

# navya



**AUTONOM<sup>®</sup>  
SHUTTLE**  
for more fluid mobility



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**Etienne Hermite**  
CEO

*'Very diverse projects, and growing international development.'*

*'We believe in artificial intelligence, but we believe even more in the intelligence of humans.'*

*'Constantly looking for new talents.'*



**Damien Spennato**  
Senior HR Business Partner



**Kathleen Ramuet**  
Certification Project Manager



**Amina Attobi**  
R&D Engineer - Driving Team

*'It's really exciting working on tomorrow's technologies!'*

*'Ensure the compliance and quality of our vehicles.'*



**Daniel Martin**  
Quality Manager

*'Ensure the proper operation of vehicles every day.'*

*'Rally technical teams around the same quality and innovation requirements.'*



**Hervé Gentil**  
Customer Success Director

*'Customer satisfaction as a driver of our organization.'*



**Maxime Etienne**  
R&D Engineer - Simulation Team

*'Safety is our priority.'*



**Aurore Lafaye**  
Supervision Customer Project Manager



**Hippolyte Bouvier**  
System Engineer

*'We are constantly looking for new solutions to help us adapt to the needs and wishes of our customers.'*

*'Been involved since the beginning.'*

*'Working for NAVYA guarantees full immersion in a rapidly changing and developing industry!'*



