



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 4

Issue: IX

Month of publication: September 2016

DOI:

www.ijraset.com

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Garden Game Playing Robot

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Abstract: This project deals with the development and construction of a manual robot capable to play various game activity with the parent & child robot. Parent robot has to carry child robot up to the play zone & child robot plays game activities. Such as see-saw, pole walk & swing.

These two robots to be prepared are as follows:

1. PARENT robot

2. CHILD robot

Parent robot manually operated is operated cable connected to it, the maximum dimension of parent robot with child robot is less than 1000mmL * 1000mmL * 1000mmH. The various links of parent robot are actuated by electric motor drive & by pneumatic. The child robot is autonomous robot.

Keywords: PET (polyéthylène téréphtalate), PMDC motor (permanant magnet DC motor), WD (wheel drive), MDF (medium density fiber)

I. INTRODUCTION

Parent robot has to carry child robot up to the play zone & child robot plays game activities in the child zone. Parent robot is manually operated and child robot is autonomously controlled which neither have wheels nor tracks for locomotion it can have arms and leg. child robot is not allow to touch the floor area, child robot's size and form should fit into cube of 500mm at all times. Both team has to play see-saw as their first activity, after completing see-saw team can attempt either swing or pole walk as per their choice. The last activity is jungle gym and the team which will complete the whole task earlier will be the winner of the game.

II. PARENT ROBOT

Parent robot is basically consists of electric motors, pneumatic pistons, solenoid valves, PET bottles as a air receiver, gripper mechanisms, 150mm aluminium wheels, lead acid battery, castor wheel, high torque viper motor and chassis is made up of MDF plywood.

The bot is driven by two 42 kgcm and 300 rpm rectangular gear box with side shaft motors to which 150mm aluminium wheels are attached. The mainly bot uses 2WD with one castor wheel fix to its front side for direction purpose.

It consists of following three mechanisms-

So we will discuss above all mechanisms in detail.

A. Lifting Mechanism

It consists of 2 motors having specification 92 kgcm and 80 rpm, 2 plummer blocks, 2 gears and aluminium links. Two motors drives driver gears simultaneously which is mesh to the driven gear having same dimension. Aluminum links are attached directly to the driven gear by means of bolting which acts as a lifting mechanism. As motors rotate clockwise the mechanism goes up and it lift down when motors rotate anticlockwise. The main task of lifting mechanism is to lift the other mechanisms for placing the child robot at desire position. By knowing the weight of mechanism as well as child bot we selected the most desired motor so that failure of mechanism is avoided.

B. Gripping Mechanism

The gripping mechanism is itself attached to the lifting mechanism at its extreme end, so that the grasping of the child robot is made easy during performing the different task. The gripping mechanism includes bent aluminium link (L-section) which is rotated by the pneumatic piston of 80mm (length)*50mm (bore).

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C. Pulling Mechanism

The pulling mechanism is merely used for pulling the swing board away from its rest position when the child robot is placed on the swing board. As it goes upward along with the child robot automatically the board is being released from the pulling mechanism and the child robot touches the flag which is kept at a distance. This mechanism consists of a pneumatic piston of length 100mm*50mm bore diameter. One end of the piston is attached to the aluminium link and the other end is fixed to the (L-section) MDF. This is kept vertically upward. All the pneumatic piston is operated by the air which is filled in the receiver and the limitation of air pressure is 6 Bar.

Parts required for this mechanism:

1) 5x2 Solenoid Valve

It is used to switch the air supply, according to the electric operated signal.

2) Pneumatic Pipe

This is duct used for the compressed air.

3) Receiver: it is storage of air which is required for various pneumatic tasks..

4) Flow Control Valve: A flow control valve regulates the flow or pressure of a fluid

5) Pressure Gauge

Pressure gauge allows us to control the pressure of outlet air, so that required change in the output can be achieved. A 2x2 Solenoid Valve is used to switch on or off the air flow by operating through PS-3 controller. A relay is used to allow the air flow take place for specified time period

6) Triple Swivel Joints

These are used when a large number of air bottles to be collectively used for any pneumatic application.

