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LAROB for Goods Transportation

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ABSTRACT

Laser Guided Vehicle is robot that can deliver the materials from the supply area to the destination. This is faster and more efficient .The robot can be access wirelessly.ie. a technician can directly order the robot to deliver the components rather than order it via a human operator (over phone, computer, etc. who has to program the robot or ask a delivery person to make the deliver). To avoid collision with human workers, safety sensor has been added which causes the robot to stop as long as there is no obstacle in its way, thus avoiding accidents.

1. INTRODUCTION WITH PROBLEM IDENTIFICATION

One of the measurement challenges in industries is internal logistics; the problem arises when the right product doesn't reach the right destination at right time, in order to overcome these problems in the industries we make use of better material handling technologies by using various guided robots. One of the major challenges in industries is internal logistics; the problem arises when the right product doesn't reach the right destination at right time, in order to overcome these we make use of advance material handling technologies such as various guided robots. AGVs increase efficiency and reduce costs by helping to automate manufacturing facilities or warehouses. AGVs can carry loads behind them in trailers. The trailers can be used to move raw material or finish the product. The AGVs can also store objects on a bed. Some AGVs used forklifts to lift objects for storage. AGVs are nowadays employed in nearly every industry, including paper, metals, newspapers and general manufacturing companies. To build an AGV that can replace manual handling and able to be the fragmentary products to a particular location based on laser-pattern recognition systems. Laser-guided vehicles (LGVs) is a flexible automated guided vehicle (AGV). LGVs are a more flexible solution than older forms of AGVs that follows the colored lines or magnetic lines on the floor. LGVs can move on multiple paths and the paths can change as needed or as required by the user. The proposed work explains how a LGV implementation would take and the steps involved. Each vehicle has one of these rotating laser sensors that interact with targets mounted along the path. The laser sensors receive the reflected signals and use that data to triangulate the vehicle's position. The research will use the laser-based positioning system as the main method of navigation. This system will differ from other AGV in three ways i.e it has a greater range than any existing systems. No prior structuring or preparation of the environment is necessary. The system will correct its course in real-time and the system will not rely on dead-reckoning for navigation.

2. INTRODUCTION

One of the major challenges in industries is the internal logistics; the problem arises when the right product doesn't reach right destination at right time, in order to overcome these we make use of the advance material handling technologies such as AGV's. AGVs increase efficiency and reduce costs by helping to automate manufacturing facilities or warehouse. AGVs can carry loads behind them in trailers. The trailers can be used to move raw material or finish product. The AGVs can also store objects on bed. Some AGVs used fork lifts to lift objects for storage. AGVs are employed in nearly every industries, including, paper, metals, newspapers and general manufacturing. To build an AGV that can replace the manual handling and able to being the fragmentary products to a particular location based on laser pattern recognition systems. Laser guided vehicles (LGVs) is a flexible automated guided vehicle (AGV). LGVs are a more flexible solution than older versions of guided vehicle that follows markers or wires in the floor or where navigation is based on following magnetic lines on the floor or the colored lines. LGVs can move on multiple paths and the paths can change as needed or as required by the user . The proposed work explains how a LGV implementation would take and the steps involved. Each vehicle has one of these rotating laser sensors that interact with targets mounted along the path. The laser sensors receive the reflected signals and use that data to triangulate the vehicle's position.

In addition in the LGV the concept of the wireless infrastructure is also done. Because of wireless communication it is easy to be in constant connection with LGV software. This is particularly advisable if an LGV is navigating. In locations where this kind accuracy is needed, the number of targets needed are been increases. In a big warehouse, where there might be as many as 2000 locations where pallets could be placed, this kind of survey could take long time. The payback from any form of AGV comes in the form of labor savings that result from less time wasted in traveling across a facility. Warehouses and factories in the urban area are finding it increasingly difficult to hire workers for material handling. That is the primary reason the automatic guided vehicle are in such a demand in industrial work. Laser guided vehicles may be getting less publicity than autonomous mobile robots because it is an older technology.

