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Automatic guided vehicle for medium load carrying capacity

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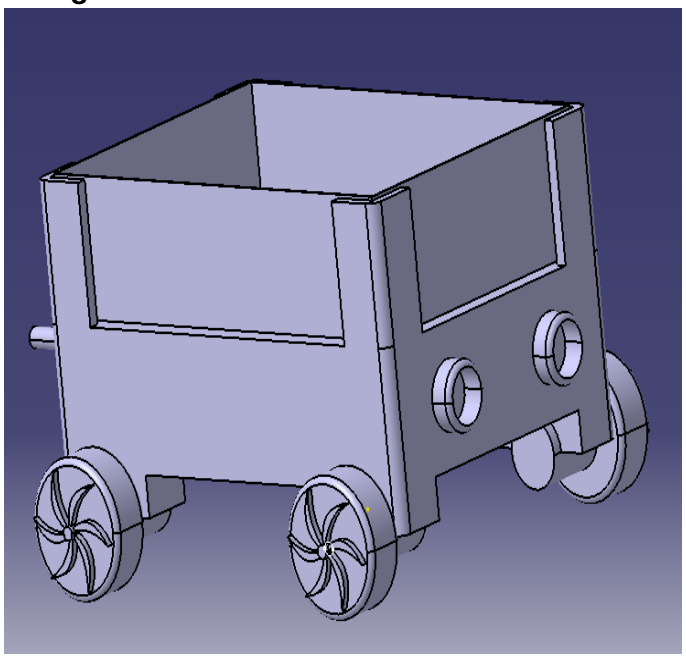
Abstract— Automatic guided vehicles (AGV's) is a mobile machine that can detect and follow the line drawn on the floor.Generally, the path is predefined and can be either visible like a black line on a white surface or it can be invisible like a magnetic field.Therefore, this kind of Robot will sense the line with its Infrared Ray (IR) sensors that installed under the robot and perform the given task like carrying load and transferring the load from point A to B.

Index Terms—Introduction, Figures,Components,Construction ,Calculation, Programming, Conclusion, References

1 INTRODUCTION

Automated guided vehicles (AGV's) help to reduce time of manufacturing and increase the efficiency in a manufacturing system. A wheeled robot is an autonomous robot and it can independently plan and manipulate its particular motion to facilitate the completion of particular tasks. It Is controlled by various tech-niques and methods. Line follower vehicle is the basic part of mechatronics system in addition there is impleme-tation of load carrying feature in it which will reduce human efforts and also time consumption. It will carry moderate amount of weights(tools, workpiece, metalslabs.)It also carry's load and reduces the humanefforts.

3 Figures



4 OBJECTIVE

a) The objective of this project was to design a system for Implementing mechatronics system in workshop by replacing manual tool container by automatically guided vehicle that would include both mechanical and electrical components.

b) However, to increase the project's complexity,the vehicle had to not only follow a straight path but also follow a curved path, navigate through an intersection, and correct its position in the event that it went offcourse.

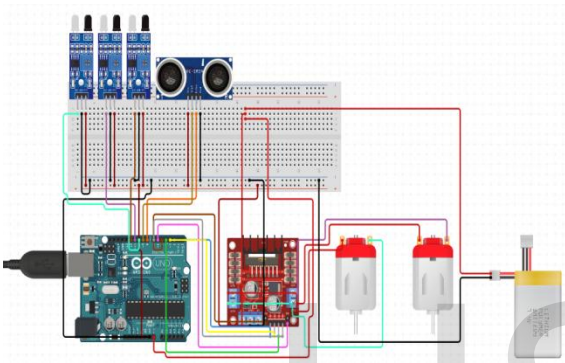
c) This was accomplished by using a microcontroller, sensor, DCmotors, motorcontrollers etc.

4 COMPONENTS

- ARDUINO UNOBOARD
- ULTRASONIC SENSOR
- INFRAREDSENSOR
- GEAREDMOTOR
- BATTERY
- MOTORDRIVER
- TROLLY
- CONTAINER
- WHEELS

5 CONSTRUCTION

- Connect all the sensors(IR,Ultrasonic) to the Arduino unoboard as shown in circuit dig.
- Upload the program in the Arduino board by connecting board to thecomputer.Connect the battery to motor driver and Arduinoboard.
- Connect the motor to driver output and input of driver is connected to Arduino.connect all the connections to the desiredpins.
- place all the components inside the chassis
- mount the motor on bottom surface with the help of clamp
- mount wheels on motor shaft using screw



Fig;-Circuit Dig

6 CALCULATION

Self weight

1 motor = 0.3kg

4*motor =1.2kg

Battery weight=0.72kg~0.9kg

Workpiece weight

1bar=0.800kg

20*bar=16kg

Sheet container=2.11kg

Weight of Aluminium chasis=0.7746kg

Weight of trolly=2kg

Weight of electronic components=0.5kg

Total chasis self weight=5.4746kg

Trolly weight=2kg

trolly weight+pay load=18kg

Force calculations

Velocity=RPM*3.14

=300*3.14

=942

=942*Dia.

=942*6mm

=5652mm/min

=0.094m/sec

Chasis drag force on wheel

Coefficient of friction of wheel with floor(μ)=0.303

Radial Force on wheel

F=R*μ

R=W*9.81

F=5.4746*9.81*0.303

F=16.2728N~16.5N

Trolly drag force

Coefficient of friction of fibre wheel with floor= 0.03-0.057

F=R*μ

R=m*g

F=(18*9.81)*0.057

F=10.065N~10.1N……(for all four wheel)

Total drag force on wheel

F=Ft+Fc….(Trolly is connected to chasis)

=10.1+16.5

=26.6N

Required torque

F=26.6…..(force on four wheels)

For one wheel=F/4

=26.6/4

=6.65N

T=F*r

T=6.65*0.50

=3.325N-cm

7 PROGRAMING

Connect ardino board to computer, open the IDE softwear and upload the code

8 SCOPE

- Load handling
- Workshop Application
- Pharmaceutical departments
- Library purpose
- Chemical industry
- Automotive industry
- Food and beverages

8 CONCLUSION

- BUILDING A ROBOT THAT HAS LIGHT WEIGHT AND HIGH TORQUE, THE DISTANCE COVERED AND THE SPEED OF THE OVERALL ROBOT.
- Therefore, we used four high torque motors and high sensitivity sensors circuit.
- The body weight and wheels radius have effects on speed,too.
- The weight carrying capacity of the designed robot is around 10-15KG.
- Arduino UNO Board and driver L298 were used to control direction and speed of motors.
- The robot is controlled by the microcontroller. In performs change the motor direction by giving signal to driver IC according to receives signals fromsensors.

9 ACKNOWLEDGMENT

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9 REFERENCES

[1] M.Zafri Baharuddin, "Analyst of Line Sensor Configuration for Advanced Line Follower vehicle", University TenagaNasional.

[2] Cao Quoc Huy, "Line Follower vehicle", University UPG dinPloiesti.

[3] P. Heyrati, A. Aghagani, "Science of vehicle Disgn and Build vehicle", Azarakhsh Publication,2008.

[4] M. Mashaghi, " vehicleic Guide", Kanone Oloum Publication,2008.

[5] A. Kahe, "AVR Microcontroller", Nas Publication,2007.

[6] vehicleic Competition Rolls site: http://www.tjrc.ir/roles.asp in date2009/05/15.