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Robotic Arm Vehicle

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ABSTRACT—Four wheels mobile vehicle with robotic arm is developed which is controlled by joystick based PS3 controller in which ESP32 module is used as a controller board to control the robotic arm vehicle, which can be moved from source point to destination and pick and place the objects without the requirement of driver, by using the commands given by PS3 controller.

The movement of the vehicle is controlled by L298N motor driver and action of the arm is controlled by using servomotor connected to ESP32 module which provides the 180 degree arm rotation. The PS3 controller will be connected to ESP32 module, Wireless through the Bluetooth whose maximum range is 100m.

Keywords— PS3 controller,ESP32 module, L298N motor Driver.

I. INTRODUCTION

The development of the robotic technology aims to assist humans in performing particular job and it is very fast evolving research field today. Since most of the developing countries are moving towards the industrialization; many industrial robots were introduced which reduces the requirements of the labor, waste and increases the accuracy.

The mobile robots were widely used for the faster movements and arm robots were designed to hold, lift and move the objects while combining the both aims to develop the robot with many functions.

The robotic system can be controlled manually using the data transmission through cable or through the wireless connections like Wi-Fi, Bluetooth, Zig-bee.

II. LITERATURE REVIEW

Joystick controlled industrial robotic system with robotic arm:

A distinct style was suggested in this article, which broadens the concept of industrial robots. This product is going to be totally sound and has excellent market value. The product being developed is very user-friendly. First, all the system are running effectively using the joystick; this is an evident benefit, as consumers are more likely to perform it with them. Second, this project enables for higher product development. The code is open source, and in several aspects it provides other people with opportunities for implementation. This will provide installation directions for setting up the job in specific. Therefore, there is no better product on the market.

III. OBJECTIVE

To control the vehicle using joystick based PS3 controller and to lift the objects and transport it from one place to another place.

IV. METHODOLOGY

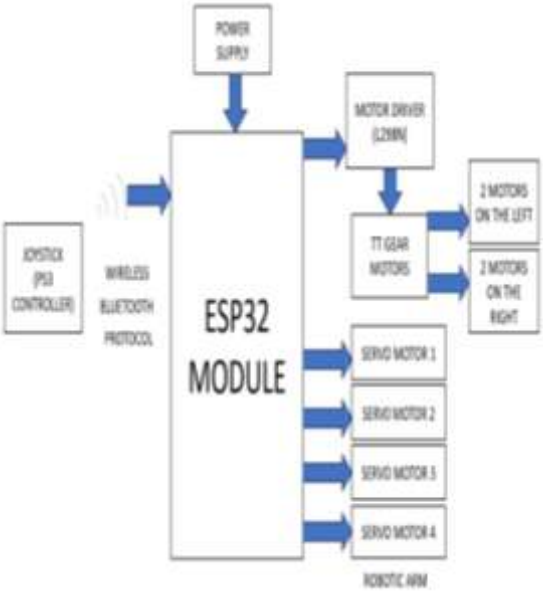

Figure 1: Block diagram of Robotic Arm Vehicle.

The block diagram consists of input block as a joystick controller i.e., PS3 controller which connect wirelessly through the Bluetooth to the ESP32 module and a power supply of usually 9V to 12V is given.

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ESP32 module is the 48 pins controller board which receives the signals from Bluetooth protocol and commands the output signals based on the input given from PS3 controller.

Output block consist of L298N motor driver which drives the TT gear motors of the vehicle and it consist of four servomotors for controlling the movements of the arm.

Once the system gets started it will check weather PS3 controller joystick has connected to ESP32 module. Once the module get initialize both the vehicle and arm are controlled by using joy stick controller.

For the vehicle movement inputs are given from the direction buttons of the PS3 controller, when the forward button is pressed, the vehicle will move forward, when the backward button is pressed, the vehicle moves in backward direction. Similarly, when the left and right direction buttons are pressed the vehicle will move in the corresponding direction.

For the arm movement inputs are given from the left and right joysticks, when the joysticks are toggled in respective direction, the joints of the arm is moved to hold, lift and place the objects in the desiredlocation.

V. APPLICATION

1) Manufacturing: Robotic arm vehicles are commonly used in manufacturing processes for tasks like assembly, welding, painting, and material handling. They can increase efficiency, precision, and safety in production lines.

2) Search and Rescue: In disaster scenarios, robotic arm vehicles equipped with sensors and cameras can be deployed to search for survivors in hazardous environments, accessing areas that are inaccessible or unsafe for humans.

3) Automotive: Used in vehicle assembly lines for tasks like welding, painting, and installing components.

VI. CONCLUSION

The design and implementation of mobile Robot with robot arm has been proposed for achieving the pick-and-place control purpose. And the mobile robot successfully follows the command of each input through the remote control.

The robotic arm vehicle represents a groundbreaking fusion of robotics and mobility, revolutionizing industries across the board. Its precision, adaptability, and ability to operate in diverse environments make it indispensable in fields like manufacturing, agriculture, and space exploration. With advancements in AI and automation, these vehicles promise increased efficiency, safety, and cost-effectiveness. From assembling intricate components to navigating challenging terrains, robotic arm vehicles are poised to reshape how tasks are accomplished, pushing the boundaries of what's possible in technology and engineering. Their integration heralds a new era of innovation and progress, offering endless possibilities for enhancing productivity and exploration.

VII. RESULT

Robotic arm vehicle is able to control by the PS3 controller effectively, which can pick and lift the object weighing up to maximum of 35 to 40 grams. Figure shows the lifting and placing the object at the desired destination.

Figure 2: Robotic arm vehicle with PS3 Controller

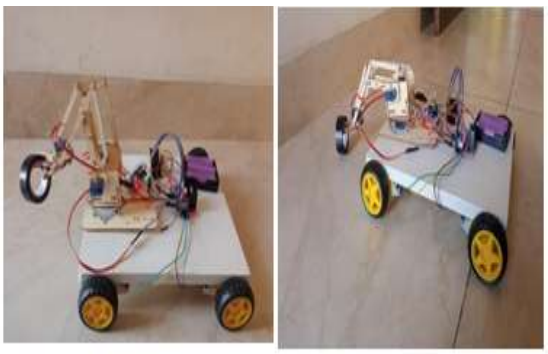

Figure 3: Robotic arm vehicle picking and placing the object.

FUTURE SCOPE

A. Manufacturing Revolution:

Robotic arm vehicles will continue to revolutionize manufacturing processes, enhancing efficiency, precision, and productivity in tasks like assembly, welding, and material handling.

B. Autonomous Operation:

Advancements in AI and autonomy will enable robotic arm vehicles to operate more independently, making decisions in dynamic environments and collaborating effectively with humans.

C. Infrastructure Maintenance:

They will be utilized for infrastructure maintenance tasks such as inspection, repair, and construction, ensuring the safety and longevity of critical infrastructure assets.

D. Personal Assistance:

In personal and household settings, robotic arm vehicles can provide assistance to individuals with disabilities or elderly individuals, aiding in daily tasks and improving quality of life.

E. Educational and Research Tools:

They will serve as valuable educational and research tools, providing hands-on learning experiences and facilitating scientific exploration and experimentation in various fields.

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