3. LITERATURE SURVEY

1)***A Low cost land wheeled autonomous mini-robot for indoor surveillance***

Juan G. Parada-Salado, Luis E. Ortega-García, Luis F. Ayala-Ramírez, 1Francisco J. PérezPinal, Senior Member IEEE, Carlos A. Herrera-Ramírez, José A. Padilla-Medina

This paper presents design and construction of a land wheeled autonomous mini-robot (LWAMR) in-door surveillance. The LWAMR can be autonomous by using a position, speed and distance sensor. In addition, it is capable to send images and video in real time by using a spy cam, which is controlled by a servomechanism. Details of design, control algorithm, communication, and human machine interface are given. HMI was implemented in Lab VIEW and it is used for monitoring remotely the LWAMR health and surveillance. Communication between the HMI and the LWAMR system was carried out by means of RF transceiver. Results shows effective implementation of this kind LWAMR system. Advantages of presented LWAMR: low cost, versatility, modularity, robustness and remote (or not) operation by using a mobile device HMI.

2***) LAROB: Laser-Guided Underwater Mobile Robot for Reactor Vessel***

Inspection Jae- Hee Kim, Jae-Cheol Lee, and You-Rack Choi

There are several cylindrical vessels in the nuclear power plant such as the reactor vessel and pressurize. The vessels usually constructed by welding large rolled plates or nozzle pipes together. To ensure integrity of vessel, their welds should be periodically inspected using sensors such as ultrasonic transducers or visual cameras. To inspect these welds effectively, this project developed an underwater mobile robot, which is guided by a laser pointer. To reduce the inspection time and the schedule during code inspections the robotic system was devised compared to the conventional inspection machine with a large structure. The system mainly consists of underwater mobile robot, a laser positioning unit, and a main control station. The underwater mobile robot guided by laser positioning unit with a precise resolution of0.05◦. The mobile robot moves on reactor vessel wall with the four magnetic wheels. This paper presents the design and underwater mobile robot. The laser guidance control of mobile robot is also described along with experimental results. The system was integrated with main control station, and tested in reactor vessel of a Korean nuclear power plant .

3) ***Localization of a Mobile Robot Using a Laser Range Finder in a Glass-Walled Environment***

Jiwoong Kim and Woojin Chung, Member, IEEE

A laser range finder is most reliable and commonly used sensors It is challenging problem to employ LRF-based localization schemes in environments surrounded by transparent or reflective object such as glass walls or mirrors. Because the LRF is an optical sensor, range measurements are affected by various phenomena at the glass wall, such as diffuse reflection, specula reflection, and penetration. Hence, LRF measurements are erroneous in environments surrounded by the glass walls. This paper proposes the new strategy for localization using the LRF in glass-walled indoor environment. We designed novel scan matching algorithm under the consideration of all candidate distances that can be measured in the direction of the glass wall which is based on reflective characteristics of laser beam. The proposed method can significantly improve the local tracking performance of a mobile robot in glass-walled environments.

4) ***Design Implementation of High-Performance Line Following Robot***

Milan Shah, L.D.College of Engineering; Viraj Rawal, Vishwakarma Government Engineering College; and Jay Dalwadi, L.D.College of Engineering

Nowadays, in hospitals, in medical centers, in farming, in the military, on factory floors, in each and every field application of robotics is increasing day by day. Line following robot is one of the widely used robots. Basically, line following robot is an autonomous mobile system which follows the line which has a different color from the background. So the performance of these line following robots heavily depends upon its efficiency in differentiating the line from the background. Many robotic events based on the line following robot are organized at college as well as industry level all across the world. In this paper, we have described various

