

EDAG CITYBOT

GIVE WAY FOR THE
MOBILITY REVOLUTION



The world's first fully integrated
ecosystem for cost-effective use in
transport and work tasks

Key Points at a Glance.

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EVERYONE IS TALKING ABOUT THE MOBILITY REVOLUTION. THIS CAN MAKE IT HAPPEN.

„With the EDAG CityBot, the UN Sustainable Development Goals set out in Agenda 2030 are achievable – if we are prepared to rethink and then live mobility in urban areas and large service centers such as airports.“

Johannes Barckmann
EDAG CityBot Concept and Product Owner



READY TO GO

1. Fully integrated concept:

EDAG CityBots are more than just a vehicle concept; they represent an all-round ecosystem.

2. Connectivity:

They are linked to one another and to the infrastructure. The fleet of highly automated robot vehicles constitutes a full ecosystem, e.g. for urban mobility, transport services and municipal service functions.

3. Flexibility:

The multi-functional robot vehicles utilize add-on modules to permit needs-based use around the clock, e.g. as passenger cells, cargo carriers, city cleaning devices, or for park maintenance.

4. Profitability:

They open up new business models, for example when automatic payments are made for work assignments for individual modules, or companies design their own user modules for the ecosystem. Personnel expenditure can be reduced and staff absences prevented.

5. Social relevance:

EDAG CityBots make our cities more life enhancing

- No noise and air pollution
- No traffic jams and accidents
- No stress with parking
- More climate protection
- More transport quality
- More cycle paths & places to meet
- Mobility for all



RELIEF FOR INNER CITIES

Simply shutting down road traffic is not an alternative, since mobility and being on the move are what determine our everyday life. For individual transport to continue to be possible even in densely populated areas, further traffic and mobility services that will genuinely ease the situation in our inner cities are called for. Not in the form of add-ons that will simply make congestion worse, but as game changers: mobility all-rounders that will take the urban future to a whole new level.

PREVENTING TRAFFIC GRIDLOCK

it is becoming increasingly evident that individual, delivery and service traffic, which has been growing constantly for decades, is coming up against its limits. Traffic congestion is becoming a health risk and a serious burden on the quality of housing, living and working conditions in urban areas. What is more, the economic efficiency and productivity of vehicles and mobility services are also diminishing.



**„The EDAG CityBot makes mobility
in urban and commercial areas profitable
again. It is safe, reliable, emission-free
and smart.“**

Christoph Mundri,
Sales Manager EDAG CityBot



OUT OF THE MOBILITY IMPASSE

WHY THINGS NEED TO CHANGE

FACTS, FIGURES, DATA

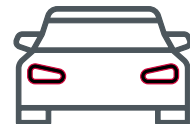


100
CityBots

for every 1,000 inhabitants could fully cover
all inner city mobility and service requirements

is the average number of vehicles
per 1,000 inhabitants in private households
(Source: Federal Statistical Office)

583
cars



408
Euro

was the average cost to every single car driver, freight
transporter and bus driver in Germany in 2022 for time
wasted due to traffic congestion and the associated
unproductive fuel consumption



156
hours

is the average time
drivers traveling in
London city traffic, for
example, have to allow
for delays each year



70
percent

of climate-damaging
emissions come from
cities



1,5
people

on average share
a car each trip



11
km/h

is the average speed a car travels in London city traffic; in rush-hour traffic, this is just as fast as a bicycle



23
hours

and 15 minutes is how long a car is parked every day, mainly outside the house.



87.000
bus drivers

According to a survey by the Federal Association of German Bus Companies (BDO), public transport companies will be short of 87,000 bus drivers by 2030. To expand the bus and rail services, however, they would actually need to increase the number of employees by some 20 %

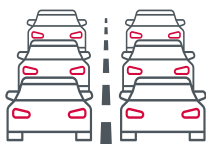


19
percent

more traffic fatalities were recorded in the USA compared to 2019; in Germany, there was a 9 % increase in the number of traffic fatalities. The number of collisions rose by 4 % in the USA and 5 % in Germany

of the population in Germany will live in cities in 2030. Worldwide, the proportion of people living in urban areas in 2005 was 49.1 %, an increase to 60 % is forecast for the year 2030

78,6
percent



1.894
kilotons of CO₂

are emitted during traffic jams each year in the UK, France and Germany. This is equivalent to the emissions of 120,000 households in these countries, or to the production of goods valuing 6.9 billion euros

GNSS localization

Guarantees precise localization for the driving and work functions. With RTK correction, positioning accuracy (1 - 3 cm) can be achieved.

