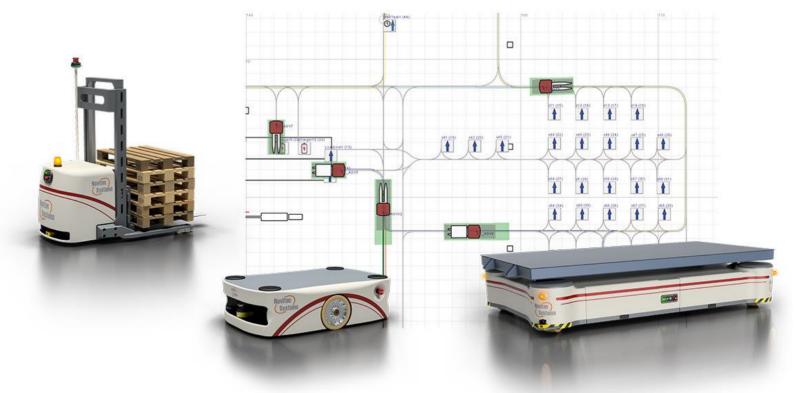


AGV Navigation software by Navitec Systems

株式会社リンクス





Comany: Navitec Systems Oy

HQ: Espoo Finland

Employees: 40 (almost all engineers)

History: 1998 Founded, and quickly become the natural

feature based navigation in mining industry.

2013 Join into AGV market and first NFN based

AGV system delivered

AUTOMINE® TRUCKING THE NEXT EVOLUTION IS HERE

AutoMine®, the industry's leading automation solution, has evolved.

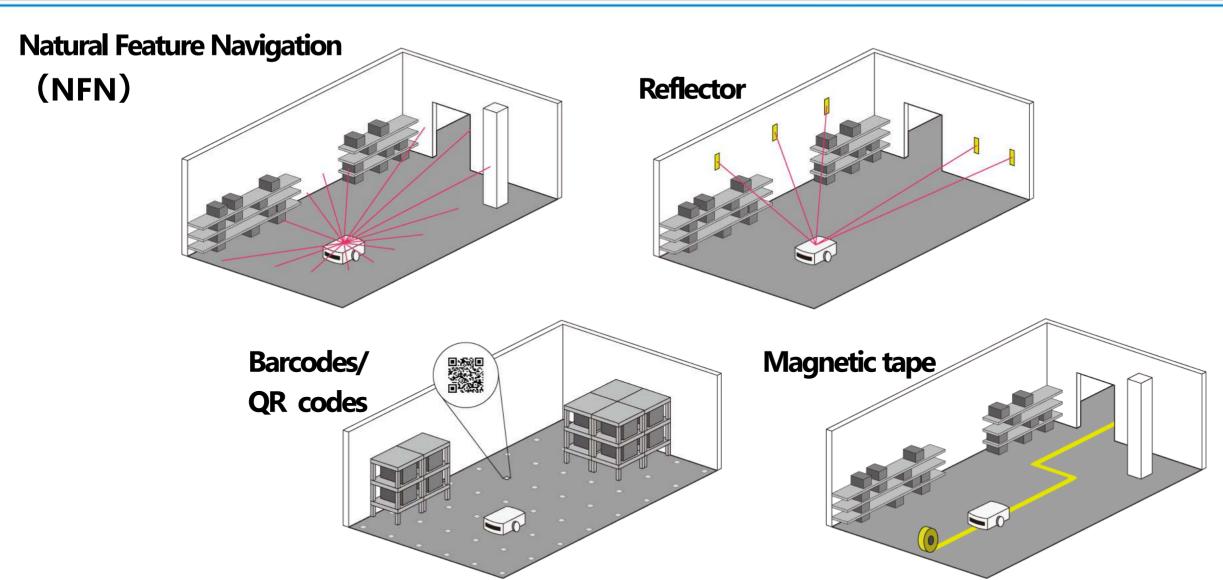




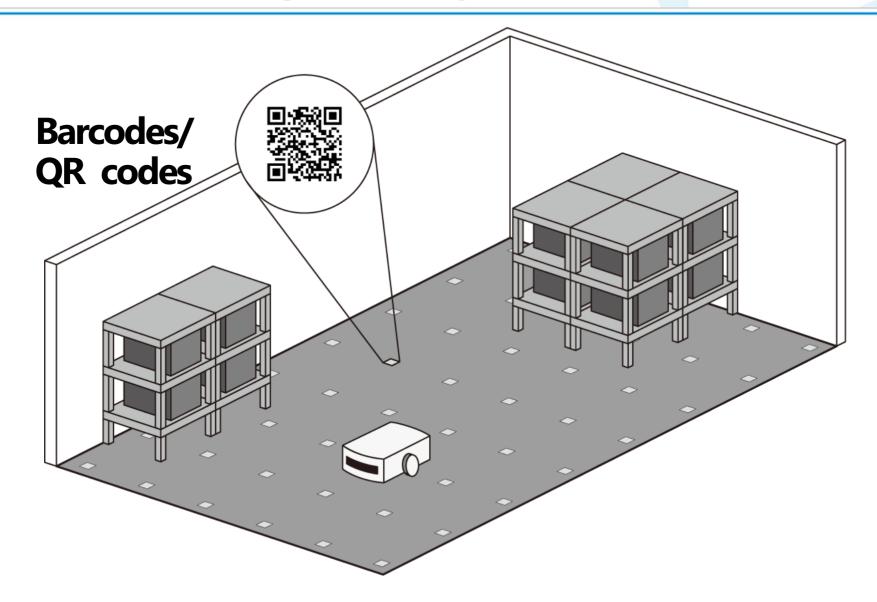
Fully automatic driving of manned vehicles on general roads is far ahead.

