International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 12 Issue 3, March-2023, Impact Factor: 7.957

Mecanum Wheeled Robotic Arm

Alen K James[1], Roshni R H[1], Shilpa L[1], Dr. Neethu Raj R[2]

[1]Student, Department of Electronics And Communication Engineering, Dr. APJ Abdul KalamTechnological University, Kerala, India
[2]Professor, Department of Electronics and Communication Engineering, Dr. APJ Abdul KalamTechnological University, Kerala, India

ABSTRACT

This paper describes the development of mecanum wheeled robotic arm using IoT. These wheels can be used easily in smooth and hard surfaces and has the ability to move in all directions with the help of servo motors. The command to the robotic arm is given through the internet of things (IoT). The IoT means the connection or controlling of an equipment using internet. This paper discuss about the technical imputation, the issue related with the implications and application of robotic arm in the field of automation of industries. It can be used as an artificial arm for a human who have lost his hand in any accident.

INTRODUCTION

Robotics comes into today's world to reduce the human efforts and to handle the task with less time and high accuracy. It works with high precision andgives valuable output. They can work for a whole day without getting tired.

The robotic arm used here moves forward, backward, left and right directions as well as provide rotational motion. Compared to legged robots, these wheeled robotic arm is very energy efficient and the commands given are not complicated, the movements are very quick.

The command for the robot's arm and the wheel is given with the help of mobile application which is made using MIT App Inventor. Wifi is used for network connectivity which is connected to the arduino and the program commands are uploaded to its chip.

METHODOLOGY

The mecanum wheeled robotic arm used here is to pick and place things from one area to another. The working of the robotic arm is based on the specific commands provided. We use internet to give thesignal to the robotic arm, so that we can access the robot from any place.

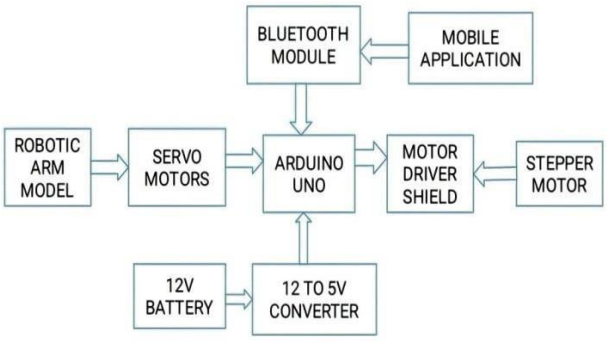

Fig1: Block diagram of proposed system

COMPONENTS USED

Arduino Mega

Arduino Mega is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins, 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header,

and a reset button. The board can be programmed with the Arduino Software (IDE). It is commonly used in projects that require a large number of inputs and outputs, such as robotics and home automation.

Fig 2: Arduino Mega

Stepper Motor

A stepper motor is a type of DC motor that moves in discrete steps rather than continuouslyrotating like a traditional DC motor. It is capable of precise position control and is commonly used in applications such as 3D printers, CNC machines, and robotics. Stepper motors come in various sizes and types, including bipolar and unipolar, and can be controlled using specialized driver circuits or microcontrollers. NEMA 17 is a standard size for stepper motors. A NEMA 17 stepper motor has a 1.7-inch faceplate and typically has a step angle of 1.8 degrees, which means it takes 200 steps to complete a full rotation (360 degrees).It has four wires for bipolar operation and two coils.

Fig 3: NEMA 17 Stepper Motor

Servomotor

The SG90 is a small and lightweight servomotor that is capable of precise angular positioning control within a range of 0-180 degrees and has a maximum torque of around 1.8 kg-cm at 4.8V. The SG90 operates on avoltage range of 4.8V to 6V and has a current consumption of around 100mA duringoperation.

Fig 4: SG90 Servomotor

Motor Driver

The L293D is a popular motor driver IC (integrated circuit) that is used to control the speed and direction of DC motors and stepper motors. It can drive up to two DC motors or one stepper motor and can handle a maximum current of 600mA per channel. It is commonly used in robotics, RC vehicles, and other projects that require motor control. It can be controlled using a microcontroller.

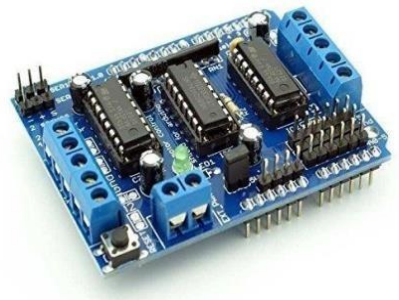

Fig 5: L293D Motor Driver

Mecanum Wheel

It is a conventional wheel with a series of rollersattached to its circumference, these rollershaving an axis of rotation at 45° to the plane of the wheel in a plane parallel to the axis of rotation of the wheel. The four mecanum wheelsare each connected to a motor for independent control. The robot can move forward, reverse and spin just like four regular wheels. The configuration of rollers at 45° also allows the robot to translate sideways and through a combination of these, in any direction (even while spinning!).