EDAG CITYBOT

Excuse me, may I introduce myself?
I am the future of mobility and work.

Why? **I'll tell you why:**

Electric powertrain

With its battery-electric drive system (possibly fuel-cell powered in the future), the EDAG CityBots are extremely energy-efficient and emission-free.

5G mobile communications

For the constant exchange of all information relevant for operation and the environment data with the vehicle's external mobility backend.

Enables optimised traffic flow and deployment planning including the necessary billing and payment processes.

Matrix lighting

Vehicle lighting, communication symbols and vehicle status are displayed automatically and order-related.

All-wheel steering

Realised with corner modules and the integrated in-wheel drives, which enable a steering angle range of 132 degrees for all wheels.

This means that the EDAG CityBot can also drive sideways and perform a point turn (optional; depending on the module configuration).



Avatar

An integrated 3D stereo camera is part of the environment sensing system. This is used to recognise objects.

It also serves as a central HMI communication point for its surroundings. It can hear, speak and also share emotions via gestures. Additional cameras support optional teleoperated operation.

Automated coupling system

Realises a robust mechanical and torque-resistant connection to the user modules.

With a central connector unit of the coupling interface, modules without separate energy storage are supplied with electrical voltage.

Control signals and the additional sensor data of the coupled modules are also transmitted via this unit. .

Environmental sensors

Ultrasonic and solid-state lidar sensors are further components of surroundings detection. These sensors detect and protect pedestrians and other road users.

Wheel hub motors

with up to 80 KW of power for an economical drive with the expected driving profile in the automated, centrally administered and connected traffic of the Smart City.

THE HISTORY OF EDAG CITYBOTS DEVELOPMENT

For the design of the EDAG CityBot ecosystem, the EDAG Group, the world's largest independent engineering partner, combined all of its engineering competencies. From design and engineering to IT architecture. The robot vehicles and their ecosystem are 100 percent EDAG.

2020

AI demonstrator



From 2025 on
In an airport
environment

Working on the airport apron and employing a wide range of utility modules, the EDAG CityBots are to be used for various tasks including the transport people and goods. The system provides perfect timing, maximum profitability and process tracking in real time.



2019

Presentation of the concept at the IAA



2022 – 2024

in the Deutsche Bank Park

Green keeping: The first real lab is being built in Eintracht Frankfurt's grounds, to research the entire system of the EDAG CityBot fleet.

This will provide important insights for the scaling of automated vehicles in a real-life environment.