Automated unmanned vehicle driving in factories / warehouses is already at the diffusion stage.



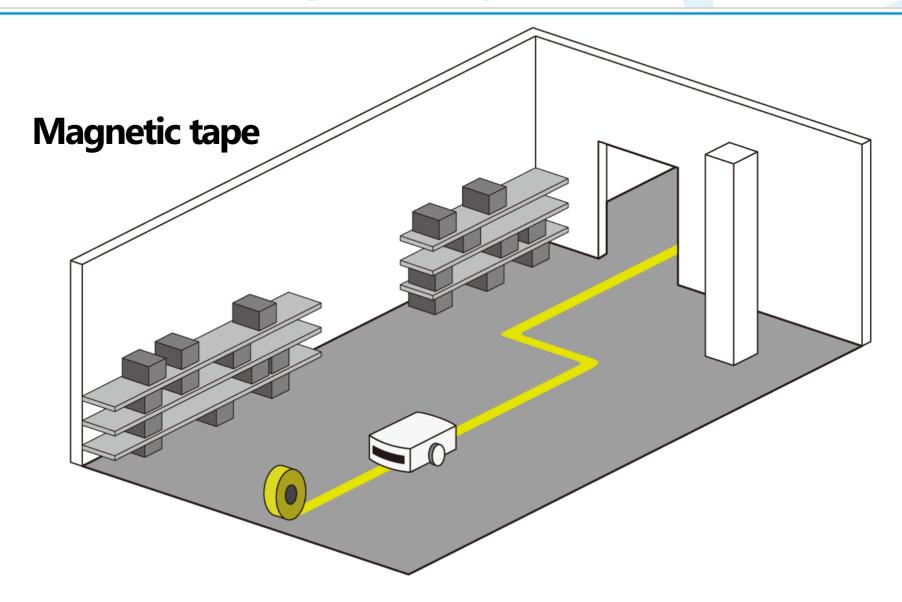






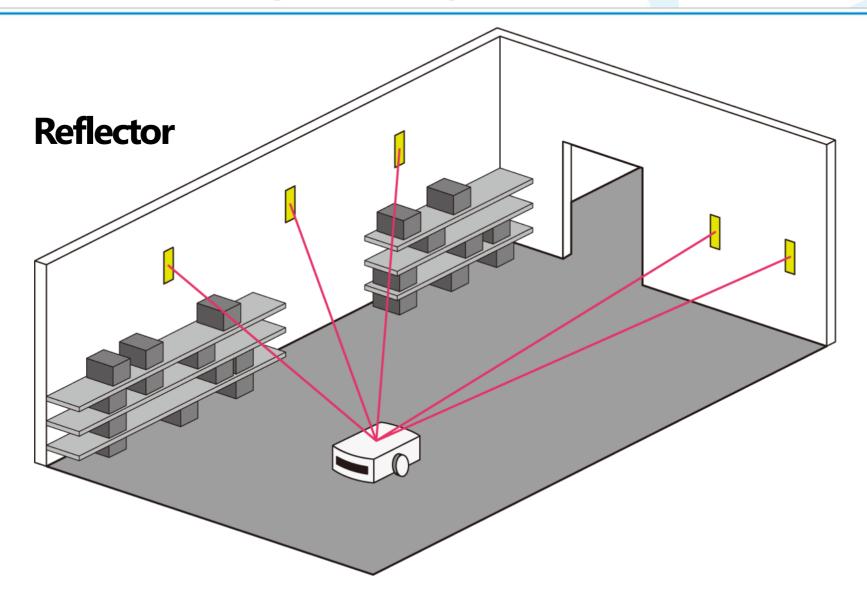












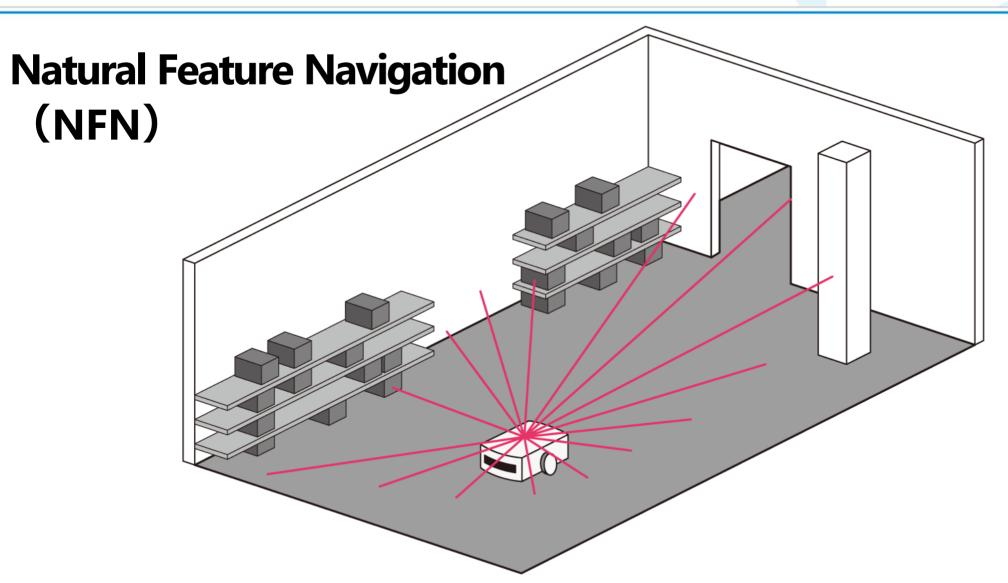


Comparison of navigation systems



Туре	Strong point	Weak point
Magnetic Tape	Stable transportation	 Unable to obstacle avoidance Route arrangement is not easy Re-taping necessary every time changing the route
QR code/ Barcode	Easy route arrangement with spot codes	 Unable to obstacle avoidance Only completely unmanned environment
Reflector	 Easy route arrangement Available in manned environment * 80% market share with Automated Guided Forklift 	 Limited condition of reflector positioning, and Sensor Height



