ANT
Autonomous Navigation Technology

Your vehicle, **our** navigation

BLUEBOTICS
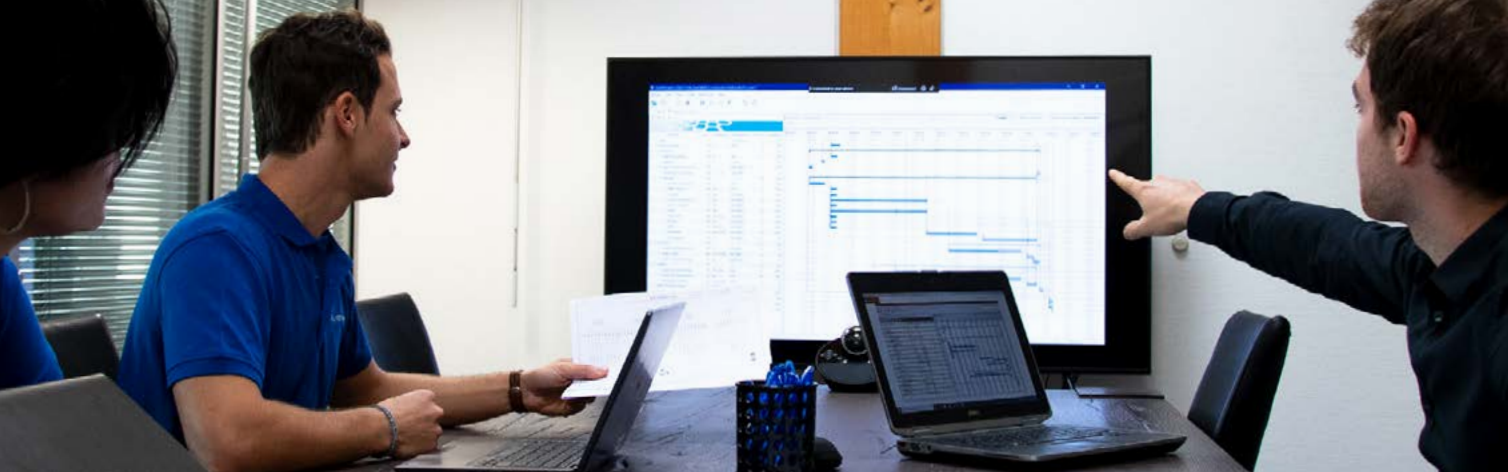#### Your Vehicle Navigation Partner

NATURAL FEATURE NAVIGATION FOR YOUR AGV, AUTOMATED FORKLIFT OR MOBILE ROBOT

With more than two decades of natural navigation experience, vehicle automation is a challenge we understand deeply.

During this time, we have helped numerous companies to navigate this process, leading to the launch of dozens of ANT driven automated guided vehicles (AGVs), automated forklifts, autonomous mobile robots (AMRs) and service robots.

