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Obstacle Avoiding Robotic Trolley for Material Handling

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***Abstract* - Robots are machines which reduce the human efforts in heavy works by automating the tasks in industries, factories, hospitals etc. Most of the robots are run by using some control unit or components like a push button, remote, joystick, PC, gestures and by executing some command by using controller or processor. But today we are here with a Automatic Robot which moves autonomously without any external events avoiding all the obstacle in its path, yes we talking about Obstacle Avoiding Robot. In this project, we have used microcontroller and Motor driver to drive the robot and Ultrasonic sensor for detecting objects in the path of Robot. And this Robot is used to material handling system for handling the material from one station to another station. The robot can efficiently and accurately move product from one location to another. Material handling applications include material transfer and machine loading and unloading. Material-transfer applications require the robot to move materials or work parts from one location to another. In robotic processing operations, the robot manipulates a tool to perform a process on the work part. The world robotics is used to collectively define a filed in engineering that covers the mimicking of various human characteristics. It must be able to perform certain task we set for it. The desired task must be achieved within some given limitations. It may be human controlled or automatic.**

Keywords: Obstacle Avoiding, Robotic Trolley, Material Handling.

I. INTRODUCTION

Material handling is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal. Material handling (MH) makes use of the robot's simple capability to transport objects. By fitting the robot with an appropriate end of arm tool (e.g. gripper), the robot can efficiently and accurately move product from one location to another. Material handling applications include material transfer and machine loading and unloading. Material-transfer applications require the robot to move materials or work parts from one location to another. In robotic processing operations, the robot manipulates a tool to perform a process on the work part. Introduction about Robotics: Robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner.

By extension, robotics is the engineering discipline dealing with the design, construction, and operation of robots. Robotics technology influences every aspect of work and home. Robotics has the potential to positively transform lives and work practices, raise efficiency and safety levels and provide enhanced levels of service. Even more, robotics is set to become the driving technology underpinning a whole new generation of autonomous devices and cognitive artefacts that, through their learning capabilities, interact seamlessly with the world around them, and hence, provide the missing link between the digital and physical world. Robotics is already the key driver of competitiveness and flexibility in large scale manufacturing industries. Without robotics many of Europe‟s successful manufacturing industries would not be able to compete from their current European bases 2 of operation. In these industries robotics already underpins employment. Increasingly robotics is becoming more relevant for smaller manufacturing industries which are central to Europe‟s manufacturing and employment capacity.

By the same token, service robotics will show far more disruptive effects on the competitiveness of non-manufacturing industries such as agriculture, transport, healthcare, security and utilities. The growth in these areas over the coming decade will be much more dramatic. From what is currently a relatively low base, service robots used in non-manufacturing areas are expected to become the largest area of global robot sales. The world robotics is used to collectively define a filed in engineering that covers the mimicking of various human characteristics. It must be able to perform certain task we set for it. The desired ask must be achieved within some given limitations. It may be human controlled or automatic.”

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II. METHODOLOGY

Step 1: We started the work of this project with literature survey. We gathered many research papers which are relevant to this topic. After going through these papers, we learnt about car towing machine.

Step2: After that the components which are required for my project are decided.

Step 3: After deciding the components, the 3 D Model and drafting will be done with the help of AUTOCAD software.

Step 4: The components will be manufactured and then assembled together.

Step 5: The testing will be carried out and then the result and conclusion will be drawn.

