

GC MOTOR – AN AUTOMATION MODULE TO IMPROVE LIFESTYLE

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Abstract

The gesture-controlled motor is a technology to control motor-based equipment with gestures. Gestures can be hand gesture or movements of any body parts. This technology will help the people to control their equipment easily with gestures. The gestures are recognized by optical cameras placed at different angles. For old aged people, children, it is difficult to manage any equipment which is at a higher altitude. Hence, they need some methods to overcome this situation. GC Motor helps them to control the equipment as they need. For differently able people, it is difficult to control the equipment which are far away. So, GC Motor will help to control the equipment with gestures without going near to them. The GC Motor help common people to improve their daily life. Any equipment driven by motor can be controlled with gesture.

In a faster growing world, where the new technologies are developing day by day, and the people are attractive towards those technologies to simplify their life too. GC Motor is a new technology that can make life simpler and more luxurious. This technology has a wide range of application. For home automation, using GC Motor we can control doors, windows, curtains, etc.

Introduction

Gesture recognition

The gesture is a type of communication method. Hand gestures, head nodding, and body postures are effective communication channels in human-human. Gestures are categorized into three types, body gestures, hand and arm gestures, head and facial gestures. Gesture recognition refers to the mathematical interpretation of human body movements by a computing device. By using gestures, a motor can rotate in a clockwise or anti-clockwise direction. Gestures can be recognized with the help of an image-based and non-image-based sensor [1].

Presently, the motor can be controlled by gestures using non-image-based sensors. These are limited to a small distance. An image-based sensor can detect gestures from a suitable distance and no need to move closer to the device for operating it, also we can control the device from any height.

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Fig. 1. Hand gesture recogniton

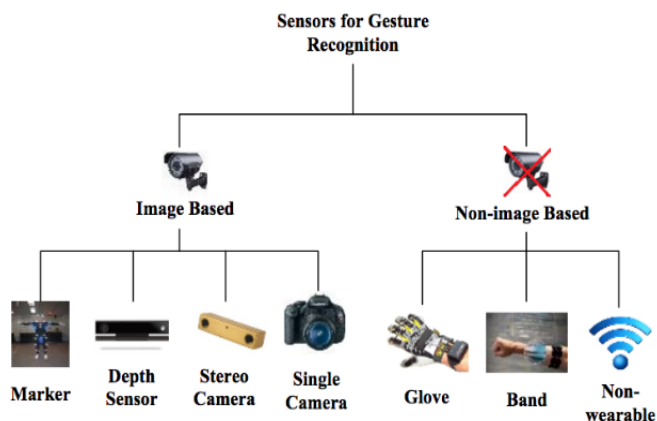
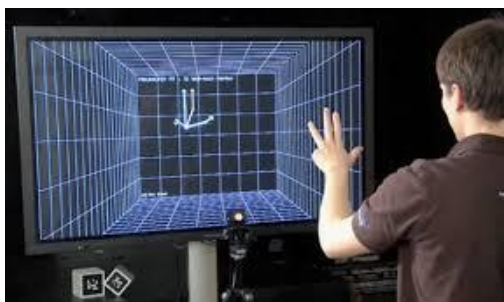


Fig. 2. Different types of gesture sensors

Socio economic relevance

For old aged people and differently able people, it is difficult to control equipment placed away and at a big height. A gesture-controlled motor will help the old aged people and differently able people to control motor-based equipment. Voice-controlled equipment are difficult to be controlled by dump persons, so gesture control communication is a better option. Along with the above mention people, the common peoples can use this technology to improve their lifestyle.

Now it is a faster-growing world, where the new technologies are developing day by day, the people are attracted to those technologies to simplify their life. Gesture controlled motor is a new technology that can make life simpler and more luxurious. This technology has a wide range of applications. For home automation, the gesture-controlled motor can be utilized for controlling doors, windows, curtains, etc.

LITERATURE SURVEY

Gesture controlled motor using accelerometer

Using an accelerometer, a gesture-controlled motor is a technology to control a motor by hand movement together with an accelerometer on it. This technology is divided as two parts Transmitter and Receiver apparatus. Where a gesture tool serves as a transmitter, and a motor functions as a receiver apparatus. When a transmitter is mounted on the side, it will send signals for needed operation to the motor.

The accelerometer is a non-image-based sensor to recognize gestures, it assists to interface with the directions. It contains 3-axis which are X, Y and Z. accelerometer, a dynamic sensor fit for a huge scope of detecting. Accelerometers are accessible that can increase speed in 3 different axes [2].