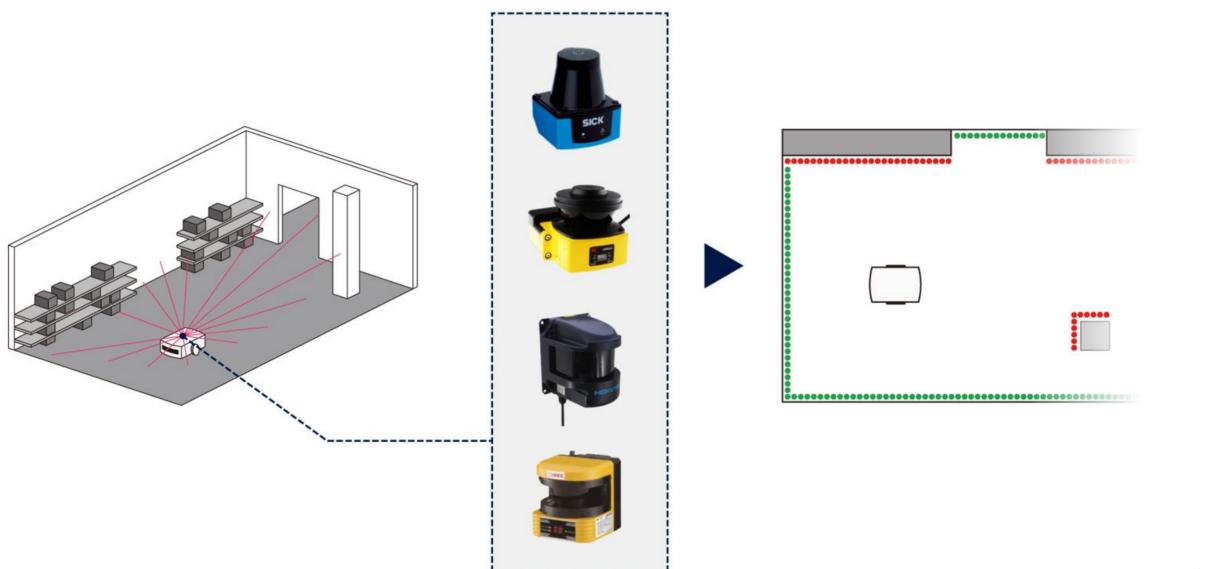






Natural Feature Navigation (NFN)





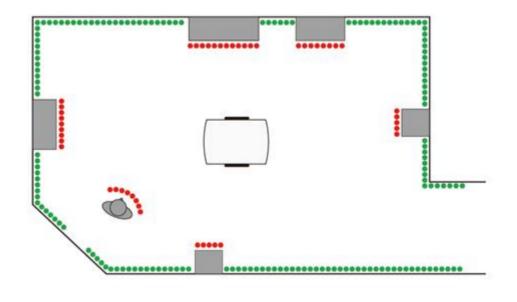
Why NFN?

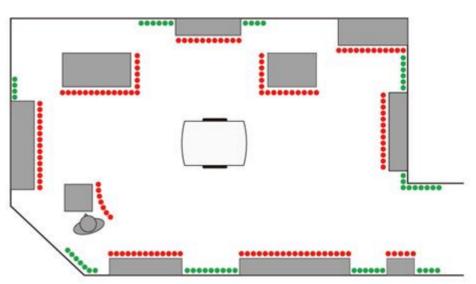


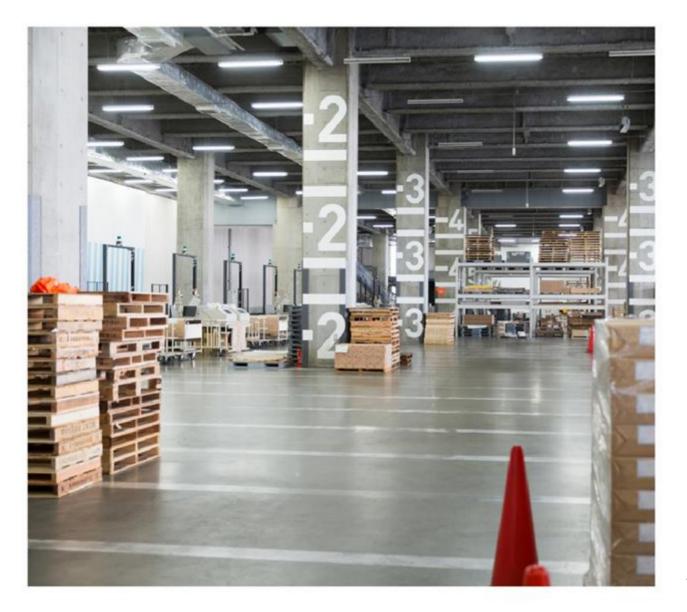
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Reflector	Easy route arrangementAvailable in manned environment	 Limited condition of reflector positioning, and Sensor Height
NFN	 Applicable with existing equipment Obstacle avoidance Available in manned environment Available to dynamic rout change Unlimited condition Short lead time for installation 	 Under unmanned condition QR code system is more stable

