International Journal For Technological Research In Engineering
Volume 1, Issue 9, May-2014 *ISSN (Online): 2347 - 4718*

AUTOMATIC GUIDED ROBOT

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Abstract: ***In production industries, chemical plants there are some repetitive and tedious jobs that require a lot of monotonous actions, like picking something from one place to another. These activities are time bounded which cannot be managed by humans alone. Automatic Guided Robot system is a reprogrammable robot which will be able to identify objects on its own and it will carry the identified object to its destination place. System uses image processing for comparison of two images, image captured by camera and required image. Wireless camera is used to capture an image and the captured image is transferred to the computer using RF module. Microcontroller At meg16 will Control the robot arms and wheels and works as per commands by computer.***

Keywords: ***AGR (Automatic guided robot), D1 (destination1), D2 (destination2), S (source), avg (average).***

I. INTRODUCTION

There are some repetitive and tedious jobs that require a lot of monotonous actions, like picking something from one place to another. These activities are time bounded which cannot be managed by humans alone. Considering this problem, there is a solution; i.e. an AGV which will be able to identify objects on its own and it will carry the identified object to its destination place.

II. WORKING

The destinations are named as D1, D2 and Source is named as S. When the computer will give command to the robot for required product, robot will start from the starting point. It will approach the source. When it reaches to the first object, wireless camera mounted on robot will capture the image and send it to the computer. Computer compares the received image with required product if it matches then robot carries the identified object and take shortest path to reach at the destination D1 or D2. If the image is not matched then robot moves further and the process continues till robot finds the correct product. Trace path of AGR is shown in Fig. 1.

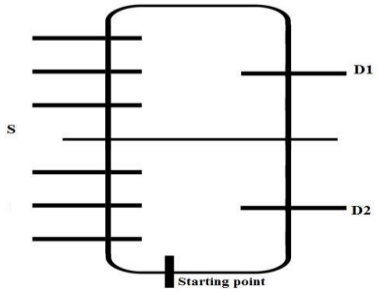

Fig. 1 Trace Path.

III. BLOCK DIAGRAM

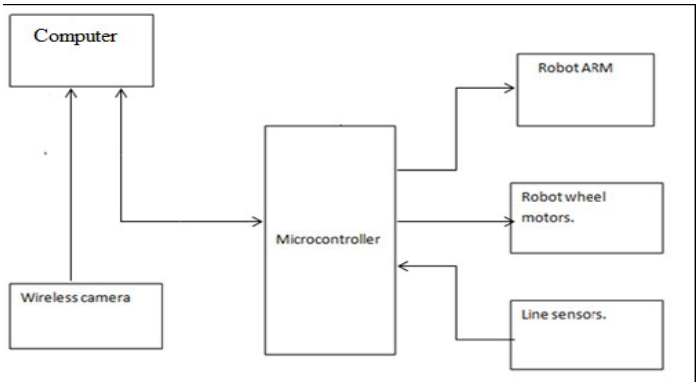

Fig. 2 Block diagram of AGR

Block diagram of automatic guided robot is shown in above Fig. 2 .Microcontroller will be programmed for movement of robot on the trace path and picking up required product. Wireless camera is used to take picture of a product and this captured image is sent to computer via RF module. Computer is used to compare the image of the product taken by wireless camera with the desired product image. If both the products matches' then robot will deliver it to desired destination and if both the products don't match then robot will move on to the next product. Wireless communication is carried by RF module. Line sensor i.e. IR sensor is used for tracing the black line and following it, Robotic arms are used to carry the product to the specified destination, .Robotic wheel motor is used for the movement of wheels.

IV. IMAGE PROCESSING

Step (1): Take the central part of both the captured image and the stored image

Fig. 3 Captured image

From the image shown take only 3*3 array of the whole image.