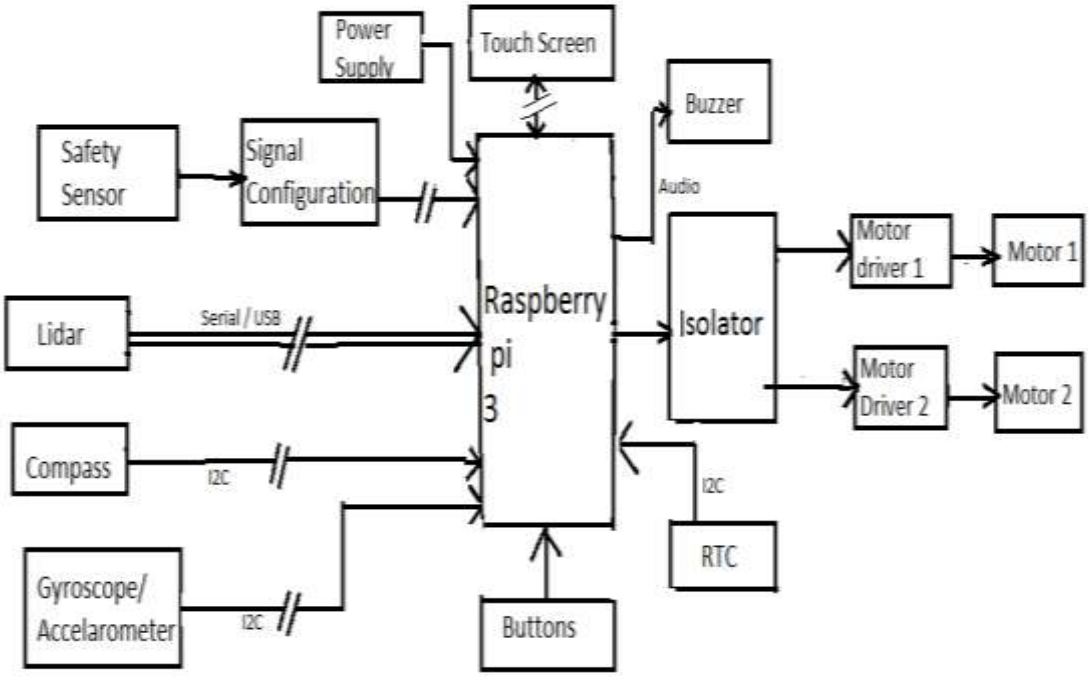
problems we faced while designing the line following system for the robot for ROBOCON 2016 (International robotics event), how we overcome them and how we designed the most optimized, efficient and high performance line following system.

4. OBJECTIVE OF THE PROJECT

The proposed system tries to fulfil the following objectives:

- To build an AGV that can replace the manual handling and able to being the fragmentary products to a particular location based on laser pattern recognition systems.
- The main purpose of LAROB is to reduce the man work for porting or delivering the raw or finished materials from one place to other.
- LAROB guide itself to reach to destination without human interference so this saves the time, manpower in the industries or warehouse
- LAROB gives the longer vehicle lifecycle with the smooth and controlled movement
- This Lowers energy consumption. Possible to operate warehouse with lights-out and at high or low temperature.

4.1 Theoretical Background



LAROB for warehouse work on the basis of this block diagram where we connect the main controller as raspberry pi which works as our controller of the project. We use the safety sensors for detecting the obstacle between the path of the LAROB so it will stop or change the direction according to it. The compass, gyroscope, accelerometer are used for the direction or navigation purpose this also let us know the angular position of the LAROB. The motor driver are used for controlling the motors in the required direction which is to be moved accordingly the need of the user. The RTC gives the real time clock for the as required for the larob the buzzer indication is been used for indicate the obstacle in between the way or between the path as programed so for this indication the buzzer is been used. 7 inch touchscreen is used for display the required information what user wants to give the input to the larob or what to know anything other purpose. The power supply used to supply the power so it can work with no problem. Lidar is the most important application used for transmitting the laser beams in all 360 degree angle so this emitted laser lights are reflected back from the reflectors and according to this the larob understand the way of its path and get to know that where it has to go. So the Lidar is the laser system used for the deciding the path of it this is the more easy and less maintenance type of navigation system used for AGV.

5. METHODOLOGY

- Literature survey will be made to understand the existing system that requires a person to control the electrical system in the warehouse and its limitations.
- The proposed system will be designed according to the specification.

- The designed control circuit will be simulated using KICAD and its characteristics will be observed.
- The finalized design of control circuit will be fabricated after choosing appropriate components.
- The proposed system will be designed, fabricated and its functioning will be observed and recorded.
- The Advantages of new design of control circuit will be validated against the performance of existing systems.

