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# Haptic hand Robotic Arm

#1Shrikant Thorat, #2Omkar Bargaje, #3Sarthak Dalwe,
#4Prof. Shalaka V. Shinde

1shrithorat2010@gmail.com
2obargaje@gmail.com
3sarthak.dalwe@gmail.com

#1234Department of E & TC

Parvatibai Genba Moze College of Engineering,
Wagholi, Pune.

**ABSTRACT**

**Robotic Arm is extremely useful in several applications such as manufacturing, surgery, handling hazardous objects, handling microscopic objects, and very heavy objects. In bomb diffusion, it is always risky for human beings to go & diffuse bomb as it may explode at any time. In such case, we can send our robot arm over there whose movements can be controlled by Bomb Diffusion Squad. Also in the industries, the people may have to work near hot zones or chemical zones or radioactive zones. For these purposes Haptic technology is extremely useful. Haptics is the scientific field that studies the sense of touch. We use motion sensors and can track the position and orientation of other objects with the help of this robotic hand, like your fingers, for example. Just like a mouse or joystick can be used to control a program, your finger actions could be used to control a program. The industrial robots perform their work repeatedly and their work remain fixed. They do not change their work. We have solved the problem of these robots that if any unexpected even occurred like falling of job from pick N place robot, then we can terminate its work. Through subroutine and haptics, we can lift up that job by the robot . We can fix this technology to already installed robots in the industry. In this a man from remote place of around 50-100mts range sitting on his chair can easily control the mechanism by his hand. An ASK transmitter attached to human hand transmits the controlling codes. These codes are received by ASK receiver, decoded and given to microcontroller which then controls the motion of robotic arm. So as per user give motion by hand the motion of robotic arm is controlled from a remote place without any wire connection.**

**Keywords: Robotic Arm, Haptic hand**

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## I. INTRODUCTION

This is the most advance version of "Pick n Place Robot". A person from a remote place can comfortably control the motion of robotic arm without any wire connection.

Again there are two systems one at the transmitter side in which a software program written in C++ generates control signals. These signals are encoded and transmitted by RF transmitter chip. At another end RF receiver chip will demodulate these signals and decoder will decode it. Finally microcontroller will take desired controlling action on robotic arm Robotic Arm is extremely useful in several applications such as manufacturing, surgery, handling hazardous objects, handling microscopic objects, and very heavy objects. In bomb diffusion, it is always risky for human beings to go & diffuse bomb as it may explode at any time. In such case, we can send our robot arm over there whose movements can be controlled by Bomb Diffusion Squad. Also in the industries, the people may have to work near hot zones or chemical zones or radioactive zones. For these purposes Haptic technology is extremely useful. Haptics is the scientific field that studies the sense of touch.

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Fig. no. 1: Haptic Hand

**Problem Statement:**

The industrial robots perform their work repeatedly and their work remain fixed. They do not change their work. We have solved the problem of these robots that if any unexpected even occurred like falling of job from pick N place robot, then we can terminate its work. Through subroutine and haptics, we can lift up that job by the robot . We can fix this technology to already installed robots in the industry.

In this a man from remote place of around 50-100mts range sitting on his chair can easily control the mechanism by his hand. An ASK transmitter attached to human hand transmits the controlling codes. These codes are received by ASK receiver, decoded and given to microcontroller which then controls the motion of robotic arm. So as per user give motion by hand the motion of robotic arm is controlled from a remote place without any wire connection.

## II. LITERATURE SURVEY

A man from remote place of around 50-100mts range sitting on his chair can easily control the mechanism by his hand. An ASK transmitter attached to human hand transmits the controlling codes. These codes are received by ASK receiver, decoded and given to microcontroller which then controls the motion of robotic arm. So as per user give motion by hand the motion of robotic arm is controlled from a remote place without any wire connection

Haptic is applicable across nearly all areas of computing including video games, medical training, scientific visualization, CAD/CAM, computer animation, engineering design and analysis, architectural layout, virtual toys, remote vehicle and robot control, automotive design, art, medical rehabilitation, and interfaces for the blinds.

**Haptics in Medicine**

Haptic medical simulators are extensively used and experimented as a training tool, especially in the context of minimally invasive surgery. Laparoscopy, Endoscopy, and Endovascular procedures are conducted by taking the help of commercial haptic simulators. Attention from the research community is also oriented on modelling of soft tissue deformation which is very important. With advances in computational hardware, the use of the finite element method (FEM) for tissue deformation has become a de facto standard due to its physically based continuum mechanics representation. Modelling the interaction of medical tools with deformable tissue has been studied extensively with respect to haptics.

