Light & Motor Controller using Hand Gesture

A PLE REPORT SUBMITTED TO
DOES,SPPU,Pune
By

Mr.Sujit Dighe(2K21E07)
Mr.Gaurav Ghodake(2K21E09)

FOR THE DEGREE OF

MASTER OF SCIENCE (M.Sc.)

IN

ELECTRONIC SCIENCE

Under the guidance of

Prof. Dr. Damyanti Gharpure

Department of Electronic Science
Savitribai Phule Pune University
Pune 411 007

University of Pune

CERTIFICATE

Certified that the project work entitled **Light & Motor Controller using Hand Gesture** work done by **Sujt Dighe & Gaurav Ghodake** at **DOEIS Lab** in the partial fulfilment of requirements for award of M.Sc (Electronic Science) degree of Savitribai Phule Pune University during the year 2021-22.The work has not formed the basis for the award of any other degree, diploma, in this or any other University or other institution of Higher learning.

Mr.Sujit Dighe
Mr.Gaurav Ghodake

ACKNOWLEDGEMENTS

It's a great pleasure to us present the project entitled as **"Light & Motor Control Using Hand Gesture"** We are really grateful our HOD **Prof. Dr. Damyanti Gharpure** for this encouragement throughout the course also for providing the all necessary facilities and able environment to carry out project work.

We would also like to express our sincere thanks to **Prof. Shamal Chinke** of the Electronics Science Department and **Prof. Pranoti Bansode** for his valuable guidance. I am also thankful to all other staff members of dept. of Electronic Science For their timely help in completion of the project.

We are thankful to Mr.Kalekar and Mr.Bhalekar and all my friends for providing information and help at every mode.

INDEX

INTODUCTION

Light & Motor Controller using Hand Gesture

Recent developments in computer software and related hardware technology have provided a value added service to the users. In everyday life, physical gestures are a powerful means of communication. They can economically convey a rich set of facts and feelings. For example, waving one's hand from side to side can mean anything from a "happy goodbye" to "caution". Use of the full potential of physical gesture is also something that most human computer dialogues lack.

The task of hand gesture recognition is one the important and elemental problem in computer vision. With recent advances in information technology and media, automated human interactions systems are build which involve hand processing task like hand detection, hand recognition and hand tracking.

This prompted my interest so I planned to make a software system that could recognize human gestures through computer vision, which is a sub field of artificial intelligence. The purpose of my software through computer vision was to program a computer to "understand" a scene or features in an image.

A first step in any hand processing system is to detect and localize hand in an image. The hand detection task was however challenging because of variability in the pose, orientation, location and scale.

Theory

Hand gesture recognition system can be divided into following modules:

- Pre-processing
- Feature extraction of the processed image
- Real time classification

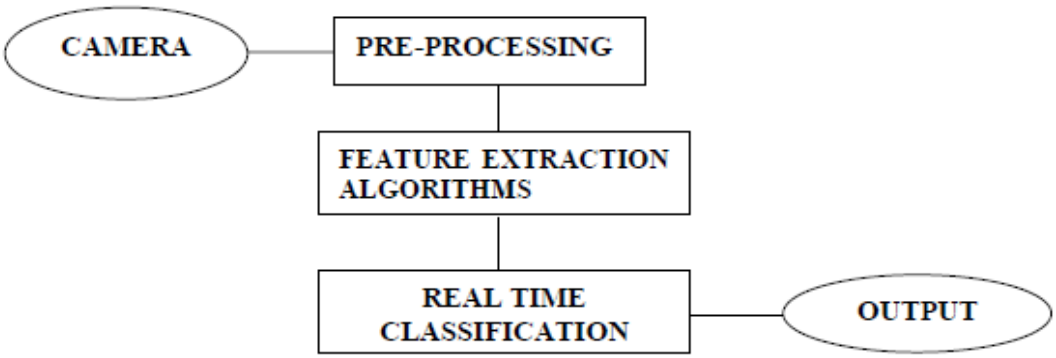


Figure 3.1: System Implementation

ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or message - and turn it into an output - activating a motor, turning on an LED.

L293D

The L293D is a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction. The L293D is designed to provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (at pin 8!).

PYTHON LIBARAY USED

Mediapipe:-

Mediapipe is a cross-platform library developed by Google that provides amazing ready-to-use ML solutions for computer vision tasks. OpenCV library in python is a computer vision library that is widely used for image analysis, image processing, detection, recognition, etc.