Fig. 3. Glove made with accelerometer to control motor

Voice controlled motor

Voice communication plays a significant role in this project. This project uses audio signals in numerous fields for numerous functions. Motor speed can be varied by totally different speed management schemes at the rotor side and stator side of the motor. In the stator side, we have voltage control, frequency control, and pole changing method. In the rotor side we have resistance control, slip power recovery method, PWM technique, etc. PWM technique is a new one which mostly used for speed control.

The motor speed can be controlled by means of a system of voice recognition. The idea is built with microphone, microcontroller, amplifier, driver and pulse shaping circuits. The voice signal is given to the microphone as input, and its output is verstarcked with an amplifier. The amplified signal is given to the circuits which forms the pulse. The pulse forming circuit produces square pulses that are supplied to the microcomputer. The pulse waveform for switching the different electrical modes ON/OFF microcontroller stores devices used. The microcontroller is set to compare the pulse obtained to the stored values and trigger the corresponding values relax the electronic equipment driver circuits [3].



Fig. 4. Toy car using voice-controlled motor technology

Remote controlled motor using RF

The remote control of a DC Motor involves the design and implementation of a microcontroller-based control unit to use RF (radio frequency) to wirelessly control a DC Motor. DC motors plays a significant role within the development of commercial power transmission systems. It was the first primary sensible device to device to convert electrical power into mechanical power.

Inherently simple operating characteristics, versatile performance and high efficiency has facilitated widespread use of DC motors in many forms of industrial applications. With the improvement in the



wireless networking field, innovation has also promoted its use in other industries such as military drones, monitoring devices, toy cars and more[4].

Fig. 5. Remote controlled motor

Remote controlled motor using IR

Infra-red or wireless technology provides a mobile approach to handling. It gives more independent means for accessing, opening and closing of a gate and other electronic information. This project aims to develop an autonomous circuit that demodulates an IR remote-control signal into the pure binary code that is sent when a user presses the button.

The system placed in a gate operates via microcontroller processing and program with the language for assembler and the logic circuit. Remote control is the main part of electronic devices; most commonly TV sets, DVD Player, Home Theatre systems, etc, that where initially used to operate the device wirelessly from a distance from view [5].

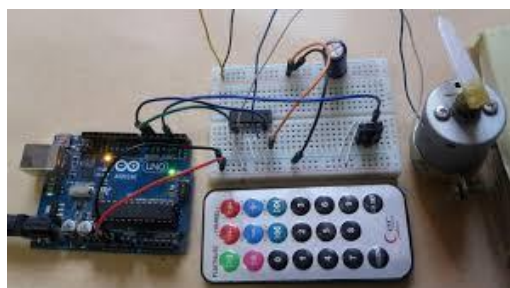


Fig. 6. Remote controlled motor using IR

OBJECTIVES AND PROPOSED INNOVATION

The Gesture controlled motor aims to develop automation in daily life applications and also it will support old aged and differently-able people in their daily life activities. It helps them in doing activities themselves by controlling motor-based equipment using gestures. GC motor can help common man to improve quality of life and to simplify their daily task. Sensors act as the key objects to identify and detect specially designed gestures produced by the user and respond according to it.

The gesture-controlled motor facilitates the use of image-based sensors to recognize the gestures from a suitable distance. These sensors then communicate with different motors to perform an action. Along with various hand gestures, head gestures or body movements can be used for gesture recognition. Addition of an extra mechanism to detect the presents or absence of the user in a specific area. These

sensors will detect the human presence and shut down the system on human absence. The efficiency and effectiveness of the proposed system could be enhanced along with drastic decrease in power consumption. Gesture control technology is developing quickly and changing many aspects of our life.

Gesture control devices began from the very primitive input devices to fine detail recognition. These devices are used in a much wider range, from research experiments and prototypes to day-to-day commercial products.

REQUIREMENT SPECIFICATION

Raspberry Pi night vision camera module

The Raspberry Pi night vision camera module is able to provide night vision capability effectively, thus increasing its efficiency multifold. It supports all the Pi 3 model's 5megapixel OV5647 sensor camera's revisions.

gesture recognizing could be performed effortlessly by utilizing the mentioned camera module while seamlessly preserving the precision simultaneously [6].



Fig. 7. Raspberry pi night vision IR camera

Raspberry pi 3 model B+

Raspberry Pi 3 Model B+ is a customer favored Raspberry product in the range of Raspberry Pi 3. It packs a high performing dual band quadcore processor having a processing frequency of 1.4GHz and its architecture is 64 bit, x84. It showcases the Bluetooth technology of version 4.2/BLE, wireless LAN of frequency bands 2.4GHz and 5GHz. It supports PoE capability via a separate PoE HAT and faster Ethernet compared to its predecessors. It attained the certification of modular compliance, thus the board to be built into end products with wireless LAN compliance monitoring substantially reduced, improving both cost and time to the market. The Raspberry Pi 3 Model B+ retains the same mechanical footprint as two of its predecessors [7].