5.1 Advantages

- Reduction in direct labor.
- Easy maintenance.
- Locations and paths can be reprogrammed.
- Improved productivity and quality.
- Heavy duty done easily and quickly.
- Saves time for shifting the load over the industry.
- No paths to be created on ground foe laser based system.

5.2 Applications

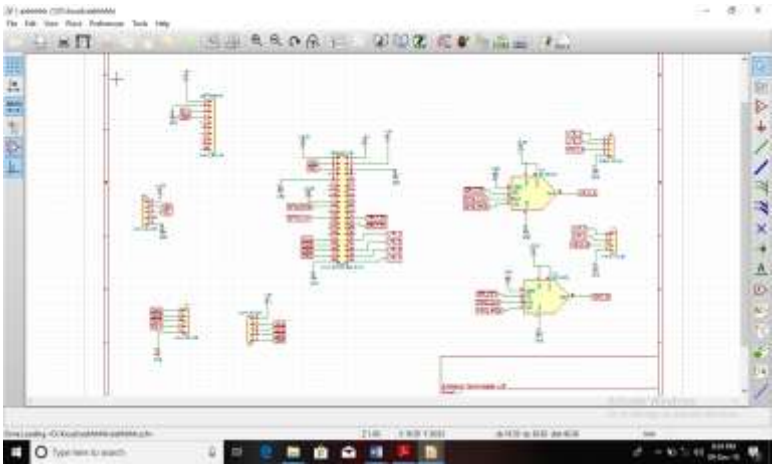
- Flexibility manufacturing system
- Assembly line operation
- Raw material handling
- Driver less train operations
- Pallet handling
- Finish trailer handling
- Trailer handling

6. FUTURE SCOPE

- Ultrasonic is still in its infancy, it will most likely get faster and have more memory for storing data.
- The range can be considerably increased by using high power drive circuit.
- It can be used as assistance for blind.
- Automated vehicles for physically and visually challenged.

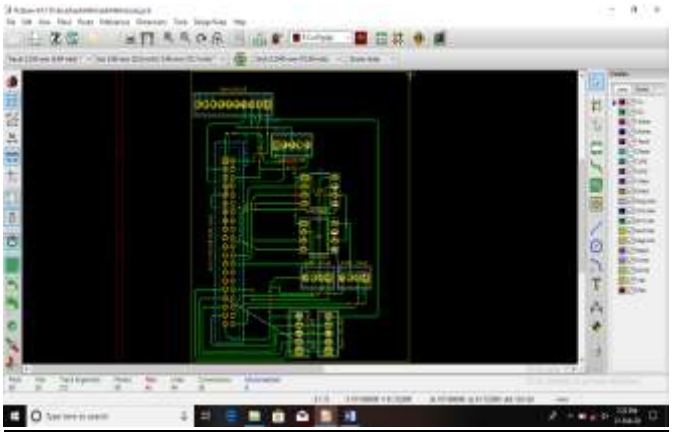
7. PROCESS AND OBSERVED OUTPUT

Circuit implementation in kicad software.



Kicad is a free software suite for electronic design (EDA). It provides the design of a schematic for electronic circuits and their conversion to PCB design. It features an integrated environment for schematic capture and PCB layout design. The tool exists within the package to create a bill of materials, artwork, Gerber files and 3D view of the PCB and its components. So here in this software, we implement the circuit designing of the lab. By using the components and labeling. We use to connect the components with each other. To know the connection with each component. An official library for a schematic symbol and a built-in schematic symbol editor help you get started quickly with your designs.

- **PCB layout**



Make a professional PCB layout with up to 32 copper layers. Kicad now has a push and shove router which is capable of routing differential pairs and interactively tuning trace lengths

Output observed

8. CONCLUSION

From this project we are able to know about automated guided vehicle or automatic guided vehicle (AGV) is a mobile robot that follows the laser light emitted from LIDAR for navigation purpose. They are most often used in warehouse for moving the material around the manufacturing facility or other industrial works. Application of automatic guided vehicle are broadened during the late 20th century. We conclude that in factory with large area , LGV will definitely increase productivity, with decrease the expenditure and transportation time

9. REFERENCES

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