1. SLAM



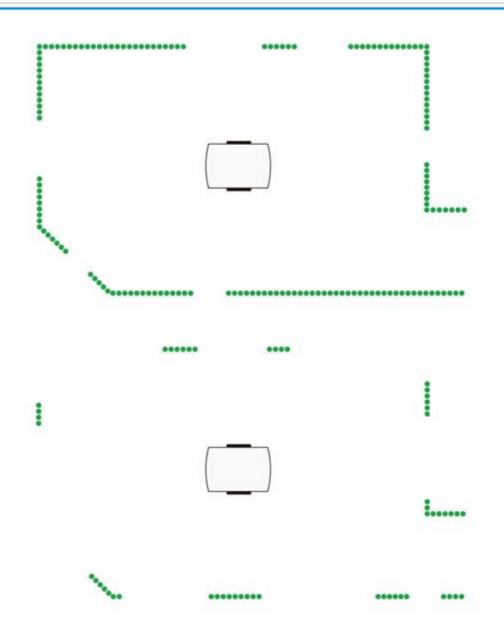


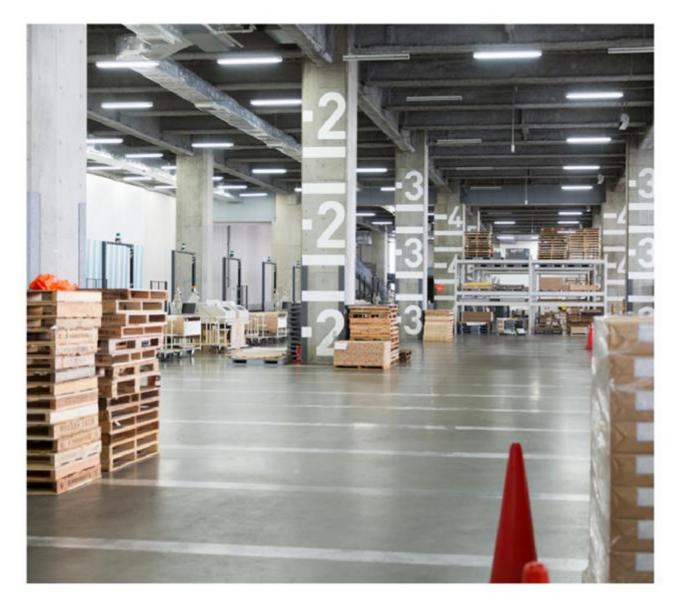




1. SLAM

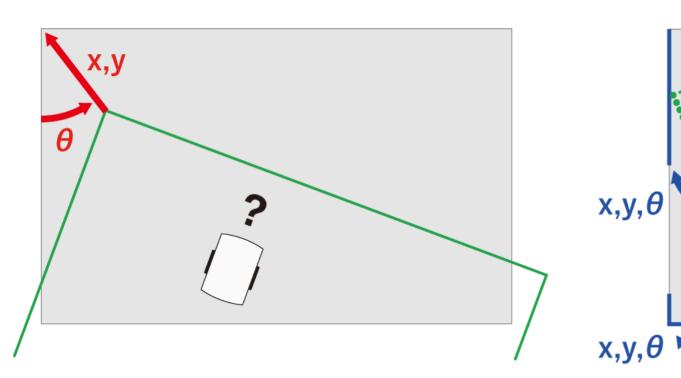


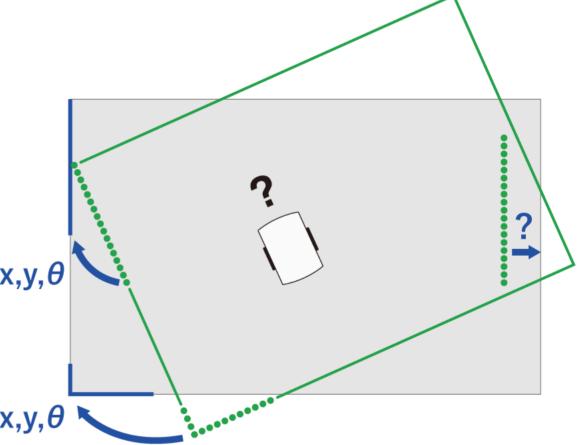




1. SLAM







Why Navitec? (1)



Stopping Accuracy: ±1cm (the best in the world)

Why Navitec? (1)



Stopping Accuracy: ± 1 cm (the best in the world)

- ..., but the SLAM is just one of the factors for AGV implementation in the real.
- Navitec software offer to our customer that AGV system implementation & maintenance lead time can be reduced to 1/4.

