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A Review of Self Adaptive Robotic Arm

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ABSTRACT: The industry is moving from current state of automation to Robotization, to increase productivity and to deliver uniform quality. The main objective of this paper is to detect maximum objects within shorter duration for performing robotic arm pick and place task using offline surface clustering algorithm. The pick and place robot is a microcontroller based mechatronic system that detects the object, picks that object from source location and place it at desired location.

KEYWORDS: pick and place, machine codes, micro controller, robotic arm.

I. INTRODUCTION

An implementation of automatic robotic pick & place operation is a long term process as it requires a complex algorithm, sensors and processors for governing the robotic arm movement towards the detected object accurately.

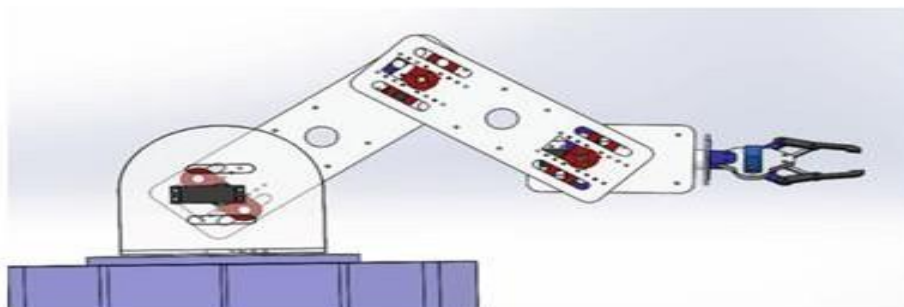
II. EXPERIMENTAL

In this paper we have developed the prototype of robotic arm movement. In the present situation the detection part is mainly based on the recent template-based linemod approach for object detection.

III. RESULT

The generation of the human-like manipulation motions has been implemented and also tested successfully for the 4 degrees of freedom (DOF) arm of the humanoid robot. The presented approach does not consider the dynamics of the robot arm.

PROJECT LAYOUT :



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IV. PRINCIPLES OF ROBOTIC ARM

The first category is one in which primary function in the inspection process the time required to most manual is a tendency for human error. We will return to robotic inspection in which many of the applications of robots make use of pick and place. The development of structural technique and decision- theoretic techniques. The basic of function and feature set training prototype sufficient number of feature.

The official definition of an industrial robot is provided by the Robotics Industries Association(RIA).Today the human analogy of the industrial robot is very limited so, we develop self adoptive robotic arm is design and program of automation in industrial application.

Motor1 & Motor2 : Shoulder Motion. Motor 3 : Elbow Motion.
Motor 4 & Motor 5 : Wrist Motion. Motor 6 : Gripping Motion.

- Polar configuration

Classification

- Cylindrical configuration
- Cartesian coordinate configuration
- Joint arm configuration

Application

- ✓ Robots are employed in a wide assortment of application in industry. Today most of the application are in manufacturing to move materials, parts, and tools of various types.
- ✓ Material-handling and machine-loading and –unloading application.
- ✓ **Processing application** This category includes spot welding arc welding spray painting.
- ✓ **Assembly and inspection** These are two separate operation which we include together in this category.
- ✓ The general problem associated with their installation.

Journal paper

From the above practically observed results and the table1 it can be concluded that the output voltage of sensors are practically different from standard values. So in the coding or algorithm the averaging of the signals is to be done. This averaging makes the system generalized for different MEMS sensors.

International Journal of Scientific and Research Publications, Volume 2, Issue 12, December 2012

Mr. C. Chandra Mouli en tl (2017)

Sensor loading issue the load driving capacity of MEMS is quite low as its output current is low. Due to this the sensor needs to be placed within few centimeters from the controller. So to overcome this loading problem the voltage follower stage needs to be introduced that provides the high input impedance and low output impedance and hence eliminates the arm.

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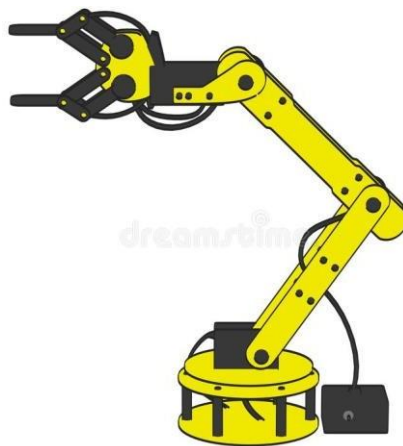
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Kaiser Kenneth L. et al (2006).

This article is an example of the completely diverse application of the (as in case of Smart computers) in terms robotics and manufacturing sector. Here it is shown how with minimum simple hardware and intelligent software the gesture controlled technology.



