HAV permit process, applicants work collaboratively with MDOT to ensure project objectives are met while prioritizing safety in testing.

The MDOT monitors emerging and innovative technologies such as personal delivery devices (PDDs) to adapt to, and take advantage of, technologies reshaping mobility choices. PDDs have emerged as an innovative technology promising to improve the efficiency of deliveries. The impact on the transportation sector is currently not well-understood.

There are several technical aspects to implementing the Senate Bill 874 that remain unresolved. Namely, there are no identified roadway prohibitions, it is unclear how a unique identifying number would be assigned, there is no defined process for regulating the approval of devices, there are no standards for device hardware or software (including the lighting requirements), and the method for monitoring insurance compliance is unclear.

Several states now allow PDDs in public spaces (WA, AZ, FL, and others), although regulations are not uniform across these states. As this technology proliferates, several areas of uncertainty remain that all communities across the country will have to consider. The impact to children, seniors, and individuals with disabilities navigating walkways will be impacted by these devices. While the legislation states that a PDD is to be used primarily on sidewalks, there is no guarantee that a PDD in a crosswalk will have the ability to determine how long it has to cross the highway, whereas a pedestrian is cued by audio and visual signals at signalized crossings. The ability of PDDs to adjust to crowded environments is currently inconsistent, and safeguards and safety controls for these devices are still evolving. Land use concerns such as the management of curb access will need to be considered as PDDs begin to appear more frequently in Maryland communities.

MDOT is embracing CAV technology and working collaboratively with many partners to ensure that Marylanders benefit from a transportation system which fully realizes the many positive potential outcomes of CAV technology, while also ensuring the safety of all roadway users. Maryland has been intensely proactive in its approach to advancements in CAV technology by ensuring that developments in the state are in line with federal legal and regulatory frameworks and reflect best practices and guidance from expertise around the country and the world.

The Maryland Department of Transportation respectfully requests the Committee consider this information when deliberating Senate Bill 874.

Respectfully submitted,

Christine Nizer
Administrator
Maryland Motor Vehicle Administration
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Maryland Department of Transportation
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