IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 7.39 ⁜ Vol. 11, Issue 4, April 2022

DOI: 10.17148/IJARCCE.2022.114143

AUTOMATED GUIDED VEHICLE WITH FORKLIFT

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Abstract: AGVs (Autonomous Guided Vehicles) or AVs (Autonomous Vehicles) are employed in a broad range of applications, including bomb disposal, underwater research, and industrial transportation. Many control and guiding solutions for AV research have been presented in the literature, ranging from entirely autonomous and intelligent systems to laser and radar guided systems and line followers. This work employs the Line follower or Direction lead to give a unique way for guiding and directing autonomous vehicles. An AV with a built-in GPS receiver may be effectively controlled by a central computer with the OSM powered control mechanism installed. Transportation automation in the industrial, commerce, and service sectors is a critical component of intralogistics optimization. AGVS has applications in every sphere of industry and commerce. Assembly lines, warehouses, order picking systems, and manufacturing plants are all good examples. The major application of AGVS and the sectors in which they are employed are examined using the AGVS-Statistic Europe, which was designed and is administered by the Department of planning and controlling of warehousing and transport systems (PSLT). The AGVS-current sector's trends and developments are recognised using this database. AGVS farmers are increasingly being forced to compete on a global scale. In the future, AGVS will become more important in the field of automation.

Keywords: Vehicles, Automation, Guidelines, Automatic control, Control systems, Transportation,

I. INTRODUCTION

An automated guided vehicle or automatic guided vehicle (AGV) is a mobile 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 or a warehouse. Automated guided vehicles increase efficiency and reduce costs by helping to automate a manufacturing facility or warehouse. The AGV can tow objects behind them in trailers to which they can autonomously attach. The trailers can be used to move raw materials or finished product. The AGV can also store objects on a bed. The objects can be placed on a setof conveyor and then pushed off by reversing them. Some AGVs use fork lifts to lift objects for storage. AGVs are employed in nearly every industry, including, pulp, paper, metals, newspaper, and general manufacturing. Transporting materials such as food, linen or medicine in hospitals is also done.

An AGV can also be called a laser guided vehicle (LGV) or self-guided vehicle (SGV). Lower cost versions of AGVs are often called Automated Guided Carts (AGCs) and are usually guided by magnetic tape. AGCs are available in a variety of models and can be used to move products on an assembly line, transport goods throughout a plant or warehouse, and deliver loads to and from stretch wrappers and roller conveyors. AGV applications are seemingly endless as capacities can range from just a few kgs to hundreds of tons. The Aim of the project is to design and fabricate such a AGV.

One of the most important aspects of logistics systems is the handling of material flows in industrial environments. Despite the high throughput rates realized by steady materials handling technologies such as roller or chain conveyors, the vast majority of industrial applications rely on common lifting or hauling trucks as transportation system. The reasons are manifold: Besides cost related aspects one of the main advantages is the unmatched flexibility regarding integration in an existing or changing environment. Vehicles are the central elements of an AGVS as they perform the actual transportation tasks. The vehicles have to be designed individually according to the specific conditions of the environment they are used in [1]. This concerns load handling equipment, the navigation system, the drive configuration and other aspects.

II. LITERATURE SURVEY

1.“Autonomous Mobile Robots at Intel” [1]

Warehouses, logistical companies, agriculture businesses, and healthcare institutions are all looking for new and innovative ways to improve operational efficiency, enhance speed, ensure precision, and increase safety. Many are turning

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to autonomous mobile robots (AMRs) for help[1].