OpenCV:-

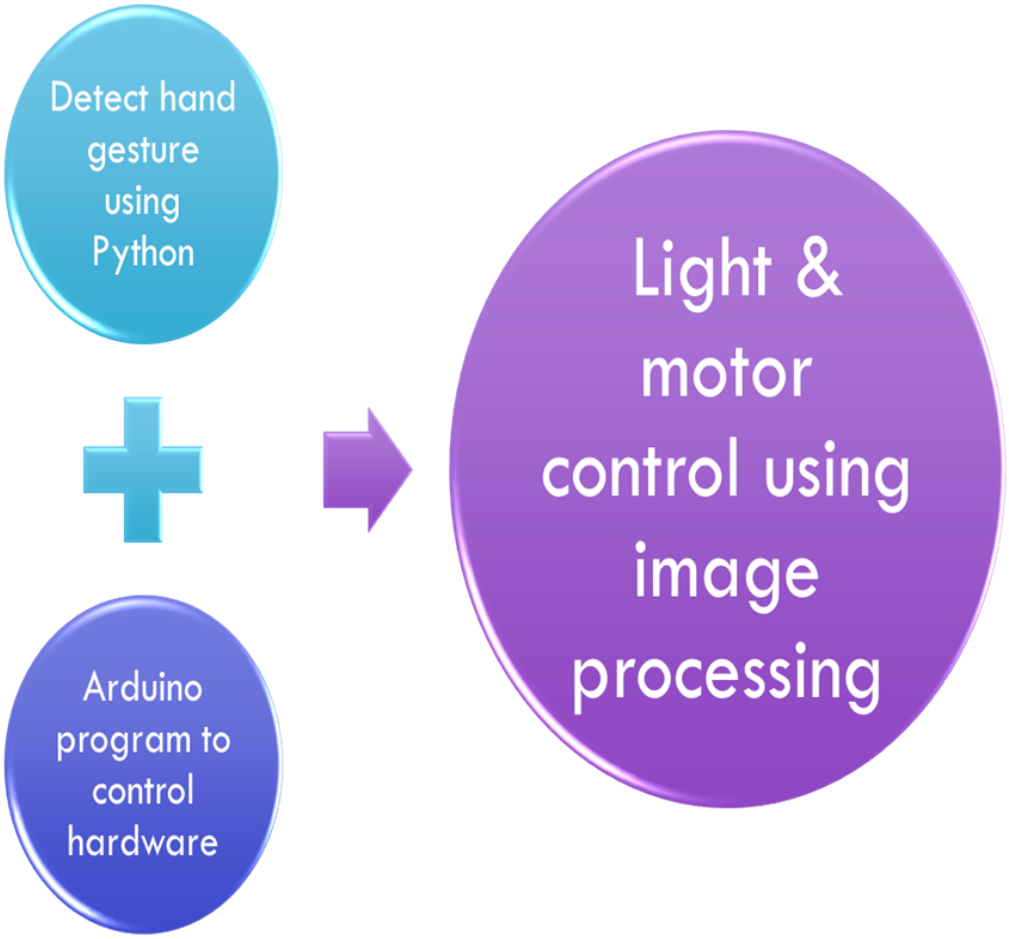
OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.

ARDUINO LIBRARY USED

Firmata:-

The Firmata library implements the Firmata protocol for communicating with software on the host computer. This allows you to write custom firmware without having to create your own protocol and objects for the programming environment that you are using. To use this library. #include <Firmata.h>

SIMULATION

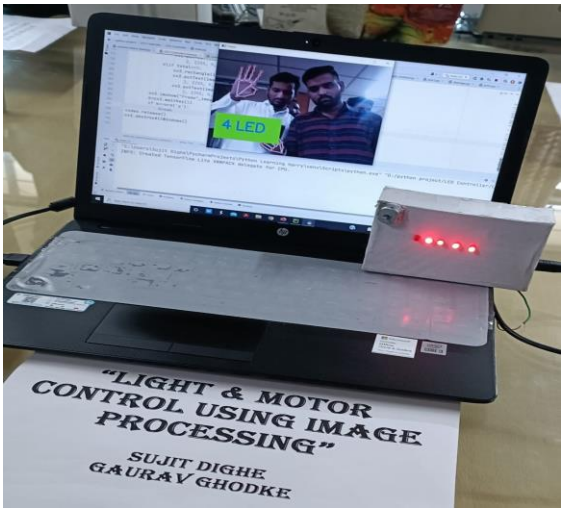


Flow Chart

- Calibration of camera (OpenCV- Python)
- Detection of hand gesture (Mediapipe – Python)
- Sending data to Arduino (Firmata-communication protocol (Arduino))
- Accessing LED & Motor (Embedded C)
- Showing output on LED & Motor

RESULT

- We have successfully control Light & Motor Using Hand gesture



Application

1. HOME AUTOMATION
    - Fan control
    - Light control
    - Door control(Open/Close)

2. AGRICULTURE (AUTOMATIC IRRIGATION)
    - Irregation system
3. AUTOMATIC VEHICLE CONTROL
    - Speed control
    - Driver less car control
4. HELTHCARE SECTORE (HELPING HANDICAPPED)
    - Sign language
    - Wheel chair control
5. HUMAN-COMPUTER INTERACTION
    - AI communication
6. INDUSTRIAL AUTOMATION
    - Conveyor belt control

CONCLUSION

Here we conclude that hand gesture based Light & Motor Control system have great uses in automatic vechile control, home automation and industry automation, which has been successfully realize through this project.

Future work

The system could also be made smart to be trained for only one or two gestures rather than all and then made ready for testing. This will require only a few changes in the current interface code, which were not performed due to the shortage of time.

REFRENCE

- Arduino datasheet
- L293D (Motor driver IC) datasheet
- Github project
- Google