Research Article

Educational Administration Theory and Practice

Medical Assistance Rover

Prof. Manisha Mhetre[1*], Shweta Jaybhaye[2], Aarya Joshi[3], Anushka Joshi[4], Kartik Khomane[5], Yash Kshirsagar[6]

[1,2,3,4,5,6]Department of Instrumentation and Control Engineering (ICE) Vishwakarma Institute of Technology, Pune, 411037, Maharashtra, India

ARTICLE INFO	ABSTRACT
	It is a well established fact that robotic discoveries and implementations are being done in every domain present. Thus, it comes as no surprise, such research will benefit the medical and health sector as well. The 2020 pandemic saw a sudden surge in load on the healthcare professionals. To ease the stressful and overworking conditions during similar emergencies, we came up with the medical assistance rover prototype. With remote access features and efficient pick and place abilities, the rover serves as an excellent helping hand around hospitals and other such facilities. **Keywords -(**Assistance bot, Medical sector, Remote control, obstacle avoidance, pick and place)

1. INTRODUCTION

In recent years, robotics has become a prominent domain for facilitating various aspects of mankind, especially in healthcare. With the rise of better technologies and the surge in the need for remote assistance and automation, the development of robotic systems specific to medical applications has gained prominent importance. This research is aimed at the design and implementation of a remote-controlled servo motor-based rover to provide assistance to healthcare workers and patients. The first and foremost goal of this study is to design a versatile rover capable of supplying various healthcare supplies to the staff and patients within the healthcare facilities. This rover is designed to traverse through indoor environments with accuracy and speed, offering efficient delivery of medical tools and medications thereby minimising human labour. To achieve this, a detailed methodology has been planned, including multiple components. The first phase of this project was building a mechanism for controlling the wheels of the robot to facilitate smooth and reliable navigation. To add functionality, we planned to model a gripper and an application to remotely control. To summarize, this research aims to cater to robotics in the healthcare domain by introducing a solution for the efficient delivery of medical supplies within medical facilities. .

II. LITERATURE REVIEW

Prime goal of the project was to design healthcare sector related assistant robot named "Docto-Bot". A direct one-to-one server-based communication method and user-end android app maintaining system has been implemented. It includes the controlling part, which can be controlled automatically and manually by users.[1]. The ground rover, hereby mentioned, is designed taking into consideration the rocker bogie suspension system which is a proven mobility application known for its obstacle climbing capability. In this design, there are six wheels on the drive system and bogie system. For the robotic arm, it has been designed with servo motors to facilitate pick and place.[2]. We have referred several research papers which have been experimentally verified to observe the different types of controllers used and different methodologies used by different authors to decide the degrees of freedom of a manipulator used for the picking of an object and placing it at specified position. Thus, gaining knowledge from all these papers, will aid in Designing of the Robotic arm.[3]Entire electro pneumatic circuit is designed using "Festo-Fluidsim" software. The robot involves electro pneumatics, however, the parts transferred are higher by two folds and time taken for the part transfer is less. Result shows that the time required for the transfer of parts from one station to another has largely reduced and the number of pieces transferred has largely increased. [4].

III. METHODOLOGY

A. Tools and Technologies

1) Hardware - 3.7 volt batteries, Arduino Uno,. Hc-05 module, Servo motors, Motor driver ,. 9 volt battery . Jumper wires ,Car Wheels.

2) Software- Arduino IDE , Application: RC Bluetooth controller , Arduino servo controller

1. Design a mechanism to control the four wheels of the robot. 2. Connect the 3.7 volt batteries, Arduino Uno, HC-05 module, servo motors, motor driver, 9 volt battery, jumper wires, and car wheels to the mechanism.

3. Model a gripper that operates and moves in different directions through its revolute joints.

4. Program the Arduino Uno using the C++ language to control the four wheels of the robot.

5. Implement the mobile application to control the robot.

The aim is to develop a remote controlled servo motor based rover that transports medicines, syringes, napkins and any other items that healthcare workers or patients might be in need of.

IV.RESULTS AND DISCUSSIONS

Successful Autonomous Navigation: The developed robot demonstrated effective autonomous navigation capabilities using sensor data from the IoT devices and Arduino. It was able to navigate as per the remote signals from the application and precisely pick up the target entity using a gripper. The motors moved as intended to control the rover. The wheels successfully moved as per the remote directions. In summary, the rover, which can be maneuvered remotely and is based on an Arduino Uno system, represents a substantial step toward revolutionizing the healthcare industry. It offers innovative solutions to challenges in patient care, healthcare logistics, and remote monitoring.

Fig [1]. Bluetooth control of the vehicle

Fig [2] Hardware setup of the vehicle
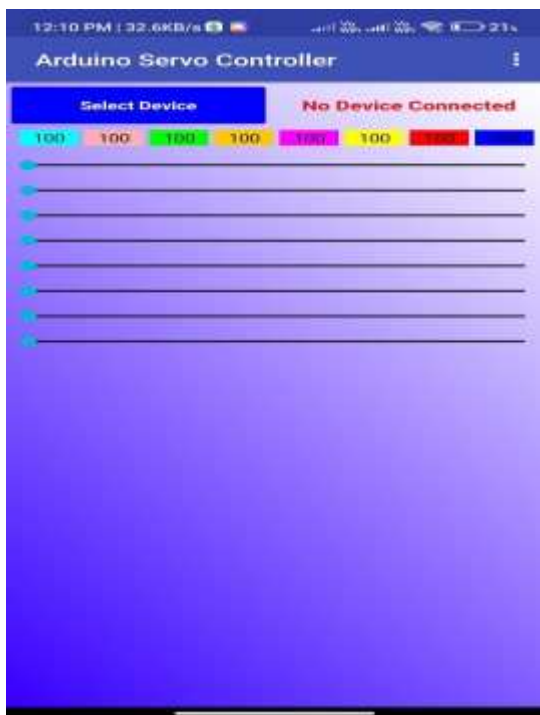

Fig [3] Robotic Arm

Fig [4] Application for the Robotic Arm Control

V. CONCLUSION

The ideation and prototyping phase of the medical assistance rover has been successfully completed. The rover is capable of line following, pick-and place as well as remote control. It retrieves objects through robotic arm control mechanism and travels through different servo motor configurations The testing phase revealed the need for incorporating AI and precision line following but the overall rover was quite sturdy and self-sufficient. The prototype is a major breakthrough in the healthcare sector and can be used as a pathway for a safer, more hygienic and less stressful environment for hospital staff and patients alike.

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FUTURE SCOPE

Considering our prototype just lays the foundation for the proposed medical assistance rover, the scope for future improvements is quite large. The most important advancement would be incorporating a chatbot that derives minor conclusions about admitted patients to make their stay more comfortable. Another prominent implementation would be an extremely precise control gripper capable of performing vaccinations, feeding pills and taking care of patients' hygiene and sanitary requirements. The bot can be trained with classification algorithms so they can retrieve the right medicines through artificial intelligence.

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