ANT
driven
by BlueBotics

Inside:
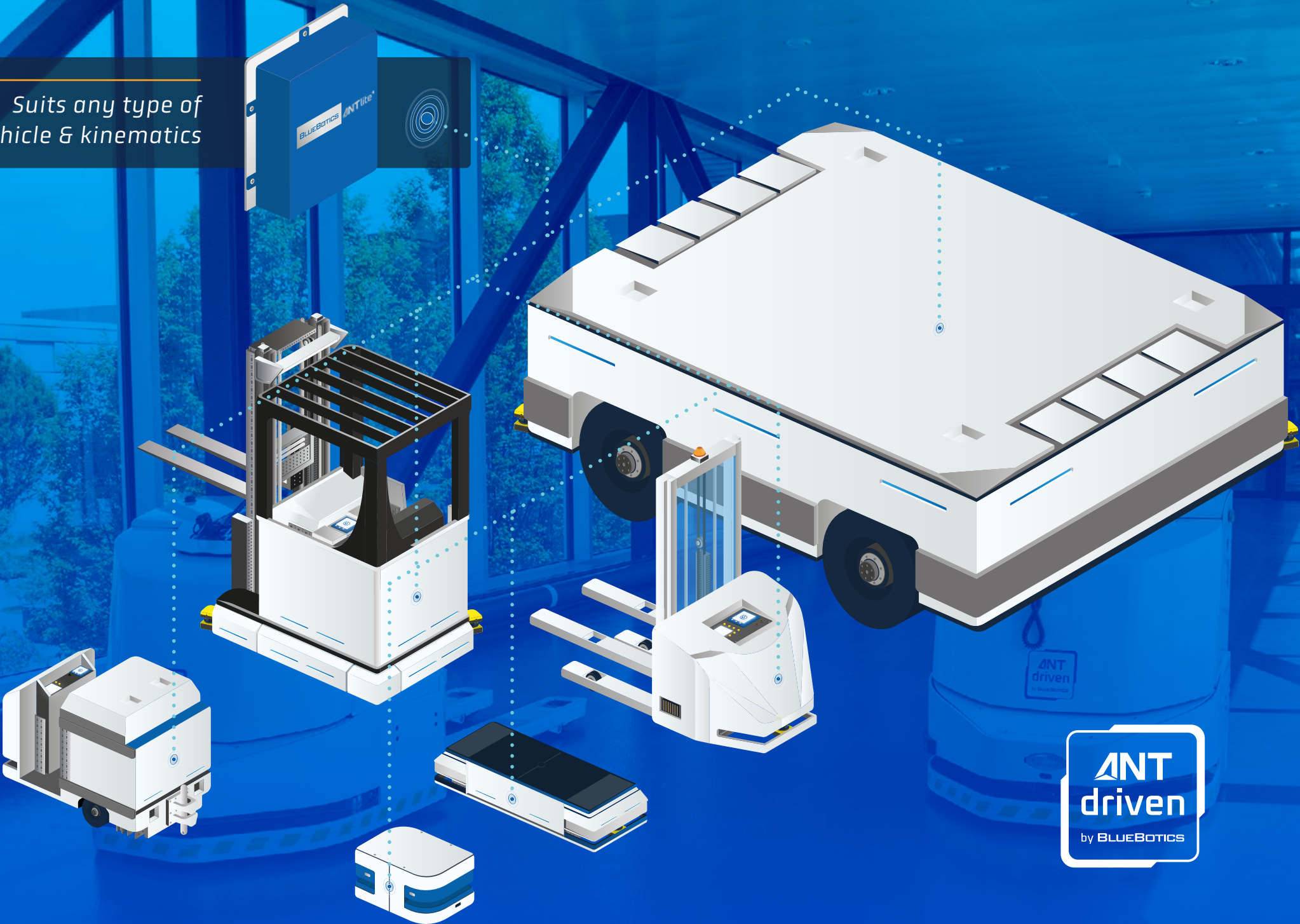
5,000+

ANT driven vehicles
in operation

1,000+

end-user
installations

10+ million

kilometers driven
by ANT

MEET YOUR AUTONOMOUS NAVIGATION PARTNER

At BlueBotics we help companies meet the challenge of vehicle automation. We provide the navigation technology and expert support they need to bring their AGV, automated forklift or mobile robot successfully to market.

When you partner with BlueBotics, our team works with you every step of the way to ensure our **Autonomous Navigation Technology (ANT)** is integrated successfully into your vehicle. Whatever it takes, we're by your side until it works.

23 **YEARS** OF

NATURAL FEATURE NAVIGATION

Our team of experienced staff covers every skillset your business might require: from mechatronics, system design and autonomous navigation to commercial business development and marketing.

Communication

We value effective communication. Listening and understanding is key, then our goal is to always convey clear and constructive messages, with customers, partners and each other.

Innovation

We are committed to continuous innovation that brings real-world value to our customers.

Simplicity

Pioneering technology is only useful if it is simple to use. We strive to make our products (and team) as easy to work with as possible.

"BlueBotics' ANT technology is very sound. Its ability to follow a path and follow it precisely was a game changer for us. And with the continuous improvements the team is making, the company has great potential. The way we're working together, it's effortless."

Michael Marcum
General Manager, Autonomous Vehicles
Bastian Solutions | a Toyota Advanced Logistics company

At BlueBotics we've helped companies to develop autonomous vehicles and robots for over two decades.

Our products are not only engineered in Switzerland, they are also produced here. Together with our network of suppliers, we deliver precise Swiss Made solutions, which guarantee your vehicles perform perfectly, both now and in the future.

Swiss Made

INTRODUCING
AUTONOMOUS NAVIGATION TECHNOLOGY (ANT)

ANT navigation technology is a flexible, accurate and highly robust solution that meets the evolving needs of vehicle producers and operators.

Based on 20 years of industry experience, ANT is simple to use and cost-effective to install and modify.
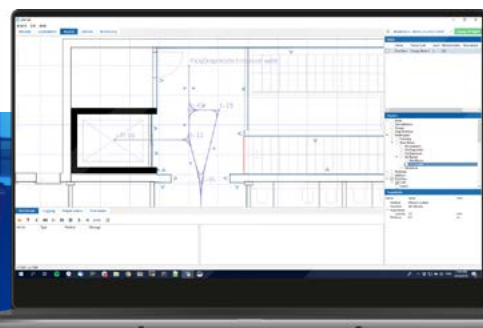
ANT
Autonomous Navigation Technology

All BlueBotics products are FCC/CE certified.

