



# Autonom<sup>®</sup> Shuttle Evo

**navya**  
self-driving made real



Étienne  
Hermite

CEO of  
Navya

"Today, we create  
the transportation systems  
of tomorrow."



Kathleen  
Ramuet

Homologation Project  
Manager

"Working at Navya means  
guaranteed immersion in a world  
in full (r)evolution. "



Albane  
Garnier

Marketing and  
Communication  
Manager

"We are contributing  
to the spread of new mobilities  
around the world."



Hippolyte  
Bouvier

Systems Engineer

"We are constantly looking for new  
solutions to adapt to the needs and  
wishes of our customers."

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# rethinking mobility

## why go self-driving?

Navya makes self-driving solutions a reality, to create today the transportation systems of tomorrow.

What are the benefits to integrate self-driving shuttles today?

### • Get ahead

by taking these new technologies on board

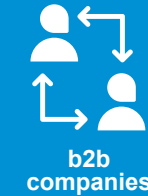
### • Innovate

by transforming your transport system

### • Improve

your service offer and user experience

## who stands to benefit?



autonomous

electric

shared

on-demand



# About us

**Navya** delivers self-driving solutions to reshape their transportation system for people or goods.

A leader in self-driving systems



One of the most advanced self-driving technologies on the market



One of the most experienced R&D teams in the world



Strategic agreements with key partners: Valeo, Keolis, Axa, Esmo



Automation of third-party platforms



# navya

**280\*** team members, including 140 R&D engineers\*\*

**+160\*** Autonom® Shuttles sold

**22\*** countries in which we operate

**2\*** production sites

# Autonom<sup>®</sup> Shuttle Evo

With neither a steering wheel nor pedals, this self-driving and electric shuttle is an intelligent, safe and high-performance mobility solution that can transport up to 15 people on private sites or open roads without a driver on board!

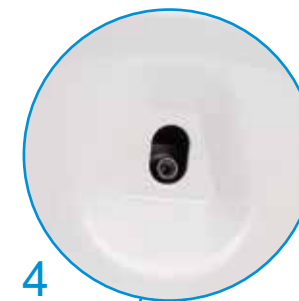
Thanks to high-performance sensors architecture, the intelligence of the **Navya Driver<sup>®</sup>** allows the vehicle to locate, analyse and interact with the environment in real time.

**1** **10 LiDAR sensors**  
2D and 3D perception to map the environment, guarantee precise positioning and obstacle detection redundancy.

**2** **Odometry**  
Wheel speed measurement 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**  
Video stream recording for data analysis and remote monitoring.



**5** **Rain and light sensor**  
Automated lights and wipers based on rain and light sensing

**6** **4G/5G compatibility**

**7** **V2X**  
Traffic light with active and passive management.



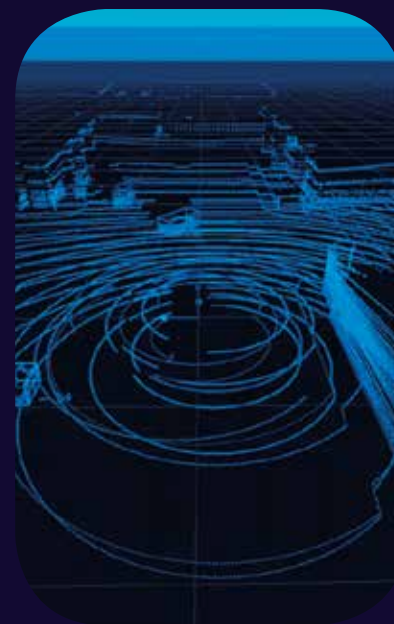
# Navya Driver<sup>®</sup> technology

**Navya Driver<sup>®</sup>** is the self-driving software developed by **Navya R&D** that allows the vehicle to perceive, decide and act according to its environment. The set of interconnected functional modules gives the vehicle its intelligence and allows it to operate without a driver on board.



## Mapping

Very high definition 3D maps are regularly produced, programmed, updated and enriched to incorporate the maximum amount of information that the **Navya Driver<sup>®</sup>** uses.



## Simulation

This module provides the entire R&D department with a virtual suite in which to test and validate algorithms. These virtual kilometres, in addition to the experience we have gained in operation since 2015, contribute to the continuous improvement of the **Navya Driver<sup>®</sup>** to make it ever more efficient and experienced.

## Perception



Understand the environment in which the vehicle is located, know its position, detect, categorize and track obstacles over time.