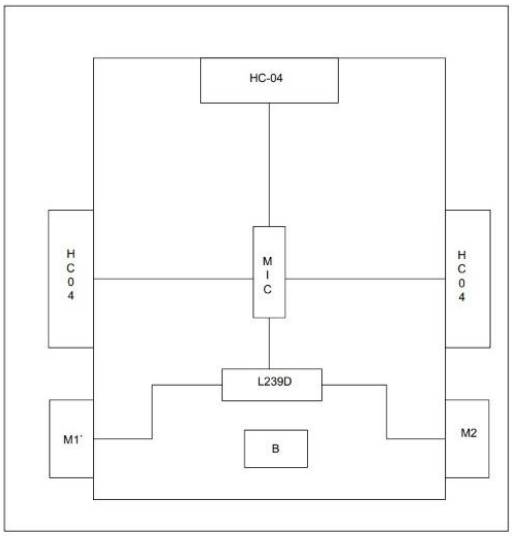

Figure 1: Block Diagram

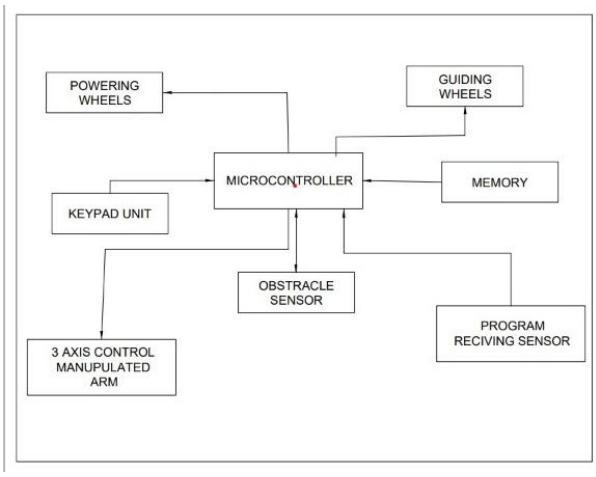

Figure 2: Circuit diagram of microcontroller

We design a basic frame for a prototype by mild steel channel (L beam), L Channel- MS Angles are L-shaped structural steel represented by dimension of sides & thickness. For e.g. 25x25x3 means, both the sides of angles are 25 mm & thickness is of 3 mm. There are various sizes of angles which are as follows: (there are also equal & unequal angles). Equal angles: They are angles having both the sides of equal dimensions. For e.g. refer below given diagram, in which both the sides are of dimensions "a". By standard available sizes we select the 25 mm so because that will be easily available and have appropriate size for frame.

III. CALCULATIONS FOR MOTOR SELECTION

BASIC CONCEPT DESIGN CALCULATION: MOTOR SELECTION: Consider, Weight to be lifted = 1000 gram Total weight of the vehicle = 600 gram So total weight applied on the motor is 1600 gram Factor of safety is 1.25 Total weight is 2000 gram = 2kg = 20N Radius of wheel = 35mm Torque Required = Force* Radius of Pinion = 20 X 0.0335 = 0.7 Nm For this actual torque we have to select the motor having the torque greater than that of the actual torque. So, we will select the motor from the availability in the market. Motor Specifications: Voltage = 12V Amp = 5A Power = P = 60 Speed = N = 1000 Rpm 23 Fig-12 Price of motor on internet [23] we know that, P = 2`*π*N*T/60 So, T =0.772 Nm The motor torque is greater than required torque. Hence the selection of motor is right.

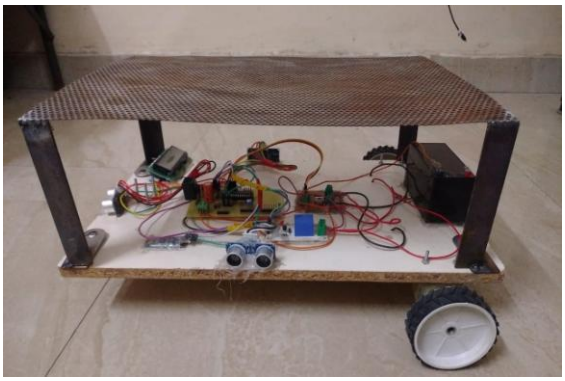

Figure 3: Actual Model

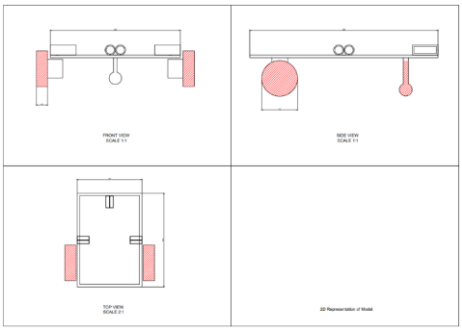

Figure 4: 2D model

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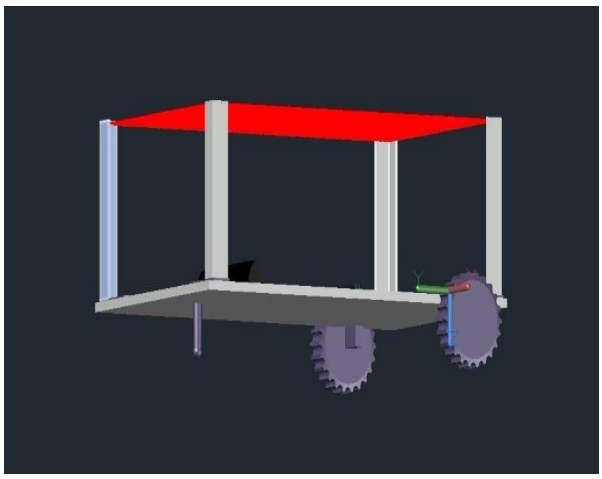

Figure 5: 3D model

IV. RESULTS AND CONCLUSION

As the robot is switched ON, 1st it will check either start signal is received or not, if not then the program counter will not go to the next address it will remains on the same address until it get a negative signal. Then the robot continuously checks any obstacle in path, if there is no obstacle then robot will go straight. If any obstacle will found in left side then the controller send a command to the motor drive to stop the right motor & move the left motor and just opposite as obstacle found in right side.

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