GC MOTOR FOR DIFFERENTLY-ABLE

A PROJECT REPORT

submitted by

Kiron M D	**MGP16CS070**
Sairam S	**MGP16CS098**
Shimil S Babu	**MGP16CS108**

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of

Bachelor of Technology
In
Computer Science and Engineering

Department of Computer Science and Engineering
Saintgits College of Engineering, Pathamuttom

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SAINTGITS COLLEGE OF ENGINEERING

CERTIFICATE

This is to certify that the report entitled "GC MOTOR FOR DIFFERENTLY-ABLE" submitted by Kiron M D, Sairam S, Shimil S Babu to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Computer Science and Engineering is a bona fide record of the project work carried out by them under my/our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Supervisor	Project Coordinator	Head of the Department
Dr. Jubilant J Kizhakkethottam	Veena A Kumar	Dr. Anju Pratap

DECLARATION

We, undersigned hereby declare that the project report titled “GC MOTOR FOR DIFFERENTLY-ABLE” submitted for partial fulfillment of the requirements for the award of degree for Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by us under supervision of Dr. Jubilant J Kizhakkethottam. This submission represents our ideas in our own words and where ideas or words of others have been included, we have adequately and accurately cited and referenced the original sources. We also declare that we have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. We understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

Place : Pathamuttom
Date : 01 April 2020

Names & Signature of the students

(1) Kiron M D

(2) Sairam S

(3) Shimil S Babu

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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 project 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. This project 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, gesture-controlled motor will help to control the equipment with gestures without going near to them. The gesture-controlled 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. Gesture controlled 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 gesture-controlled motor we can control doors, windows, curtains, etc.

CONTENTS

INDEX **PAGE NO:**

LIST OF FIGURES

INDEX **PAGE NO:**

1. INTRODUCTION

1.1. 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]. The various hand gestures can be downward motion of hand, upward motion of hand, left swipe, right swipe, rotating the hand palm [2].

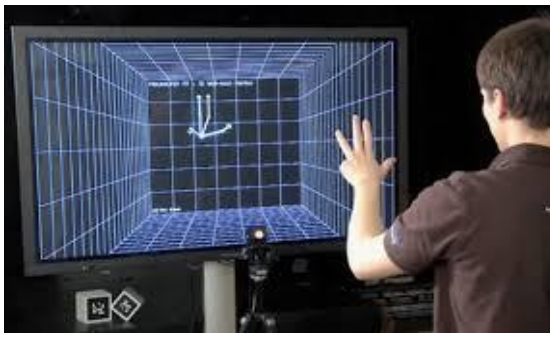


Fig. 1. Hand gesture recogniton

Fig. 2. Different hand gestures

1.2. Gesture sensors

Gestures can be recognized using non-image-based sensors and image based gestures. The Non image based sensors are limited to a small distance, they are Accelerometer enhanced glow, sensor bands, remote controlled sensors(using Infrared, Radio frequency, Voice, etc),etc. 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. The various image based sensors are depth sensor, stereo camera, marker sensor, optical camera, etc.