**Haptics in Gaming and Robotics**

According to Gamers just want to have fun. Some factors of a game which contributes to the experience that keeps the player coming back for more are: a compelling storyline, challenging scenarios, amazing graphics, exciting online play, and good game design are just a few. Some special Rumble effects used properly can also greatly enhance the gaming experience and increase entertainment.

Similar to Human beings robots also should have sense of touch since a well-performing robot must be able to interact and identify objects in its environments. It is also important as it supports, and sometimes substitutes, the visual modality during recognition of objects. Like humans, robots need to perceive properties like shape, size, texture, and hardness and also should be able to discriminate between individual objects by the sense of touch.

**Haptics in Mobile devices**

The two factors which influence the perception of strength of a mobile were examined: the weight of the device and the frequency of the driving vibration. Since there is a clear correlation between these factors and the perception of vibration strength, findings suggest that designers of mobile devices need to take them into account.

## III. BLOCK DIAGRAM

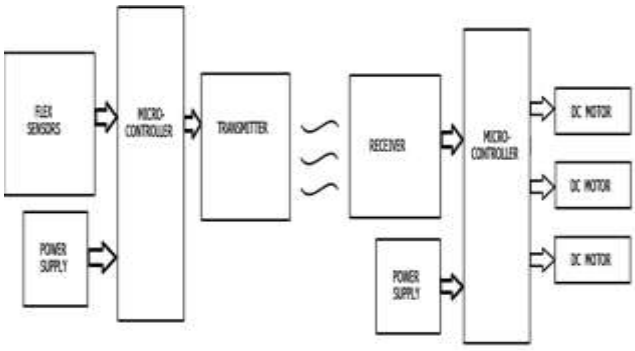


Fig1. Block diagram

In the block diagram there are two sections, one is Sensor & Transmitter section and other is Receiver section. Its details are as follows.

**Sensor and Transmitter Section**

1. Power Supply: It is used to supply the required amount of the voltages and currents to the different components in the circuit. We are using here a DC power supply to drive the entire circuit.

 

2. Microcontroller: A microcontroller is a small computer on a single integrated circuit containing a processor core, memory and programmable input/output peripherals. We are using microcontroller from AVR family, it is Atmel's ATMEGA16PU.

3. Flex Sensors: Flex sensors are passive resistive devices that can be used to detect bending or flexing. They convert the change in bend to electrical resistance- the more the bend, the more the resistance value. Flex sensors may be used in robotics to determine joint movement or placement.

4. Transmitter: We are using a RF module for wireless communication. The transmitter itself generates a radio frequency which is applied to the antenna. The information is then transmitted with the help of these radio waves through the communication channel.

**Receiver Section**

1. Receiver: It receives the modulated RF signal, and demodulates it. This RF receiver operates at a frequency as that of the Transmitter. The RF module is small in size and weight. And it is having high accuracy.

2. Microcontroller: Again we are using another AVR microcontroller ATMEGA 16PU on receiver side. As this project is wireless and can operate from a distance, we have to use a separate microcontroller.

3. Motor Driver: L293D is a dual H-Bridge motor driver integrated circuit. Motor drivers act as current amplifiers since they take a low current control signal and provide a higher current signal. This higher current signal is used to drive the motors.

4. DC Motors: For actuating the joints of the Haptic hand, we are using the DC motors. As they are small in size with higher torque, it is advantageous to use them. The number of motors used is actually equal to number of joints of the robotic hand.

**Algorithm:**

Step 1: Start.
Step 2: Power On.
Step 3: Check microcontroller is On or not. If not, then go to step 1.
Step 4: Check Sensors and motors are working or not.
Step 5: If yes, check for Robot Arm (Haptic Hand), whether it is in safe operating parameter or not. If yes, go to step 7.
Step 6: Reset the arm and again go to step 5.
Step 7: Take data from sensors and process it.
Step 8: Send the drive signals to the motors according to inputs from sensors.
Step 9: Observe the motion. Is robot arm is in safe operating range? If yes, go to step 7. If not go to step 6.

## IV. RESULT

Our prototype is running successfully. Gripper and joints of robot are moving according to hand gestures and the whole robot assembly can move in all directions by 'pitch' and 'roll' movements of hand.

This technique is ready to be installed an industrial robots easily and with minimum investment. So, there is no need to modify the design of installed robots for implementation of this technique. If any error occurred, the robot will go to the subroutine and will pick up the object according to the haptic instruction of the human hand.

## V. CONCLUSION

We have build these easily with minimum cost , this project is not so hard for implement as well as understanding. It solves many problem in industry and military. It help human to work fast and efficient. Human handle all the things by seating at one place. Only problem with this robot is you want wear hand gloves continuously.

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