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Smartphone Controlled End-Effector

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Abstract

Robotic hands are still beyond a horizon from matching the grasping and manipulating capability of their human complements. To reduce the involvement of human beings in certain dangerous applications, this approach presents an acquisition method that extensively looks for the design of the human hand. The information obtained through this procedure is further analyzed, transfigured, and used to synthesize a reduced space of a robotic hand. It is mainly implemented based on wireless communication technology. The proposed system consists of an application that is installed in the smartphone and passes information to the Bluetooth module. The module converts information into data packets. The data is transferred to the servo motor through Arduino. The servo motor rotates as per the data received. At last, the robotic hand moves according to the rotation of the servo motor. Nowadays many industries use this robot hand for the safety of the people working where they use harmful chemicals like bromine chloride or others which are harmful to the skin.

Keywords: Arduino UNO, Servomotor , Bluetooth module , Servo control application

1. Introduction

In automation,an end effector could be a tool placed at the top or last link of a robotic arm, designed to interconnect with the atmosphere. The precise nature of this device depends on the applying of the automation.In the strict definition, that originates from serial robotic manipulators, finish| the top tip effector suggests that the last link or end of the automaton. At this end point, the tools ar connected. in a very large sense, an end effector will hold the a part of a automaton that connects with the operating atmosphere. This refers physically grasp, and penetrate the surface of the article.

In gift years robot-based surgery plays a significant role within the medical field. Robot-based surgery permits surgeons and doctors to perform differing kinds of problematic procedures with a lot of accuracy, precision, and suppleness to manage the various movements of the human hand. There ar varied surgeries like abdominal abscission, body part abscission, viscus abscission wherever doctors like robotic surgery. Robot-based abscission could be a minimally invasive procedure within which, the surgeons management the robotic hand for surgical operations. The most wide used surgical robotic system includes a mechanical arm, camera arm, and a few of the mechanical arms square measure wont to choose and place the surgical tools, whereas alternative robotic systems square measure used for actual insertion

physical effects wont to attain a robust grasp between a gripper and also the object to be grasped. Industrial grippers might use magnetic mechanical, or suction means that.

The automotive field and metal sheet handling are dominated by electromagnets and vacuum cups. using Bernoulli's principle, the airflow between the gripper and the part where lifting force attracts the gripper and part close to each other, are exploited by Bernoulli grippers. These are one of the types of contact-less grippers. The object stays confined within the force made by the gripper while not returning into direct contact with it. Bernoulli grippers square measure largely employed in cell handling, semiconducting material wafer handling, and textile and animal skin industries. alternative principles square measure used at atiny low scale, within the last 10 years, fascinating applications square measure incontestable in micro-handling.

2.Additional Grippers Used:

Based on electric charges,

1..Electrostatic grippers- The work of charge-difference between the clipper and the area generally executed by the clipper.

2. Van der Waals grippers- Work at low power atomic gravity between the gripper and the object.

Based on a liquid medium,

Capillary grippers-To center, align and grasp a vicinity, Capillary grippers utilize the physical phenomenon of a gristle between the gripper and therefore the half.

Based on contact less-grasping mechanism,

1.Ultrasonic grippers-Uplift a part and trap it at a certain level using pressure standing waves

If a robot is designed to lift a round object, the gripper surface shape may be a concave impression of the object to improve grip.

$F=ma/\mu n$

where,

F is the force required to grip an object

m is the mass of the object

a is the acceleration of the object

μ is the coefficient of friction and

n is the number of fingers in the grippers

The direction of travel will be calculated in whole equation. When the body is moving upwards against gravitational force, the force needed is greater than moving downwards. As a result, a new word is added, and the formula becomes:

$F=m(a+g)/\mu n$

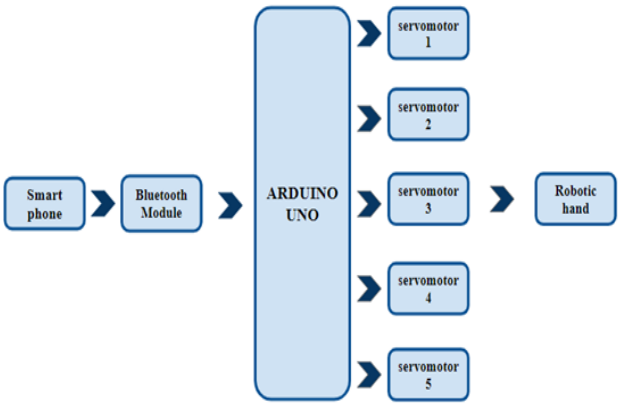
The acceleration due to gravity and movement should be taken as g and a respectively. A task-related grasp criterion may be wont to choose grasps that ar most fitted for fulfilling explicit task specifications sure enough physically interactive manipulation tasks, like writing and screwdriver handling. variety of task-oriented grasp consistency metrics [4] are recommended to help within the choice of a eminent grasp that meets the task needs a pattern of wires that close around a handle or other gripping point like the lens of a camera.