**Pascal Lecuyot**  
CTO



**Albane Garnier**  
Operational Marketing Manager

*'Expand the image of NAVYA worldwide.'*



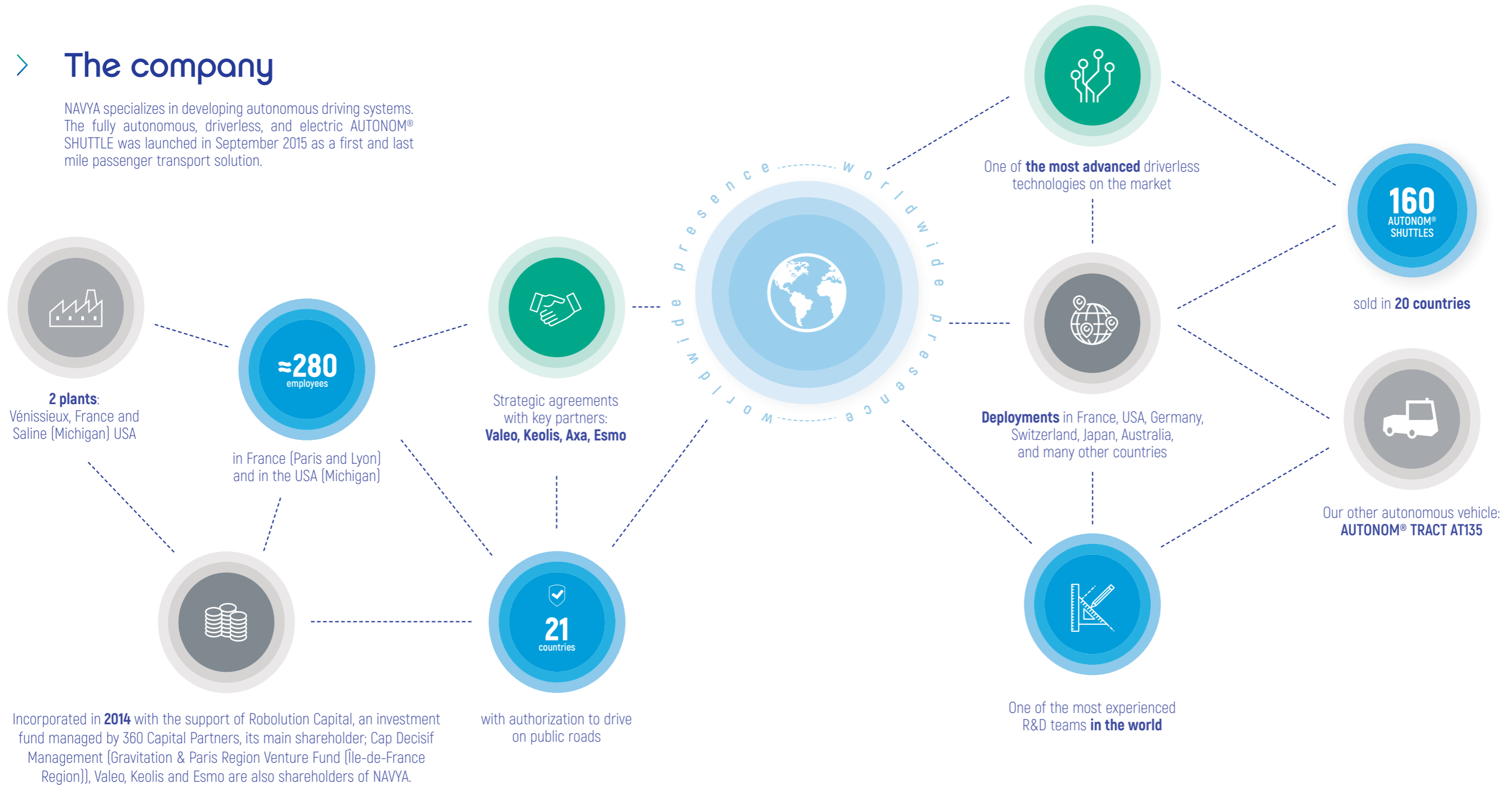
**Henri Coron**  
CBDO



**Frederick Ferre**  
Product Owner - Maps Team

## > The company

NAVYA specializes in developing autonomous driving systems. The fully autonomous, driverless, and electric AUTONOM<sup>®</sup> SHUTTLE was launched in September 2015 as a first and last mile passenger transport solution.



Incorporated in **2014** with the support of Robolution Capital, an investment fund managed by 360 Capital Partners, its main shareholder; Cap Decisif Management (Gravitation & Paris Region Venture Fund (Île-de-France Region)), Valeo, Keolis and Esmo are also shareholders of NAVYA.