7) U- joints

8) On-off valve (hand operated)

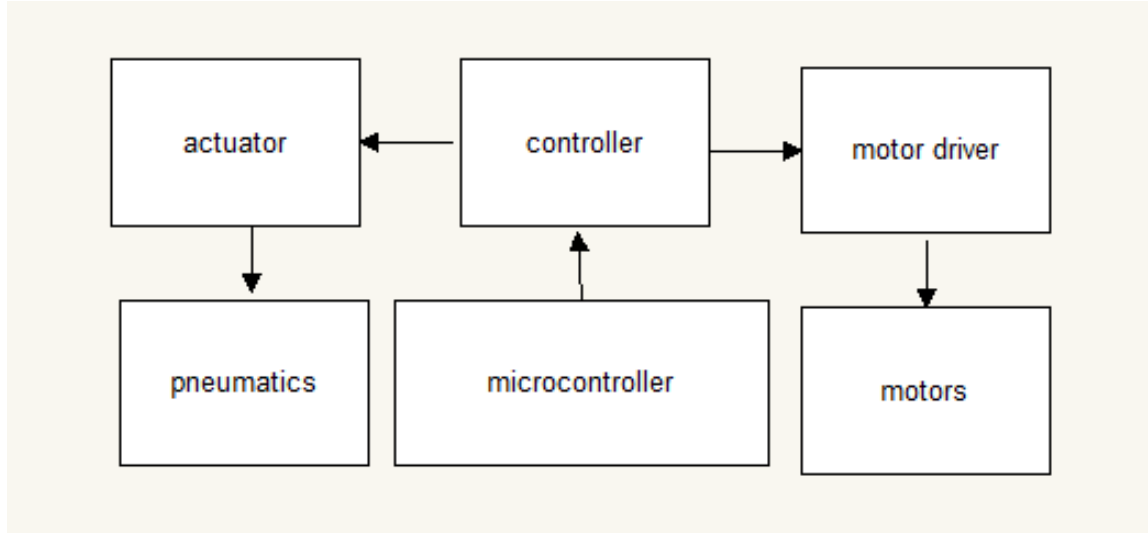


Fig: 1. Block diagram of Parent robot (MANUAL Robot)

D. Child robot

The child robot is an autonomous robot, it does not have wheels nor tracks for locomotion; it can have arms and legs. The child robot is not allowed to touch the floor area; the child robot's size and form should fit into a cube of 500mm at all times. It is also made of different aluminium sections; it consists of two slider cells.

E. Hardware's used in the robot

1) Aluminium wheels

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- 2) Solenoid valves
- 3) Lead acid batteries
- 4) Pneumatic pistons
- 5) Motors
- 6) Controller
- 7) Pressure gauges
- 8) On/off valve
- 9) Pneumatic connectors

III. HARDWARE SPECIFICATIONS

- A. Specifications of motor driver
- B. Operating voltage: 6V to 36V
- C. Continuous output current: 15Amp
- D. Infrared Proximity Sensor
- E. Operating Supply: 12-24V dc
- F. Controller
- G. Microcontroller: ATmega2560
Operating Voltage: 5V
- H. Input Voltage: 7-12V

IV. CONCLUSION

According to the theme as 'salute parenthood' the parent robot takes the child robot to the game field and accordingly all the task are performed by the both robot. This concept can be used in the industry in case when the most delicates parts are transported from one place to the other place, with the help of the manually operated robot. As we used the separate mechanism for completing the each task, it is possible to use single mechanism for performing different task.

V. ACKNOWLEDGEMENTS

The authors are thankful to the following persons Dr. P. S Adwani (Principal), Dr. A .G. Thosar (HOD), Dr. R. K. Srivastava, Dr.Balchandra A.S., Prof. Kolhare Nilima, Dr.Deodhar Kulkarni, Prof.Mrs.Agrawal, Prof..Harne M.S., Prof.Hirekhan, Dr.U.J.Kahalekar, Dr.D.G. Regulwar, Prof Sohel Shaikh, Mr.Shastrri, Mr.Husai M.R. for the publication of this paper.

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