

AUTOMATED MATERIAL HANDLING SYSTEM FOR MULTI STORAGE BUILDING

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Abstract: Automatic motion planning and navigation is the primary task of an Automated Guided Vehicle (AGV) or mobile robot. All such navigation systems consist of a data collection system, a decision making system and a hardware control system. Artificial Intelligence based decision making systems have become increasingly more successful as they are capable of handling large complex calculations and have a good performance under unpredictable and imprecise environments. This project focuses on development of multi storey material handling systems using automated guided vehicle which can smartly follow a predefined path on industry floor. The project involves development of smart inter vehicular communication system between AGV,s which perform a task in coordination with each other. The project consists of AGVS and a lift to transfers material across different floors. The prime focus of the project is to make entire operation automated thus involving least manual intervention.

Keywords: Material Handling, AGVS

I. INTRODUCTION

Material handling involves short-distance movement within the confines of a building or between a building and a transportation vehicle. It utilizes a wide range of manual, semi-automated, and automated equipment and includes consideration of the protection, storage, and control of materials throughout their manufacturing, warehousing, distribution, consumption, and disposal. Material handling can be used to create time and place utility through the handling, storage, and control of material, as distinct from manufacturing, which creates form utility by changing the shape, form, and makeup of material. Robots are now working in dangerous places, such as nuclear disposal, space explorers, fire fighting, etc. One such robotic vehicle which is employed in industries is the automated guided vehicle. The primary purpose of AGV is in material handling in industries from one point on industrial floor to another. An automated guided vehicle (AGV) is a robot that follows markers or wires in the floor, or uses vision or lasers. They are most often used in industrial applications to move materials around a manufacturing facility. Automatic guided vehicle uses less manpower and are highly efficient. They are not only used in manufacturing process but are also used in transporting the product from manufacturing unit to warehouse.

II. EXISTING SYSTEM

The existing system is the manual handling refers to the use of a worker's hands to move individual containers by lifting, lowering, and filling, emptying, or carrying them. It can expose workers to physical conditions that can lead to injuries that represent a large percentage of the over half a million cases of musculoskeletal disorders reported in the U.S. each year, and often involve strains and sprains to the lower back, shoulders, and upper limbs. Ergonomic improvements can be used to modify manual handling tasks to reduce injury. These improvements can include reconfiguring the task and using positioning equipment like lift/tilt/turn tables, hoists, balancers, and manipulators to reduce reaching and bending.

III. PROPOSED SYSTEM

The main objectives of the project are to develop a multi storey material handling system which can transport material from one floor to another in industries. The objectives of the project are outlined as below.

- 1) To develop a multistory material handling system using lift which can be installed on industry floor.
- 2) To make the system completely autonomous by developing two AGV's for material handling across each floor
- 3) To implement smart inter vehicular communication system in which the AGVS communicate with each other to perform the operations autonomously.

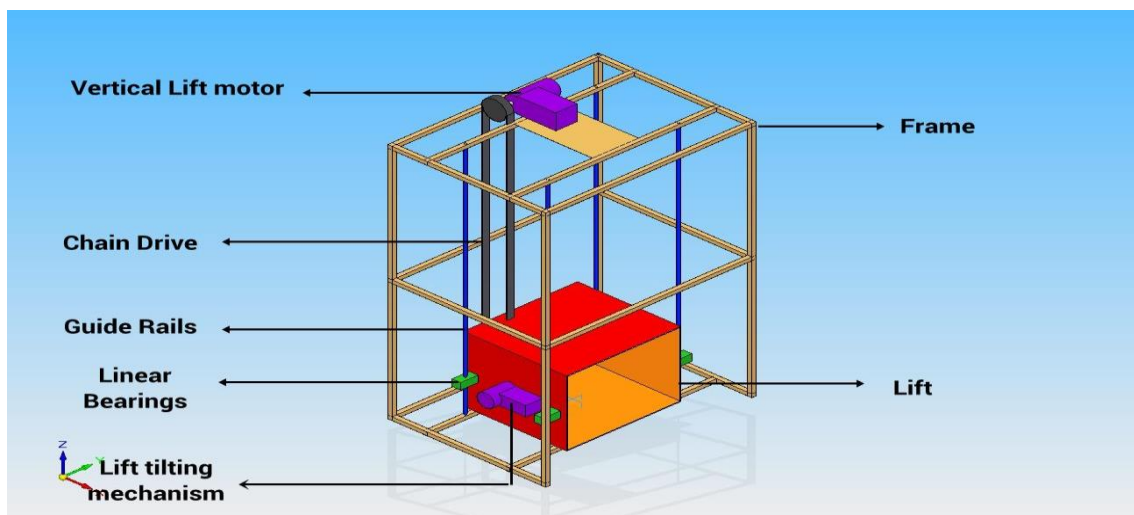


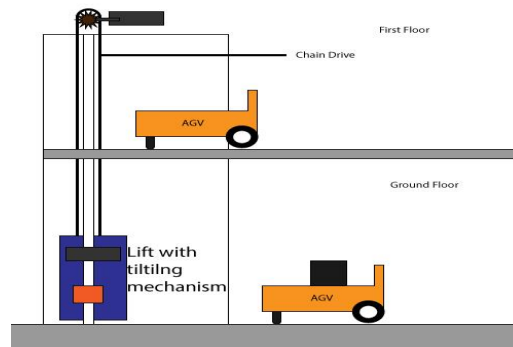
Fig 1: Proposed Set Up

IV .WORKING PRINCIPLE

The Figure shows the working principle of the project. This project focuses on automation in material handling system currently used in industries and material handling for multi storey systems. To understand the working principle correctly we have simplified the tasks as below.