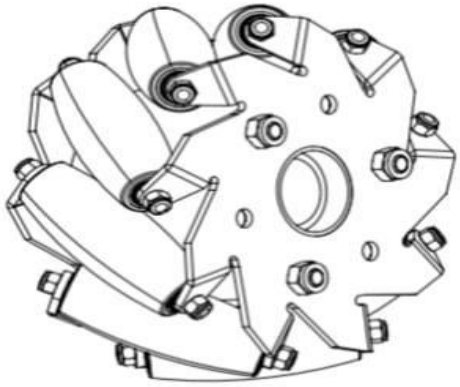

Fig 6: Mechanum Wheel

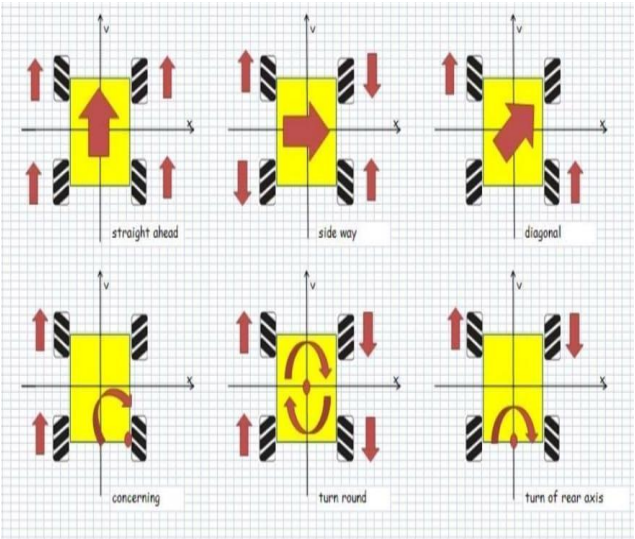

Fig 7: Direction of control of mechanum wheel

SOFTWARE USED

Arduino Software

The software used is Arduino IDE (Integrated Developmrnt Environment). It is a powerful tool for anyone interested in programming and experimenting with electronics, and it has helped to make microcontroller programming more

accessible to wider audience. We write the codes and messages in the text editor, which is connected to the arduino hardware for uploading the programs and communicate with them. The file extension used here is .ino. While saving if there is any error in the text, it will be displayed in the message area and the output of the text will be displayed on the console area of the Arduino IDE.

MIT App Inventor

MIT App Inventor is a visual programming platform that allows users to create mobile apps for Android devices without requiring any prior programming knowledge. The platform uses a drag-and-drop interface for designing the user interface and a block-based programming language for creating the app's functionality. With MIT App Inventor, users can create a wide variety of apps, from simple games and quizzes to complex utilities and social networking apps.

RESULT

Earlier robot made by IoT online communcation lacked capabilities to respond in emergencies and have less security. In this project, we aims to overcome these demerits. This is a combination of many fields such as mechanical, electronics, electrical, computerscience, technology, math and science. Here,we aims for a robot that performs the task repeatedly with a high accuracy than a most experienced human operator.

REFERENCES

[1]. G.Ramakrishnaprabu; E.Elangovan;"IoTServomotor Enhanced Pick and Place Robo Arm" ISSN (Online): 2278 – 8875 Vol. 5, Issue 6, June 2016.

[2]. Kaustubh Gawli ; Parinay Karande ; Pravin Belose; Tushar Bhadirke; Akansha Bhargava " Internet of things (iot) based robotic arm" e-ISSN: 2395-0056 Volume: 04 Issue: 03, Mar - 2017.

[3]. Carro.G.; Castro.M.; Sancristobal.E.; Diaz.G.; Mur.F; Latorre.M.; haparro.M.; Lopez- Rey.A; Salzmann.C.; Gillet.D, "The color of the light: A remote laboratory that uses a smart device that connects teachers and students" Global Engineering Education Conference (EDUCON), 2014 IEEE, vol., no., pp.854,860, 3-5 April 2014.

[4]. Fernandez.G.C.; Gil.M.C.; Perez.F.M., "Remote robotic laboratory as nexus between students and real engineering," Interactive Collaborative Learning (ICL), 2012 15th International Conference on, vol., no.,pp.1,4, 26-28Sept. 2012

[5]. Carro Fernandez.G.; Gutierrez.S.M.; Ruiz.E.S.; Gil.M.C.; Perez.F.M., "Formation in robotics, the key to integration in industrial environments", Interactive Collaborative Learning (ICL), 2012 15th International Conference on, vol.,no., pp.1,4, 26-28 Sept. 2012

[6]. Song.G; Ding.F; Song.A, "A wireless power outlet system for smart homes", IEEE Transactions on Consumer Electronics, Vol 54, No.4, 2008.

[7]. Kim.T.T; Poor.H.V., "Scheduling power consumption with price uncertainty", IEEETransactions on Smart Grid, Vol. 2, No. 3, pp. 519-527, 2011.

[8]. S.V. Manikanthan , T. Padmapriya "An enhanced distributed evolved node-b architecture in 5G tele-communications network" International Journal of Engineering & Technology (UAE), Vol 7 Issues No (2.8) (2018) 248-254.March2018.

[9]. S.V. Manikanthan , T. Padmapriya "An enhanced distributed evolved node-b architecture in 5G tele-communications network" International Journal of Engineering & Technology (UAE), Vol 7 Issues No (2.8) (2018) 248-254.March2018

[10]. M. Rajesh, Manikanthan, "GET-UP- AND- GO EFFICIENTMEMETICALGORITHM BASED A MALGAM ROUTING PROTOCOL", International Journal of Pure and Applied Mathematics, ISSN NO:1314-3395, Vol-116, No. 21, Oct 2017.

[11]. T. Padmapriya, V.Saminadan, "Performance Improvement in long term Evolution-advanced network using multiple input multiple output technique", Journal of Advanced Research in Dynamical and Control Systems, Vol. 9, Sp-6, pp: 990-1010, 2017.