It is used to process the gesture identified by raspberry camera. Initially identifies the gesture then the gesture will be tracked. And after tracking the gesture will be classified with predefined gestures, the corresponding output action will be generated.



Fig. 8. Raspberry pi 3 module

L293D motor driver

L293D systems are half-H drivers with a quadruple high current. The L293 is built to supply bidirectional drive currents up to 1 A at 4.5 V to 36 V. The L293D is designed to supply bidirectional drive currents of 600 mA at voltages ranging from 4.5 V to 36 V. All the mentioned devices are solenoids, bipolar stepping motors and works on DC, also useful in supply applications [8].

It is used to control the motion of the 12volt DC motor in clockwise and anti-clockwise direction.

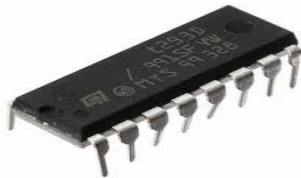


Fig. 9. L293D motor driver

12Volt DC motor

The 12Volt DC motor is the output action unit, that can be used in different applications to automate any equipment.



Fig. 10. 12Volt DC motor

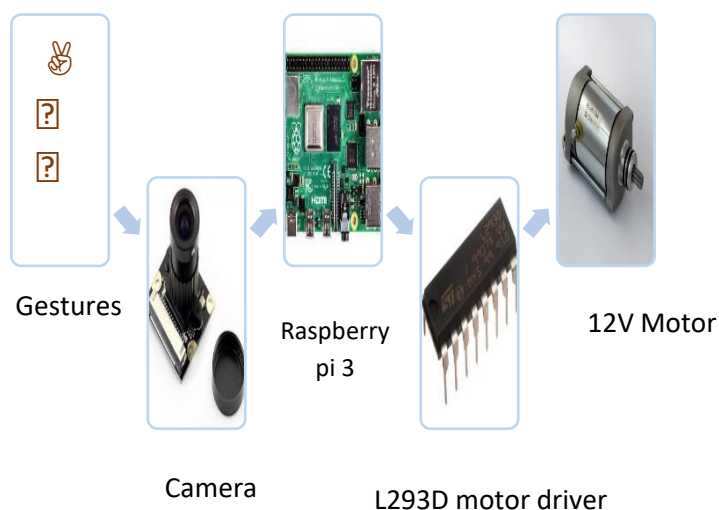
HYPOTHESIS, DESIGN AND METHODOLOGY

The GC motor consists of optical cameras, 12volt DC motor, L293D motor driver module and Raspberry Pi 3 modules. The Infrared night vision surveillance camera lively record the movements in the series of frames in the focus. The recorded data will be identified based on local features and motion. The change of local features in the adjacent frames will detect for any gestures or body postures.

The skeleton model approach for gesture classification is an excellent method for gesture identification and it will simplify the gesture classification. In the skeleton model the recorded data will convert to grayscale image of each frames. This grayscale images will help to identify the human body. These identified gestures should be tracked by the gesture tracking approach. This will give a mapping of grayscale image frames.

The input data consists of more frames, that is a motion and it is the need for gesture tracking. The gesture tracking will give relation between the captured frames. This tracked gesture data will be classified with some set of pre-constructed gesture models in the database. From which the appropriate gesture action will be selected. For the output action the corresponding output motor will be selected and L293D motor driver drives the motor to the corresponding direction (Clockwise and Anticlockwise direction). Output action is done by the motors.

The identification, tracking and classification of the gestures are done by the Raspberry Pi module. The module generates the output. Thus, the corresponding motor will rotate. The program written in the Raspberry Pi module is designed using OpenCV. OpenCV is a library of programming functions mainly aimed at real time computer vision.



CONCLUSION

Automation is a promising field to the modern culture and the peoples are concerned about the life of differently-abled and old-aged people. This project aims towards the betterment of their life. With the automation of equipment, life becomes more easier and simpler.

The gesture-controlled motor will bring improvements to current life. Along with that, life becomes more easier and simpler for everyone. Using this GC motor module, anything which run using motor can be controlled by gestures. In this faster growing world, new technologies are developing day by day. People are attractive towards technologies that simplify their life. Gesture controlled motor is a new technology that can make life simpler and more luxurious. This technology has wide range applications.

For home automation, use of gesture-controlled motor for operating doors, windows, curtains, etc could bring betterment for differently able people and elderly people.

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