ANT lab (included):
Configure vehicles & missions

ANT server:
Manage missions & fleets
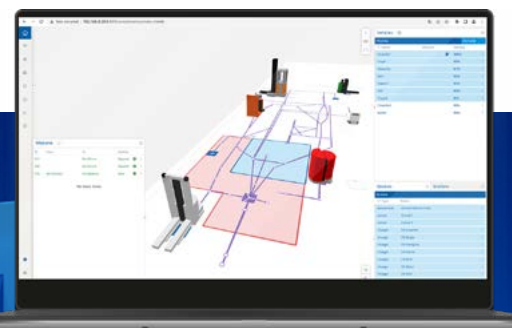
NATURAL FEATURE NAVIGATION FOR YOUR AGV, AUTOMATED FORKLIFT OR MOBILE ROBOT

> Natural feature navigation

> Accurate to ±1 cm / ±1°

> Minimal infrastructure changes (reflective stickers possible)

> Vehicles commissioned in days, not weeks

> Multi-brand fleet management

"After a week to prepare the map and pick/drop positions, we turned on our client's fleet and were able to run full production the same day. We have 12 AGVs and 6 loading positions delivering to 80 unloading positions. The performance and stability of BlueBotics' ANT lab software has really saved us a lot of time during commissioning."
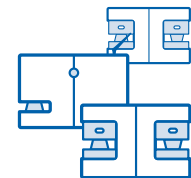
Kurtis Schram
Application Developer
Cimcorp North America

Quick
to install and modify

Accurate
to ±1 cm / ±1°

Scalable
Create an ANT fleet

Comparing navigation technologies
Join our expert team for an in-depth appraisal of today's different autonomous navigation technologies.

> WATCH THE WEBINAR

Embedded mission control

The transfer of mission data from computer to vehicle happens once (instead of commands being sent continuously from server to vehicle). This vastly reduces network requirements.

Payload detectors

These functions enable the successful pick-up of pallets and racks, and the hitching of carts, even if staff place these payloads imprecisely.

Full integration support

Our expert team of engineers supports you from project kick-off until you have a fully working ANT driven vehicle (including on-site).

WHAT FEATURES DOES ANT NAVIGATION INCLUDE?

Autonomous Navigation Technology (ANT) includes a wide range of features to automate your AGV, forklift or mobile robot. Each function has been designed to bring real-world value, based on the needs of customers around the world.

Robust localization

ANT uses laser scanner data and odometry to localize the vehicle in the map, using permanent structures (features) in the environment acting as references. Accurate to ±1 cm /±1°.
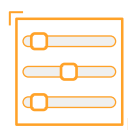
Optimal vehicle control

Based on the X, Y and angle coordinates provided, ANT controls the vehicle's motion either directly or via the vehicle's PLC (ANT lite+ only).

Optimized path follower

ANT's virtual path following is efficient, accurate and repeatable, with the vehicle stopping in case of blockages. This navigation mode suits most industrial applications.

Obstacle avoidance option

Enables a vehicle to dynamically navigate around blockages, rather than waiting for them to be removed. This navigation mode suits applications where coverage is more important than efficiency (e.g. cleaning).
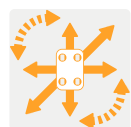
Full kinematic support

ANT is compatible with all types of AGV, forklift and AMR kinematics including tricycle, differential, car-like (Ackermann) and omnidirectional.
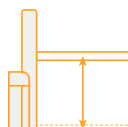
Fork control

ANT lite+ enables advanced actions such as full control of a lift truck's forks by communicating either with a vehicle's PLC or the motor controller that controls the fork.

> "The ANT product allowed Stöcklin to enter the AGV market with a competitive, flexible vehicle, which is installed in days."

Valentin Adelfio
Director Lift Trucks
Stöcklin

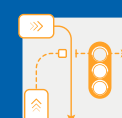## ADDITIONAL WITH **ANT server**

Fleet management

ANT server selects and deploys the right vehicle for each mission, seamlessly coordinates vehicles at intersections, and provides operators with a complete overview of their fleet in real-time.

Intelligent mission scheduling

Decides which vehicle to send on each mission, based on parameters you can configure.

Traffic control

ANT server's built-in traffic manager seamlessly coordinates the movement of different vehicles at locations such as intersections, doors, elevators etc.

Battery charge management

Determines when and where a vehicle must go to charge its battery.

API connection to WMS/MES/ERP

Manage missions and your wider fleet via your organization's existing software infrastructure via ANT server's dedicated API.