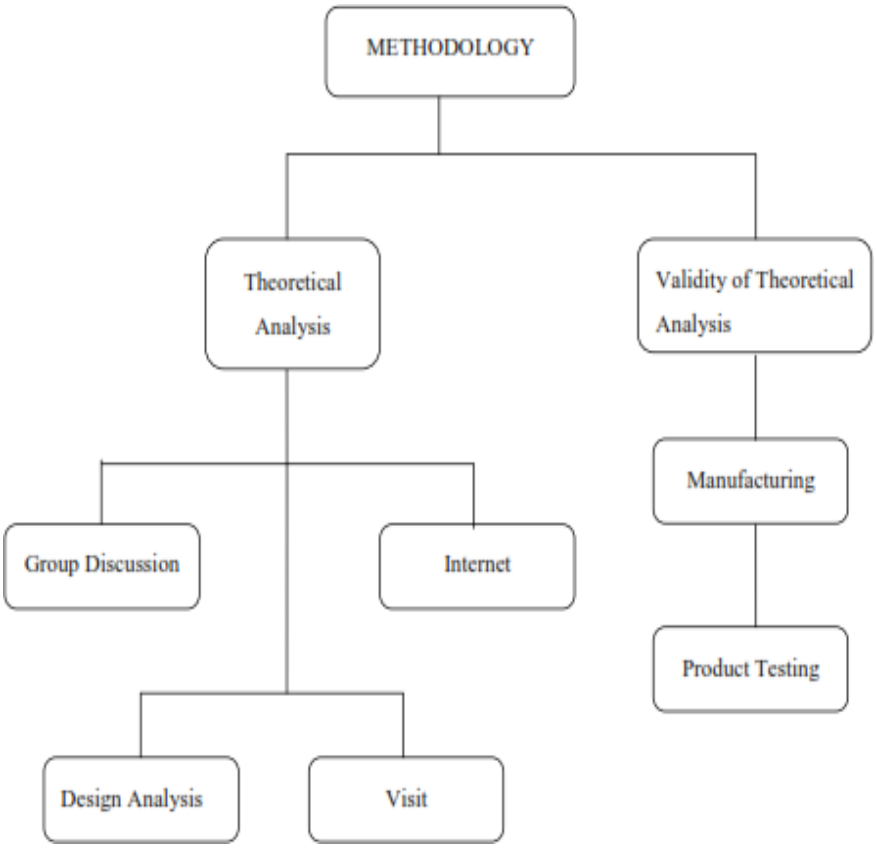
2.“The basics of guided vehicle”(AGV system Savant. 5 March)[2]
I.AGVS Assembly Line Vehicles are an adaptation of the light load AGVS for applications involving serial assembly processes.
II.AGVS Towing Vehicles were the first type introduced and are still a very popular type today. Towing vehicles can pull a multitude of trailer types and have capacities ranging from 8,000 pounds to 60,000 pounds.[2]

3.Olmi, Roberto (2011). Traffic Management of Automated Guided Vehicles in Flexible Manufacturing Systems[4]
The objective of the research carried out by Roberto Olmi has been the development of an innovative traffic management system (TMS) for fleets of automated guided vehicles (AGV) operating in industrial environments. These vehicles are used for the transport of materials in environments where the presence of people and moving machinery has to be expected. The TMS has to control the motion of the vehicles so as to avoid collisions and optimize transport times. The approach is based on the decomposition of the problem into three parts: assignment of transport tasks, path computation, motion control of each AGV along its path. [4]

4.“AGV Drive and Steering Options” December 7, 2011, at the Wayback Machine Transbotics Corp., 2009 [9]
There are many different types of AGV steer movements and drives. Selecting the appropriate drive and movement for your AGV is sometimes the key element in meeting the desired throughput and maximizing production. Some steering options will give you the flexibility to travel in tight areas without having to modify the facility. The drives will allow the vehicle to travel at different speeds and inclines. Consulting references and specialists are the best way of acquiring knowledge regarding reliability.[9]

5. “Sonar sensor and mounting". University of Birmingham. 5 March 2006 [5]
The sonar sensor of the robot allows it to find the goal. This is performed once it has the ball. It performs a 360 degree scan in 60 segments. If it is unsuccessful at finding the goal, it will identify the middle of the room, head to it, and scan again.[5]

