

Compact Automated Guided Vehicle

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Abstract –The objective of the Compact Automated Guided Vehicle is to help in increasing the production and efficiency of work in the industries. Methodology used here for the project is problem identification, recent researches, identification of resources, designing of parts, making and testing. Coding the vehicle, that is coding the microprocessor so that it works accordingly on the factory floor, without crashing to something which comes in the way of the vehicle, it is also very significant in small scale industries because we have reduced its size so that it can travel in very small path without any problem and also its obstacle detection is also very significant that it stops before getting crashed to something on its way. The vehicle designed in small size so that it can also be used in commercial places like malls, shops, offices where it can carry small load around the area which can help in reducing the time needed for carrying small things from time to time. Significant amount of price reduction is done in the vehicle which makes it more affordable and also due to its size compared with industrial automated vehicle is comparatively less and also integration of microprocessor makes it very easy to customise the functions according to the use just coding. In future automated vehicles can play a significant role in human life.

Key Words: Automation, vehicle, Coding, factory, Compact, path, size.

1.INTRODUCTION

An automated or Automatic guided vehicle system is material handling system. Which are programmed for moving in different paths on the factory floor. 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.

2.OBJECTIVE

To help in Increasing the production with higher efficiency which will effect in reduction of costs of production as the supply will increase. This AGV will reduce human efforts and will improve the work Efficiency while working For 24 hours. To reduce the size of Automated Guided Vehicle Suitable working with small scale industries also.

3.METHODOLOGY

- Problem Identification
- Recent Research
- Identification of equipments
- Designing of parts
- Calculation
- Material Selection
- Cost Estimation
- Fabrication and Testing

4. CALCULATIONS FOR SELECTION:-

Weight of vehicle= 5Kg
Required speed = 1 kmph
Wheel size = 1.7 inch dia = 0.0229m
Efficiency of motor = 80%
Rolling resistance = 0.01 assume
Coefficient of drag = 0.65 assume
Area of vehicle = 0.02057 m²
Density of air = 0.6465
length of Car = 0.187m
Width of car = 0.11m

$$\begin{aligned} 1) & \text{Linear distance traveled} \\ & = 2\pi r \\ & = 2 \times 3.14 \times 0.01145 = 0.1355\text{m} \end{aligned}$$

$$\begin{aligned} 2) & \text{Speed} = 1\text{ kmph} = 1000\text{mph} \\ & = 0.277\text{m/s} \end{aligned}$$

$$\begin{aligned} 3) & \text{RPM} = \text{Total distance covered per hour} / \text{Linear distance} \\ & = 1000 / 0.1355 \times 60 \\ & = 123\text{RPM} \end{aligned}$$

$$\begin{aligned} 4) & \text{Power} = (M \times \text{Acceleration} \times \text{Velocity} \times \text{Rolling} \\ & \text{Resistance}) + (\text{air density} \times \text{Coefficient of drag} \times \text{Area} \times V^3) \\ & = (5 \times 9.81 \times 0.277 \times 0.01) + (0.6465 \times 0.88 \times 0.02 \times 0.02^3) \\ & = 0.13609 \text{ Watt. (Peak Power)} \end{aligned}$$

5.CONSTRUCTION

5.1 Arduino Uno 680:-

Arduino is an open source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs-light on a sensor, a finger on a button and turn it into output activating a motor turning on an LED, publishing something online.

You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on wiring), and the Arduino software (IDE), based on Processing.



Fig -1: Arduino Uno 680

5.2 Infrared Sensor:-

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems (such as in robots). Passive IR sensors are most commonly used in motion-based detection, such as in-home security systems. When a moving object that generates infrared radiation enters the sensing range of the detector, the difference in IR levels between the two pyroelectric elements is measured. The sensor then sends an electronic signal to an embedded computer.

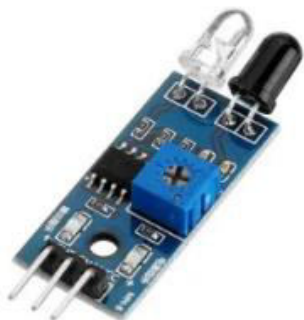


Fig2: IR sensor

5.3 DC Motors:-An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft Electric motors can be powered by direct current (DC) sources, such as from batteries, or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators An electric generator is mechanically identical to an electric motor, but operates with a reversed flow of power, converting mechanical energy into electrical energy.

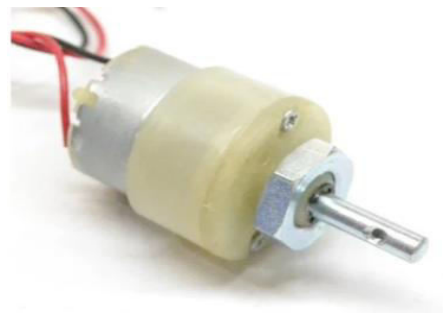


Fig.3 DC Motor

6. ADVANTAGES

- 1.Assembling & disassembling is easy
- 2.Space required is less
- 3.Skill worker not required
- 4.Portable
- 5.Cost is less
- 6.Production is easy and production in less time.

7.CONCLUSION

Automated system has increased the production and also provide efficiency in work as it operates automatically without human operator. In general, we need one worker for operating a vehicle separately but by implementation of this automated vehicle the need for separate human operator is eliminated . Human efforts are reduced. Cost and time can be easily be reduced work efficiency can be increases as this vehicles can work for 24hrs without any break.

8. FUTURE SCOPE

As we saw that Due to the pandemic situation of Covid19 everything was in lockdown humans were not allowed to get out of the house or they must not go out of the house but we also have to fulfill our daily needs such as food and water which makes us risking our life and getting out of the house for food and water services whereas when in future we will develop such automated vehicles which can deliver us food and other necessary resources at our door steps which will bring safety and comfort even more in human life.

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