Equipment interfacing

Use ANT server's API to interface with equipment such as automatic doors, elevators, palletizers, production machines and more.
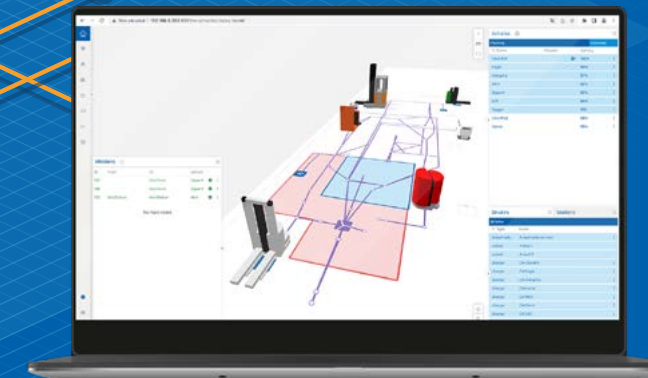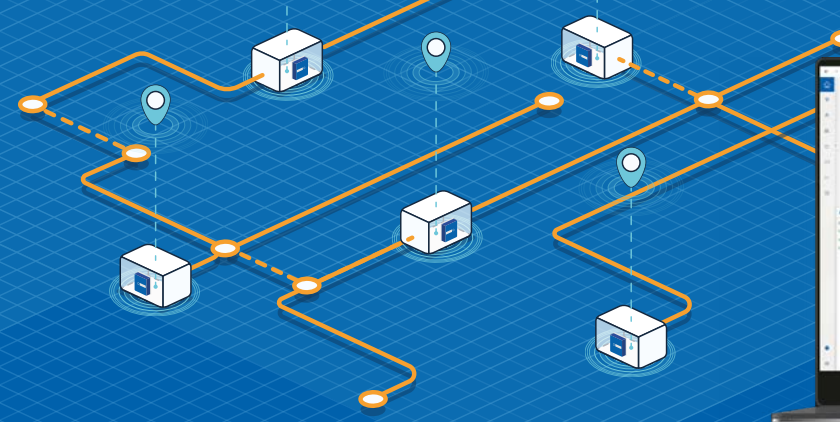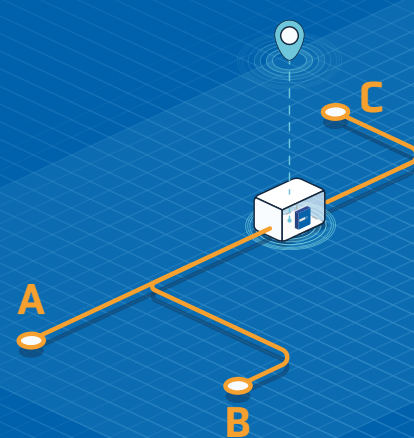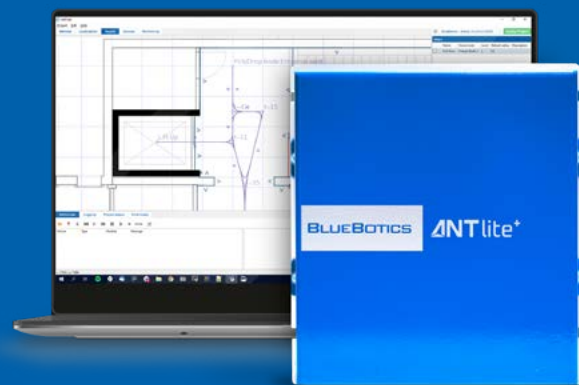
System monitoring

Visualize and monitor your AGV operation with ANT server's handy web interface for use with PC/tablet /smartphone etc.

Mission simulation

Ensure your operation runs smoothly from the start by simulating everything from individual AGV missions to full-scale fleet operations.

ANT lite⁺
POSITIONING & CONTROL

ANT lite⁺ is a vehicle control and positioning system for AGVs, automated forklifts and mobile robots. This complete natural feature navigation solution calculates the vehicle's position (localization), controls its motion, and interfaces directly with the vehicle's safety laser scanners.
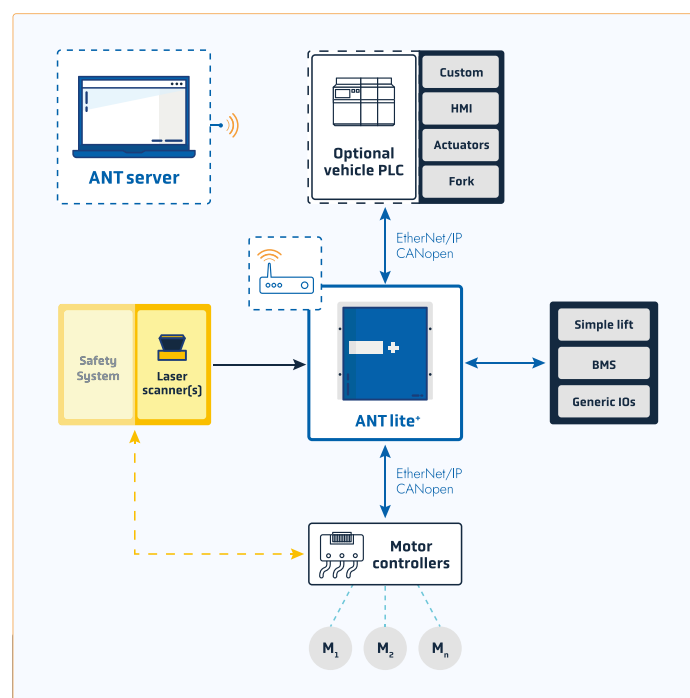
ANT lite⁺ provides commands directly to a vehicle's motor controller or via the vehicle's PLC (e.g. to interface with specific devices).