III. METHODOLOGY



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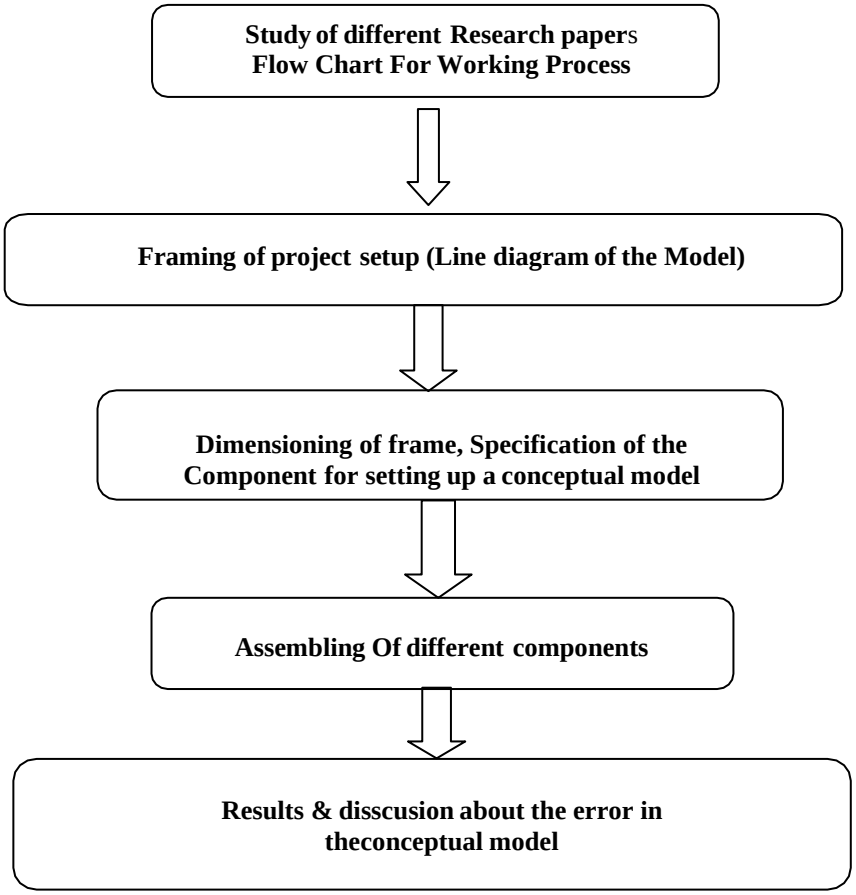
METHODOLOGY OF WORKING PROCESS



METHODOLOGY OF DESIGN AND ANALYSIS

A parameter study is done to evaluate the most crucial parameters for FE analysis of axial ball bearings. The parameters that are evaluated are mesh density, contact stiffness, osculation, load level, geometrical nonlinearity and material nonlinearity. The studies are performed by means of the FE software ANSYS. The accuracy of finite element analysis depends on different parameters such as element type, boundary condition and how the loads are applied etc. Therefore, the FE model is nothing else but an approximate realization of the reality. The parameter study can be done by physical tests. However, it will increase the cost, time and resources consumed and therefore FE analysis is more suitable choice, at least for parameter evaluation.

Theoretical aspects of the work

In this study, the finite element method is adopted using Pro Engineer and ANSYS as a commercial CAD and FE program. The following chapter contains some fundamentals of the applied theories provided that the reader has an initial knowledge of basic structural mechanics, machine components, and fundamentals of the finite element method.

Finite element method (FEM) is a method for approximate solutions of partial differential equations. The domain of interest is divided into finite elements on which the solution is approximated by piecewise-polynomials. The finer the partition (Mesh) is, the more accurate the solution.

Newton-Raphson is an iterative method for finding solution to nonlinear equations and equationsystems.In FE calculations, the method is used for non-linear problems and the relations between force and displacement for one degree of freedom. The procedure for Newton-Raphson method is as follows: The load is applied and the displacements are calculated. From the displacements, new conditions are calculated and the displacements are recalculated. This procedure is repeated until the solution is converged i.e. reach a certain value or level.

