

ARDUINO BASED ANIMATRONIC HAND

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Abstract - *Animatronics is the use of mechatronics to create machines which seem to animate rather than be robotic. Animatronic figures are most often powered by pneumatics, and, in special instances, hydraulics, or by electrical means. The present work is to design animatronic hand that must be able to lift small weights and to highlight the use of wired communication and its application. In order to achieve this Servo motor, Arduino, Flex sensors are required and to power the entire circuit with a 9-volt battery will be used. Animatronic Hand can be used in many fields such as medical, defense, chemical industries, etc.*

This bend sensor actually reacts (decreases in resistance) to pressure, not specifically to bend. But because it is sandwiched between two layers of neoprene (rather sturdy fabric), pressure is exerted while bending, thus allowing one to measure bend (angle) via pressure.



Fig1: Flex Sensor

Key Words: Flex Sensors, Servo Motor, Arduino.

1. INTRODUCTION

Animatronics is the use of cable-pulled devices or actuators to animate a replica of a human or an animal, or bring lifelike characteristics to an otherwise inanimate object. A robot designed to be a convincing imitation of a human is more specifically labeled as an android. Animatronics is a multi-disciplinary field which integrates anatomy, robots, mechatronics and puppetry resulting in lifelike animation. Animatronic figures are often powered by pneumatics, hydraulics, and/or by electrical means, and can be implemented using both computer control and human control. Motion actuators are often used to imitate muscle movements and create realistic motions in limbs. Figures are covered with body shells and flexible skins made of hard and soft plastic materials and finished with details like colors, hair and feathers and other components to make the figure more lifelike.

2. HARDWARE COMPONENTS

Flex Sensor: A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of sensor element is varied by bending the surface. Since the resistance is directly proportional to the amount of bend it is used as goniometer, and often called flexible potentiometer.

Arduino UNO: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced with various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable It can be powered by the USB cable or by an external 9volt battery, though it accepts voltages between 7 and 20 volts.



Fig2: Arduino UNO

Servo Motor: A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.



Fig3: Servo Motor

3. SOFTWARE DESCRIPTION

The software which we use here is Arduino IDE. The main features we need to know about it are:

- **Code area:** This is where you will type all your code.
- **Verify:** This allows you to compile your code to code the Arduino understands. Any mistakes you have made in the syntax of your code will be shown in the info panel.
- **Upload:** This does the same as verify but will then send your code to your Arduino if the code is verified successfully.
- **Info panel:** This will show any errors during compiling or uploading code to your Arduino.
- **Serial Monitor:** This will open a window that allows you to send text to and from an Arduino.

4. WORKING PRINCIPLE

Voltage Divider Rule:

In electronics, the voltage divider rule is a simple and most important electronic circuit, which is used to change a large voltage into a small voltage. Using just an input voltage and two series resistors we can get an output voltage. Here, output voltage is a fraction of the input voltage. The best example for voltage divider is two resistors are connected in series. When the input voltage is applied across the pair of the resistor and the o/p voltage will appear from the connection between them.

Generally, these dividers are used to reduce the magnitude of the voltage or to create reference voltage and also used at low frequencies as a signal attenuator. For DC and relatively low frequencies, a voltage divider may be appropriately

perfect if made only of resistors; where frequency response is required over a wide range.

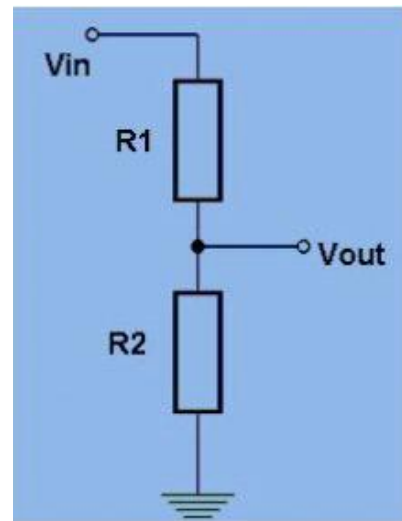


Fig4: Voltage Divider

5. CIRCUIT DIAGRAM

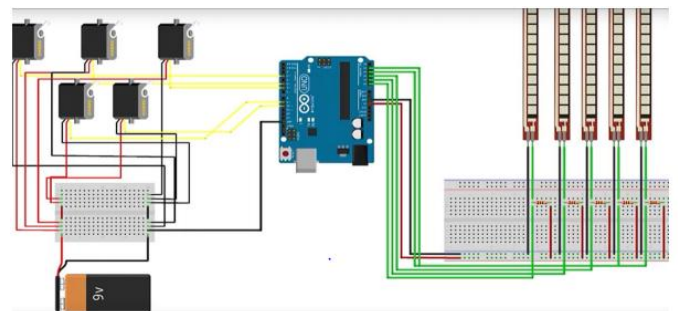


Fig5: Circuit Diagram

6. ADVANTAGES

- Ease to handle in a simpler manner.
- Requires less maintenance.
- The technology doesn't bring any unemployment issues as it only safeguards the employees either be the chemical industry or the physically challenged persons.

7. CONCLUSION

The Paper mainly focuses on how to imitate the motion that has to create or generate by the flex sensors mounted or attached onto the users's hand glove in order to lift small weights.

The sensitivity of the "Animatronic Hand" varied with the usage of different resistor in the voltage divider circuit and the use of various kinds of flex sensors.

8. References

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