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Biohazard wastage disposal by using wireless humanoid robot

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Abstract *-In this research, a six axis robot manipulator arm is designed and constructed for industrial applications. Then the robot arm and the base rover is controlled by a single unit Raspberry Pi. The robotic Arm and its application using the object sorting and the controlled position mode's by user which presented in this project. Focusing on the robot controlled system, the specific angular motion of each joint so that robot arm can move to desired locations with high accuracy even with load variation. Such architecture has been used to test compliance strategies; specifically, this work shows the implementation of sorting an object by demonstration based on manual guidance using a force/torque (F/T) stepper motor and a wireless android or a pc interface. In Earlier Systems Mobile Robotic Arm Control was not there. Only Rover or Fixed Robotic Arm was only founded and invented. The Modern Robotic Arm was manufactured by using the Vacuum tubes. In some of the previous projects Robot Hand design only designed and it can be controlled by mechanical during that time there is no proper software interface and in some of the projects robot design using alloy was made.*

I. INTRODUCTION

Robotic manipulators and robotic arms were the very first robots to be used in industry (they have been in use since the 1960s). Although the robotic arm was designed for manufacturing and production processes, it has long been used for other purposes and researchers A large number of Studies have focused on robots for helping individuals with the continued progress in computing power, computer vision, and advanced sensors, research have started to focus on uses of robotic arms in daily life and work environments in project. In general a robotic arm is a mechanical arm which is programmable and functions like a human arm. The robotic arm is used to perform complex tasks in place of human beings and it is capable of doing tasks like welding, shielding, sorting gripping spinning etc. In recent years the usage of robotic arm has increased because the tasks are easily performed by them with no errors when compared to human beings.

Nowadays the presence of human being is required in hazardous area, which is a life threat to them. Among many opinions and discussions of using robots the most important is to shield people from such dangerous situations, in such cases robots can be used for handling hazardous materials like radioactive substance, so here in our project we have implemented a robotic arm instead of human beings to handle situations in hazardous environments. A locomotion robot can replace human to do work. The robot is controlled wirelessly to ensure it can be used a long way from the user. This project describes the build of a real time mobile robot system based on using internet communication. Through this the human need not be present in that place and can make use of the arm connected to the wireless network do their work which prevents them for inhaling the toxic gases which are released through the substances thereby saving human life's and also the human can monitor the robotic arm consistently through online video streaming .The mobile robot can be controlled by web page programmed in JavaScript language. Necessary programs are installed to run server and camera correctly, and then the system is connected wirelessly. Mobile robots are those which are designed to move on ground. Mobility gives a robot a much greater flexibility to perform new, complex, exciting tasks. The robots can move where needed. Fewer robots can be used. Robots with mobility can perform more natural tasks where the environment is not designed especially for them. These robots can work in a human-centered space and cooperate with men by sharing a workspace together. This can also be implemented in the oil rig felids where it can save people from major explosions by making them stay away from their work place and doing their work from a certain distance away.

II. LITERATURE SURVEY

A. Title: Humanoid Robot Arm for Intelligent Haptic Interaction with the Environment

Author Dzmitry Tsetserukou[1] , Naoki Kawakami[1] and Susumu Tachi[1]

Abstract The paper concentrates on the development and control of the humanoid robot arm iSoRA[1], intended for operation in a dynamic unstructured environment. Optical torque sensors integrated into each joint enable measurement of contacting forces along the entire manipulator surface. A variable admittance control strategy was elaborated to increase the robot functionality and to achieve the human-like dynamics of interaction.The experimental results[1] show that the proposed approach not only provides safe interaction of the robot arm with a person, but also improves the effectiveness of contact task performance. The paper also presents a novel concept of avoidance of an obstacle of unknown shape. The tactile sensory ability of the developed manipulator allows robot links to follow the object contour and to perform motion planning in the dynamic environment. The information on the applied normal force vector, object shape and target point coordinates is supplied to the motion planning system. The algorithms for contact point detection, object geometry recognition, and estimation of contacting object stiffness are detailed. The numerical simulation elicits a capability of the proposed method to approximate various object shapes precisely. The experimental results showed that the local admittance control and motion planner allowed the end-effector to follow the object contour in a very smooth, consistent manner while reaching the target point.[1]

B. Title: Extracting scientific results from robotic arm support operations: A technique for estimating the density and composition of rocks on Mars

Author Bradley J[2]. Thomson 1[2] , Peter H. Schultz 2 , and Nathan T. Bridges 1[2]

Abstract Background: Robotic arms on landed spacecraft are typically designed to either (a) retrieve surface samples for analyses by the main spacecraft or (b), bring a mobile instrument package into contact with surface components. Yet the engineering data returned by a robotic arm while conducting these science support operations can themselves be used to investigate the physical properties of surface materials.[2] The Viking Lander 2 (VL2) displaced several nearby rocks with its sampling arm to obtain regolith samples from the protected environment beneath them.

