MICROCONTROLLER BASED MULTIPURPOSE ROBOT

[1]Abhijit Samanta, [2]Falgun Pawar, [3]Ashish Pithadia, [4]Abraar Sayed, [5]Mohammed Adil Shaikh

[1] Professor, [2] Student,[3] Student, [4] Student, [5] Student
[1]Department of Mechanical Engineering,
[1]Shree L. R. Tiwari College of Engineering, Thane, India

Abstract: This paper contains information and concepts read and studied from various research papers. Various concepts have been inherited in the making of a multipurpose robot able to perform many daily tasks at low cost. The paper contains a brief information that have been studied from various sources which has helped us to make the idea of multipurpose robot successful.

1.1 Introduction

Robotics is a field of engineering that consists of electronics, mechanical and computer engineering. This branch deals with the designing, constructing, use of control robots, sensor feedback and data processing. These are some technologies which will replace humans and human activities in coming years. The robots are designed to be used for many purpose but are used in sensitive environments such as bomb detection, deactivating of various bombs etc. Robots can be given any character but most of them are given the human appearance. These are some types given below:

Articulated Robots: The feature of such robot is that is it consists of rotary joints and range from 2 to 10 or maybe more. The arm of the robot is connected to the rotary joint. Each and every joint is known as the axis providing a set of movements.

Cylindrical Robots: These types of robots have minimum of single rotary joint and single prismatic joint. The rotatory joints turn along the axis and for providing linear motion prismatic joints are used.

Polar Robots: Known also as spherical robots. The base has a arm connected to it with a twisting joint and combines 2 rotatory joints and a single linear joint.[9]

Scara Robots: Assembly tasks consist of mostly this type of robots. The arms have a cylindrical design. It has duo parallel joints, used to provide assent in only single selected plane.

Delta Robots: They have structure of a spider. The common base is connected to joint parallelograms. The parallelograms move in a work area of dome shape. They are mostly used in food industries and electrical industries. Having the form of human, they may have the walk like humans, speech, perception and most importantly everything a human can do. Today robots are inspired by nature and are also known as bio-inspired robots. Robotics is thus a division of engineering that deals with conception, designing, operating, and manufacturing of robots.

2.1 Literature Review

Nico Surantha stated a monitoring system established on Iot. The purpose system consists of a couple of components. The novelty of proposed system is inclusion of human detection capabilities as a method to warn the concerned authority.[1]

Lutfi MUTLU used LASER measurement sensor for mapping and obstacle avoidance. Laser measurement senor with active obstacle avoidance and trajectory deciding algorithm provides self-mapping of environment development for adaptive path finding. [2]

Digvijay Singh presented the development of a fire alarm system using Arduino UNO. This system undoes the need of a person to continuously monitor area. The monitoring will be done using sensors. Buzzer and Message alerts are used to alert the required authorities. [3]

Zern Khoo proposed a working robotic arm with capability to perform sense-picking-and-placing function. The design was stared from prototyping stage. The prototype of the arm was successfully emerged and it was to perform the desired function. The design of the robotic arm was drawn and calculations for the shear stress of the gripper was done. [4]

A geometric method for solving the unidentified joint angles required for self-governing placing of the robotic arm was shown, this analysis is dependent upon the known lengths of each arm and joint to joint link as well as desired final position. The geometric method is easily modifiable for similar robotic system architectures and provide the capabilities of local autonomy. [5]

A widely used 6 DOF robotic arm manipulator has been kinematically modelled followed by the analysis of its workspace. It model has been validated using MATLAB. The strategy presented in this paper may also be used to model and analyze other 6 DOF arms.[6]

Dhruva Jyoti Paul proposed a security monitoring system based on Iot. The purpose system consists of a couple of components. The novelty of proposed system is inclusion of human detection capabilities as a method to warn the concerned authority. It will also detect the fire in its initial stage and do the warning process through GSM module.[7]

The objectives of the paper are developing the hardware and software for wireless mobile robotic arm. The robot is designed to perform the pick and place operation. The project has been trusted and resulted in meeting the criteria. The analysis of the robot has been and the movement of the robot has been found out to be precise and ac- curate as expected. The arm of the seems to be responsive to the wireless signals given to it. The main objective of this pick and place robot which is wirelessly controlled is to pick up hazardous objects without any human contact.[8]

A robotic are having 4 degree of freedom has been designed based on haptic technology. The basics of designing a mechanical robotic arm have been carefully observed and detailed explanation of each process and construction has be given. The robot seems to have a number of industrial and medical applications like pick and placing objects, surgical robots, drilling, etc. It be employed where accuracy is required in operation. The arm which is designed efficiently and can lift objects which are of medium weight. [10]

Human like manipulation motion with 4 degree of freedom of humanoid robot has been made. However, to generate the realistic movement for manipulation motions, dynamics is considered for main mechanical structure of the robotic arm. Robotic arm is controlled with the help of body switch. The project learns by itself with an auto learner. Robotic arms help in day to day life with simple tasks. Though the results are not satisfactory as it is not same as human movement it can be capable to perform many days to day task.[11]

The aim of this project was to evaluate and choose the best platform for the application of home automation. One of the main outcomes of this project is that the Arduino platform is best tool for implementation of analogous non- industrial automations. It allows the use of various sensors and is capable to manage a wide range of actuators. Benefit of this solution is definitely a several occurrences of the most widely used communication systems and mainly, the price. The resulting theory involved the modular expandability feature. Shield are layered on top of each other, an easy solution can be achieved. Sufficient in- formation cannot be displayed on a single LCD display, so it was essential to add an additional switchable screen. Compared to the local display, the remote visualization is a far more complex visualization method. The results of this project are fully appropriate while it can be used as a theory for upcoming developments of other corelated projects. [12]

This paper gives information about sensor net- work system which monitor air quality. The project can give information of air quality and can be controlled wirelessly. The system contains sensors like gas sensors which are easily available in the market at low cost. The main controller used in this project opensource microcontroller know as Arduino. The core networking capabilities of this system is achieved by ZeeBee module which is easily available in the market, this ZeeBee module simplifies the development of this project. This system is greatly useful in monitoring air condition and its quality in closed spaces like buildings, malls, etc. to understand the current quality and also its long-term impact on public health.[13].

3.1 Conclusion

Hence, we have studied the different research papers related to design and construction of various projects in the field of robotics. A lot of useful ideas and concepts were inherited from these pa- pers which proved helpful in making our project. A lot of information about the sensors and actuators was available which proved essential for the project. Concepts were studied and put forth to use in the making of a multipurpose robot.

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