

Review on Fabrication of Remote Operated Robotic Arm Based Transportation Vehicle in Industries

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Abstract

In recent years the industry and daily routine works are found to be more attracted and implemented through automation via Robots. The pick and place robot is one of the technologies in manufacturing industries which is designed to perform pick and place operations. This work unravels the fact that man would always want to adhere to safety precautions at workplace and even in its environment, to be able to handle some specific tasks, like sending the robotic vehicle to hazardous environment to obtain samples for chemical analysis. It is control system which works in alliance with wired remote with wireless surveillance through Application. Wireless camera can be accessed by android application and the application can control the movement of camera. This system comprises of a remote module which work as the receiver for vehicle. This sends commands to the controller which execute according to the signals received by remote.

Keywords: Remote operating Robotic Arm, Transportation vehicle, Industries application etc.

1. Introduction

The use of Industrial mechanical arm characterizes some of contemporary trends in automation of the manufacturing process. However, present day industrial mechanical arm also exhibit a monolithic mechanical structure and closed-system software architecture. They are concentrated on simple repetitive tasks, which tend not to require high precision.

The pick and place mechanical arm is a human controlled based system that detects the object, picks that object from source location and places at the desired location. For detection of object, human detect presence of object and move machine accordingly. Robots are indispensable in many manufacturing industries. The reason is that the cost per hour to operate a robot is a fraction of the cost of the human labour needed to perform the same function. More than this, once programmed, robots repeatedly perform functions with a high accuracy that surpasses that of the most experienced human operator. Human operators are, however, far more versatile. Humans can switch job tasks easily Robots are built and programmed to be job specific. Today's most advanced industrial robots will soon become dinosaurs. Robots are in the infancy stage of their evolution.

2. Problem Statement

We have selected the pick and place robots for this particular process due to the following reasons:-

a. Using of human labour for the loading and unloading of the batteries and also for packing purpose will consume more time.

b. Even though Number of labourers is required more, the loading and unloading time should include allowances if labourers are considered.

c. Moreover the work can be done easily using a single pick and place robot, which is used for both

3. Objective

The main objectives of this project are,

- To control the displacement of the robotic arm so that the arm can be used to pick and place the elements from any source to destination.
- To control the displacement and movement of robotic arm using wire remote Transmitter and Receiver.
- To implement a robotic arm with two degrees of freedom.
- To fabricate robotic vehicle with robotic arm built in.
- Testing of final output of robotic vehicle with results at end.

4. Literature Review

[1] Designed a Voice Controlled Robot (VCR) which is a mobile robot whose motions can be controlled by the user by giving specific voice commands using same technology of ZigBee and EasyVR as [1]. The speech is received by a microphone and processed by the voice module. When a

command for the robot is recognized, the voice module sends a command message to the robot's microcontroller (ATMEGA2560). The microcontroller analyses the message and takes appropriate actions. The walking robot is controlled by servo motors. Furthermore, a camera is mounted on the head of the robot to give live transmission and recording of the area. The work suffers similar problems as [1] in addition to unauthorized usage due to absence of password.

[2] Designed a wireless robot arm control for picking and placing an object using android application. The android application acts as a remote transmitter having the advantage of adequate range, while the receiver Bluetooth device is connected to the microcontroller to drive D.C. motors via motor driver I.C. for necessary operation. The microcontroller used was Atmega328 and Arduino software used to program it. The maximum upward and downward motion of the arm was limited by a mechanical push button type switch. The vehicle was able to move along surfaces being smooth or rough in the direction of forward, backward and left and right while able to carry a maximum weight of 2kg. The device was however on screen remote controlled rather than voice controlled.

[3] constructed a voice controlled robotic vehicle using 8051 microcontroller. The two wheel robot powered by D.C. battery used an android application called *AMR Voice* as the transmitter and a HC-05 blue tooth I.C. as the receiver. The robotic vehicle was able to move forward, backward, left and right using the voice commands but had no appendage which also limited its application to motion only.

[4] Used android mobile phone Bluetooth to control robot's operation using 8051 microcontroller. Remote buttons in the android app were used to control the motion of the robot. The robot was able to move forward, backward, left and right side using the android application. The device can be reprogrammed but the absence of an appendage limits its application to motion only.

[5] Presented a robotic vehicle system for disabled people controlled either by oral commands or by human computer interface (HCI) using a Microcontroller. A disabled person sitting in the vehicle can control it by giving oral commands, if he is further unable to control, it can directly be controlled from the base station using oral commands or by using GUI. These commands will be issued at the base station on a PC connected with a sound card and a Microphone. The commands issued will then be relayed over an RF channel and will be received by the Module-2. Here, the system will require the training from the user (for the accent) after which the device will start understanding the commands issued.

[6] Provided a strategy which can be used in controlling a robotic vehicle through connected speech input. The speech recognizer platform is an Android smart phone which

communicates with the robot using Bluetooth Connectivity. Additionally the robot also has the capability to detect obstacles and inform the user to use a different command. .