Method: The masses of displaced rocks are estimated using measurements of the pushing force exerted by the sampling arm by assuming a basic block-sliding model. Rocks densities are estimated by dividing the mass estimates by rock volumes determined from stereo pairs of images.[2]

C. Title: A Geometric Approach for Robotic Arm Kinematics with Hardware Design, Electrical Design, and Implementation

Author: Kurt E. Clothier[3] and Ying Shang[3]

Abstract This paper presents a geometric approach to solve the unknown joint angles required for the autonomous positioning of a robotic arm[3].A plethora of complex mathematical processes is reduced using basic trigonometric in the modeling of the robotic arm. This modeling and analysis approach is tested using a five-degree- of-freedom arm with a gripper style end effector mounted to an iRobot Create mobile platform.[3] The geometric method is easily modifiable for similar robotic system architectures and provides the capability of system architectures and provides the capability of local autonomy to a system which is very difficult to manually control.[3]

D. Title: Design and Development of a Competitive Low-Cost Robot Arm with Four Degrees of Freedom

Author: Ashraf Elfasakhany[4] ,Eduardo Yane[4], Karne Bayne[4], Ricardo salgado[4]

Abstract The main focus of this work was to design, develop and implementation of competitively robot arm with enhanced control and stumpy cost.[4] The robot arm was designed with four degrees of freedom and talented to accomplish accurately simple tasks, such as light material handling, which will be integrated into a mobile platform that serves as an assistant for industrial workforce. The robot arm is equipped with several servo motors which do links between arms and perform arm movements. The servo motors include encoder so that no controller was implemented. To control the robot

we used Labview, which performs inverse kinematic calculations and communicates the proper angles serially to a microcontroller that drives the servo motors with the capability of modifying position, speed and acceleration. Testing and validation of the robot arm was carried out and results shows that it work properly.[4]

E. Title: Design, Analysis and Implementation of a Robotic Arm- The Animator
Author: Md. Anisur Rahman1[5] , Alimul Haque Khan[5] , Dr. Tofayel Ahmed , Md. Mohsin Sajjad[5]

Abstract A humanoid robotics is a new challenging field. To co-operate with human beings, humanoid robots not only have to feature human like form and structure, but more importantly, they must prepared human like behavior regarding the motion, communication and intelligence. The model number of this beginner is ASRK-250. This paper[5] we consider the mechanism and mechanical structure of ASR K-250 (Beginner) and its implementation[5].

F. Title: Remote Learning: Android operated educational robotic arm with 6 DOF
Author: 1Neerparajai [6], 2 Palzor Gyatso Bhutia[6], 3 Udit Pradhan[6]

Abstract This paper addresses an intelligent optimal control for a flexible robot arm that is driven by a permanent-magnet synchronous servo motor. An intelligent optimal control of robot arm with 5 axes with servo gripper is proposed by the instructions given through Android device (android app on smart phone). This proposal was addressed to fourth-year engineering students and combines knowledge from android java programming and robotic control to complete anautomation project task[6]. The educational robotic arm initially learns to pick up a randomly placed target from a target surface and move it to a predefined destination after which it repeats the contouring process under the presence of the target.This paper presents an off-line trajectory generation algorithm and, therefore, it possesses significant industrial implications,as no hardware changes are needed for its implementation. The proposed method has been experimented with Dexter ER-1 Robotic Arm for optimum project based learning[6].

G. Title: Humanoid Robotic Arm for Tactual Interaction with Industrial Environment by using Mobile
Author: Golap Kanti Dey1[7], Palash Kanti Dey 2, Mohammad Hasan Ul Islam3[7]

Abstract The general aim of our research is to build up a “Humanoid Robotic Arm” from the garbage materials which can support people in their daily life and also in industry. The vital component of such a robot for handling objects is the construction of its arm gripper. The design of our Robotic Arm is based on the observation of the motion range of a human arm.[7] We have tried to depict simple mechanical knowledge to build this arm. Five DC motors are used here in five Gear boxes. The gear boxes are for the base of the arm, for the elbow, joint, shoulder joint, wrist joint and for the Gripper. Ball bearing is used here to rotate the arm 360 degree. And the brain was given to it by circuit board. The whole system is controlled by using a Mobile. We need two microcontrollers here. The used microcontrollers are PIC16F872 for receiver and PIC16F84A for controller.[7] The designed manipulator able to perform various industrial tasks as per requirement and it has large industrially application on material handling and positioning any object or job. If we can utilize properly, industrial robots can enhance the perfection of life by releasing workers from scruffy, tiring, risky and heavy labor. In the modern world robots can cause unemployment by substituting human workers but robots also create jobs for engineers,programmers, supervisors or as a robot technician. In the era of industrial revolution in Bangladesh the uses of this kind of technology[7]

H. Title: Design and Analysis of Robot Arm using Matlab & ANYSYS
Author: Ramanideepthi Tanneeru[8] Ajay Jandrajupalli B. Kiran Kumar[8]

Abstract In today’s society, robots are used in various areas especially in those where high precision is required. Robots have improved life standards and we are upgrading their performances in order to make our lives easier and more comfortable. Many applications in the field of medicine and industry use different kind of motor-based systems such as

robots because of their wide-range of sufficient characteristics like the fact that they can be used as constant power devices with accurate positioning and fast response. This paper describes implementation of the proposed remote control of the stepper motor and robotic arm. In this work a motorized robot arm with a single degree of freedom is designed.For this design control algorithm was developed by MATLAB software which is widely used incontrolling application. The results of the control system are also described.