FULLY AUTOMATE YOUR VEHICLE

Positioning & control for:

> Automated guided vehicles (AGVs)

> Automated forklifts

> Autonomous mobile robots (AMRs)

> Service robots

Includes:

ANT lab

Every ANT navigation system is supplied with ANT lab, our proven vehicle and mission configuration software.

ANT server
MISSION & FLEET MANAGEMENT

FOR **ANT lite⁺**

ANT server is our advanced mission and fleet management software. Use it to manage and optimize your on-site operation (including traffic control).

Any vehicle. Any brand.

ANT server is a truly cross-platform solution. It can manage any AGVs, automated forklifts or mobile robots driven by ANT lite⁺, no matter what a vehicle's type, brand or kinematics.

> Simulate vehicles and missions

> Schedule missions

> Control traffic automatically

> Monitor your fleet in real-time

> Manage the charging of vehicles

> Interface with software (WMS/MES/ERP) and equipment (doors/elevators etc.)

PUT YOUR AGVs TO WORK

ANTloc⁺

ANT localization⁺ is a positioning system for the upgrading of line following AGVs. It enables a vehicle to follow a virtual line using natural feature navigation, effectively replacing the antenna used to follow physical lines such as magnetic tape, inductive wire, tags etc.

UPGRADE TO VIRTUAL LINE FOLLOWING

Positioning for:

> Line following AGVs

Includes:

ANTlab

Every ANT navigation system is supplied with ANT lab, our proven vehicle and mission configuration software.

ANT localization⁺ estimates a vehicle's distance from the desired virtual line (offset). It then communicates this data directly to the PLC, as well as providing virtual tags and a recommended speed.

ANTloc

POSITIONING

ANT localization is a vehicle positioning system for automated guided vehicles (AGVs), automated forklifts and mobile robots. It can also be used to track manual vehicles. ANT localization simply provides position coordinates to the main vehicle controller. Therefore, it suits vehicle makers who have their own control system.
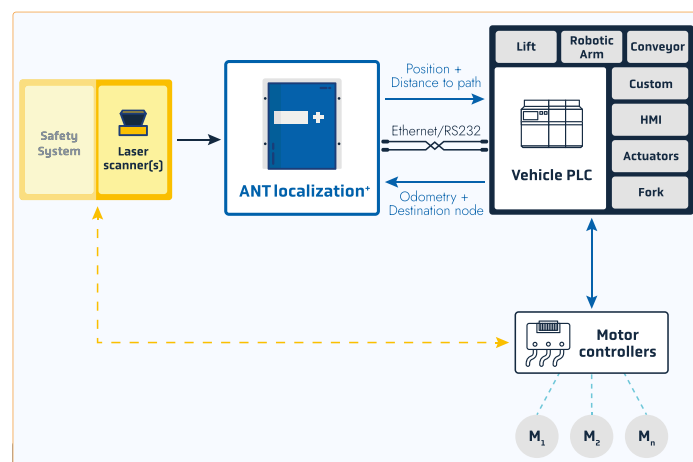
KNOW EXACTLY WHERE YOUR VEHICLE IS

Positioning for:

> Automated guided vehicles (AGVs)
> Automated forklifts
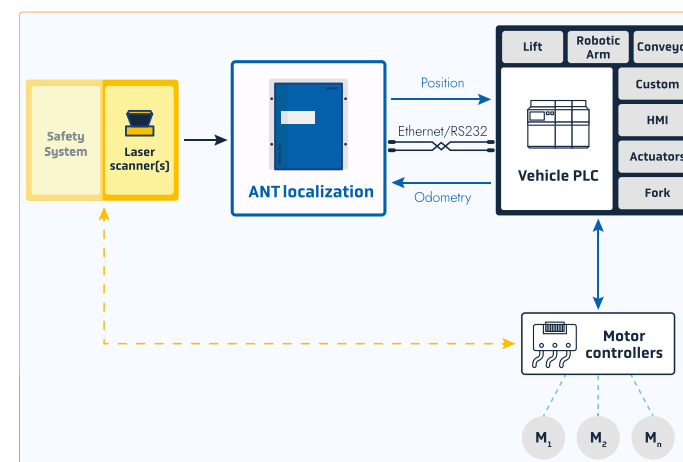> Autonomous mobile robots (AMRs)
> Service robots
> Manual vehicles

Includes:

ANTlab

Every ANT navigation system is supplied with ANT lab, our proven vehicle and mission configuration software.