# > NAVYA TECHNOLOGY, autonomy lever for any kind of platform

In order to safely manage all situations related to a **completely autonomous** vehicle in a given environment, NAVYA technology is based on **three pillars**:

### > Perception

Understands the environment in which the vehicle is located; knows its position, detects, categorizes, and monitors

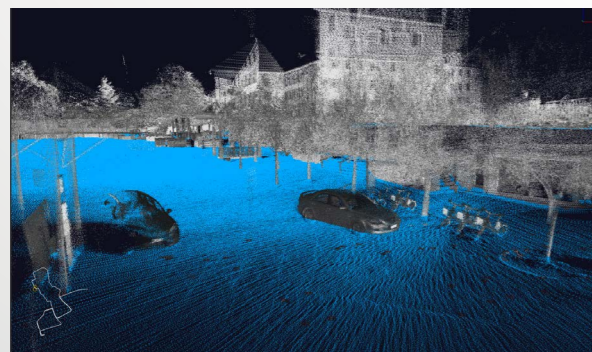
### > Decision

Calculates and determines the route and trajectory.

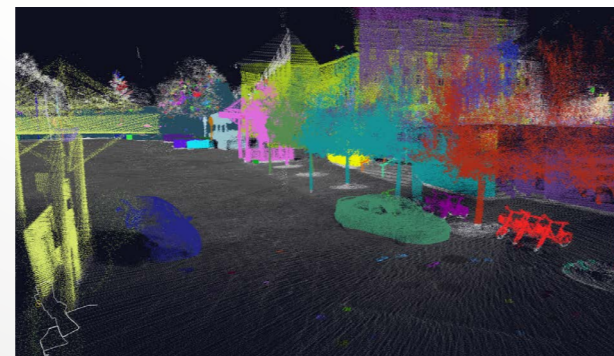
### > Action

Makes optimum use of the decisions taken based on the data collected in real time by the sensors.

