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Automation in Material Handling

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***Abstract*: In today's industrial environment in fast life environment, every human being wants a fast, automated and reliable machine which gives high efficiency in low cost with more flexibility so to fulfill this conditions one technology is invented which looks like human and do whatever human wants with higher efficiency known as robot. Here, we design one robot which is useful for industrial work, there are so many types of robots are available in the market, but we designed & manufactured a robot for material handling. The robot has unique specification like it is easily modifiable or flexible in the nature. This robot can lift weights up to 2 kg using electromagnet not by jaws. This robot not using battery, transformer. This robot uses hanging power supply.**

***Keywords*: Material handling.**

1. Introduction

A LINE follower robot means a robot which moves forward, backward by following lines predetermined by user. This lines are simple as a physical white line on the floor, e.g. embedded lines, magnetic markers and loser guide markers.

In order to detect this lines various sensors are used which sensed the lines and gives a signal to the Arduino board which control the DC motors connected to the driving wheels. There are varieties of sensors are available from low accuracy to high accuracy, depending upon our requirement we can choose it. The main aim of the robot is pick an object and place it to specified distance. There is requirement of turning the arms of robot so, this requirement is fulfilled by using a stepper motor for arms turning. Stepper motor turns in angles so one can easily give the command to the Arduino or save to angle value and turn to arm as per requirement. There are two DC motors are used for driving the robot forward, backward. This DC motors are connected to rare two wheels. Material used for this robot basically mild steel, aluminum electromagnet used for this robot having lifting capacity at maximum 2 kg. The shape of electromagnet is either circular or square in shape. The supply needed for working of all motors is 12 V DC supply with near about 1-3-amp current. Basically Arduino board used is Arduino mega 2560.

2. Components Used

A. DC Geared Motors

A DC motor is an electric motor that runs on direct current (DC) electricity. The below figure shows the overall working of DC motor.

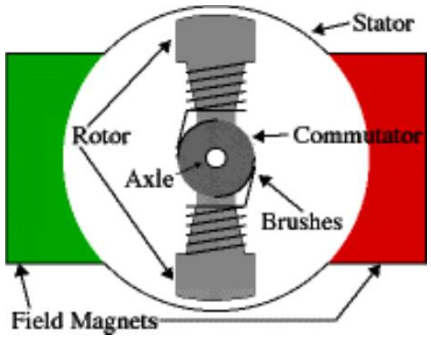

Fig. 1. DC motor

B. Arduino Mega

Arduino 2560 is a microcontroller board based on the AT mega 2560.

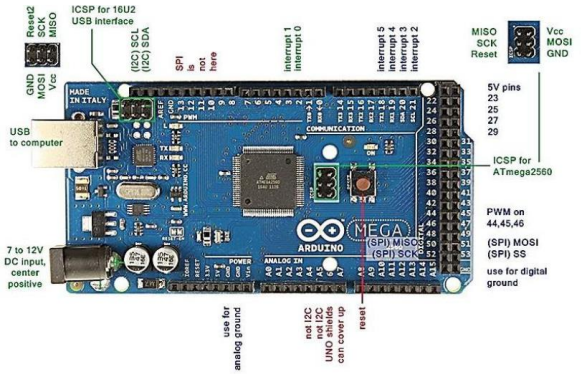

Fig. 2. Arduino Mega

Technical specifications are:

1. Microcontroller: AT mega 1280 or 256
2. Operating Voltage: 5V
3. Input Voltage(recommended): 7-12V
4. Input Voltage(limits): 6-20V
5. Digital I/O Pins: 54 (of which 14 provide PWM output)
6. Analog Input Pins: 16
7. DC Current per I/O Pin: 40 mA
8. DC Current for 3.3V pin: 50 mA
9. Flash Memory: 128 KB or 256 KB