From 2030 on
Smart City

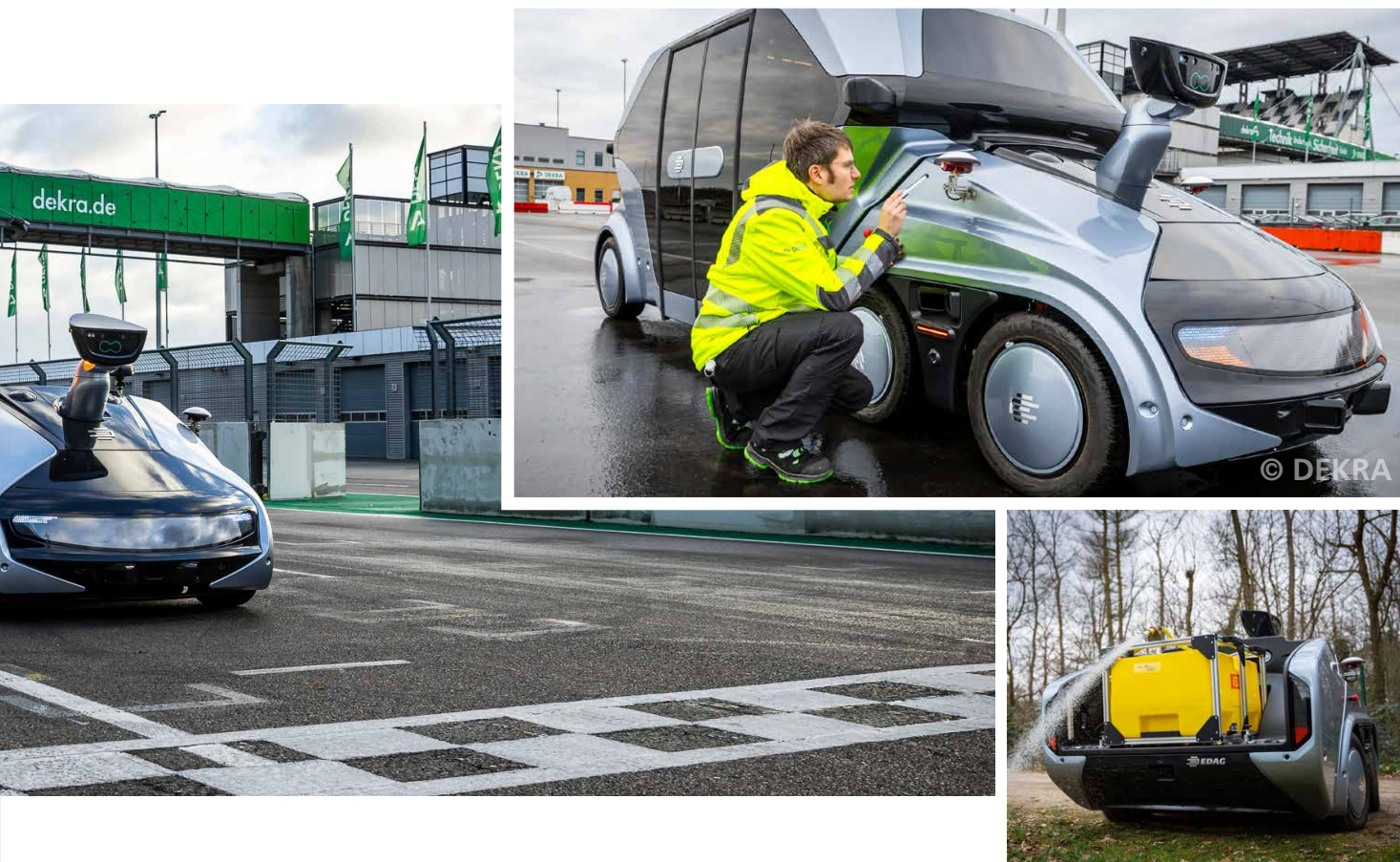


Which shows that the EDAG CityBots innovation, which was presented for the first time at the IAA 2019, is more than just a show car. The highly automated robot fleet constitutes a comprehensive ecosystem that aspires to be a real game changer for mobility and logistics challenges in the city of the future.

Following the successful testing of various use cases in the grounds of the Deutsche Bank Park, the EDAG Group is now focusing on the airport apron as its next field of action. A further evolutionary stage also envisages its use in a smart city environment.

EDAG CITYBOT REAL LABS

Digital and sustainable innovations need areas where they can be tried out in a real-world environment.



EDAG CityBots in practical use

The EDAG CityBot real labs in Fulda (at the EDAG Group's site) and in the Deutsche Bank Park in Frankfurt create scope for the legally compliant testing of innovations, from which guidelines for certification and legislation can be derived.

Within the context of the „Campus FreeCity“ research project involving EintrachtTech GmbH's „Arena of IoT“ digital center, a wide variety of applications from the areas of passenger services, transport, logistics and facility management were defined for the EDAG CityBots in the grounds of the Deutsche Bank Park. These include transport for people with restricted mobility, supplying kiosks with goods, refuse and green waste disposal, watering trees and plants,

and transporting workers and their work materials to their job locations. In the smart stadium, EDAG CityBots are to be used to test the stadium's automation potential.

New functions and system setups are to be tested under real-life conditions. The focus here is on realistically demonstrating the effectiveness of important protection and safety standards of smart mobility concepts from the EDAG CityBot ecosystem. At the same time, EDAG CityBot real labs permit the participation of stakeholders and citizens. There is evidence that proactive citizen participation significantly strengthens social acceptance of innovations like the EDAG CityBot ecosystem.