## 1 3D vision and environment recognition



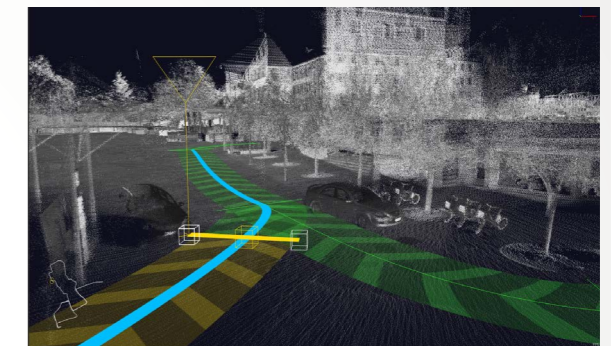
## 2 Localization and prioritization of objects



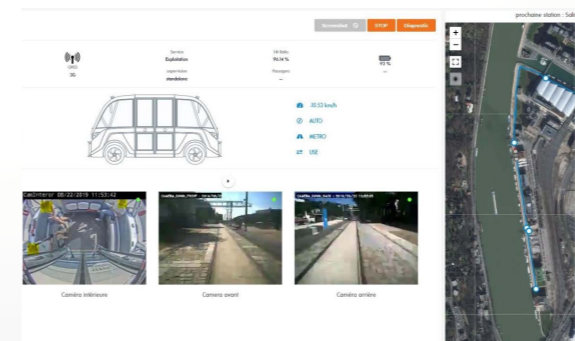
## 3 Real-time obstacles detection and continuous optimization of the vehicle's route



## 4 Definition of the vehicle's behavior on the route and configuration of its decision-making (position on the road, priorities, etc.) using algorithms



## 5 Continuous monitoring and supervision of operating fleets



## 6 Safety

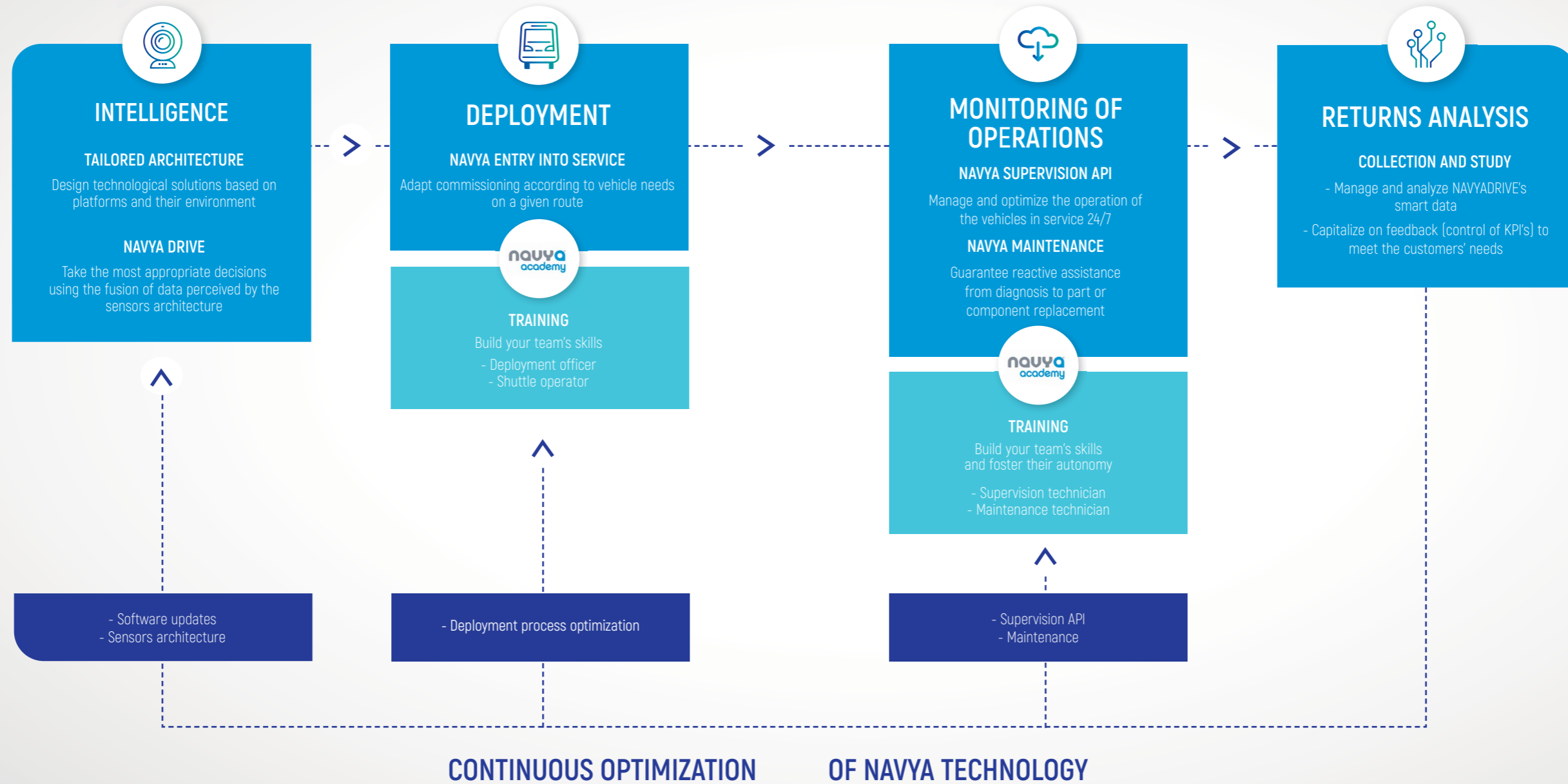
**NAVYA technology designed for the highest levels of safety:**

