AUTOMATED GUIDED VEHICLE (AGV) & AUTONAMOUS MOBILE ROBOT (AMR)

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HISTORY

AGV

1950S

The first AGV was developed by Barrett Electronics in the United States for use in a grocery store

1960S-1970S

AGVs were developed for use in factories and warehouses to transport materials and products

1980S-1990S

AGVs became more advanced and were able to navigate using sensors and computer controls.

TODAY

AGVs are used in a wide range of industries for material handling and transportation, and can be programmed to perform a variety of tasks

AMR

2000S

The initial AMRs were created for use in space and military applications. These early AMRs were primarily operated remotely by human operators and were utilised for missions including reconnaissance, surveillance, and exploration.

2010S

AMRs started being employed in commercial and industrial environments for operations including cleaning, inventory control, and material handling. AMRs became more sophisticated and autonomous during this time thanks to advancements in sensor technology, artificial intelligence, and machine learning.

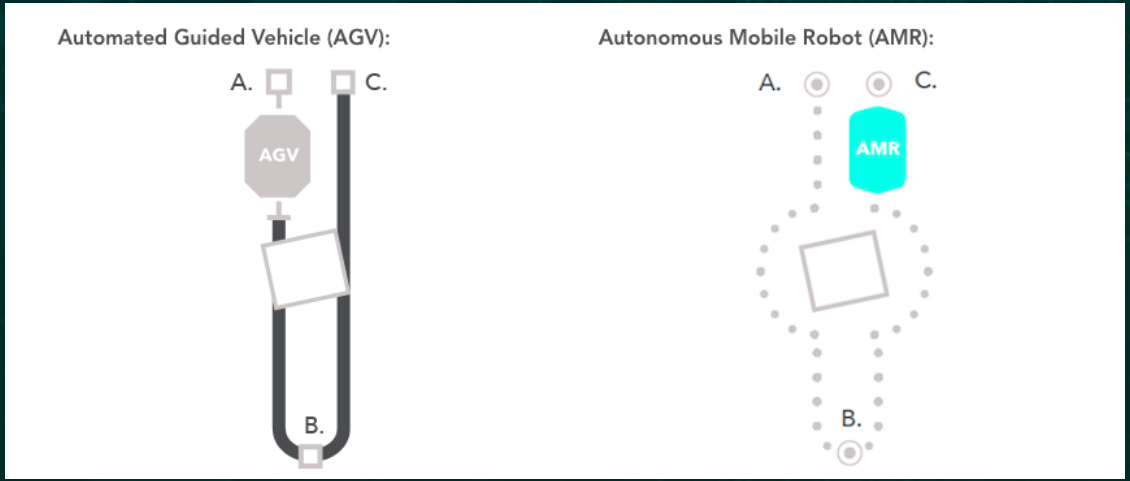
TODAY

AMRs are being used more frequently in a wide range of industries and are evolving thanks to the incorporation of machine learning and artificial intelligence.

02

DIFFRENCES

AGV	AMR
Simpler than AMR	Complex and sophisticated compared to AGV
Sometimes it is less expensive	Often more expensive than AGV
Primarily follow fixed infrastructure	Freely navigate operational space
Have extreme payloads	Payload capacity may be limited
Follow fixed infrastructure	There are numerous ways for AMR manufacturers to keep their equipment "localized."
Work well under clearly defined circumstances, such as when handling material	Work best in contexts with little organization, like security, delivery, and person-to-goods intralogistics



Differences in AGV and AMR movement

03

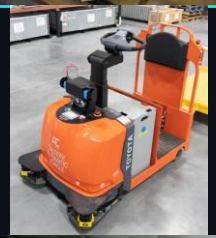
APPLICATION

Field of application	AGV	AMR
Agriculture	Transporting agricultural goods and products, such as greenhouse and farm	Can be used to convey things or goods, harvest crops, or monitor crops.
Logistics	Used to move materials or goods between facilities or within facilities	Used for order picking, inventory management and transportation tasks in logistics and e-commerce settings
Healthcare	Used for transporting material or supplies within hospitals of other healthcare facilities	Used to transport lab specimens, provide prescriptions, supplies, or meals to patients
Assembly	moving components or assemblies between workstations	Used for transporting parts or tools to assembly lines to assist assembly task

04

MAIN COMPONENTS

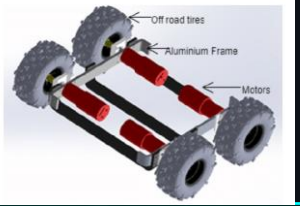
BODY DESIGN (AGV)

Main types	Description	Example
Unit load	This type of AGV is designed to transport unit loads, such as boxes or totes, from one location to another.	
Tugger	Tugger-style AGVs are made to pull or tow other trailers or carts that can be filled with supplies or goods.	
Forklift	Like tugger AGVs, but with the ability to lift and move pallets thanks to a forklift attachment. They are employed to autonomously stack and transport things like automobiles, coils of paper, and even rolls of paper.	