REQUIREMENTS FOR A NEW MOBILITY CONCEPT

This unique ecosystem calls for technical, architectural and urban planning conditions such as the following:

2025 | Airport:



Optimal basic conditions with a **clearly defined area** on **private property**, with precisely **defined routes**.

Plannable logistics and transport tasks **with unvarying processes**.

Integrable infrastructure with extensive IT networks, high cybersecurity standards and a powerful power supply.

Semi-public area open to the public in specifically designated zones only

24/7/365 operations guarantee high efficiency and savings in personnel costs

2030 | Smart city:



Defining a **separate area** for the new mobility concept, where, apart from bicycles, no other individual or private vehicles are permitted. This is the only effective way of avoiding traffic congestion. For CityBots, pedestrians always have the right of way – without crosswalks.

Integration of rail-based **public transport** into the system.

Open data and open standards, as well as interoperability and barrier-free principles.

Peripheral integration of **Park+Ride zones** into the system.

Extension of **cycle paths** in newly vacant areas, e.g. roadside parking spaces.

Control and coordination of the traffic by means of appropriate software. There is no longer any need for traffic lights.

Development and expansion of the concept **in collaboration** with municipalities, industry and the civil society.



EDAG CITYBOT

AIRPORT OPERATIONS

COSTS

- Reduction of personnel costs
- Reduction of investments in single-purpose vehicles
- Precise and punctual deliveries of goods and maintenance with no delays
- Reliable and efficient 24/7 logistics processes with real-time tracking (operation center/dispatcher)
- Full service integration in a software platform
- Fewer accidents
- Reduction in the cost of vehicle maintenance

CLIMATE PROTECTION

- Decarbonization of the airport
- CO₂ reduction
- Reduction in the number of vehicles
- Resource-saving
- Long service life as a result of predictive maintenance

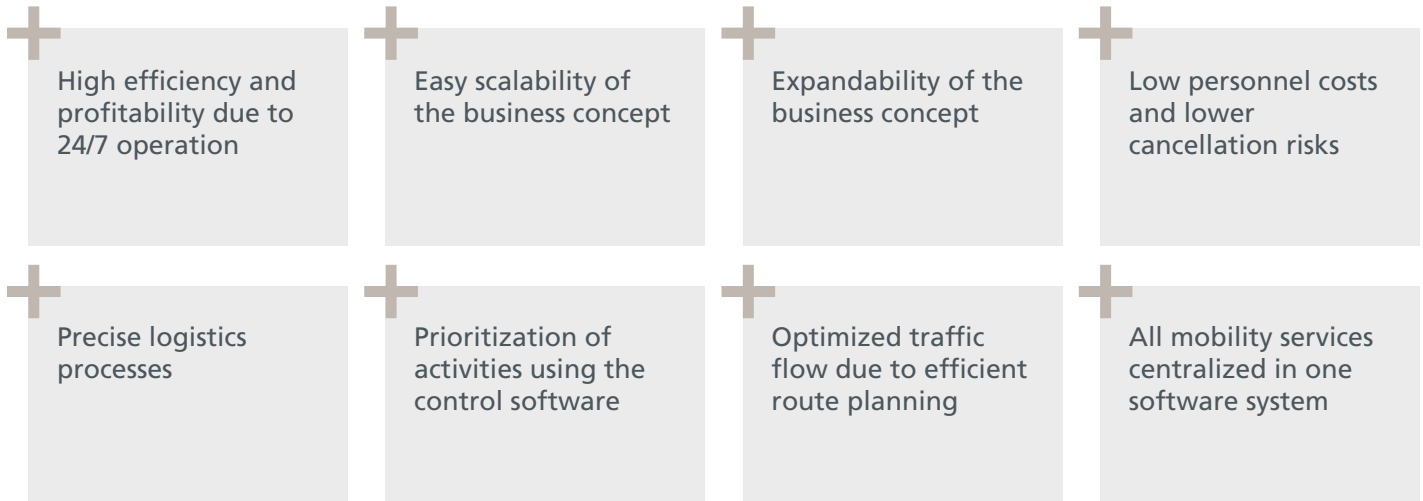
POTENTIAL

- Growth without expanding the workforce (shortage of skilled labor)
- Automated payment and accounting system
- Time stamp utilization, traceability (location/route), insurance/delay
- Additional possible uses of the data acquired
- Other sensor technology can be integrated (thermal image, night vision cameras, metal detectors, infrastructure, etc.)