### sensors

The optimal architecture results from a combination of selected sensors and their configuration. Our team of engineers, who have unique expertise in terms of sensor selection and configuration, is constantly on the watch for the latest sensor innovations.

### localization

This module transmits the kinematics of the vehicle in an ultra-precise and real-time way: position, orientation and speed. The fusion of this information will provide the position of the vehicle in any environment.

### obstacles

This module allows in real time to detect, track and classify surrounding obstacles. For each of them, it determines its position, speed and shape and monitors the evolution of this information over time to enable optimal driving decisions to be made.

## Decision

Once the information received has been analysed, this module determines the optimal trajectory for the vehicle, taking the safety and comfort of operations into account.

## Action

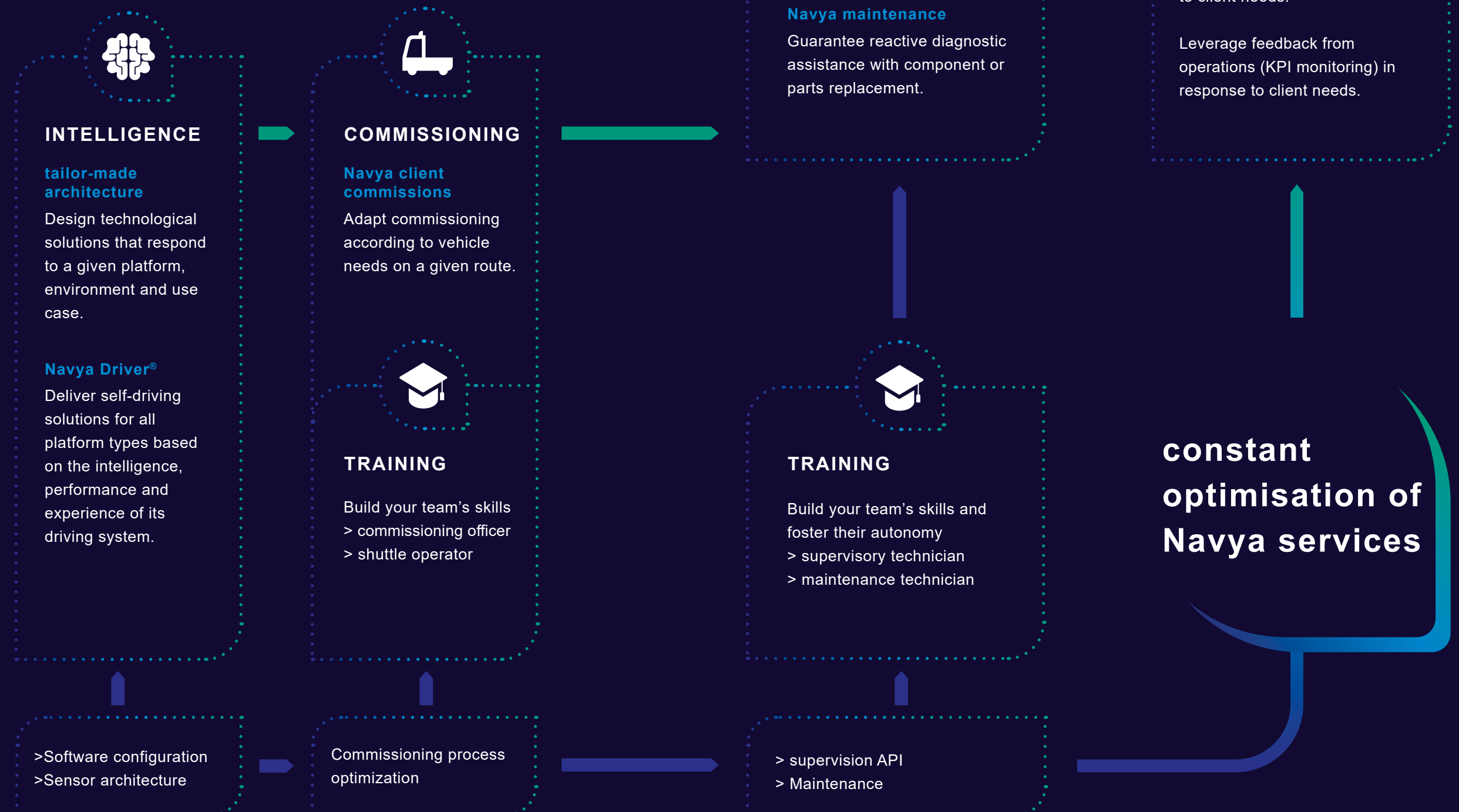


**Apply decisions taken by the Navya Driver<sup>®</sup>.**



# the Navya service offer

In order to meet the needs of partners, such as operators, companies, municipal and local authorities, **Navya** has developed a tailor-made service offer based on continuous improvement.