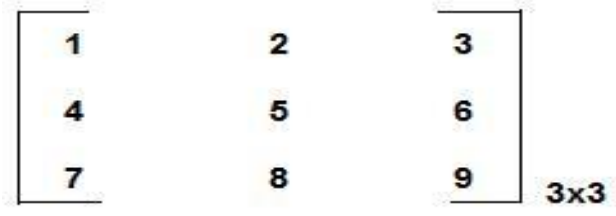

Fig. 4

Step (2): Find the average of both the matrices i.e stored image and captured image.
Step (3): Compare the average intensity value of captured image and stored image as per standard values standard intensities of Red, Green and Blue colors are:
1) 30<avg<50 then it is red colour. If the average value calculated from the captured image is between 30 to 50 then the colour of the image is red as per natural standards.
2) 40<avg<60 then it is blue colour. If the average value calculated from the captured image is between 40 to 60 then the colour of the image is blue as per natural standards.
3) 10<avg<30 then it is green colour. If the average value calculated from the captured image is between 10 to 30 then the colour of the image is green as per natural standards
4) 0<avg<10 then it is black colour. If the average value calculated from the captured image is between 0 to10 then the colour of the image is black as per natural standards.
Step (4): Now we have finished the color identification process by pixel by pixel comparison between stored image and captured image.

V. RESULT

The navigation of the robot under various test conditions are as follows: Automatic Transportation Robot will be searching the source for the object to be placed. It stops when the source is detected by the sensors mounted on it to the left side. It will stop at the source till an object is placed on it.

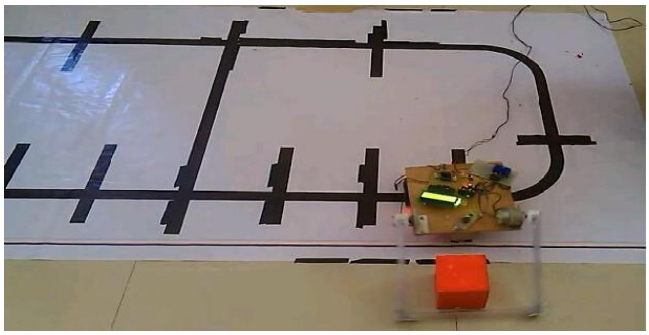

Fig. 5 AGR is picking up the required object.

Once the Object is placed on it, the web camera mounted on the robot captures the image and transfers the image to the PC. The PC takes the snapshot of the image at the required moment of time and process the image and recognizes the object.

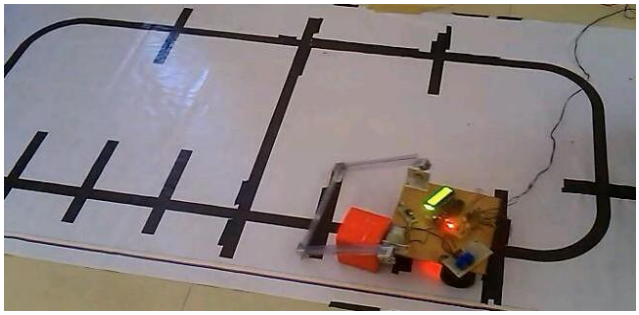

Fig. 6 AGR is dragging the object to its destination

After the object recognition the signal of the respective object image is sent to the microcontroller on the robot for deciding the destination to which the object has to be transported. If the object recognized is according to given input on the object placed, the destination to be reached is D1 or D2. Hence robot follows the line, and reaches the destination D1 or D2.It stays in destination D1 till the object is unloaded from it. After the object is unloaded, the robot reaches the source by tracing the path again to transport another object.

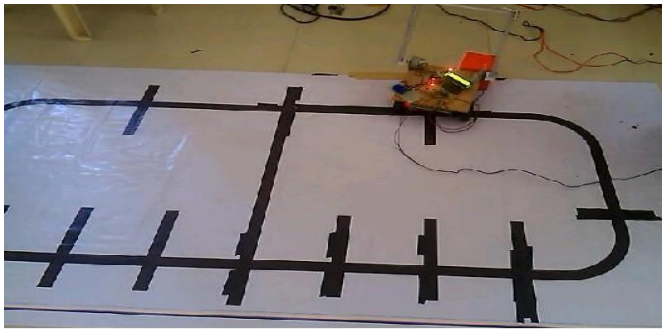

Fig. 7 AGR is dropping the object at specified destination.

VI. CONCLUSION

An autonomous robot has been built and tested which is capable of transferring the objects automatically between a source and different destinations using image processing and line tracing mechanism. The robot developed is extremely useful in hazardous places where different kinds of goods are to be transported to different respective destinations without any manual interference. It can be used in all kinds of industries, harbors, airports and in all places where goods are transported from a source to different destinations.

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