BODY DESIGN (AMR)

Main types	Description	Example
Box-shaped	These AMRs have a box-shaped design, with the payload located on top. This design allows the AMR to carry larger payloads and move over uneven surfaces.	
Cylindrical-shaped	Usual settings include restaurants and hospitals. AMRs of this body shape are employed in environments with plenty of obstacles or confined places. The robot can move smoothly and avoid obstacles without becoming stuck because to its cylindrical design.	

LOCOMOTION (AGV)

Main types	Description	Example
Omnidirectional wheels	With numerous little wheels or rollers positioned at an angle to the robot's primary axis, it may travel in any direction.	
Mecanum wheels	Multiple smaller rollers mounted to the wheel rim allow for movement in multiple directions. suitable for usage in an indoor environment with crowds.	
Differential wheels	Two independent motors drive the wheels individually, enabling the robot to spin by accelerating one wheel more quickly than the other.	

NAVIGATION

MAGNETIC TAPE

Using a magnetic tape that has been laid on the facility's floor as a guide. The magnetic tape, which is pre-programmed to direct the AGV to its destination, is followed by the AGV.

OPTICAL GUIDANCE

Observe a line or pattern on the facility's floor. The AGVs employ sensors to find the line or pattern and then use that information to guide the AGV to its intended location.

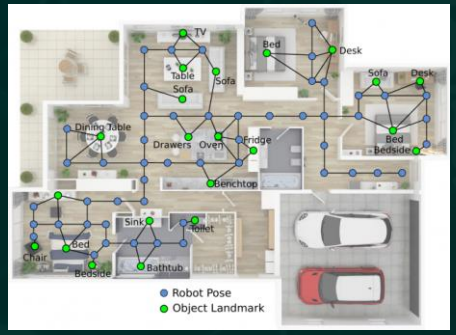
RFID NAVIGATION

Guided by RFID tags that are placed on the floor of the facility. The AGV's sensors detect the RFID tags and use them to determine its location and navigate it to its destination.

MAP-BASED NAVIGATION

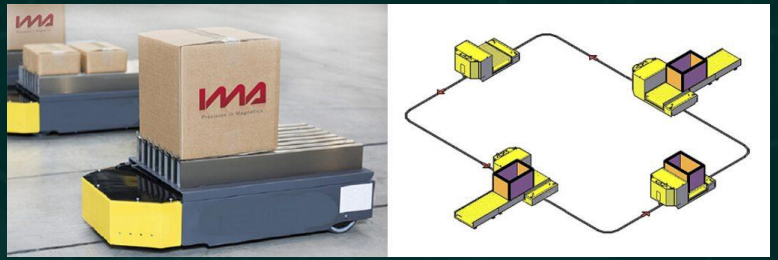
Equipped with sensors that map the facility by scanning the surroundings, including cameras or laser scanners. The map is kept in the AGV's control system, which employs it to chart a route to the intended location.

NAVIGATION



Map-based navigation

Optical guidance



Magnetic tape

DATA COLLECTION AND TRANSMISSION

Data collected is based on the sensor used on the AGV and AMR and its application.
Example of data obtained:

1. Mapping data: The inclusion of sensors like cameras, IMUs, and lidar improves the robot's navigational accuracy by mapping the environment and providing precise location information.
2. Battery level: Keep track of the robot's power level before charging and the battery's health to determine the battery's efficiency and whether a new battery is required.
3. Materials and stick status: The delivery status of the item from one place of business to another to let the warehouse staff know where it is and how far it will take it to get there.
4. Maintenance: gathering robot performance patterns and predicting when to do repairs if performance drops

Data transmission can be done through wired and wireless communication of the robot. Wired connection can be obtained by cable attached to the robot and data can be retrieve instantly but it will make the robot coverage distance lesser and less efficient, Wireless connection can be done through connected through warehouse Wi-Fi, Bluetooth, remote control or other wireless protocols.

POWER MANAGEMENT

Battery	Fuel-cell
Rechargeable batteries, which can be lithium-ion, lead-acid, or other types depending on the particular use, can power AGVs. Recharging is quick and simple.	These AGVs are powered by hydrogen fuel cells, which turn hydrogen and oxygen into energy through a chemical reaction.
Electric	Solar
These AGVs are powered by an electric motor that is coupled to a battery or other external power source.	This type of AGV is ideal for outdoor applications where it can recharge during daylight hours and operate at night.

¡THANK YOU!