# shuttle operations



## CAMPUSES

<b>Adelaide</b> Flinders University	<b>Michigan</b> Mcity
<b>Gothenburg</b> Chalmers University	<b>Manchester</b> University Of Salford
<b>Helsinki</b> Metropolia University Of Applied Sciences	<b>Noordwijk</b> European Space Agency
<b>Lille</b> Cité Scientifique	<b>Perth</b> Curtin University
<b>Linköping</b> Transdev	<b>Rennes</b> Beaulieu Campus
	<b>Singapore</b> NTU Nanyang University



## INDUSTRIAL SITES

<b>Bascharage</b> Sales - Lentz	<b>Goteborg</b> Lindholmen
<b>Contern</b> Sales - Lentz	<b>Lyon</b> Mia
<b>Dubai</b> DEWA	<b>Lyon</b> Keolis
<b>Dunkirk</b> Total	
<b>Fukushima</b> TEPCO	



## HOSPITALS

**Berlin**  
Charité Hospital  
BVG

**Groningen**  
Scheemda Hospital  
Province of Groningen

**Jacksonville**  
Mayo Clinic  
Beep

**The Hague**  
The Hague  
Public Hospital  
Haagse Shuttle Bv



## CITY-CENTRES

<b>Aalborg</b> Holo	<b>Geneva</b> TPG	<b>Lauenburg</b> TUHH
<b>Abu Dhabi</b> Masdar	<b>Gunsan</b> SpringCloud	<b>Luxemburg</b> Sales-Lentz
<b>Candiac</b> Keolis	<b>Knauf</b> Pommerloch Sales-Lentz	<b>Lyon</b> Keolis
<b>Daegu</b> SpringCloud	<b>La Défense</b> Keolis	<b>Monaco</b> CAM
<b>Drimmelen</b> Future Mobility Network	<b>Lake Nona</b> Beep	<b>Neuhausen</b> Trapeze
<b>Fribourg</b> TPF	<b>Las Vegas</b> Keolis	<b>Ormoya</b> Holo
		<b>Peoria</b> Beep



## TOURIST ATTRACTIONS

<b>Fontevraud</b> Abbaye Royale De Fontevraud	<b>Singapore</b> Gardens By The Bay - STELS
<b>Helsinki</b> Aurinkolahti Holo	<b>Val Thorens</b> Bertolami
<b>Hong Kong</b> WKDA	<b>Vincennes</b> RATP
<b>Oslo</b> Oslo Waterfront Holo	
<b>Paris</b> Groupe ADP	
<b>Sejong</b> SpringCloud	



## Business Park — Groupama Stadium Lyon, France

### THE CHALLENGE

Integrate a self-driving shuttles service into Lyon's public transport network, linking the Décines Grand Large station on the T3 tramway line to the Olympique Lyonnais stadium.

### THE NAVYA SOLUTION

2 **Autonom® Shuttles** cover a 1.4km circuit in a dense urban road environment used by several thousand vehicles, pedestrians and cyclists daily. Major technical challenges, such as the crossing of 4 crossroads with traffic lights, including a roundabout and 8 pedestrian crossings. This collaboration with SYTRAL and Keolis forms part of the EU HORIZON 2020 project for the development of autonomous vehicles in European cities.

« Lyon is leading the way in terms of autonomous and responsible transport. By investing in the experimentation with these new modes, we are seeking to shape the future of mobility by enriching the public transport offer with clean and attractive alternatives to polluting vehicles. »

Fouziya Bouzerda,  
CEO of SYTRAL.



## City-centres — Lake Nona Florida, USA

« The Lake Nona community is a perfect example of a use case for the implementation of autonomous shuttles. Residents are eager to have an alternative to personal transportation in order to access the full range of local services and shops. Our partner organisation Tavistock, a leader in technology and innovation, is proud to provide unique services that allow residents, business and visitors to stand out from the competition. Transforming mobility together. »

Joe Moyer,  
Chief Executive Officer (CEO),  
Beep AV Solutions



### THE CHALLENGE

To provide residents, employees and visitors of Lake Nona with a more accessible means of transportation that brings people closer to local businesses and amenities within a planned community.

### THE NAVYA SOLUTION

2 **Autonom® Shuttles** operated by Beep since September 2019, covering a circuit of 1.9km within an urban environment alongside vehicle traffic. These shuttles strengthen the local transport network and improve quality of life for visitors of Lake Nona.