Md. Anisur Rahman et al (2019)

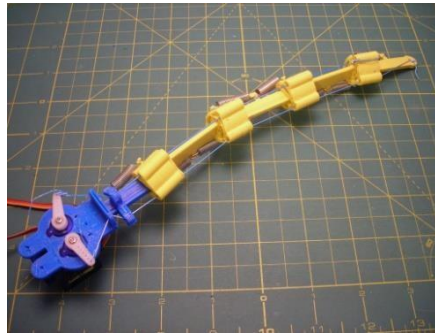
The redundancy of the animator robots' arm can be described by the rotation of the center of the elbow joint about the axis. The base frame (x_0, y_0, z_0) of the feasible position of the elbow around this axis is defined by the curve. This curve can be described from the ending point of the upper arm which can be describes an ellipsoid. The centered of the origin of the base coordinate system (x_0, y_0, z_0) and that the starting points of the forearm derived a sphere centered on the wrist position (x_w, y_w, z_w) which corresponds to the origin of the coordinating system (x_s, y_s, z_s) which is arm angle is in system.

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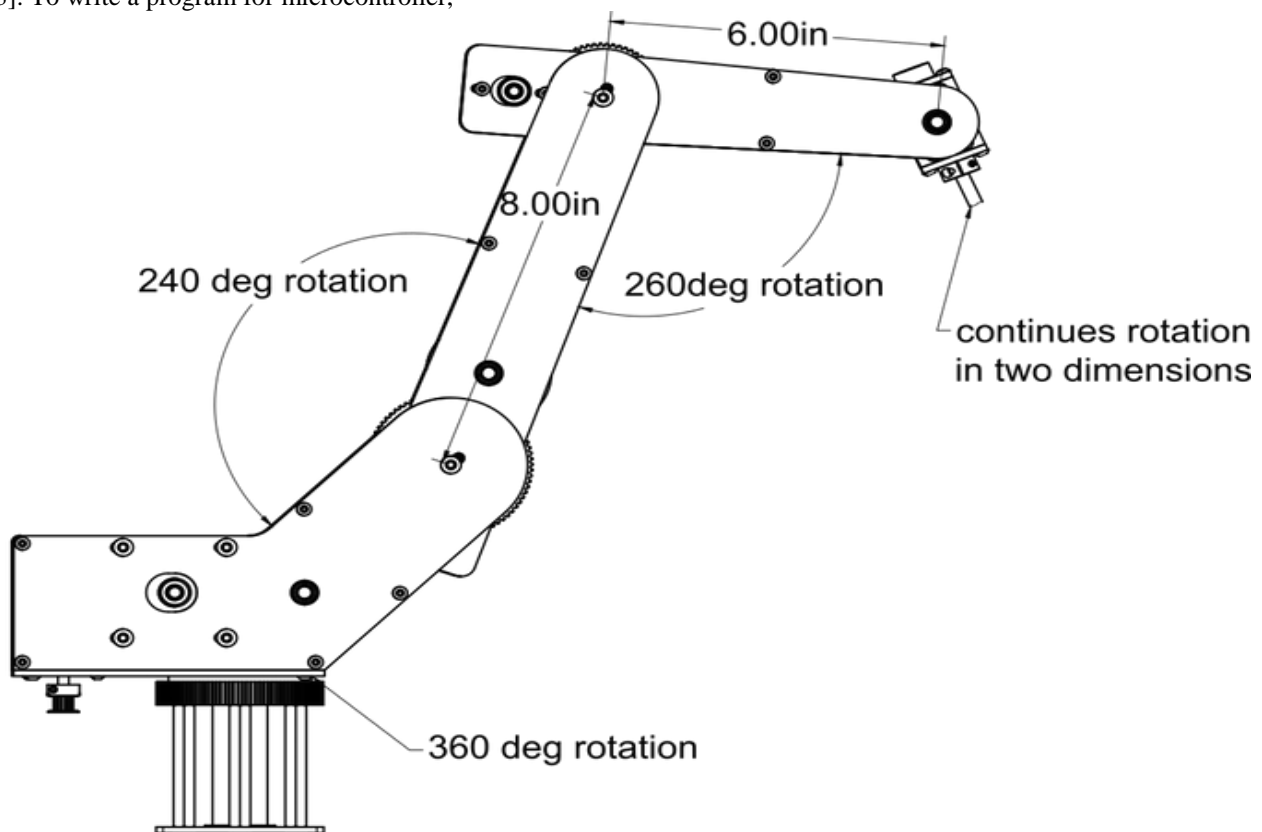
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Dr. Corke, P et al. (1996)

In this paper, AVR microcontroller ATmega16 is used for data acquisition. The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 16KB of programmable flash memory, 1KB SRAM, 512B EEPROM, an 8-channel 10-bit A/D converter, and a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts. By executing instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed. It has 1 programmable serial USART (universal synchronous asynchronous receiver transmitter) and 32 programmable I/O pins [3]. To write a program for microcontroller,