This paper discusses the robotic arm developed by victimisation MEMS-ACCELEROMETER technology. These gesture arms were controlled by preloaded code i.e. via joystick. six motors was used, out of those 2 for shoulder motion and radiocarpal joint motion and one motor for elbow motion and fascinating motion.

he actuation mechanisms consisting of micro servo motors, belts, and pulleys are connected to the finger joints and thus promote extending and bending of the fingers. Two kinds of sensors, i.e. light dependent resistor and force sensor are integrated into the system.

This paper highlights the significance of wireless communication & its application by developing robotic hands which can be second-handed in many fields such as chemical industries, defense, and medical. The use of a real hand of a human in deleterious applications can be replaced by a wireless robotic hand. To avoid any harm to human life, to diffuse the bomb from a safer distance, this end effector is taken on a platform(a moving one) with a camera. This hand can assist patients who suffered from paralysis and can't move their hands by providing an electronic hand that can work through the voice command of the holder. In general, this project has two main parts i.e. receiver (electromechanical robotic hand) & transmitter (control glove).

3.Proposed Model:



■For better accuracy we have to overcome some time delay of 0.133ms.

To overcome the drawbacks of the actual model, we have introduced a Bluetooth module instead of flex sensors.

To activate the Bluetooth module, we are going to create an application by MIT App Inventor, which will be installed on a smartphone.

This application operates the servo motor via the Bluetooth module.

Our proposed system consists of a robotic hand whose five fingers are connected to the servo motors using the strings. The servo motor needs PWM signal which will be supplied through the Arduino. The Bluetooth module gets data packets from the smartphone. These data packets are modified as PWM signals by the Arduino and go to the servo motor. According to the movement of the servo motor, the robotic hand fingers will move.

To communicate with the Bluetooth module, we created an application by MIT App inventor. Using that application, we can send our information as data packets. In that application we can vary the angle of rotation of servo motors from 0 to 180 degree only by dragging a button.

4.Hardware Implementation

4.1.Arduino

Arduino is a software business, project, and user community that creates machine, open-source software, open-source hardware, and microcontroller-based kits for creating interactive objects and digital devices that can feel and manipulate physical objects. The projects can be completed using microcontroller board designs provided by several vendors and various microcontrollers.

4.2.Servo Motor

The Servo motors operate from 4.8 Volts to 6.5 Volts, If the voltage is high, the torque will be high. but generally, the servo motors are operated at +5 Volts and can rotate from 0° to 180° due to the gear arrangement of the servo motor or it can adjust the motor to rotate 360° angle or a full circle.

Next is one of the most important parameters, torque at which the motor rotates. 25kg/cm torque is the most common one available in the market, which incorporated with the Towerpro SG90 Motor. A weight of 2.5 kg can be dragged by this 2.5 kg/cm torque motor can drag when it is held up at a distance of 1 centimeter. Then if

it suspends the load at 0.5 centimeters, the motor can pull a load of 5 kilograms similarly at 2 centimeters can pull only 1.25.

Black Wire: GND

Red Wire:+5v

Colored Wire: Control signal

Torque:4.8V:25.00oz

Speed:4.8V:0.12 sec/60 degree

5.Result And Discussion

A wireless end effector was initial tested with one finger.It was discovered that a bluetooth module connected to a smartphone activates one servo motor. And such servo motor causes the movement of a robotic finger. With regard to this, all 5 servo motors get connected to bluetooth module and activates the full end effector. by this approach ,wireless communication with smart phone has been achieved with success**.**

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6.Conclusion:

This paper presents a wireless end effector that is enforced by employing a Bluetooth technology. It can be wide used wherever there are harmful things within the human hand. it's essentially a art movement project which will be used to whole human hand. Future efforts are going to be created to form this hand movable from one to a different , a lot of versatile and a lot of precise. If potential be enforced associate exceedingly in a very pc using an external eris recognition device

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