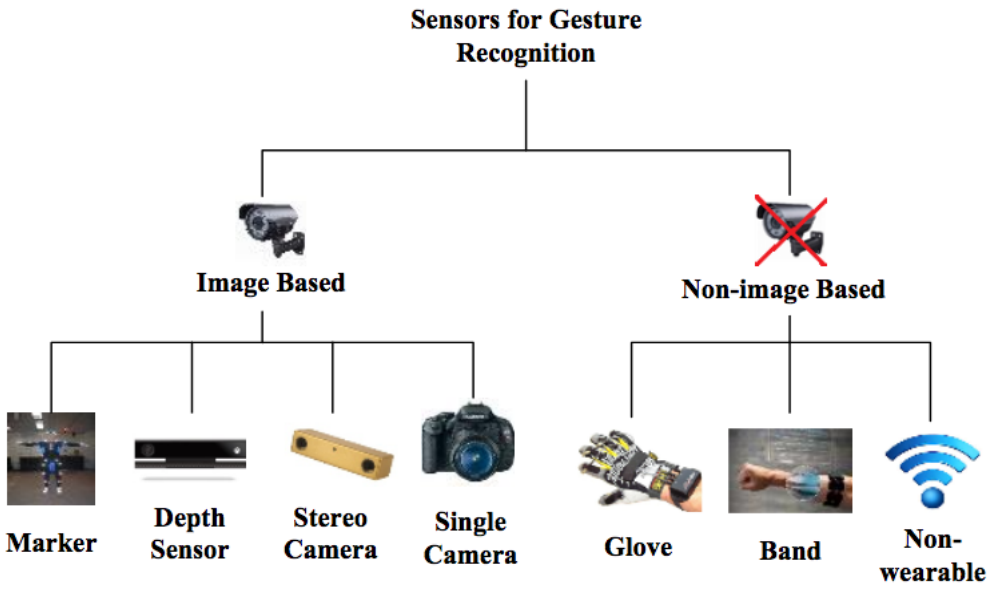


Fig. 3. Different types of gesture sensors

1.3. 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.

2. LITERATURE SURVEY

2.1. Gesture controlled motor using accelerometer

A gesture-controlled robot using an accelerometer is one kind of robot that can be operated by the movement of hand by placing an accelerometer on it. This project is divided into two parts transmitter device and receiver device. Where a gesture device works as a transmitter device and a robot works as a receiver device. When a transmitting device (accelerometer) is placed on the hand, then it will send signals to the robot for the required operation. 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].

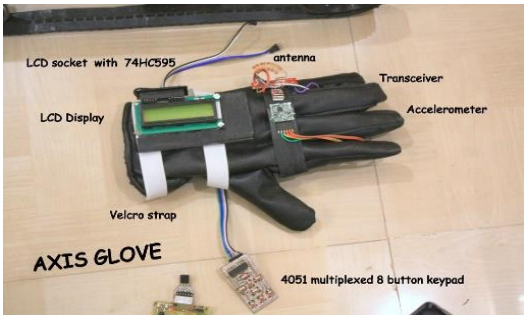


Fig. 4. Glow made with accelerometer to control motor

2.2. 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 speed of the motor can be controlled by voice recognition method. This project is designed with microphone, microcontroller, amplifier, pulse shaping circuit and driver circuit with relay. The voice signal is given as input to the microphone and its output is amplified using an amplifier. The amplified signal is given to the pulse shaping circuit. The pulse shaping circuit generates square pulses which are provided to the microcontroller. The pulse waveform for switching ON & OFF of the different electrical appliances used are stored in the microcontroller. The microcontroller is programmed to compare the received pulse with the stored values and to activate the corresponding relay driver circuits of the electrical appliances [3].

Fig. 5. Toy car using voice-controlled motor technology

2.3. 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 straightforward operating characteristics, flexible performance and high efficiency encouraged the widespread use of DC motors in many types of industrial drive applications. With the advancement in the field of wireless communication technology has thus encouraged their use in other fields such as military drones, surveillance systems, toy cars among others [4].

Fig. 6. Remote controlled motor

2.4. 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 device placed in a gate is working through the processing from microcontroller which program with assembler language and logic circuit. Remote control is a mean of the component in an electronic device, most commonly a television set, DVD player and home theatre systems originally used for operating the television device wirelessly from a short line-of-sight distance [5].

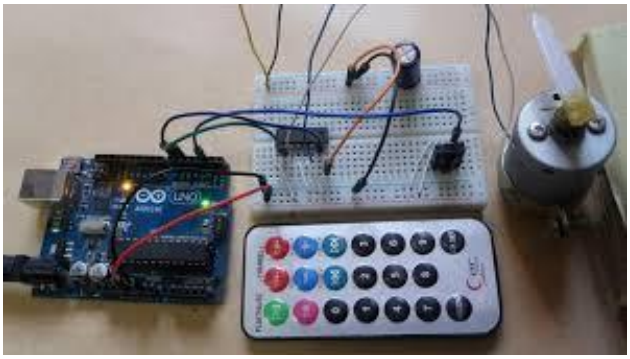


Fig. 7. Remote controlled motor using IR

3. 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.