10. SRAM: 8 KB
11. EEPROM: 4 KB
12. Clock Speed: 16 MHz

C. Material Selection for Aluminum is based on

a) Availability
b) Cheap Cost
c) Strength
d) Light Weight

Table 1
Properties of Aluminum

Property	Values
Atomic Number	13
Atomic Weight (g/mol)	26.98
Valency	6
Crystal Structure	FCC
Melting Point (°C)	660.2
Boiling Point (°C)	2480
Mean Specific Heat (0-100°C) (cal/g.°C)	0.219
Thermal Conductivity (0-100°C) (cal/cms. °C)	0.57
Co-Efficient of Linear Expansion (0- 100°C) (x10- 6/°C)	23.5
Electrical Resistivity at 20°C (Ω.cm)	2.69
Density (g/cm³)	2.6898
Modulus of Elasticity (GPa)	68.3
Poissons Ratio	0.34

D. Material selection for component is mild steel

Criteria for selecting Mild Steel is same as Aluminum.
Mild Steel contains
Carbon: 0.16 to 0.18 %
Manganese: 0.70 to 0.90 %

3. Design

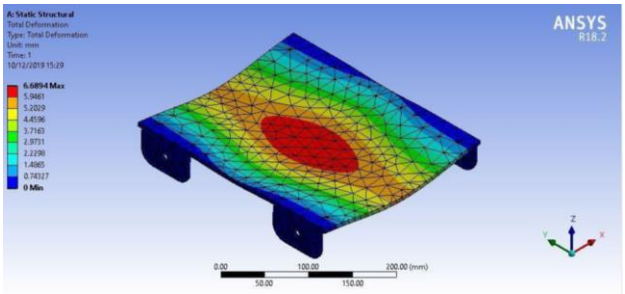

Fig. 3. Total deformation

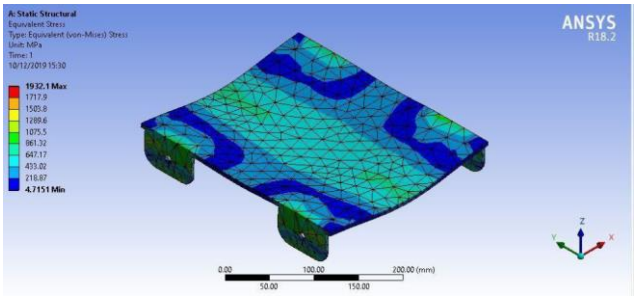

Fig. 4. Stress distribution

The design and drafting is done on CATIA and analysis is on Ansys for 500gm to 2kg capacity of chassis. There are some images of load distribution of loads on chassis which shows the impact on load on various points.

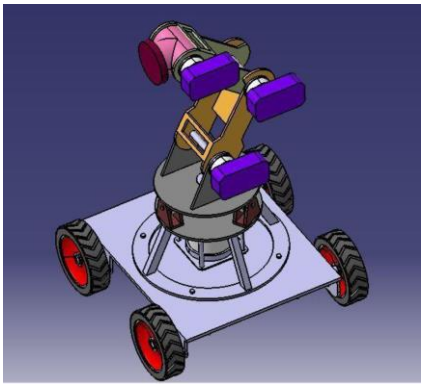
Fig. 5. CATIA model

4. Conclusion

By using this project model, we are going to eliminate the human interface. This model will reduce labor cost & will increase productivity. This robot can be used where material which is handled to much hot or cold. This model follows a specific path as programmed so less chances of accident.

References

[1] Vivek Deshpande and P. M. George, "Kinematic Modelling and Analysis of 5DOF Robotic Arm", International Journal of robotics Research and Development, vol. 4, no. 2, pp. 17-24, April 2014.
[2] Raskar, D. S, Belagali, "Interactive Pick and Place Robot Control using Image Processing Method," 2014.
[3] Deepak L. Rajnori, A. S. Bhide, "Automatic Material Handling System Using Pick & Place Robotic Arm & Image Processing," 2016.
[4] Anusha Ronanki, "Design and Fabrication of Pick and Place Robot to Be Used in Library," June 2015.
[5] Ratheesh Rajan, "Foundation Studies for an Alternate Approach to Motion Planning of Dynamic Systems," 2001.