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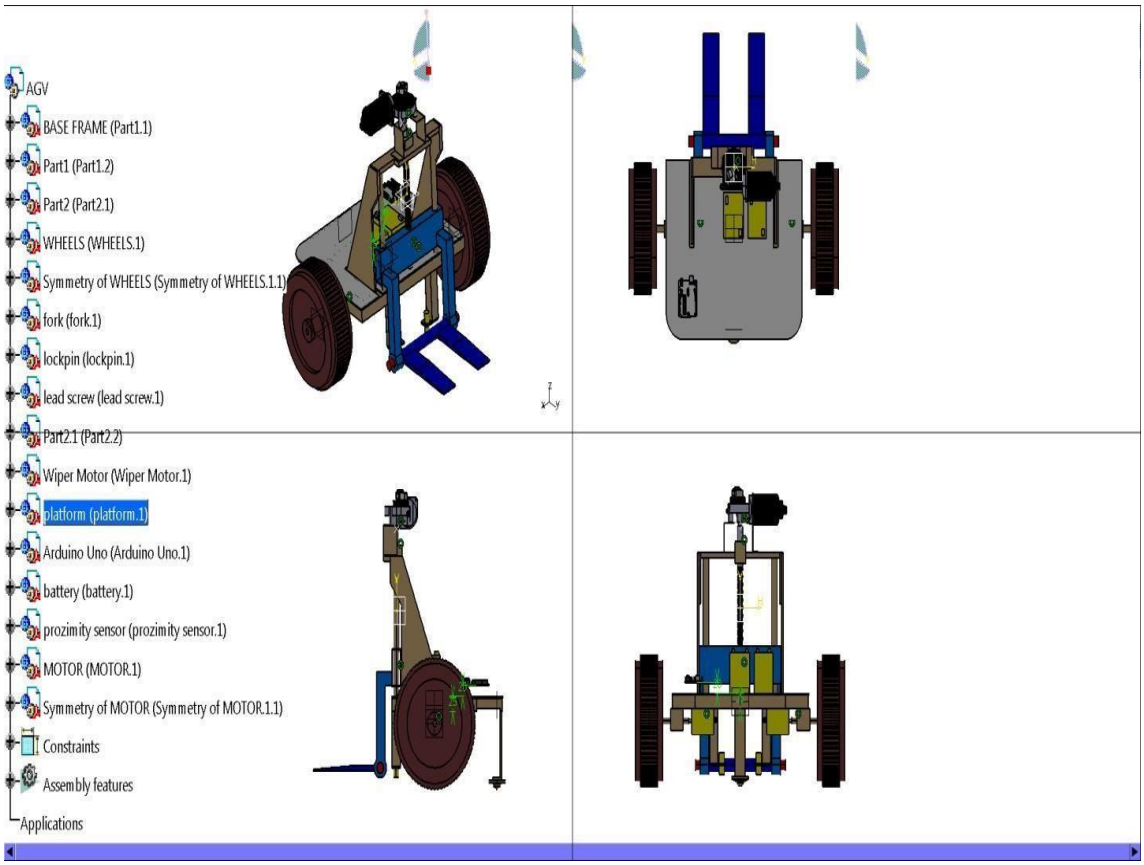
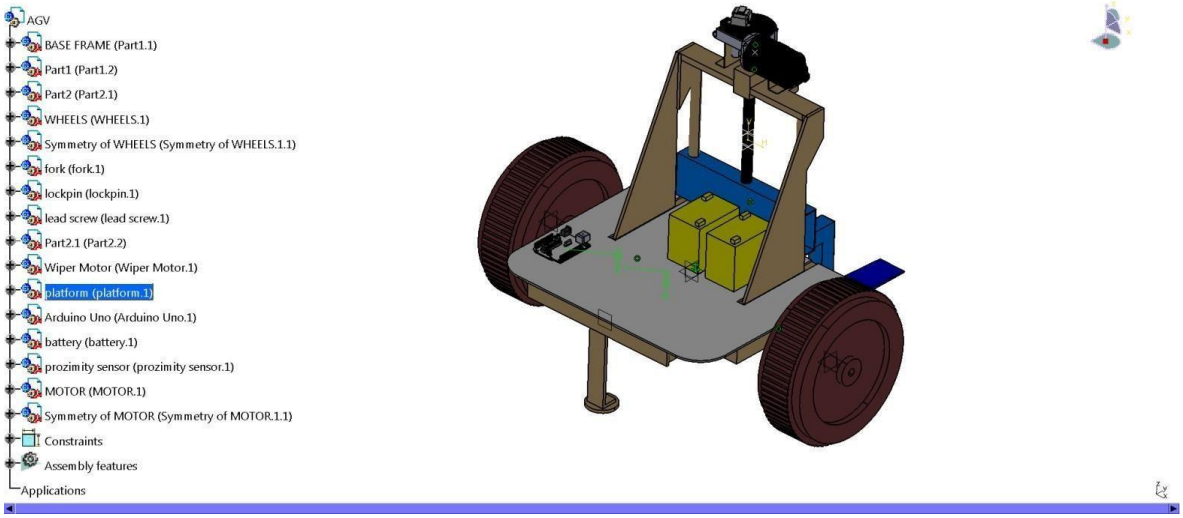
IV. SYSTEM DESIGN