This project is an incorporation of different areas of Computer vision to a integrated platform. The use of image sensing technology helps the clear understandability of gestures in a area. Computer vision enhances the gestures reading and tracking from captured/recorded data. The grayscale data of the tracked images improves depth analysis of data. Deep learning in computer vision helps to get the grayscale data from each frames of data using the contours and regions. The last big part of innovation will be the controlling of different motors for the desired activity. Each activity or purpose will contribute various number of motors to function. The speed and polarity of the motor can be controlled by the L293D motor driver.

Gesture management technology is developing quickly and ever-changing several aspects of our life. Gesture management devices began from the terribly primitive input devices to fine detail recognition. These devices area unit employed in a way wider vary, from analysis experiments and prototypes to every day industrial merchandise. In the coming scenario the entire world would have to go through an automated life. This gesture control motor will help to accomplish that aim. Everything which can be managed using motor can be automated using this gesture control motor.

4. REQUIREMENT SPECIFICATION

4.1. Raspberry Pi night vision camera module

A Raspberry Pi camera module, supports night vision features in Raspberry Pi night vision camera. It supports all revisions of the Pi 3 5megapixel OV5647 sensor camera. It is used to recognizing gestures [6].

Fig. 8. Raspberry pi night vision IR camera

4.2. Raspberry pi 3 model B+

The Raspberry Pi 3 Model B+ is a popular product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT. The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B [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. 9. Raspberry pi 3 module

4.3. L293D motor driver

L293D devices are quadruple high current half-H drivers. The L293 is designed to provide bidirectional drive currents up to 1 A at from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600 mA at voltages from 4.5 V to 36 V. Both devices are solenoids, DC and bipolar stepping motors, as well as supply applications [8].

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

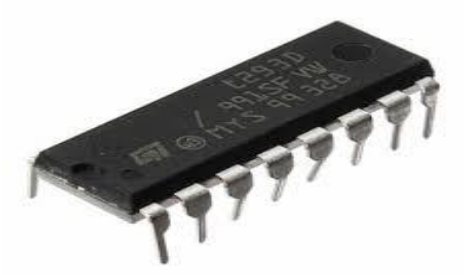


Fig. 10. L293D motor driver

4.4. 12Volt DC motor

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

Fig. 11. 12Volt DC motor

5. HYPOTHESIS, DESIGN AND METHODOLOGY

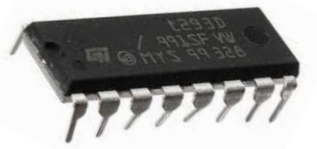
The GC motor consists of optical cameras, 12volt DC motor, L293D motor driver module and Raspberry Pi 3 modules. The Infrared night vision surveillance camera lively record the movements in the series of frames in the focus.

Capturing the input gestures

Transferring the input frames to raspberry pi for processing

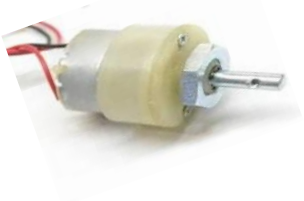
Input frames will track to get the corresponding frames. The corresponding gesture is tracked and classified with the preconstructed gestures. Appropriate gesture action performes.

Information about the next action passing.



For corresponding action L293d controls the direction (Clockwise/Anticlockwise direction) of motor.

Signal to rotate motor



Working of the equipment with GC motor.

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.