2. Route Setting - Flexible & Easy -

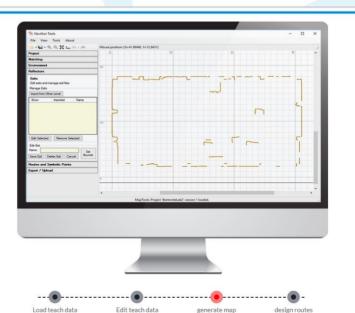






generate map

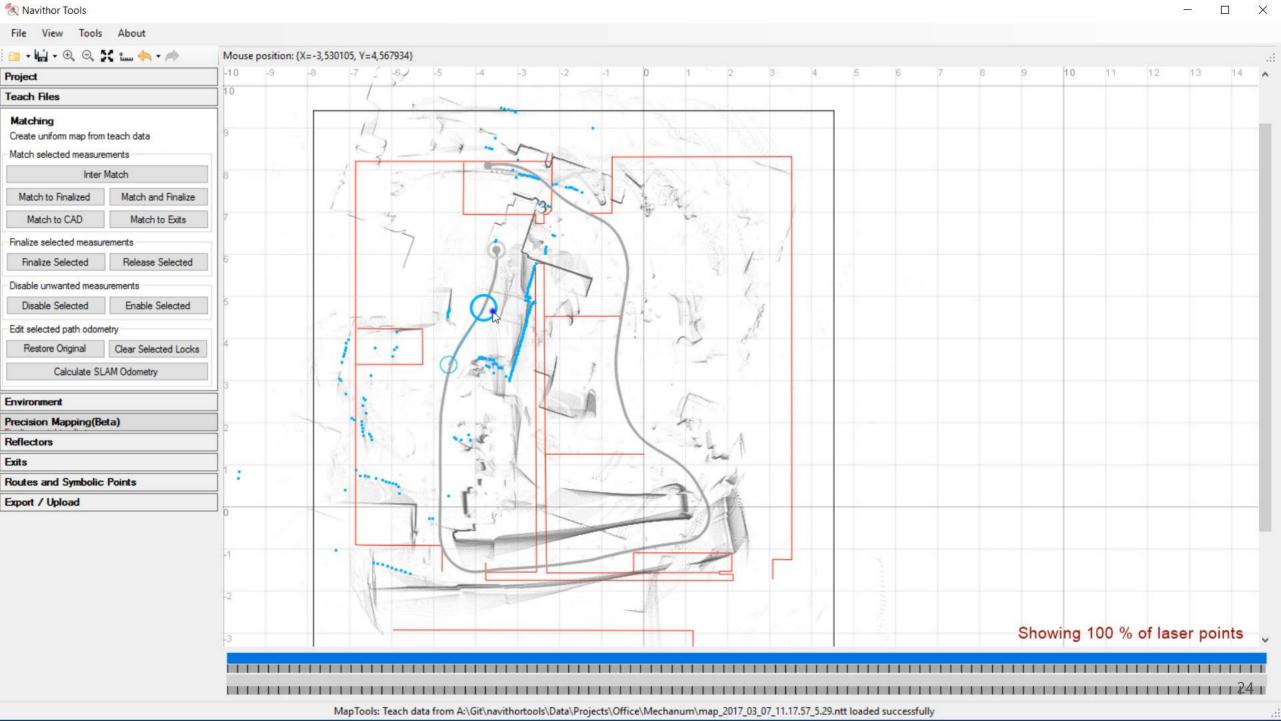
Edit teach data

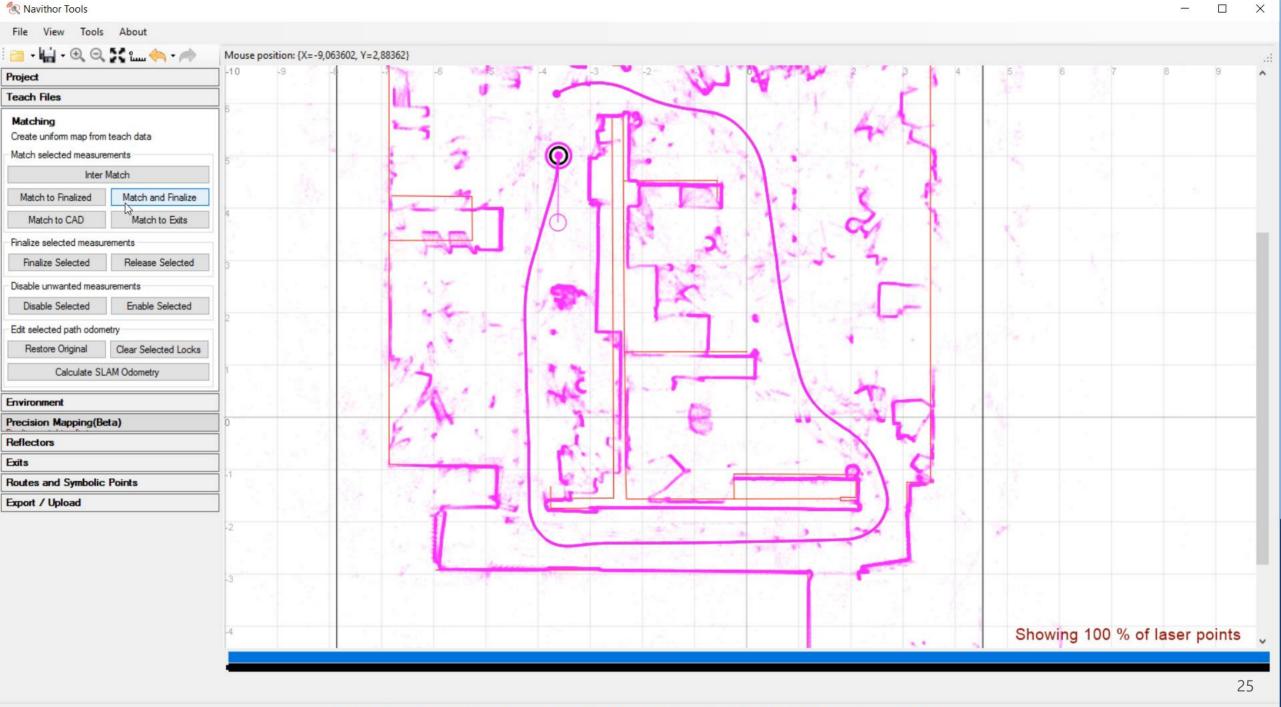


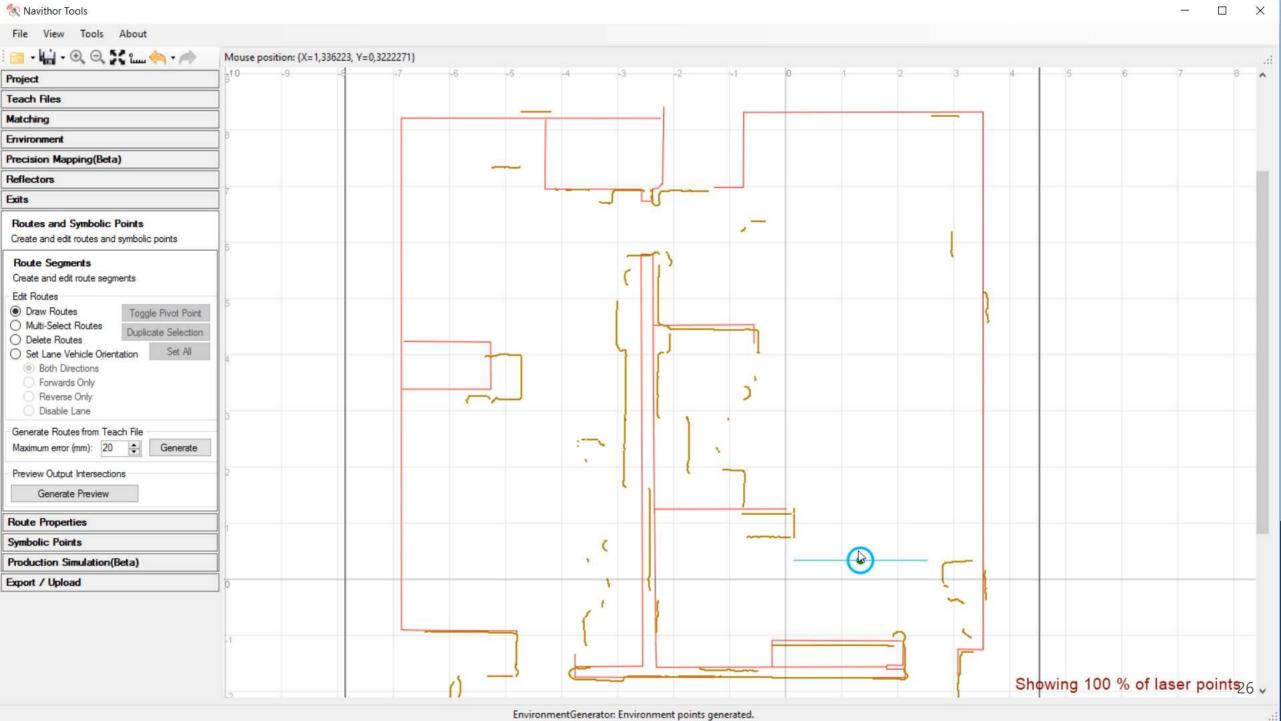


Edit teach data

Load teach data



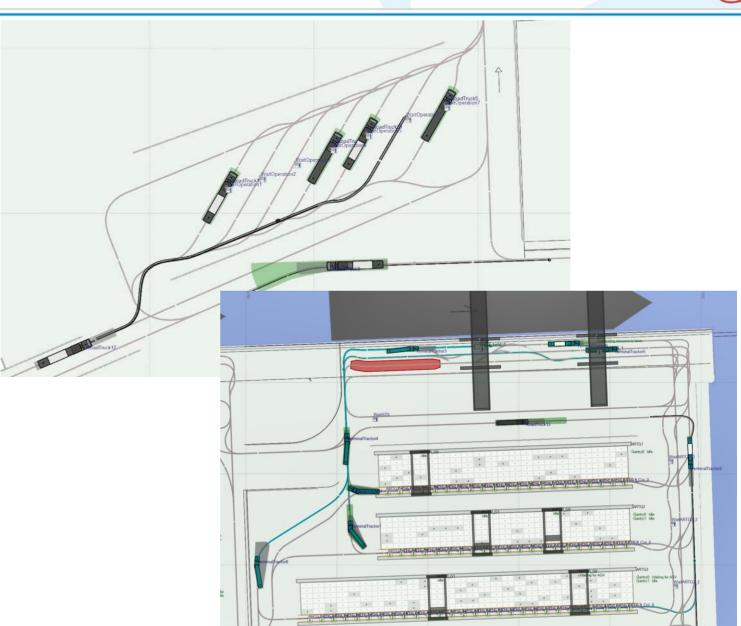