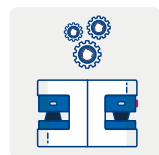ANT localization provides a vehicle's coordinates directly to the PLC.

ANT lab
VEHICLE & MISSION CONFIGURATION

ANT lab is our proven vehicle and mission configuration software. Use it to configure and install your customers' AGVs. Then, in the future, use ANT lab to update their installations, modifying routes and actions as required.

How it works

1 **Configure & calibrate your vehicle**

Set your vehicle's parameters, then calibrate its laser scanner positions and odometry to ensure high accuracy.
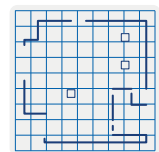
2 **Create your map**

Create the site map by driving your vehicle around manually. Then, clean this by removing dynamic objects, leaving only the permanent, static features your vehicle will use as references.
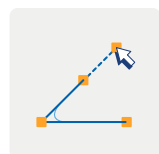
3 **Define routes & actions**

Create your vehicle's routes, define actions (such as moving its forks), and configure devices to define how your vehicle interacts with chargers, elevators etc. If using ANT server, battery management strategies can also be defined. Traffic rules are configured automatically.

CONFIGURE, INSTALL, DEPLOY

> Configure & calibrate vehicles

> Map sites

> Create routes & actions (e.g. move forks)

> Configure devices (e.g. chargers, elevators etc.)

> Monitor & validate projects

> Included with every ANT product

> Free & regular updates
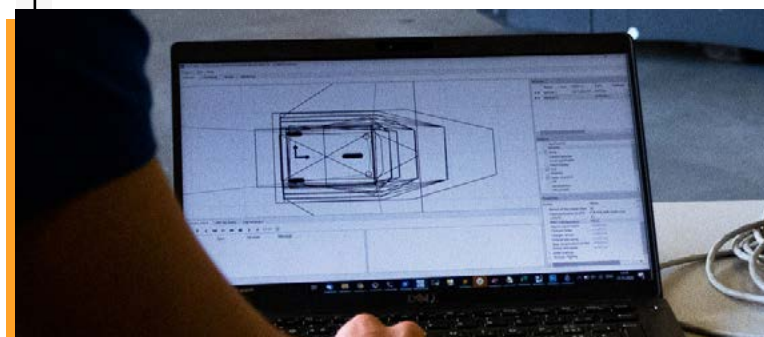
> "BlueBotics' technology is the most robust natural feature navigation software around. We couldn't believe its potential, or the precision possible, until we saw it with our own eyes. And when integrating ANT into our forklifts, the support was excellent, simply the best."

Thanassis Papaleloudis
CEO
LIFTCO E.E.

COMPARE ANT PRODUCTS
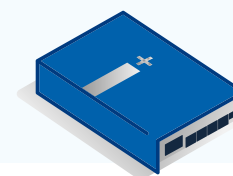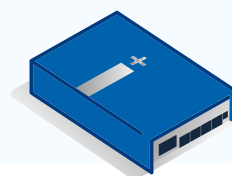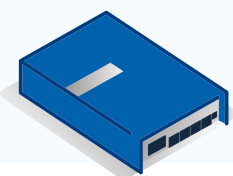
	ANTlite⁺	ANTloc⁺	ANTloc
LOCALIZATION	✓	✓	✓
CONTROL	✓	✗	✗
EMULATION OF LINE FOLLOWING	✗	✓	✗
MISSION MANAGEMENT	✓	✗	✗
FLEET MANAGEMENT	✓ (WITH ANT server)	✗	✗
OUTDOOR OPERATION	✓ (WITH ANT everywhere)	✓ (WITH ANT everywhere)	✓ (WITH ANT everywhere)

Which ANT product do I need?
To identify the best ANT navigation system for your vehicle, try our online product finder tool.

> **PRODUCT FINDER**

HOW TO COMMISSION ANT DRIVEN VEHICLES

When it comes to making your customers happy and ensuring the profitability of your vehicle, quick and efficient commissioning (or installation) is the goal. With ANT this process is quick and simple, with minimal infrastructure changes required.

