Can Autonomous Shuttles Provide a Real Return on Investment?
Sharad Agarwal
Senior Vice President

- Senior Executive at First Transit for 5 years both in Operation and Sales
- Led Innovation to introduce ride sharing, AV, and micro-transit to FT
- Spent 6 months in Doha, Qatar managing 650 buses and drivers for the 2006 Asian Games
- Launched company to build 56 PAX motor coaches in China for the U.S market
- Board Advisor for Spare labs
Agenda

I. What is Autonomy?
II. Who is Easy Mile?
III. Are there Autonomous Vehicle really DRIVERLESS?
IV. Business Case for Autonomous Vehicles
V. 61AV
Five Levels of Vehicle Autonomy

**Level 0**
No automation: the driver is in complete control of the vehicle at all times.

**Level 1**
Driver assistance: the vehicle can assist the driver or take control of either the vehicle’s speed, through cruise control, or its lane position, through lane guidance.

**Level 2**
Occasional self-driving: the vehicle can take control of both the vehicle’s speed and lane position in some situations, for example on limited-access freeways.

**Level 3**
Limited self-driving: the vehicle is in full control in some situations, monitors the road and traffic, and will inform the driver when he or she must take control.

**Level 4**
Full self-driving under certain conditions: the vehicle is in full control for the entire trip in these conditions, such as urban ride-sharing.

**Level 5**
Full self-driving under all conditions: the vehicle can operate without a human driver or occupants.

*Source: SAE & NHTSA*
Homologated Vehicles with Autonomous Technology

- AV Technology applied to existing car make and model
- 1-6 Passengers
- Approved for city roads in most states due to vehicle meeting FMVSS standards
- Not practical for quick load and upload scenarios
- Ability to travel at posted speed limits
- Traditional OEMs, Parts suppliers, and technology companies focused in this space.
- Expectation is vehicles will not be available for sale, but used for mobility services
- Cost of sensor package to be Level 5 makes commercial viability difficult

Shared Autonomous Vehicles

- Custom built vehicle with integrated technology
- 1 - 15 Passengers
- Requires special approval to operate on public roads in the US as vehicles have not met FMVSS standards yet
- Ideal for quick load and unload and ADA accessible
- Travel between 12-15 mph
- New startups primarily filling this space
- Requires pre-mapped set routes, however, can manage unlimited number of set routes
EasyMile in a nutshell

Founded in June 2014

Current headcount 170 employees

Headquartered in Toulouse (France), with offices in Denver (USA), Berlin (Germany), Singapore, and Adelaïde (Australia)

Privately funded by founders, with Alstom, Continental and Bpifrance as strategic investors
EZ10 Autonomous shuttle

EZ 10 ID card

- Driverless and electric shuttle
- Up to 15 people (6 seated, 9 standing)
- 16h autonomy, 12 with A/C
- Built-in automatic access ramp
- Pre-mapped network of roads
- No need for additional infrastructure
- Other vehicles’ maximum speed
- EZ10 maximum speed

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The EZ10 is the most deployed shuttle worldwide

- More than 200 deployments in 20 countries
- 100 shuttles worldwide
- More than 300,000 people transported
- More than 400,000 kilometres travelled
A picture is worth a thousand words...even more when it comes to autonomous vehicles

This is the EZ10
What environments does EasyMile operate?

We focus on specific use cases ... ...
... where we can already safely operate ... with business value for our customers.
Since November 18, the EZ10 is fully driverless on an industrial site in France

TLD site key specs

- 700m segregated road, with limited other motorized vehicles
- Road between the factory and the restaurant
- Operates every day between 11.30am and 2pm

- Supervised from a remote control center, manned by a fully trained supervisor
- 50% of the TLD factory employees use the driverless service daily

“The EZ10 has proven to be a safe, reliable service around our campus. Employee feedback is very positive, especially in case of inclement or hot weather! TLD is proud to be involved in such an important milestone both for EasyMile and for mobility in general,“

Nicolas Verin, CEO of TLD Europe.
EZ Fleet: our Fleet Management System

1. Control center
- Supervise vehicle performance & safety
- Ensures communication with users (camera, intercom)

2. Mission & Fleet management
- Dispatch vehicles
- Define missions (on demand, ride sharing, bus mode, metro mode)
- Pilot vehicle’s behavior on stations (doors opening, …)

3. Data reports & statistics
- Gather vehicle information on usage patterns and performance
Why is there a cost savings with Autonomous Vehicles?

- Switch from fossil fuels to electric
- Reduced training and turnover costs
- Reduced operator wages
- Reduced operator to vehicle ratio (i.e. extra-board, holidays, etc.)
- Reduced scheduling and dispatching costs
- Reduced overhead from payroll clerk to HR manager
- ACCIDENT REDUCTION
SAMPLE SCENARIO

# of days per week: 5
# of Weeks per Year: 52
Hours of Service per day: 12
# of Passengers per Hour: 200
Round Trip Time: 15 min

# of Trips per Hour: 4
Passengers per vehicle: 15
Miles per Hour of site: 12
Miles traveled per day: 144
# Cost Comparison - Vehicle Pricing