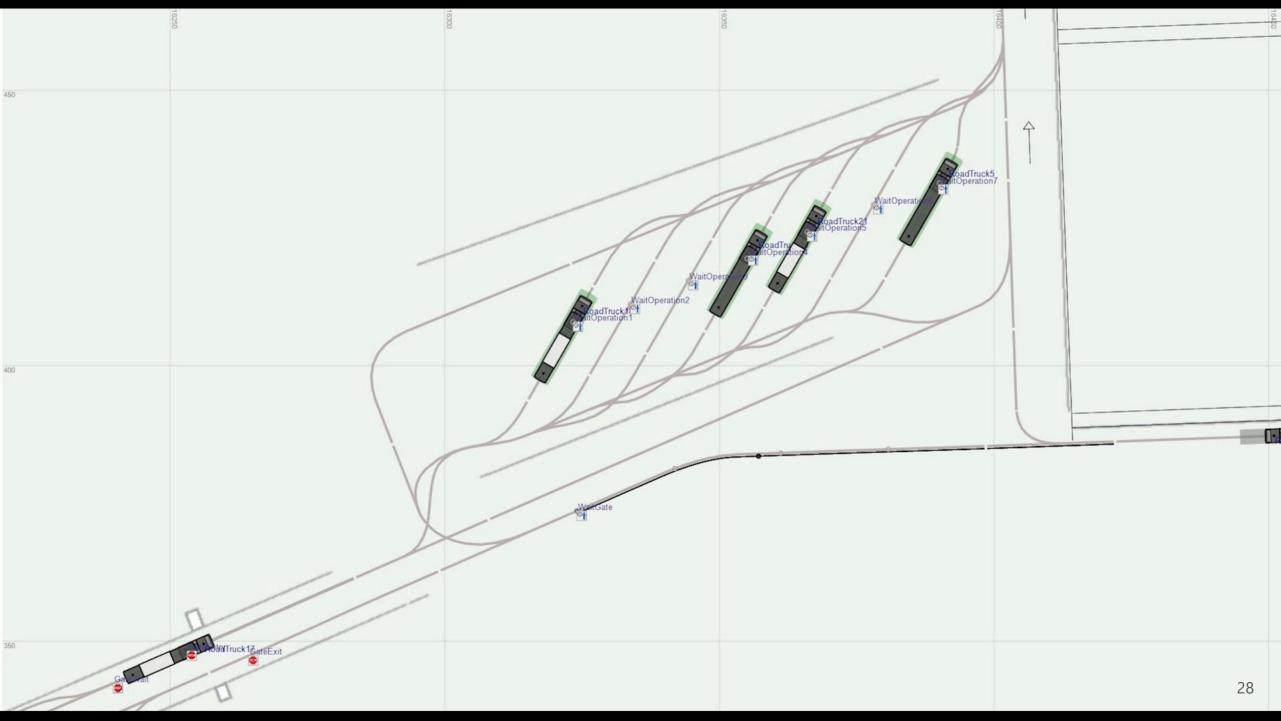


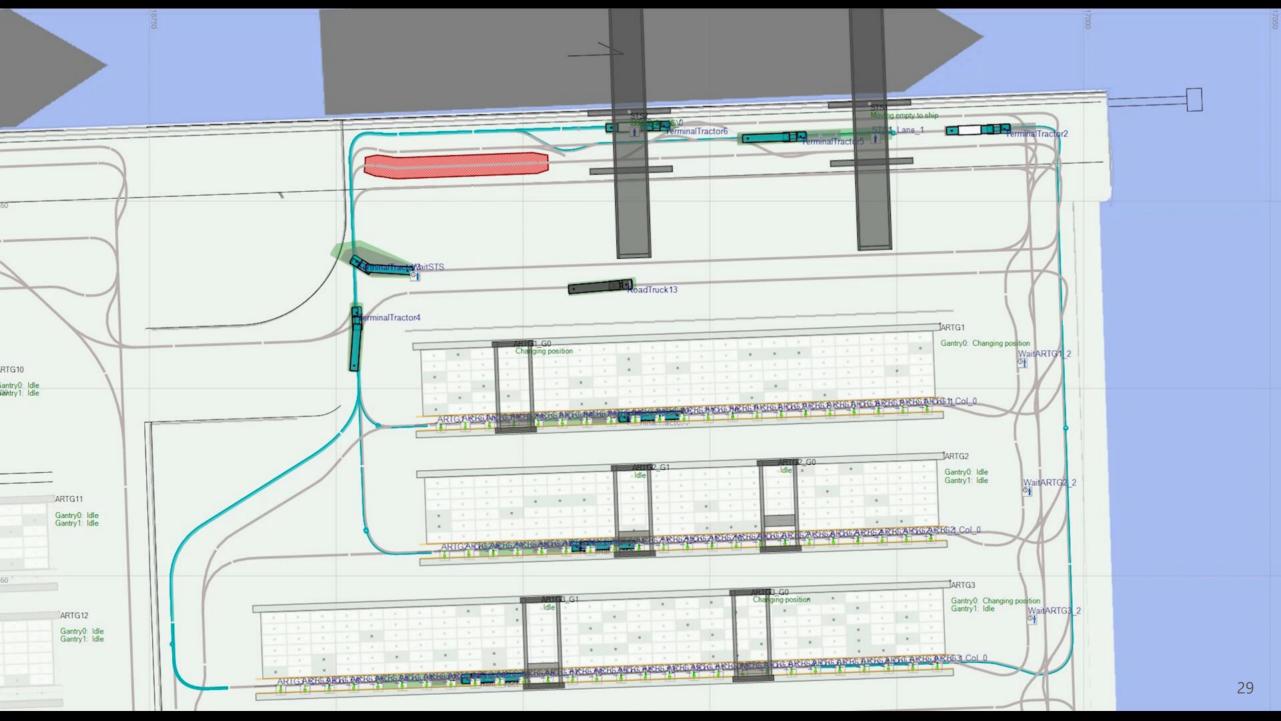
3. Fleet Control





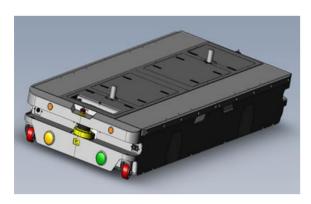






3. Fleet Control - One system with various AGVs -





AGC with pin for pulling carts



Omni-directional AGV



Forklift-type AGV



Mobile Platform



Tugger - train

Case Study



Arçelik社 (Tulky)

https://www.youtube.com/watch?v=-ZsCaSWjjyM

Grenzebach社 (Germany)

https://www.grenzebach.com/products-markets/intralogistics/

Sandvik社 (Sweden Mining) *custom development

https://www.youtube.com/watch?v=difuW752jNU&list=PLcm3ILgVIKAWM303VUek8GRpv5H7NbCpM&index=4