EDAG CITYBOTS – BECOME A PARTNER NOW!

Your benefits



JOIN US AS A PARTNER...

...to advance the system with us.

...as a „CityBot friend“, for example,
to bring backpack modules to life.

...as someone who wants to use the EDAG CityBot as a business model.
The EDAG Group can provide support here from the very outset: from the
initial idea and the development of hardware and software components
through to series production.

...to identify new possible future applications for our EDAG CityBots.
E.g. closed-off areas such as airport aprons and
newly developed, traffic-free city districts.

...e.g. as a manufacturer working with us
on the series production of the system

A BUSINESS IDEA IN EVERY EDAG CITYBOT

EDAG CityBots are all-rounders. Numerous utility modules (trailer or backpack modules) can be used to individually configure the EDAG CityBot, and there are no limits to the business models this makes possible.

THE EMERGENCY CALL MODULE
is there in case of emergency,
works as a city guide or in security



THE CLEANING MODULE
keeps the city and parks clean and
provides winter- and other services



THE DUMP TRUCK MODULE
independently transports
debris and waste



THE RELAX MODULE
creates wonderful worlds
for you to
experience



THE GROUP TAXI
MODULE
brings people
in the city
from A to B



THE PARK MAINTENANCE
MODULE
does the gardening when
everyone is asleep



THE LOUNGE MODULE
provides a new dimension
in mobile comfort



THE PARTY MODULE
sets a club feeling
all of its own in motion



THE SUPERMARKET
MODULE
provides a mobile
shopping experience



THE PACK STATION MODULE
delivers all kinds of parcels

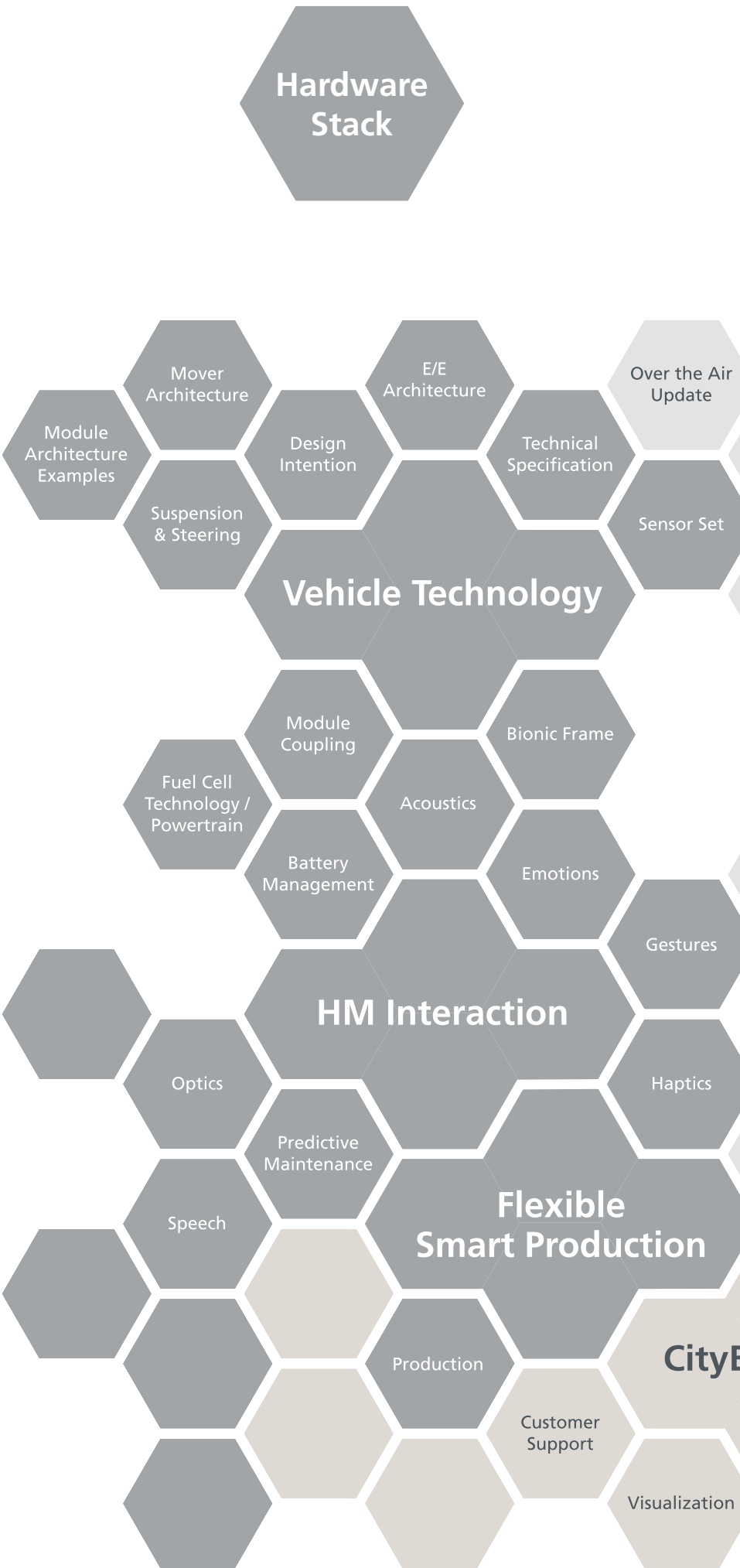


THE PIZZA MODULE
delivers delicious food fresh to
your door



THE EDAG CITYBOT ECOSYSTEM

The whole is greater than the sum of its parts: the EDAG CityBot ecosystem involves all the necessary participants in its development, implementation, operation and use. This could make it a game changer not only in the city of the future but also at airports and other mobility service areas.