1 Create your map

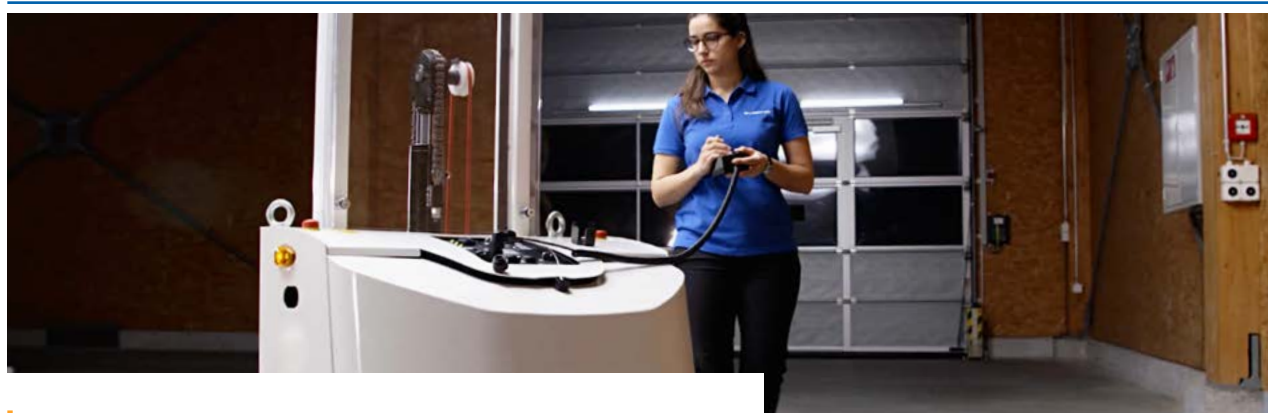Drive your AGV manually around the site. Our ANT lab software (included) records data from the vehicle's safety laser scanners, which is then used to generate a 2D map. Lastly, 'clean' this map by removing any dynamic objects, leaving only permanent features such as walls, pillars, fixed equipment, etc. These 'references' will be used to calculate your vehicle's position, allowing it to navigate effectively.

2 Define your operation

Program your AGV's required routes. Then, add actions such as moving a lift truck's forks, setting a digital I/O, or communicating with the vehicle's PLC. Routes and actions are configured in ANT lab, while traffic rules are configured automatically.
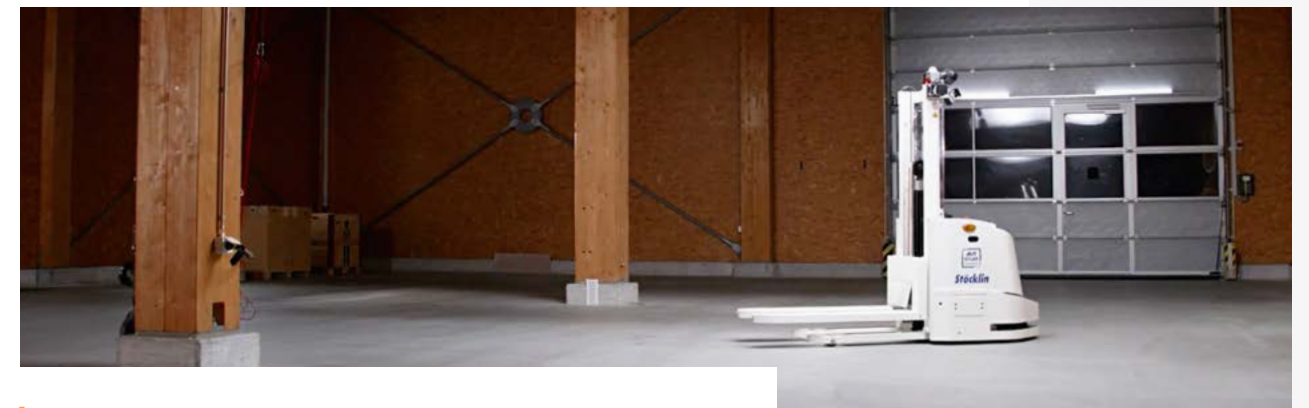
3 Go to work

Start your first mission! Your ANT driven vehicle will use a combination of safety scanner data and odometry to move safely through the environment, following your pre-defined routes and actions. In the case of multiple AGVs, traffic and fleet management is easily handled by our ANT server software (available with ANT lite+).

> "Since we adopted ANT, we moved from a typical installation of two to four weeks, to only a few days!"
>
> Guiliano Bavaj
> Managing Director
> Esatroll

HOW WE CAN HELP

Our proven collaboration process is flexible enough to suit every project's needs. Put simply, it breaks down into three key phases.
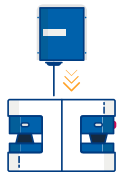
Get our detailed project guide

Explore how we will work with you to make your automated vehicle project a success.