SKB社 (Sweden Forsmark Spent Fuel Repository) * custom development

https://www.youtube.com/watch?v=WCHqxqIZUNA&feature=youtu.be&t=370

Reference



Web/ Catalogue Download

https://linx.jp/product/navitec/

YouTube Linx Channel

https://www.youtube.com/playlist?list=PLwF4eNIno02a6l6kx20ArgXDxNdxCc38T

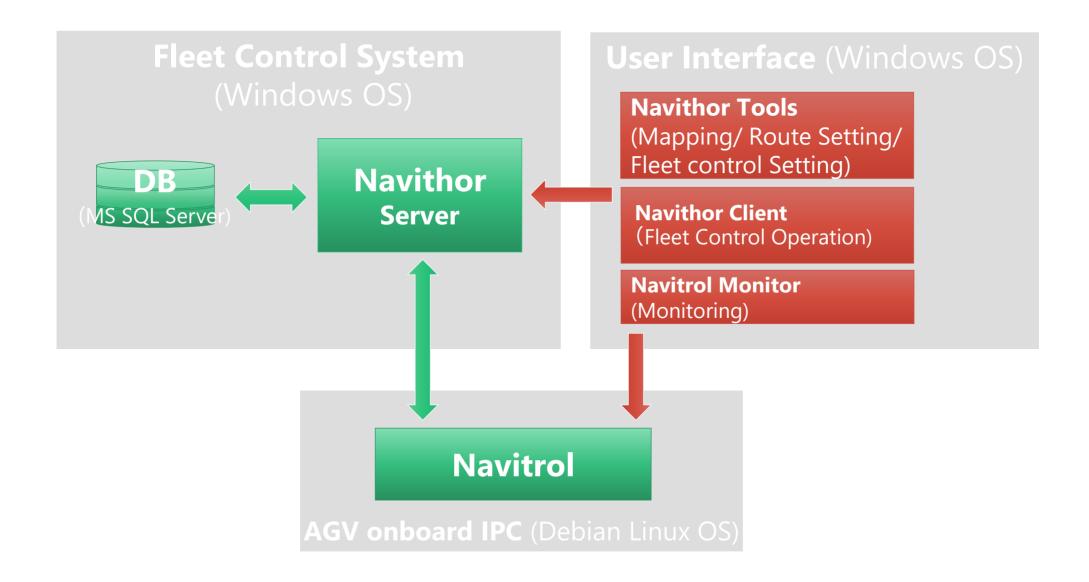


Technical Information

株式会社リンクス

System Overview





Navitec License Modules



- Navitrol AGV Navigation software
 - Navigation for single AGV or limited area applications with no need for traffic control or centralized task management.
 - Also suitable for multiple AGVs if controlled by a customer fleet control.

Modules	
Positioning	
Dynamic Mapping	
Driving Differential or Tricycle	
Driving Omni	
Precision Positioning	
Pallet Detection	
Obstacle Avoidance	
Routing Tool with basic stations inside the Vehicle	

Navitec License Modules



Navithor – Fleet Control software –

The Fleet Control receives MES/WMS transportation tasks and transforms them into intelligently planned drive orders for the AGV fleet. Task reporting and logging ensure a permanent connection to the production and full traceability of the process.

Modules	
Fix charge	
Per vehicle Charge	
Modules	
Lifting Table / Fork Package	
High Bay Warehousing	
Block Stacking	
Standard interface to WMS/MES	
Multiple vehicle Types (one type included)	
Omni vehicle(differential & tricycle type)	
Driving in formation - Assembly Line (automotive straight line)	
Hot-Swap(doesn't include 3rd Party)	
Web-based User Interface	
Additional license for Fleet Control basic	

Supported Hardware (1)



Kinematic modules :

- Steer driven Tricycle
- Differential driven
- Omni vehicle up to 6 controller wheels
- Mechanum
- Combination of steer and differential drive







Supported Hardware (2)



- LiDAR Scanner
 - Sick NanoScan/ MicroScan3/ S300/ TIM/ LMS
 - Omron OS32C
 - P&F R2000
 - Velodyne VLP16
 - Leuze RSL400
 - Hokuyo UAM-05LP
 - Keyence SZ-V 32N

- Can utilize safety scanners for positioning
 - 1 or 2 laser scanners for positioning
 - Up to 4 safety scanners can be connected

Supported Hardware (3)



- Industrial PCs
 - Sintron (Taiwan) VBOX series
 - Vecow (Taiwan)
 - Aprotech (Germany) Golub-4200 series
- CAN
 - Kvaser
 - Peak
 - SocketCAN
- Serial
 - Diamond Systems RS422
- TCP/IP
 - 3rd party motor controller through Ethernet or WLAN

Supported Hardware (4)



- Encoders
 - Kübler
 - Sick AHS
 - P&F
 - Leine&Linde
 - Generic CANOpen



https://linx.jp

Tel:03-6417-3371