AGV(Automated Guided Vehicle) For Industries

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Abstract- *Automated Guided Vehicle (AGV) is the future drift that provides unmanned transportation — that transports all kinds of products without human intervention in production, logistic, warehouse and distribution environments. The key pro of AGV is that they can operate as a standalone system with higher efficiency. The proposed work has a predominant feature of AGV in which the EPROM is used for holding the data. Taking up the advantage of EPROM (non volatile), the robot can retain and progress with their current execution even when the system comes back to the powered state after a period of power loss at crisis conditions. The AGV's serves many of the industries with greater efficacy compared to the manual functioning. The AGV is implemented using ATMEGA 328 controller which has a remarkable EPROM compared to other controllers. The controller is being assisted by the ultrasonic sensor that enables the obstacle detection capability in the bot. The AGV can be further promoted to the elevation of automation by its artificial intelligence that is being controlled by Bluetooth / Wi-Fi.*

Keywords- AGV; EPROM; Industries; AI.

I. INTRODUCTION

The AGV can pull heavy loads behind them on trailers that they can independently attach to. The trailers can be used to transport both finished goods and raw materials. Objects on a bed can also be stored by the AGV. The items can be loaded onto a conveyor, a collection of powered rollers, and then moved off of it by rotating the conveyor backwards. Almost all industries, including pulp, paper, metallurgy, newspaper, and general manufacturing, use AGVs. In hospitals, it is also necessary to transport supplies like food, linens, and medications.

The earliest AGV was merely a tow truck that followed a wire in the floor rather than a rail when it was initially introduced to the market in the 1950s by Barrett Electronics of Northbrook, Illinois.[Reference needed] A new form of AGV that follows invisible UV markers on the floor rather than being towed by a chain was created as a result of this technology. The Willis Tower (previously Sears Tower) in Chicago, Illinois, installed the first such system to distribute mail among its offices.

Wired

A wire is inserted about an inch below the surface into a groove that has been made in the floor. Along the AGV's intended route, this slot was cut. Radio signals are sent through this line. On the AGV's bottom, near the ground, a sensor is attached. The sensor is able to determine the relative location of the radio signal coming from the wire. The steering circuit is controlled using this information, causing the AGV to follow the wire.

II. LITERATURE SURVEY

1)Wired

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2)Aid tape

Tape is used by AGVs (sometimes referred to as automated guided carts or AGCs) as the guide path. There are two types of tapes: magnetic and coloured. To follow the tape's course, the AGV is equipped with the proper guidance sensor. The ability to quickly remove and relocate tape if the path has to be changed is one of the main advantages it has over wired guiding. Although coloured tape initially costs less, it cannot be inserted in heavy traffic locations where it may get filthy or destroyed. The same way wire may be implanted in the floor, a flexible magnetic bar can do the same. However, it operates in the same way as magnetic tape and is thus passive or unpowered.

3) Navigation of laser targets

Reflective tape mounted on poles, permanent objects, or walls is used for navigation. A revolving turret on the AGV is mounted with a laser transmitter and receiver. The same sensor is used to send and receive the laser. Any reflectors that are in line of sight and within range have their angle and (sometimes) distance automatically determined. This data is contrasted with the reflector layout map kept in the AGV's memory. This makes it possible for the navigation system to triangulate the AGV's present location. The path pre-programmed into the reflector layout map is contrasted with the present position. To keep the AGV on course, the steering is changed appropriately. After that, it may use the continuously updated navigational

III. SYSTEM REQUIREMENTS

An AGV should have at least 0.5 m (19.7 inches) of clearance from any exterior structure, including its load. This space must remain open between vehicles (including freight) and impediments. The safety device facing the direction of movement must be operational in the operating zones.

DIRECTION PATH SYSTEM

AGV are specified and vehicles are commanded to follow the course ways using the vehicle guidance system. The guiding path system used by AGVs selects a course based on a predetermined route. It compares the value provided by the programmer to the measurement obtained from the sensor. The AGV only needs to choose whether to continue along the path when it reaches a decision point.

The two guiding systems most frequently employed in AGVs are:

1. landmark-based navigation
2. behavior-based navigation.
3. navigation using vision

IV. SYSTEM ARCHITECTURE

An AGV (Automated Guided Vehicle) system typically consists of four main components:

1. AGVs: These are the vehicles that move autonomously within the facility. They are equipped with sensors, controllers, and other hardware and software components that enable them to navigate and perform various tasks.
2. Control system: This includes the software and hardware that monitor and control the AGVs' movements and actions. It may include a central computer, wireless communication devices, and other components that enable communication between the AGVs and the control system.
3. Facility infrastructure: This refers to the physical components of the facility that support the AGV system, such as tracks, guide wires, sensors, and charging stations. The facility infrastructure may also include safety barriers and other features to ensure the safety of workers and the AGVs.
4. Human-machine interface (HMI): This is the user interface that enables human operators to interact with the AGV system. It may include computer screens, touchscreens, or other devices that provide real-time information about the system's status and allow operators to control and monitor the AGVs' movements and tasks. Overall, the AGV system architecture is designed to provide a seamless and efficient operation that enables the AGVs to move autonomously within the facility, perform tasks, and communicate with the control system and human operators as needed.

