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ArmPi Multipurpose Robotic Arm using Raspberry Pi

Prof. Lata S Handigolkar[1], Prof. Raghudathesh GP[2],
Prof. Raviteja Balekai[3], PDr. Kavya ML[4],
Chandan A[5], Anirudh M[6],
[1,2,3]Assnt Prof Dept. of ECE
[4,5,6]UG Scholar, Dept. of ECE
[1,2,3,4,5,6]GMIT, Davangere, India
[1]lathah@gmit.ac.in
[2]raghudateshgp@gmit.ac.in
[3]ravitejb@gmit.ac.in
[4]kavya.ml1996@gmail.com
[5]chandan22111996@gmail.com
[6]anirudhmanohar128@gmail.com

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Abstract

In this paper, a minimal effort motion controlled mechanical arm framework, to be specific ArmPi (Multipurpose Robotic arm using Raspberry Pi) is produced for the multipurpose activity. It offers remote control effortlessly of movability. The robot can be sent to places where no people can go. It likewise offers live video bolster of its task and can spare human life stuck in troublesome circumstances. Raspberry Pi, which is actualized in this framework is coordinated with multi-sensors, for example, ultrasonic sensors, and camera module. Broad testing has been conveyed out with the created robot and a satisfactory performance is obtained in terms of response.

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1   INTRODUCTION

Robotics has been part of high-tech industry. Today, robotics finds usage beyond manufacturing and more towards areas like ecommerce, logistics, retail, healthcare etc. Robotics also has significant overlap with Artificial Intelligence. At the moment USA is doing a lot in robotics. There isn't much going on in India in robotics. Multipurpose robotic arm has created a massive hype in various automation industries. The reason being multitasking is an utter requirement, it can help reduce the human error and man power.

Figure 1. Prototype of Robotic ArmPi

In the proposed project we are building a multipurpose robotic arm. The robotic arm is mounted on the Base Motor Car(BMC), Camera Pi and PIR sensors are incorporated with the framework. It offers a great edge over other object detection BOTS because of the factors like pick and drop, 360 degrees rotation, video streaming and object detection which is controlled through software like Bash and Shellscript using the wifi module the robot is controlled from any part of the world by means of html webpage, hence making the world a global village.
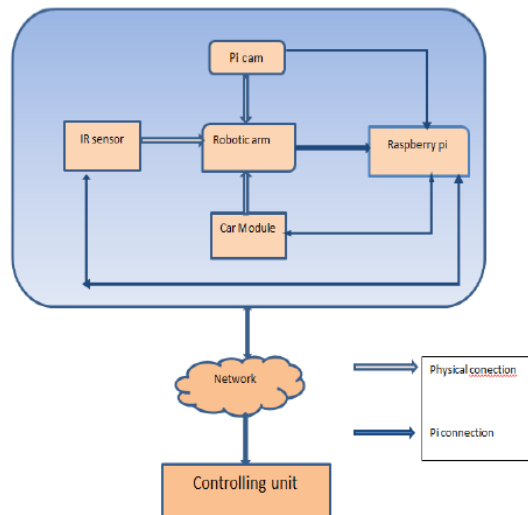
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2 SYSTEM DESIGN AND IMPLIMEN-TATION

Figure 2. Overview of our design

Design of Concept Structure

In this paper, the objective is to assemble an automated arm in a low-weight design, which incorporates highlights, like multipurpose and simple programming. The idea of programmed Base Motor Car(BMC) along with OWI robotic arm is illustrated. The framework parameters include Video streaming, Car developments, IR Sensing of the encompassing in light of utilization. A client can control the framework in light of the applications usage. The different hardware units used include OWI Robotic Arm, Base Motor Car(BMC),Raspberry Pi 3 Model B+, Camera Pi, PIR sensor and L293D H-bridge motor driver. Mobility of arm and base are created by interfacing H-bridge motor driver to the Raspberry Pi. video streaming and object detection is done by PIR sensor and Camera Pi module. Raspberry Pi controls all the actions of arm, base and sensor through wifi module from html webpage.

System Interface

The serial communication is done between Raspberry Pi and the driver in Table 1.

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Table 1. Interface between Raspberry Pi and device

GPIO pin number	Control
6	Arm motor hold
12	Base Arm Motor 1
13	Arm motor release
14	Arm motor up(mid)
15	Arm motor down(mid)
16	Base Arm Motor 1
18	Arm motor (anti-clock)
20	Base Arm Motor 2
21	Base Arm Motor 1
23	Arm motor (clock)
24	Arm Motor down
25	Arm Motor up
26	Arm Motor 2

The coding is done through CGI using BASH and Shellscript. The Figure 3., Figure 4., Figure 5., demonstrates the software interface and operation of the framework.
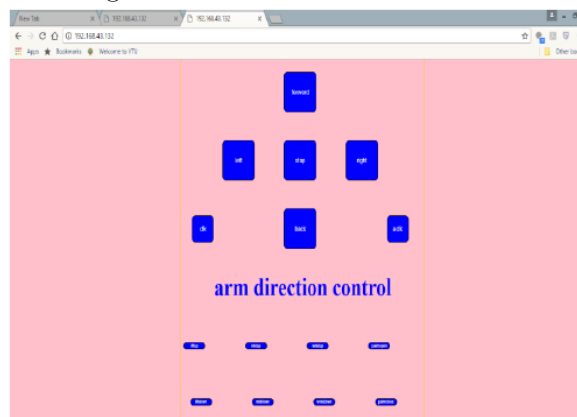

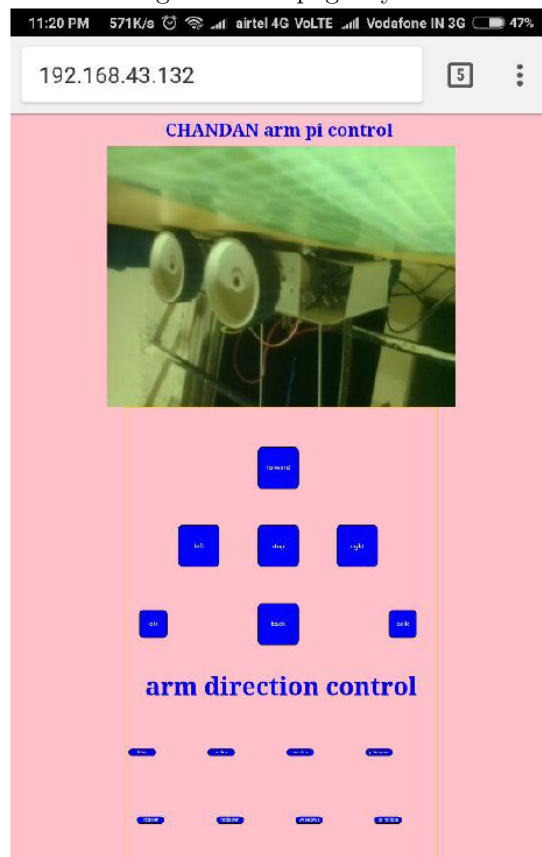Figure 3. Robotic Arm control code

Figure 4. webpage layout

Figure 5. Video streaming through Camera Pi

3   CONCLUSION

In this paper a prototype is designed for multitasking which is achieved through multipurpose robotic arm. Here Raspberry Pi has enabled controls of different tasks of arm, base and sensor through wifi module from html webpage. It can help reduce the human error and man power in automotive industries. Thus, the robotic arm offers a great advantage over other object detection BOTS by implementing the factors likepick and drop, 360 degrees rotation, video streaming and object detection.

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