# Tourist attractions — Gardens by the Bay Singapore

## THE CHALLENGE

Reinforce the transport system at one of Singapore's busiest tourist attractions, welcoming more than 12 million visitors every year.

## THE NAVYA SOLUTION

2 **Autonom® Shuttles** have covered a 1.5km circuit through the gardens since October 2019. The user experience is enhanced by game concepts and entertainment. The next step is the implementation of an on-demand trip reservation service via a mobile application.

« Gardens by the Bay has always been known to break new ground in the way that we connect people and plants, and this includes tapping on technology to reach out to an urban generation. The self-driving shuttles not only provide an alternative mode of getting around but enhance the overall visitor experience of the Gardens. Its extended operating hours also complement our myriad offerings in the day and night. »

Felix Loh,  
CEO of Gardens by the Bay



# Campuses — European Space Agency Noordwijk, The Netherlands

« We are delighted to be involved in a project that provides real-life applications for the technologies we have developed here at ESTEC. »

Franco Ongaro,  
ESTEC Director of ESTEC  
and Head of Technology,  
Engineering and Quality at ESA.



## THE CHALLENGE

To provide a transport solution for employees and visitors to the European Space Technology Centre. Increase the autonomous capabilities of the shuttles through the incorporation of advanced telecommunications solutions in partnership with the European Space Agency.

## THE NAVYA SOLUTION

2 **Autonom® Shuttles** transport employees and visitors around the campus in mixed traffic. Multiple shuttle stops, similar in appearance to bus stops, have been established. This 2-year contract is the outcome of collaboration between multiple parties, such as ESA ESTEC, Arriva, Dutch Automated Mobility, **Navya** and the Dutch province of Zuid-Holland.

# technical characteristics



## Capacity

Passengers .....	Up to 15
Seated .....	11
Standing .....	4



## Dimensions

Length m .....	4.78
Width m .....	2.10
Height m .....	2.67
Minimum ground clearance m .....	0.17
Michelin Cross Climate tyres .....	215/60 R17
Wheel rims .....	Alloy
Empty weight kg .....	2600
Maximum allowable mass kg .....	3500



## Engine

Drive wheels .....	2
Engine .....	Electric
Power kW .....	22.6 nominal (34 peak)
Maximum operating speed km/h .....	25
Maximum slope % .....	18



## Energy

Battery .....	LiFeP04 battery pack
Theoretical capacity kW.h .....	33
Theoretical average autonomy hours .....	9
Time to charge to 100% .....	12 (230V AC plug, 16A)
hours .....	6 (230V AC plug, 32A)
Charging temperature °C .....	From 0 to +40
Operating temperature °C .....	From -10 to +45



## Steering

Steering wheels .....	2x2
Turning radius m< .....	4,5



## Equipment

Air conditioning .....	Automatic regulation at 9,8 kW
Heating .....	Automatic regulation at 9 kW
Doors .....	Double doors
Bodywork .....	Composite
Windows .....	Glass
Visual information .....	15" inside touchscreen, inside 28" information screen, 38" exterior screen (x2)
Audio information .....	Audio speakers
Lighting .....	Two-way pack
Audible warning devices .....	Horn / buzzer
Safety .....	Standing apprehension handle (x4), handle (x2), emergency hammer (x1), fire extinguisher, inside fish-eyes camera 360 set of seats with lap seat belts
Mobile access ramp for passengers with disabilities .....	Manual ramp
Light/rain sensor .....	Automatic wiper and light control (on/off)



## Obstacles location and detection

10 x Lidar .....	2 x Velodyne VLP, 360°, multi-layers
	4 x Valeo SCALA, multi-layers
	2 x SICK MRS, multi-layers
	2 x SICK TiM, single-layer
Cameras .....	Front and rear cameras
Odometry .....	Wheel encoders
GNSS .....	2 RTK antennas
IMU .....	2 inertial units



## Safety

Emergency stop buttons .....	2 buttons
Emergency intercom .....	1 button via surveillance
Emergency brake .....	Automatic
Parking brake .....	Automatic
Safety pack .....	Safety vest, triangle and first-aid kit
Safety equipment .....	Automatic tyre pressure control

## Options

- GNSS Base
- Thermal film (vehicle window insulation)
- Automatic access ramp
- Wheelchair user anchoring system





**see you  
soon  
on board!**

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**in** NAVYA Group

**🐦** @NAVYA\_Group

**📺** NAVYA

## **contact us**

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