I. Title: Implementation of a Wireless Gesture Controlled Robotic Arm
Author: Saurabh A. Khajone 1[9] , Dr. S. W. Mohod 2 , V.M. Harne 3[9]

Abstract In today's world, most of all sectors, the work is done by robots or robotic arm having different number[9] of degree of freedoms (DOF's) as per the requirement. The idea is to change a perception of remote controls for actuating manually operated Robotic-Arm. Well, this paper presents a thought and a way to eradicate the buttons,joysticks and replace them with some of the more intuitive technique that is, controlling the complete Robotic Arm by the operators hand gesture. The proposed electronics system recognizes a particular hand gesture that will be performed in front of webcam & transmitted respected signals wirelessly through RF module. Depending on the received signals the robotic arm which is followed by AVR microcontroller performs the receptive motions at the receiver section[9].

J. Title: Hand Gesture Based Wireless Robotic Arm Control for Agricultural Applications
Author: Rajesh Kannan Megalingam[10], Shiva Bandhyopadhyay, Gedela Vamsy Vivek, Muhammad Juned Rahi[10]

Abstract One of the major challenges in agriculture is harvesting.[10] It is very hard and sometimes even unsafe for workers to go to each plant and pluck fruits.Robotic systems are increasingly combined with new technologies to automateor semi automate labour intensive work, such as e.g. grape harvesting. In this work we propose a semi-automatic method for aid in harvesting fruits and hence increase productivity per man hour. A robotic arm fixed to a rover roams in the in orchard and the user can control it remotely using the hand glove fixed with various sensors. These sensors can position the robotic arm remotely to harvest the fruits. In this paper we discuss the design of hand glove fixed with various sensors, design of 4 DoF robotic arm and the wireless control interface. In addition the setup of the system and the testing and evaluation under lab conditions are also presented in this paper.[10]

III. PROPOSED WORK

In the proposed system we built a real time mobile robot system based on using internet communication. This project shows how to implement mobile robot system by interface the microcomputer (Raspberry Pi). The Raspberry Pi is programmed in python language, the mobile robot system contain camera moving in two axes and 5-DOF arm robot to hold objects. The mobile robot can be controlled by web page programmed in JavaScript language. Necessary programs are installed to run server and camera correctly, and then the system is connected wirelessly. Mobile robots are generally those robots which can move from place to place across the ground. Mobility give a robot a much greater flexibility to perform new, complex, exciting tasks. The world does not have to be modified to bring all needed items within reach of the robot.

The robots can move where needed. Fewer robots can be used. Robots with mobility can perform more natural tasks in which the environment is not designed especially for them. These robots can work in a human-centered space and cooperate with men by sharing a workspace together. A CCD camera is mounted on the mobile robot to acquire information, which is displayed inside the browser for the remote operator's operation. The designed mobile robot can be remotely operated from 500 meters long as there is a set of computers with keyboard, mouse, display and connection to the Internet.

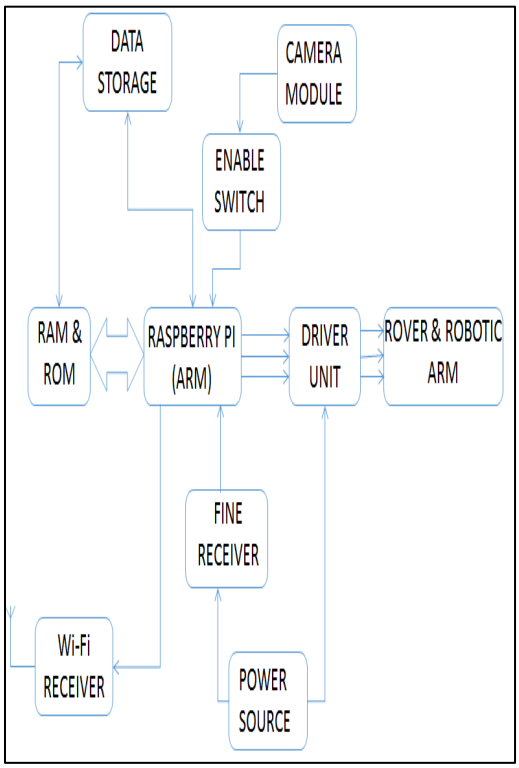

Figure 1.Block diagram

IV. CONCLUSION

This project is effectively useful in the hazardous areas where there is lot of risks to human life and many dangerous situations can cause rapid destruction and it also Improves the practical usability of the hand gesture based controls which can be controlled wirelessly through a remote or by an application installed in the users mobile.

V. REFERENCES

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