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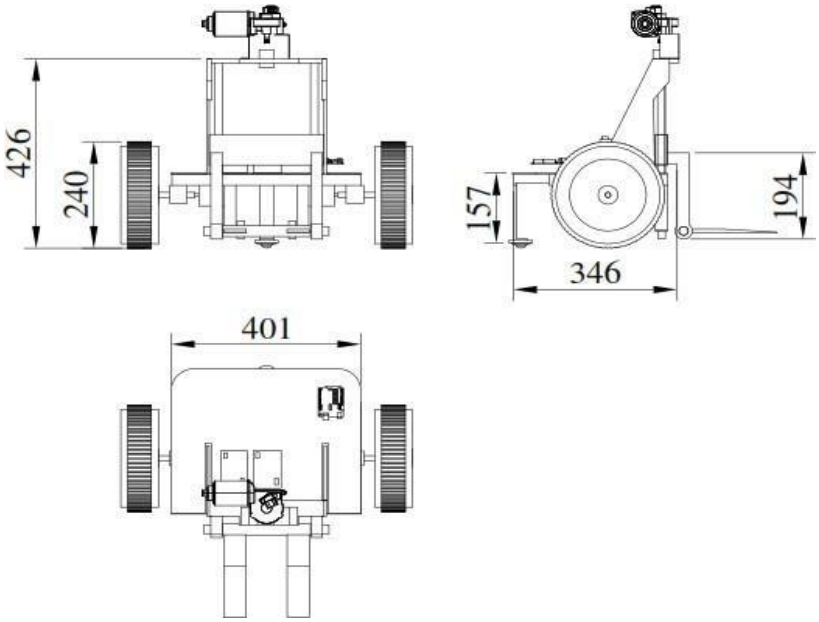
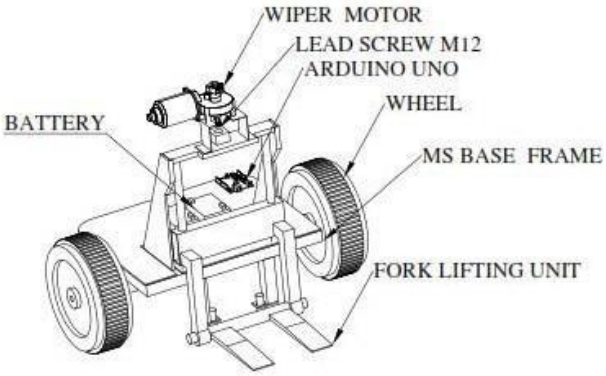
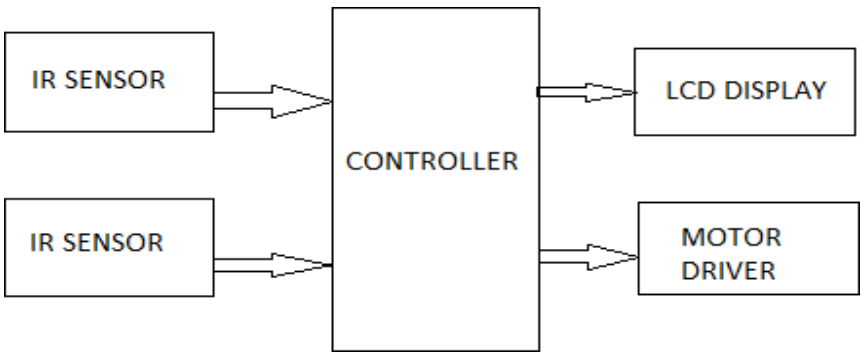