- **Vehicle safety:** software updates for continuous improvement of safety.
- **Human safety:** NAVYA technology designed to avoid remote takeover of control of the vehicle.
- **Data security:** high level of data encryption.



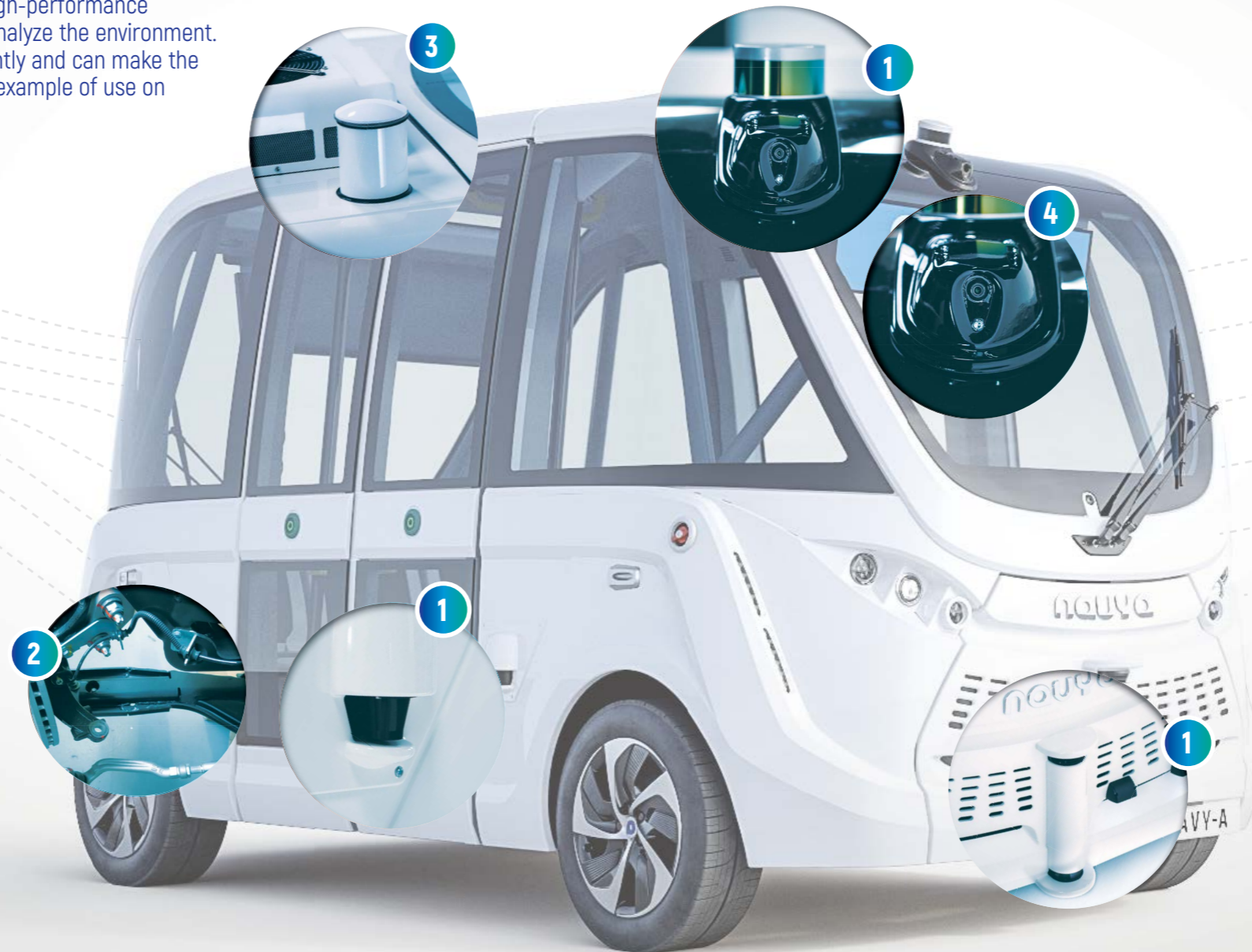
# > Service cycle

A leader and pioneer in autonomous driving systems, NAVYA is committed to provide a solution tailored specifically to its customers and partners in a continuous improvement process.



## > The most proven technology on the market

This unique architecture is composed of high-performance sensors that allow vehicles to locate and analyze the environment. With this technology, vehicles move efficiently and can make the best decisions without a driver. Here is an example of use on AUTONOM® SHUTTLE.



**1 LiDAR sensors**  
 2D and 3D perception to map the environment, guarantee precise positioning and obstacles detection.

**2 Odometry**  
 Measures wheel speed to estimate vehicle speed and confirm its position

**3 GNSS antenna**  
 Communication between a GPS sensor and a reference beacon to determine the exact position of the vehicle at all times.

**4 Cameras**  
 Obstacle detection and estimation of their position relative to the vehicle. Environment analysis (signs, traffic lights, etc ...) and information extraction.



**Dimensions**  
 Length 4,75 m - Width 2,11 m  
 Height 2,65 m - Empty weight/MAM  
 2,400 kg / 3,450 kg



**15 passengers**  
 11 Seated  
 4 Standing



**Average range**  
 9 hours



**Operating speed**  
 25 km/h



# > Deployments



## CAMPUS

- MICHIGAN - MCITY
- MANCHESTER - UNIVERSITY OF SALFORD
- HELSENKI - METROPOLIA UNIVERSITY OF APPLIED SCIENCES
- PERTH - CURTIN UNIVERSITY
- LILLE - CITÉ SCIENTIFIQUE
- RENNES - UNIVERSITE DE RENNES 1
- ADELAIDE - FLINDERS UNIVERSITY

## INDUSTRIAL SITES

- FUKUSHIMA - TEPCO
- DUNKIRK - TOTAL
- LYON - MIA
- GOTHENBURG - LINDHOLMEN
- DUBAI - DEWA
- CONTERN - SALES - LENTZ
- BASCHARAGE - SALES - LENTZ
- NOORDWIJK - EUROPEAN SPACE AGENCY

## HOSPITALS

- GRONINGEN - SCHEEMDA HOSPITAL PROVINCE OF GRONINGEN
- BERLIN - CHARITÉ HOSPITAL - BVG
- THE HAGUE - THE HAGUE PUBLIC HOSPITAL - HAAGSE SHUTTLE BV