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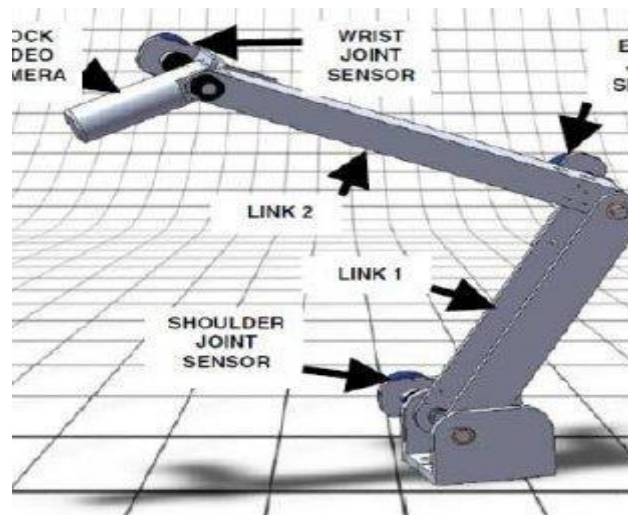
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Serdar Kucuk and Zafer Bingul (2006)

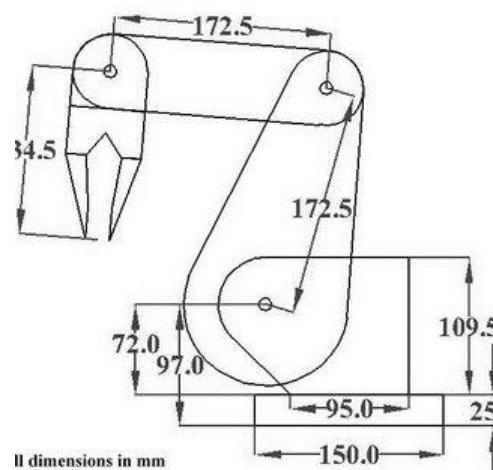
Robotic arm, inverse kinematic model and control was developed using an arm to microcontroller. Arm length was used to calculate the IK model to evaluate the joint angles of the robot arm. The correct position of the end effector with respect to the base was achieved using the joint angles. The performance of the robot arm has been compared with the application of picking a general purpose Hi-Watt 9V battery and placing it in the predefined space which was shown in the.

The following observations were done while teaching the robot arm.



Chung-Hsien Kuo et al (2008)

The idea is to change the 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 other more intuitive technique, that is, controlling the complete Robotic Arm by the operators hand movement or motion or gesture. In this paper the completely electronic (i.e. without mechanical sensors) way of achieving the above stated goal is discussed. This is achieved by using MEMSACCELEROMETER technology (that is used in smart laptop for tilt sensing), showing the diversity of the application of the same technology.



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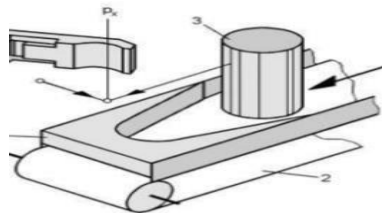
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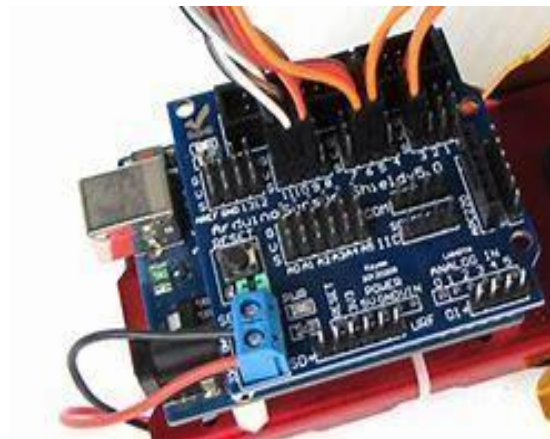
Alexander Shkolnik et al (2010)

While many successful approach dynamic legged locomotion exist, we do not yet have approaches which are general and flexible enough to cope with the incredible variety of terrain traversed by animals. Progress in motion planning algorithms has enabled general and flexible solutions for slowly moving robots, but we believe that in order to quickly and efficiently traverse very difficult terrain, extending these algorithms to dynamic gaits is essential.



C. Fonseca et al (2007)

Electro Encephalo Gram based Brain-Computer Interface robotic arm can help as a powerful support for severely disabled people in their regular activities, especially to aid them to move their arm voluntarily. This paper proposes and implements a brain signal (mind) controlled robotic arm to yield different movements in robotic arm. The scheme uses a single electrode pair acquisition scheme, microcontroller based robotic arm module. The key lies in the mapping of the EEG signal to the robotic arm to achieve the objective. In this project we are developing a cost effective BCI robotic arm that will help the physically challenged to lead an independent life with the help of their brain signals using non-invasive techniques.