6. FORMULATION OF WORK PLAN

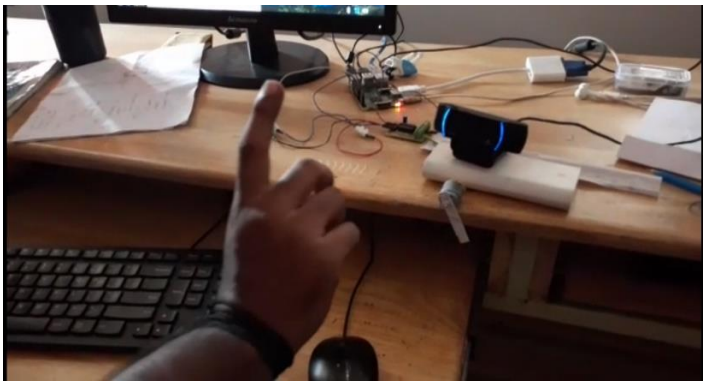


Fig. 12. phase 4 - Data set collection (Gesture recognition)

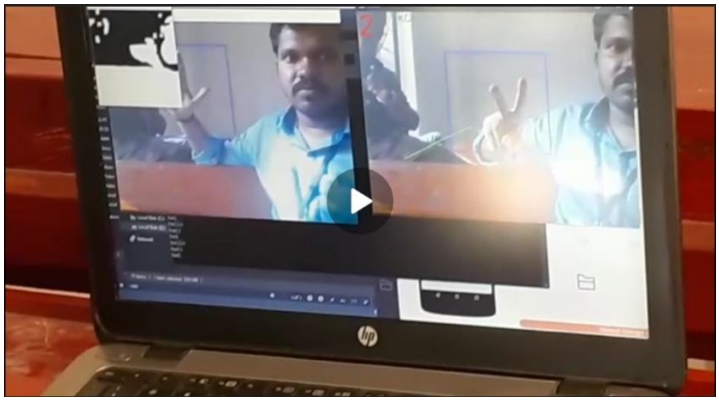


Fig. 13. Phase 5 – Testing, error detection and correction.

7. **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 equipments, life becomes 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.

EXHIBITION AND PRESENTATIONS

1. SRISTI 2020

PUBLICATIONS

G C MOTOR – An Automation Module to Improve Lifestyle

ABSTRACT

1. INTRODUCTION

1.1. Gesture recognition

2. LITERATURE SURVEY

2.1. Gesture controlled motor using accelerometer

1.2. Socio-economic relevance

2.2. Voice controlled motor

2.3. Remote controlled motor using RF

2.4. Remote controlled motor using IR

3. OBJECTIVES AND PROPOSED INNOVATION

4. REQUIREMENT SPECIFICATION

1. Raspberry Pi night vision camera module

2. Raspberry pi 3 model B+

3. L293D motor driver

4. 12Volt DC motor

5. HYPOTHESIS, DESIGN AND METHODOLOGY

6. CONCLUSION

REFERENCE

REFERENCE

1. Hongyi Liu, Lihui Wang, GESTURE RECOGNITION FOR HUMAN ROBOT COLLABORATION, International Journal of Industrial Ergonomics 2017.

2. Dr.Amol Kasture, A STUDY ON GESTURE CONTROL ARDIUNO ROBOT, ISSN: 2455-2631, IJSDR Volume 3, Issue 5, 2018.

3. Prabhu.s, VOICE ENABLED SPEED CONTROL OF AC MOTOR, eISSN: 2319-1163 pISSN: 2321-7308, IJRET, Volume: 03, 2014.

4. Kimemia Elwis Wanjagi, WIRELESS CONTROL OF A DC MOTOR, UNIVERSITY OF NAIROBI, 2014.

5. Ezea Hilary, DESIGN OF AUTOMATIC GATE CONTROL USING INFRARED REMOTE WITH PASSWORD PROTECTED FEATURES, ISSN (Online):- 2349-3585, International Journal For Research & Development in Technology Volume: 2, Issue: 5, 2014.

6. Raspberry pi camera module with adjustable focus and night vision, Thingbits Electronics Pvt. Ltd, © 2019.

7. Ardman and Studiocanal,SAS, RASPBERRY PI 3 MODEL B+, Raspberry Pi Foundation, ©2019.

8. L293X QUADRUPLE HALF-H DRIVERS, SLRS008D –september 1986–revised, ©1986–2016, Texas Instruments Incorporated, 2016.