## CITY CENTERS

- LYON - KEOLIS
- SION - POSTAUTO
- MONACO - CAM
- ABU DHABI - MASDAR
- VIENNA - WIENER LINIEN
- NEUHAUSEN - TRAPEZE
- FRIBOURG - TPF
- PERTH - RAC INTELLIBUS
- DRIMMELEN - FUTURE MOBILITY NETWORK
- CANDIAC - KEOLIS
- ORLANDO - BEEP
- GENEVA - TPG
- SYLT - SVG
- LAUENBURG - TUHH
- LUXEMBOURG - SALES- LENTZ
- SYDNEY - OLYMPIC PARK

## TOURISM

- VAL THORENS - BERTOLAMI
- SINGAPORE - GARDENS BY THE BAY - STELS
- HELSINKI - AURINKOLAHTI - HOLO
- OSLO - OSLO WATERFRONT - HOLO
- VINCENNES - RATP
- HONG KONG - WKCDA

## 3 AUTONOM<sup>®</sup> SHUTTLES operated on the TEPCO nuclear power station in Fukushima

### Challenge

Provide employees with efficient transport adapted to the constraints of a nuclear power station.

### Solution

> 3 AUTONOM<sup>®</sup> SHUTTLES

### Results

An efficient transport service and a scalable solution capable of adapting to developments on site.

*The advanced autonomous shuttle is the focus of visitors attention. It has been used by over 2,000 people so far.*

Tomohide Hosoda  
Manager, Decommissioning Engineering Company  
Tokyo Electric Power Company Holdings, Inc.



View our  
videos and use cases



**2 AUTONOM<sup>®</sup> SHUTTLES:**  
Total Oleum Nord industrial site  
DUNKIRK (France)



**1 AUTONOM<sup>®</sup> SHUTTLE:**  
Gaulnes mixed development zone  
JONAGE (France)



**1 AUTONOM<sup>®</sup> SHUTTLE:**  
Sales-Lentz site  
CONTERN (Luxembourg)



## City Centre - Sion

Over **50,000 passengers** used AUTONOM® SHUTTLES in Sion

### Challenge

Connect the train station and city centre on a 3.5 km route.

### Solution

> 2 AUTONOM® SHUTTLES were entered into service in June 2016.

### Results

A transport system used by over 50,000 passengers, visitors, and tourists which contributed to develop the city centre's transport network coverage.


*With the technological advances proposed by NAVYA, we have been able to broaden our horizons. Customers (youngest to oldest) get onto the shuttles curious and get out happy.*

Vishala Haxhie  
Safety driver / teleoperator  
PostAuto




View our  
videos and use cases



 **3 AUTONOM® SHUTTLES:**  
Masdar city centre  
ABU DHABI (UAE)



 **1 AUTONOM® SHUTTLE:**  
Confluence district  
LYON (France)



 **2 AUTONOM® SHUTTLES:**  
City centre  
PERTH (Australia)



## An **integrated mobility solution** for students and faculty

### Challenge

Improve mobility on the campus and foster autonomous vehicle acceptance

### Solution

- > 2 AUTONOM® SHUTTLES were entered into service in June 2018

### Results

In service from 9am to 3pm Monday to Friday which allowed autonomous vehicles acceptance by the population to be assessed.

- NAVYA was a great partner for us when we started the Mcity Autonomous Shuttle service to the University of Michigan's North Campus Research Complex. This deployment is a research project that helps us assess the acceptance of automated vehicle technology by consumers.

Greg McGuire  
Associate Director  
Mcity



View our  
videos and use cases




 **1 AUTONOM® SHUTTLE:**  
Curtin University (Australia)



 **1 AUTONOM® SHUTTLE:**  
University of Salford (UK)



 **2 AUTONOM® SHUTTLES:**  
Gothenburg-Chalmers  
University (Sweden)



 Special case -  
Scheemda Hospital

## Private and public road transit for Scheemda Hospital (Netherlands)

### Challenge

Supplement the local transport offer between Scheemda hospital and the bus stop with a roundabout to negotiate.