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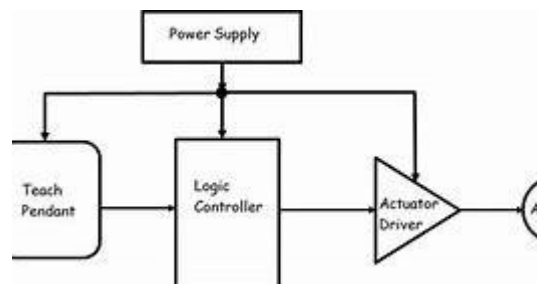
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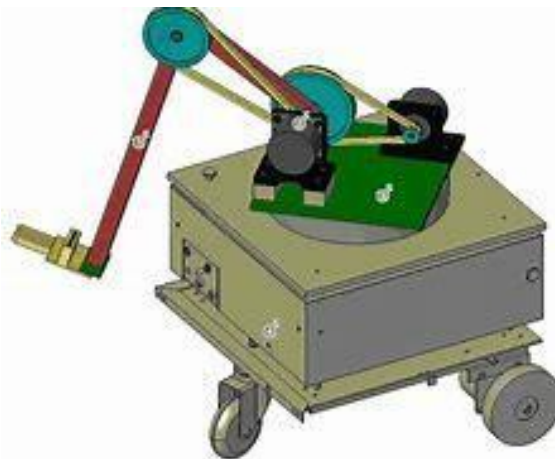
Dr. Abdellatif Baba en tl (2007)

These machines, which are operated with the need for human assistance in advance, have been made to operate spontaneously without the need of human power with the progress of technology. One of the most used components of automation systems is robots. Robotic systems; Mechatronics Engineering, Mechanical Engineering, Electrical Engineering and Computer Engineering have all come together to work together.



Khushboo Khurana en tl(2013)

Robotic pick and place automation speeds up the process of picking parts up and placing them in new locations, increasing production rates. With many end-of-arm- tooling options available, pick and place robots can be customized to fit specific production requirements. Moving large, small, heavy, or hard-to-handle products can be an easy task to automate in the factory line. Consistency is also a benefit of using a pick and place



V. RESULTS & DISCUSSION

The object recognition is done by using image processing in programming and machine language using software. The image processing programming used in this system for object detection is clustering program.

VI. CONCLUSION & FUTURE WORK

The objects were detected by image processing using programming software and machine language using software. It is found that the offline surface clustering algorithm can detect more objects within shorter duration. Hence, suitable for robotics application. When the detected objects are transmitted to the microcontroller unit through zigbee , the robotic arm performs pick & place task. Thus, the prototype of robotic arm movements has been developed with the help of zigbee technology. An implementation of fully automatic robotic arm pick & place operation is a long term process as

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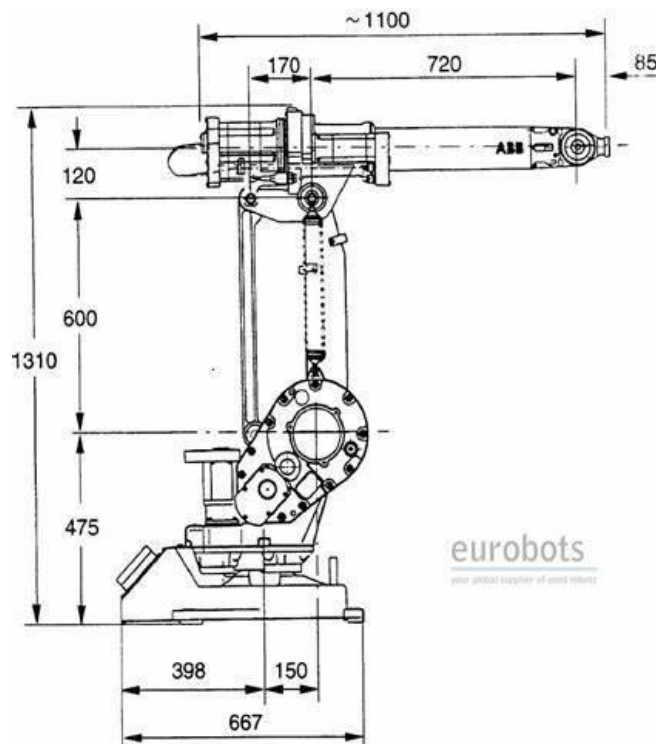
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it requires a complex sensors and processors for governing the robotic arm movements towards the next world

Diagram



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