**EZ10**

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase Price</td>
<td>$292,500</td>
<td></td>
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<tr>
<td>Annual License</td>
<td>$3,300</td>
<td>$3,300</td>
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<tr>
<td>RTK + GPS</td>
<td>$17,550</td>
<td>$17,550</td>
<td>$17,550</td>
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<tr>
<td>Software</td>
<td>$6,381</td>
<td>$6,381</td>
<td>$6,381</td>
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<tr>
<td>Insurance</td>
<td>$26,325</td>
<td>$26,325</td>
<td>$26,325</td>
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<tr>
<td>Maintenance (Silver)</td>
<td>$11,833</td>
<td>$11,833</td>
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<tr>
<td>Startup Costs</td>
<td>$357,889</td>
<td>$53,556</td>
<td>$53,556</td>
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<tr>
<td>Total Annual</td>
<td>$155,000</td>
<td>$155,000</td>
<td>$155,000</td>
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**15 PAX Ford E-350**

<table>
<thead>
<tr>
<th></th>
<th>Inputs</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<tbody>
<tr>
<td>Purchase OB Technology</td>
<td>$60,000</td>
<td>$8,571</td>
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<tr>
<td>OB Technology Insurance</td>
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<tr>
<td>Insurance</td>
<td>$6289.92</td>
<td>$6289.92</td>
<td>$6289.92</td>
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<tr>
<td>Maintenance</td>
<td>$18,346</td>
<td>$19,263</td>
<td>$20,226</td>
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<tr>
<td>Startup Costs</td>
<td>$20,000</td>
<td>$6,667</td>
<td>$6,667</td>
<td>$6,667</td>
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<tr>
<td>Annual Cost</td>
<td>$40,374</td>
<td>$40,374</td>
<td>$40,374</td>
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</table>

**Startup Costs**

- Shipping  $9,500
- Training  $13,000
- Deployment $13,000

$35,500
## Cost Comparison – Vehicle Inputs

<table>
<thead>
<tr>
<th>EZ10</th>
<th>E-350</th>
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<tbody>
<tr>
<td><strong>Passengers Per Vehicle</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong># of Vehicles Required</strong></td>
<td>4</td>
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<tr>
<td><strong># of Drivers Required</strong></td>
<td>0</td>
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<tr>
<td><strong>Cost of electricity</strong></td>
<td>$0.11 Kw/Hr</td>
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<tr>
<td><strong>Full Charge</strong></td>
<td>16 hours</td>
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<tr>
<td><strong>Electric Cost per Day</strong></td>
<td>$1.76</td>
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<tr>
<td><strong>Passengers Per Vehicle</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong># of Vehicles Required</strong></td>
<td>4</td>
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<tr>
<td><strong># of Drivers Required</strong></td>
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<tr>
<td><strong>Cost of Fuel</strong></td>
<td>$3.50</td>
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<tr>
<td><strong>MPG of E-350</strong></td>
<td>6</td>
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<tr>
<td><strong>Driver Wage</strong></td>
<td>$20</td>
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<tr>
<td><strong>Burden (taxes, benefits) Wage</strong></td>
<td>$26</td>
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<tr>
<td><strong>Annual Wage Per Driver</strong></td>
<td>$54,080</td>
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<tr>
<td><strong># of Gallons</strong></td>
<td>$24</td>
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<tr>
<td><strong>Cost of Fuel Per day</strong></td>
<td>$84</td>
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### Cost Comparison

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<thead>
<tr>
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<th>No Av</th>
<th>W/Safety Year 1</th>
<th>W/Safety Year 2</th>
<th>W/Safety Year 3</th>
<th>W/Safety Year 4</th>
<th>W/Safety Year 5</th>
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</thead>
<tbody>
<tr>
<td># of EZ10</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
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<tr>
<td># of E-350</td>
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<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td># of Hours EZ10</td>
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<td>4368</td>
<td>8736</td>
<td>13104</td>
<td>17472</td>
<td>17472</td>
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<tr>
<td># of Hours E-350</td>
<td>17472</td>
<td>13104</td>
<td>8736</td>
<td>4368</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Safety Drivers</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Bus Drivers</td>
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<td>8</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

|                  |       |                 |                 |                 |                 |                 |
| Vehicle Cost EZ10| $     | $155,000        | $310,001        | $465,001        | $620,002        | $620,002        |
| Vehicle Cost E-350| $   | $161,494        | $121,121        | $80,747         | $40,374         | -               |
| Driver Wage EZ10 | $     | $162,240        | $324,480        | -               | -               | -               |
| Driver Wage E-350| $   | $594,880        | $432,640        | $324,480        | $162,240        | -               |
| Fuel Cost EZ10   | $     | $641            | $1,281          | $1,922          | $2,563          | $2,563          |
| Fuel Cost E-350  | $    | $122,304        | $91,728         | $61,152         | $30,576         | -               |
| Supervisor       | $    | $113,568        | $113,568        | $113,568        | $113,568        | $113,568        |
| Total Cost       | $    | $992,246        | $1,076,938      | $1,215,709      | $813,681        | $736,132        |

*Driver to Vehicle Ratio is 2.75:1*

*Assume supervisor equivalent for both scenarios*

*Does not account for SPARE RATIO on either vehicle type*
61AV - Come see us!

- First public transit in the U.S operating an autonomous shuttles
- Operates 10 - 6, M-F
- Connects 61st/Pena rail stop to nearby commercial and residential buildings
- Available RTD mobile App and Google Maps
- Test by City of Denver of reliability, feasibility, and applicability of AV’s in transit

- 3 Stations
- Customers Service Ambassador on board for first 6 months of pilot to answer questions
Thank you!

Connect with us to find more about our recent developments!
#EasyMile