• **Industrial storekeeping by Autonomous guided system**

For its working as soon as the operator in the machine shop finds the requirement of any auto part (let) , then it needs to put on that requirement in form of coded request on the computer (server computer) ; this computer upon accessing the request from the operator by the means of the RF module that locally generates the signals which henceforth is transmitted by it and is directed towards the two,

- AGV
- Robotic arm

The AGV which initially is in its base station called the charging unit, senses the request signal, and follows a path which directs it to take the position besides the robotic arm ,the robotic arm after finding the AGV in the specified (strictly defined)position after a delay of 1 minute, for which it is already programmed to maintain after acknowledging the presence of AGV ;then start performing the operation of picking up and placing of the so required auto part upon the AGV which after getting the proper placement of the object then carries it to the machine shop where it is required; the operator then picks up the object from the AGV thereby freeing the AGV from the so liable work and then the AGV returns back to its initial position that is its charging unit.

Thus by the means of our, so designed system the tedious work of making the heavy auto parts carriage from one place to another within the department of the industry is hereby faithfully and easily casted off by the system. This accomplishment has rendered the following-

1. Time saving
2. Elimination of physical labor which otherwise is to be bored by human workers.
3. Systematic operation.
4. More or less wireless operating mode of operation.

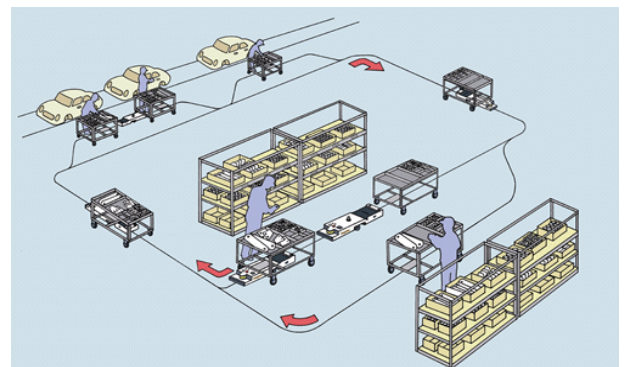


Fig. 1. Industrial storekeeping by Autonomous guided system

5. Block Diagram

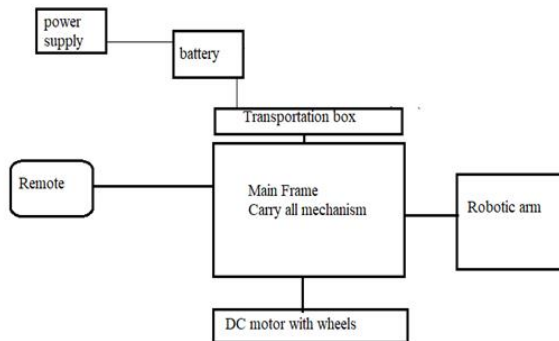


Fig. 2. Block Diagram of system

6. Working

- The block diagram of the proposed system is shown. It consists of an controller , remote module, four DC Motors with wheels system and power supply.

- The pick and place robotic arm consists of robotic arm placed on a moving vehicle. The vehicle is able to move along any type of surfaces irrespective of it is smooth or rough.

- It uses two motors for the operation and a belt type tyre is attached to the vehicle like in the tanks, for the smooth and reliable operation.

- The pick and place robot uses four motors for the operation of the system, two for the operation of moving vehicle and two for the pick and place operation.

- The pick and place arm consists of an arm assembly with a jaw, which is only able to move in up and down direction. There are two motors are for the arm assembly, one fort the up and down motion and other for jaw opening and closing.

- The maximum upward and downward motion is limited by a mechanical push button type switches. It breaks the motor circuit when the arm is at its maximum position beyond which the motor does not rotates.

7. Components Specification

- Robotic arm
- Robotic vehicle
- Adapter
- Received module
- Motor driver
- DC motor
- Wheels
- Battery
- Wireless camera

- Other

8. Advantages

1. Our robot can handle dangerous chemicals in chemical lab or in nuclear reactor labs which are hazardous to human body.

2. Having a wired remote control facility this robot can perform many tasks that human cannot or dangerous for human to handle.

3. With some modifications this robot can be used for helping the physically challenged people.

9. Disadvantages

1. The range of the wired remote, which is only near about 8-10 ft .

2. It is only controlled by using remote.

10. Conclusion

To design a working robotic arm with ability to perform sense-pick-and-place function. The design of the robotic are was stared from the prototyping stage. Drawings and assembly schematics were generated as design data to be kept for future reference if improvements were to be done to enhance the developed device in any possible way. Therefore, the first and third objectives were achieved. The prototype of the robotic arm was successfully developed and it was able to sense-pick-and-place function. It was tested to give a clearer image on its overall reliability. The overall successful rate of the robotic arm to perform its tasks correctly was 90%.

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