### Solution

> 1 AUTONOM® SHUTTLE since August 2018.

### Results

A 850-metre mobility solution between public and private roads.

NAVYA's autonomous shuttle allowed us to set up an efficient transport solution from the entrance of Scheemda Hospital to the bus station and its vicinity. This service has been highly appreciated by hospital staff, visitors, and patients over the year.

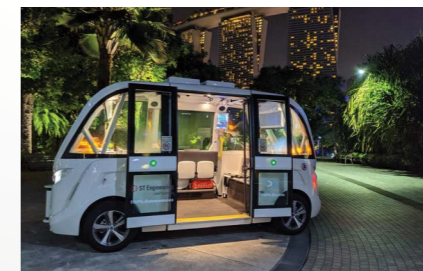
Tahir Ehetasham  
Technical Director Self Driving Mobility  
Provincie Groningen



View our  
videos and use cases



 **1 AUTONOM® SHUTTLE:**  
Devoted to the mountain in Val  
Thorens (France)  
Touristic site



 **2 AUTONOM® SHUTTLES:**  
Gardens by the Bay (Singapore)  
Touristic site



 **1 AUTONOM® SHUTTLE:**  
in Candiac (Canada)  
City Centre



# Technical characteristics

## Capacity

Passengers .....	15
Seated .....	11
Standing .....	4

## Dimensions

Length <i>m</i> .....	4.75
Width <i>m</i> .....	2.11
Height <i>m</i> .....	2.65
Minimum ground clearance <i>m</i> .....	0.20
Tires .....	215/60 R17
Wheel rims .....	Alloy
Empty weight <i>kg</i> .....	2,400
Maximum allowable mass <i>kg</i> .....	3,450

## Engine

Drive wheels .....	2
Engine .....	Electric
Power <i>kW</i> .....	15 nominal (25 peak)
Maximum operating speed <i>km/h</i> .....	25
Maximum slope % .....	12

## Energy

Battery .....	LiFePO4 battery pack
Theoretical capacity <i>kWh</i> .....	33
Theoretical battery life <i>in hours</i> .....	9
Time to charge to 90% <i>in hours</i> .....	8 (plug 3.6 kW) 4 (plug 7.2 kW)
Charging temperature °C .....	0 - +40
Operating temperature °C .....	-10 - +40

## Steering

Guide wheels .....	2x2
Turning radius .....	< 4.5

## Equipment

Temperature regulation .....	Automatic regulation
Airconditioning .....	(2 x 4.6 kW cold)
Heating .....	Automatic regulation (3.4 kW)
Doors .....	Double doors
Bodywork .....	Polyester
Windows .....	Glass
Visual information .....	Cabin 15" touch screen 38" screen to the outside (x2)
Sound information .....	Internal speakers

Lighting .....	Two-way pack
Audible warning devices .....	Buzzer // Horn
Safety .....	Handgrips (x4), Grab bars (x2), Emergency hammer (x1), Safety pack (triangle, yellow vest, first aid kit) Fire extinguisher Cabin camera
Mobile access ramp for passengers with disabilities .....	Manual ramp

## Obstacle location and detection

LiDARs 1 .....	Two 360° multi-layers LiDARs
LiDARs 2 .....	Six 180° single-layer LiDARs
Cameras .....	Front/rear cameras
Odometry .....	Wheel encoders + Inertial sensor
GNSS .....	2 x RTK

## Safety

Emergency stop button .....	2 buttons
SOS intercom .....	1 button / via monitoring
Emergency brake .....	Automatic
Parking brake .....	Automatic
Safety pack .....	Safety vest, triangle and first aid kit

## Options

- GNSS base
- Seat pack with lap seat belts
- Lap seat belts for folding seats
  - Thermal filter (vehicle window insulation)
  - Metallic paint
- Automatic access ramp
- 4 wheel drive





We look forward  
to seeing you  
on board!

[www.navya.tech](http://www.navya.tech)

## CONTACTS

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