Software Stack

Business Stack

Platform Technology Provider

Data Exchange Protocol

M2X Car2X

Secure Communication

Decentralized p2p System

Payment

Service Booking

Backend

Automated Micro Transaction

Big Data Analysis

My own Data

Mobile Application Provider

Administrator Dashboard

Ticketing

Functionality Enabler

Sensor Raw Data Fusion

Connectivity Provider

Hubs P+R

Supply Chain

Energy

Infrastructure

Public Transport

Waste Disposal

Sociology Psychology

Multimodal Traffic Management

Traffic Flow Simulation

CityBot Intersection

Digital Twin

Swarm Intelligence

Bot Provider

Cities Municipalities Citizens

Modules

Roadworks

Cleaning

Data Services

Doctor's Office

Motorhome

Point of Sale

Ice Cream

Surveillance

Party Module

Any more

First Aid

Delivery

City Guide

VIP Lounge

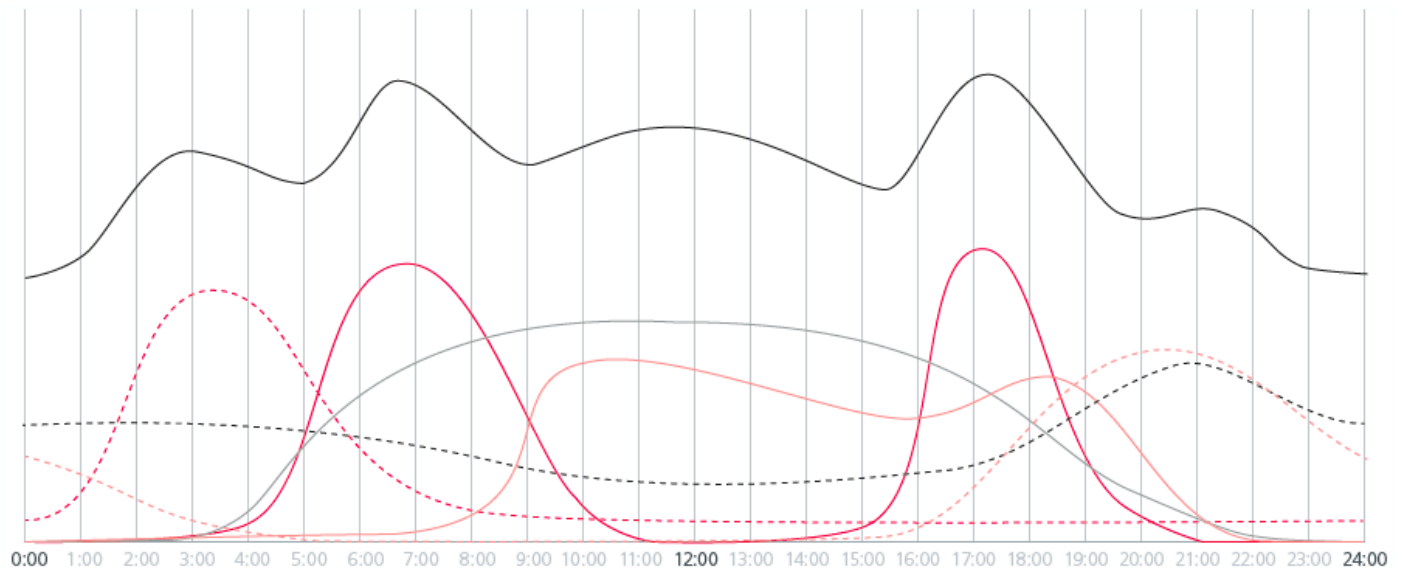
People Mover

People Mover

Gardening

TIME FOR ALL-ROUNDERS

With the EDAG CityBot, rush hours and peak traffic periods with congestion and tailbacks are a thing of the past. Around the clock and multi-functional – and as a result, the sophisticated technology pays off. The fully integrated, modular EDAG CityBot concept solves the capacity utilization problems during peak and off-peak periods.



	EDAG CityBot: cumulative use in 24/7 operation		Police and security tasks
	Commuter traffic		Street cleaning
	Goods transport		Individually commissioned services
	Private use (shopping, family, hobbies)		Entertainment



TECHNICAL DATA SHEET



Highly automated robot vehicles (no manual driving option inside the vehicle)



Connected driving of the vehicles with mobility backend and infrastructure using 5G mobile communications technology



Optional teleoperated operation via cloud computing



Automatic coupling of modules



132-degree steering angle realises a 360 degree agility



Drive power (electric in-wheel drives motors integrated in four corner modules): 4 x 20 kw



Energy storage capacity in tractor module: 20 kWh