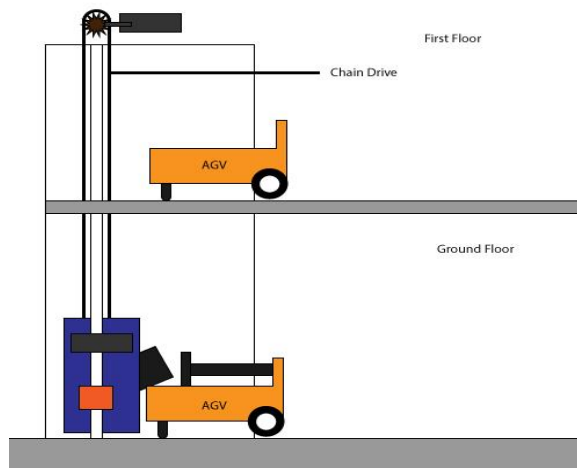
- 1) The material arrives at the ground floor:

When the material to be transported arrives at the ground floor, the material is placed over the AGV. The AGV starts following a pre-determined path on the industry floor and starts moving automatically towards the multi storey material handling system. As shown in the figure the project involves development of autonomous multi storey material handling system. As shown in the figure below when the AGV reaches the unloading station the material on the AGV is automatically loaded onto the lift using the material unloading mechanism equipped onto the AGV.

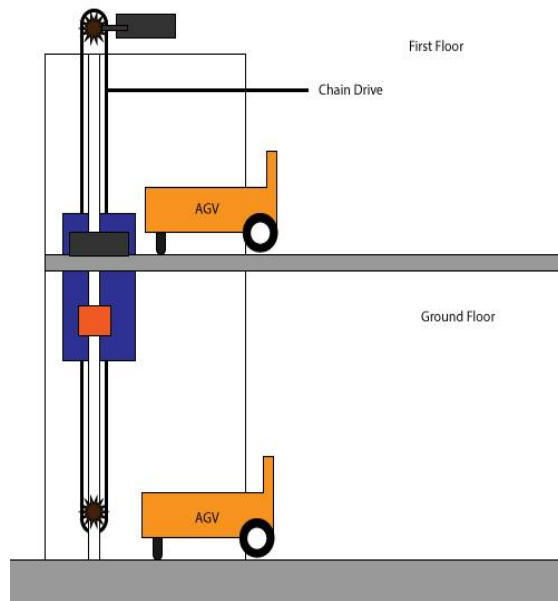


2) The material is unloaded into the lift:

When the material is unloaded into the lift, the sensor determines if the lift is empty or the material is unloaded. AS soon as the material is unloaded the lift starts moving upwards and triggers the AGV on the first floor to arrive and the loading unloading station and wait for the lift to reach first floor.



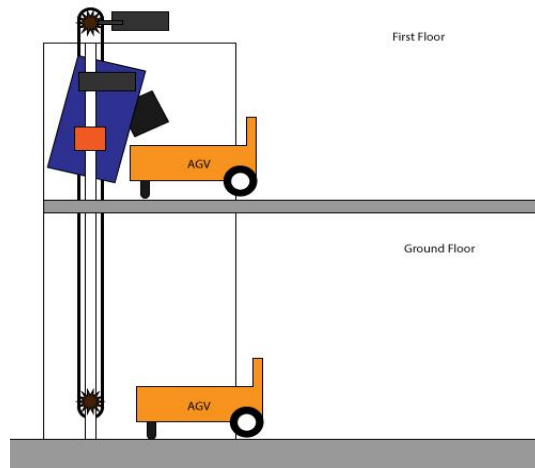
Lift moving to first floor carrying the material.

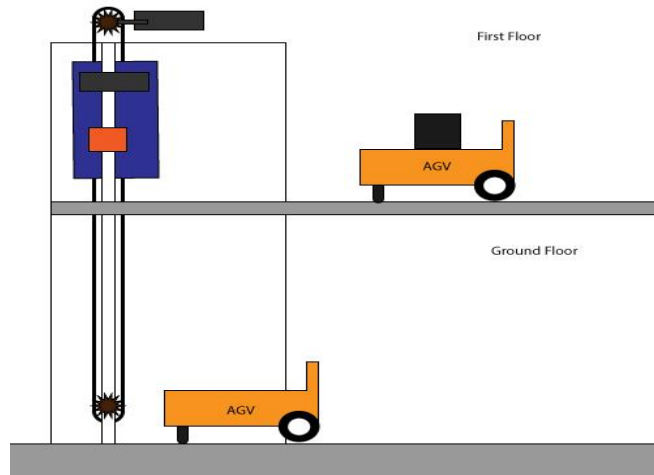


3) When the lift arrives the first floor:

When the lift arrives the first floor along with the material, the tilting mechanism on the lift is activated.

Due to this the material in the lift is unloaded automatically onto the AGV, which is already waiting for the LIFT to arrive at the first floor unloading station. Once the material is unloaded onto the AGV the AGV starts moving automatically to the required destination.





Thus this forms the completely automated multistory material handling systems. Other than this system implements swarm communication, which is an advanced level communication between AGV-AGV to prevent ambiguity in material handling systems.

Also this system is equipped with a Collision avoidance system prevent AGV from colliding others on industry floor.

ADVENTAGES

1. Saving in labour charges.
2. No danger of accidents.
3. Suitable for handling delicate materials.
4. Suitable for handling heavy materials.
5. No damage of goods.

V CONCLUSION

Material handling is the part of industrial work in which required material is transported and stored to its destination. It is necessary to store material in proper way, so that there will be optimum utilization of space. Stored materials are taken out from store and send for use.

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