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Servo Actuation by Open Palm Detection

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Abstract

This project presents a real-time open palm detection system integrated with servo motor actuation. Using MediaPipe Hands for gesture recognition, the system detects an open hand in a video feed and sends a signal to an Arduino. The Arduino then actuates a servo motor and toggles an LED for feedback. This seamless integration of computer vision and hardware demonstrates potential applications in robotics, assistive devices, and gesture-controlled systems.

INTRODUCTION

Gesture recognition has become an integral part of human-computer interaction, bridging the gap between human intent and machine response. This project explores the use of MediaPipe Hands for detecting an open palm gesture and translating it into physical motion using a servo motor. The system operates in real-time, utilizing computer vision to analyze live video input, detect specific gestures, and communicate the findings to an Arduino microcontroller. The Arduino then actuates a servo motor and toggles an LED to provide immediate feedback. Such integration of vision-based detection and hardware control has

DESCRIPTION OF THE WORK

Software Implementation

The system employs MediaPipe Hands for robust and efficient hand gesture detection. The Python-based application processes a live video feed, identifies the landmarks of the hand, and evaluates the position of key fingers to determine whether the hand is open. If the gesture is detected, a command is sent via serial communication to an Arduino microcontroller.

Hardware Integration

The Arduino receives serial commands ('1' for an open palm and '0' otherwise) to control a servo motor. Upon receiving the signal for an open palm, the servo rotates to a specified angle, while a built-in LED provides visual confirmation of the detected gesture.
such as:
Facilitating hands-free control for individuals

HARDWARE AND SOFTWARE DETAILS

Hardware Used

SL. No	Module Name	Price in Rupees.	Description
1	Arduino UNO	400/-	CH340
2	Servo Motor	76/-	Tower Pro SG90 mini

Software Used

1. Arduino IDE
2. VS Code
3. Python libraries: Open CV, MediaPipe, PySerial.

Screen Shots

Figure 1. Open palm detected

Figure 2. Servo rotation

KEY REFERENCES

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[3] **Palm area detection for reliable hand gesture recognition** Giulio Marin, M. Fraccaro, P. Zanuttigh