Voltage Level: 56 V



Charging current: 100 A (5.8 kW)



Possible operating time in backpack configuration:
6 - 8 h (range in drive mode 150 – 220 km)



Maximum speeds: 10 km/h (laboratory operation),
25 km/h (tested), 50 km/h (technical development target)



Curb weights: Tractor 910 kg / people mover
module 1,180 kg / backpack module 87 kg

FUTURE OF URBAN MOBILITY IN REAL LAB

The EDAG CityBot fascinates trade and public media



September 28th, 2023

Citybots – concept of the future?

Autonomous, multi-functional, emission-free – is the CityBot the future of mobility?



August 21st, 2023

EDAG CityBot: Urban mobility enters new phase in real lab in Fulda



August 11th, 2023

Robot vehicle presented: Test at the Frankfurt stadium

March 13th, 2024

Research project: Autonomous City-Bots in training for city logistics at the Eintracht Frankfurt stadium

The consortium project „Campus FreeCity“ aims to develop a holistic mobility system for the city center – and is testing the implementation of autonomous transport and service robots in Deutsche Bank Park.

August 10th, 2023

AI robot soon at Eintracht's stadium





Edison

EDAG CityBot

August 21st, 2023

First live tests of the EDAG CityBot

„...Engineering service provider EDAG has been testing the first highly automated „CityBot“ vehicles in a real lab at its test site in Fulda.“

December 14th, 2023

Through the city with robot multi-vehicles

„...which could make privately owned cars superfluous in the city while also taking on local supply and municipal services.“

Frankfurter Allgemeine

Mai 22nd, 2023

A robot for the soccer stadium

August 14th, 2023

Urban mobility of the future

Test site for highly automated CityBot vehicles

This emissions-free, autonomous bot is learning to empty trash cans by itself

Learn more about how robots are helping to make a cleaner and safer world.

WORLD
ECONOMIC
FORUM

HANSER
automotive



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