Working:

Line follower robots were one of the earliest automatic guided robots. They are able to followa line marked on a contrasting background, usually a black line on a white surface or a white line on a black surface. Usually the line follower robot works on a closed loop feedback algorithm where the feedback from the line sensor is used by the controller for correcting the path of the robot. The sensors are usually LED/LDR, LED/Photodiode or LED/Phototransistor pairs and the controller is an electronic circuit which executes the desired feedback algorithm. Gear motors are used for driving the robotic wheels. The line follower robot presented here is designed to follow a black line on a white background. It has a pair of sensors (LED / LDR) and works on a simple "align robot on centre of the line algorithm



Block Diagram:



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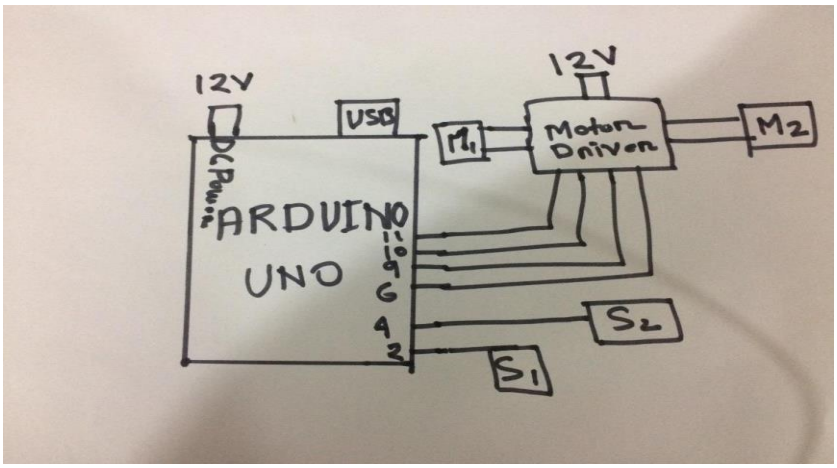
The line fallowing robot is one of the self-operating robots. That detects and fallows a line drawn on the area. The line is indicated by white line on a block surface or block line on a white surface. This system must be sense by the line. This application is depends upon the sensors. Here we are using two sensors for path detection purpose. That is proximity sensor and IR sensor. The proximity sensor used for path detection and IR sensor used for obstacle detection. These sensors mounted at front end of the robot. The microcontroller is an intelligent device the whole circuit is controlled by the microcontroller.



Advantages:

- Robot movement is automatic.
- It is used for long distance applications.
- Simplicity of building.
- Fit and forget system.
- Used in home, industrial automations etc.

Disadvantages:

- Should be recharged periodically
- Will stop delivery when the AGV is forced off the path.
- High Initial cost

V. CONCLUSION

There are several possible directions for further research. We can improve the type of AGV guided tape using a better navigation technique. Any environment and cheap among autonomous robots can be adopted. There is a significant amount of difference between the theoretical and practical time value of the work cycle being optimized by adopting a different methodology. Besides, one can think of a relaxation of the symbol holding requirements in the traffic control system, so that more vehicles can leave different crossing zones simultaneously and, therefore, the performance of the AGV system can be improved.

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