V. WORKING PRINCIPLE

Navigation: AGVs are equipped with various sensors such as lasers, cameras, and magnetic tape sensors, which allow them to navigate within the facility and avoid obstacles. The sensors scan the environment, and the data collected is processed by the AGV's onboard controller.

Route planning: The AGV's controller uses the data collected by the sensors to determine the vehicle's location and plan the optimal route to its destination. The controller also takes into account factors such as traffic and congestion to ensure that the AGV reaches its destination quickly and safely.

Payload handling: Once the AGV reaches its destination, it can perform a variety of tasks, such as loading or unloading materials, moving products to different locations, or performing other operations. AGVs are typically equipped with robotic arms or other payload handling devices that enable them to perform these tasks autonomously.

Communication: The AGV's onboard controller communicates with the control system, which monitors and manages the AGV's movements and actions. The control system may also communicate with other systems within the facility, such as warehouse management or production planning systems, to optimize the AGV's movements and tasks.SIMULATION

VI. TESTING METHODOLOGIES

Functional testing: This involves testing the AGV's basic functions such as navigation, payload handling, and communication with the control system. This testing ensures that the AGV can perform its primary tasks accurately and efficiently.

Performance testing: This involves testing the AGV's speed, acceleration, and braking, as well as its ability to handle different payloads. This testing ensures that the AGV can perform its tasks within the required time frame and that it can handle the payload's weight and size.

Safety testing: This involves testing the AGV's safety features, such as emergency stop buttons, obstacle detection sensors, and safety barriers. This testing ensures that the AGV can operate safely and that it can detect and avoid obstacles to prevent accidents.

Integration testing: This involves testing the AGV's integration with other systems within the facility, such as warehouse management or production planning systems. This testing ensures that the AGV can communicate with these systems correctly and that it can perform its tasks efficiently as part of the overall system.

Environmental testing: This involves testing the AGV's performance under different environmental conditions such as temperature, humidity, and lighting. This testing ensures that the AGV can operate reliably under various conditions, which is especially important in industries such as food and pharmaceuticals.

Durability testing: This involves testing the AGV's ability to withstand wear and tear over time. This testing ensures that the AGV can operate reliably and that it can withstand the demands of the facility's operations.

Overall, these methodologies ensure that the AGV can perform its tasks accurately, efficiently, and safely while operating within the facility's parameters.

VII. CONCLUSION

AGV (Automated Guided Vehicle) systems have revolutionized the way industries operate, providing a flexible, efficient, and safe way to transport materials and products within a facility. AGVs have a wide range of applications, from manufacturing and logistics to healthcare and retail. AGVs operate autonomously, using sensors and controllers to navigate and perform tasks within the facility. They can carry heavy loads, move at high speeds, and operate around the clock, making them an excellent choice for improving productivity and reducing labor costs. AGV systems can be customized to meet the specific needs of a facility, such as size, payload capacity, and navigation requirements. They can also integrate with other systems within the facility, such as warehouse management or production planning systems, to optimize operations. While AGV systems are becoming more popular, they still require careful planning, implementation, and testing to ensure they operate safely and efficiently. Proper training and maintenance are also essential to maximize the system's lifespan and minimize downtime. In conclusion, AGV systems have transformed industries by providing a reliable, efficient, and safe way to transport materials and products within a facility. As technology advances and more industries adopt AGV systems, we can expect to see continued growth and innovation in this field.

VIII. FUTURE SCOPE

The future of AGV (Automated Guided Vehicle) systems is bright, as they continue to offer a flexible, efficient, and safe way to transport materials and products within a facility. Here are some potential areas of growth and development for AGV systems:

Integration with Industry 4.0 technologies: AGV systems can be integrated with Industry 4.0 technologies, such as the Industrial Internet of Things (IIoT), to provide real-time monitoring and data analysis of the system's performance. This integration can help optimize operations, reduce downtime, and improve maintenance processes. Advancements in autonomous navigation: AGV systems are becoming more advanced in their ability to navigate and avoid obstacles within a facility. Future developments in autonomous navigation could include increased use of artificial intelligence and machine learning to improve the accuracy and efficiency of the navigation process.

Expansion of applications: AGV systems are currently used in a wide range of industries, including manufacturing, logistics, healthcare, and retail. However, there is potential for AGV systems to expand into new applications, such as construction, mining, and agriculture.

Improved energy efficiency: AGV systems can consume a significant amount of energy during their operations. Future developments in energy-efficient components, such as batteries and motors, could help reduce the energy consumption and environmental impact of AGV systems.

Collaboration with other autonomous systems: As other autonomous systems, such as drones and robots, become more prevalent in industries, there is potential for AGV systems to collaborate with these systems to provide a comprehensive and efficient solution for transportation and logistics.

Overall, the future of AGV systems is promising, as they continue to evolve and offer new capabilities to meet the demands of industries. As technology advances and more industries adopt AGV systems, we can expect to see continued growth and innovation in this field.

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