> **DOWNLOAD GUIDE**

1 Discovery

We discuss your needs to ensure our ANT navigation technology can bring value to your vehicle.

2 Integration

This phase spans from kick-off until your company has a working ANT driven vehicle, including on-site support.

3 Launch

We work with you to make sure your launch is a success, including on-site support at your first customer installation.

Integration Package

Our expert team supports your vehicle's development every step of the way. This includes visiting your site during the integration of ANT into your vehicle, and supporting you at your customer's site the first time your vehicle is commissioned.

"ANT is great but what makes also the difference is the service you have. I get an answer immediately, and you always answer. This makes the difference."

Miguel de Sebastian
CEO
DTA

ANT TECHNICAL SPECIFICATIONS

	ANT lite⁺	**ANT loc⁺**	**ANT loc**
FUNCTIONALITY	Positioning, control	Positioning, emulation of line following	Positioning
VEHICLE COMPATIBILITY			
Kinematics	Tricycle, differential, omnidirectional, car-like (Ackermann)	Tricycle, differential, omnidirectional, car-like (Ackermann)	Tricycle, differential, omnidirectional, car-like (Ackermann)
Maximal speed	Up to 3.5 m/s (7.8 mph)	Up to 5.0 m/s (11.2 mph)	Up to 5.0 m/s (11.2 mph)
POSITIONING			
Accuracy	± 1 cm/± 1°	± 1 cm/± 1°	± 1 cm/± 1°
Localization rate	5 Hz	Up to 20 Hz	Up to 20 Hz
CONTROL			
Obstacle avoidance rate	10 Hz	-	-
Path following rate	10 Hz	10 Hz (emulation)	-
COMPATIBLE COMPONENTS			
Safety laser scanners	HOKUYO UAM-05LP-T301, OMRON OSC32C, LEUZE RSL425, LEUZE RSL445 SICK microScan3, SICK nanoScan3, SICK outdoorScan3, SICK S3000 Expert, SICK S300 Expert, SICK TiM781S	HOKUYO UAM-05LP-T301, OMRON OSC32C, LEUZE RSL425, LEUZE RSL445 SICK microScan3, SICK nanoScan3, SICK outdoorScan3, SICK S3000 Expert, SICK S300 Expert, SICK TiM781S	HOKUYO UAM-05LP-T301, OMRON OSC32C, LEUZE RSL425, LEUZE RSL445 SICK microScan3, SICK nanoScan3, SICK outdoorScan3, SICK S3000 Expert, SICK S300 Expert, SICK TiM781S
Non–safety laser scanners	Pepperl&Fuchs OMD30M-R2000, Pepperl&Fuchs OMD60M-R2000, SICK LMS100, SICK LMS151, SICK LMS141 Security Prime, SICK TiM571, SICK LMS500	Pepperl&Fuchs OMD30M-R2000, Pepperl&Fuchs OMD60M-R2000, SICK LMS100, SICK LMS151, SICK LMS141 Security Prime, SICK TiM571, SICK LMS500	Pepperl&Fuchs OMD30M-R2000, Pepperl&Fuchs OMD60M-R2000, SICK LMS100, SICK LMS151, SICK LMS141 Security Prime, SICK TiM571, SICK LMS500
Motor drives	CANopen, EtherNet/IP	-	-
User configurable I/Os	10 dig. in / 10 dig. out	-	-
HARDWARE			
Embedded computer	Industrial PowerPC	Industrial PowerPC	Industrial PowerPC
Operation voltage	24 VDC (20 VDC...30 VDC)	24 VDC (20 VDC...30 VDC)	24 VDC (20 VDC...30 VDC)
Power consumption	<20 W	<20 W	<20 W
Operating temperature	0℃ to 60℃	0℃ to 60℃	0℃ to 60℃
Storage temperature	-25℃ to 85℃	-25℃ to 85℃	-25℃ to 85℃
Relative humidity	5% to 95% (non-condensing)	5% to 95% (non-condensing)	5% to 95% (non-condensing)
IP rating	IP30	IP30	IP30
Certification	CE, FCC	CE, FCC	CE, FCC
Dimensions (WxHxL)	153 x 46 x 160 mm	134 x 30 x 160 mm	134 x 30 x 160 mm
Weight	0.85 kg	0.65 kg	0.65 kg

BLUEBOTICS

Your Vehicle Navigation Partner

About us

At BlueBotics we help companies meet the challenge of vehicle automation. We provide the navigation technology and expert support they need to bring their AGV, automated forklift or mobile robot successfully to market.

A ZAPI GROUP COMPANY

How to find us

CONTACT US

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+41 21 694 02 90
bluebotics.com

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HEADQUARTERS

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| Shanghai, China

Swiss Made