Eyeball Movement Based Wheel Chair Control using OpenCv and Arduino

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*Abstract---*The main aim to his paper is to Provide a system to paralyzed peoples they can travel by in wheel chair independently without need another Person. In Previous System they are giving remote control type of wheel chair controlling system is present in wheel chair. But this system is not much helpful for all the paralyzed peoples because handicapped people unable to move their hands freely. So, we go for some alternative solution is to Provides an eyeball-based wheel chair control. Camera Connected to the PC running python will capture the Eye ball and it fix the centroid of the eye based on the centroid we track the position. Then the different variation on pupil position get different command set for wheelchair. The signals pass the motor driver to interface with the wheelchair itself. The motor driver will control both speed and direction to enable the wheelchair to move forward, left, right and stop.

Keywords--- Wheel Chair, OpenCv, Arduino, Eyeball Movement, Eyeball

I. INTRODUCTION

- Some people are not able to operate computer because of an illness. The idea of eye controls of great use to not only the future of natural input but more importantly the handicapped and disabled.
- Moreover, implementing a controlling system in it enables them to operate computer without the help of another person. It is more helpful to handicapped peoples. Those are need to operate wheel chair without hand this one is most useful.
- Those can operate by movement of eye. In this paper Camera is capturing the image of eye movement. First detect pupil centre position of eye. Then the different variation on pupil position gets different movement of chair.

Procedure for Paper Submission

A. Review Stage
Submit your manuscript electronically for review.

B. Final Stage
When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

C. Figures
As said, to insert images in *Word,* position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "Float over text" unchecked).

The authors of the accepted manuscripts will be given a copyright form and the form should accompany your final submission.

II. PROBLEM STATEMENT

- The main theme is to design a vision based wheelchair using the camera to acquire user image analysing user intent using Eyeball gesture.
- To design a wheel chair assembly that can be controlled with eye pupil movement of a person suffering from quadriplegia.
- It is design to make the person self dependent and rebuilt their self confidence and to make them move in their desire direction.

III. OBJECTIVE

- The project mainly consists of the following objectives:
- To detect eye pupil movement of a quadriplegia person.
- The purpose of this eye-controlled wheelchair is to eliminate the assistance required for the disabled person.
- The combination of the hardware and software makes the life of paralysed people self-dependent.
- In this project we developed a wheelchair system which enables the disabled patient to move their wheelchair independently in their own direction.

IV.   METHODOLOGY

EXISTING SYSTEM

In existing system they are giving remote control type of wheel chair controlling system is present in wheel chair. But this system is not much helpful for all the paralyzed peoples because handicapped peopled unable to move their hands freely. So, we go for Brain computer interface based on the eye blink it moves that direction accordingly. It also has some limitation[1].The person must be always wearing brain wave sensor, also sensor is powered by battery this need to be changed periodically. If battery power goes down the sensor will not work properly and might give error values.

PROPOSED SYSTEM

In order to overcome the limitation in existing system we go for alternative method is Eyeball based wheel chair control. In this method camera is focused on the eye by using OpenCV we need to find out the centroid of the eyeball. By tacking the eyeball movement, we can move the wheel chair accordingly. It very useful for Elderly and disables people who needs guidance to live.

SYSTEM ARCHITECTURE
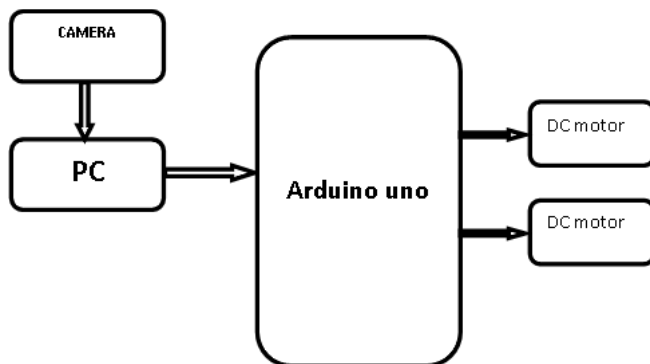
Fig-1: Block diagram of System architecture

HARDWARE DESCRIPTION

Arduino

The Arduino Uno is an open-sourcemicrocontroller board based on the MicrochipATmega328P 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 to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and 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 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo[2]. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.
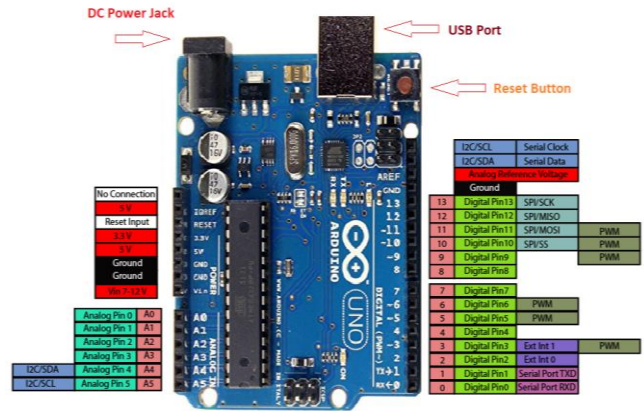
Fig-2: Arduino UNO Board

DC motor and l293d driver

A machine that converts DC electrical power into mechanical power is known as a Direct Current motor. DC motor working is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force.
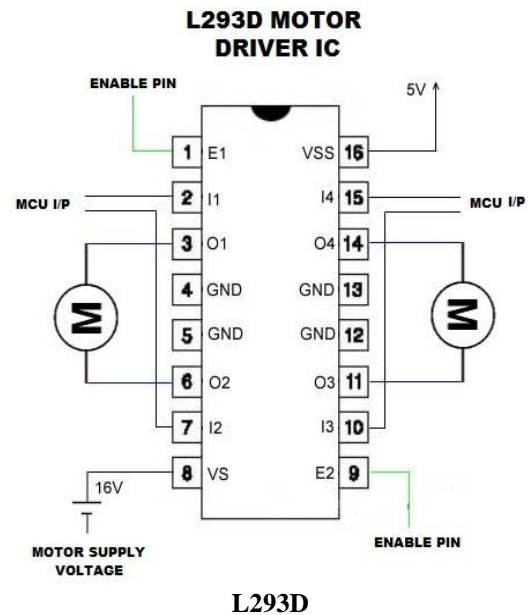
L293D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC.Dual H-

bridge *Motor Driver integrated circuit* (*IC*).

The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end. **Camera.**

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer to a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video. For example, Apple's iSight[4] camera, which is built into Apple laptops, iMacs and a number of iPhones, can be used for video chat sessions, using the iChat instant messaging program (now called Messages). Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires a lot of bandwidth, such streams usually use compressed formats. The maximum resolution of a webcam is also lower than most handheld video cameras, as higher resolutions would be reduced during transmission. The lower resolution enables webcams to be relatively inexpensive compared to most video cameras, but the effect is adequate for video chat sessions

SOFTWARE DESCRIPTION
Arduino Software (IDE)
- Writing Sketches
  - File
  - Edit
  - Sketch
  - Tools
  - Help
- Sketchbook
- Tabs, Multiple Files, and Compilation
- Uploading
- Libraries
- Third-Party Hardware

- Serial Monitor
- Preferences
- Language Support
- Boards

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

PYTHON
Python is an interpreted high-level programming language for programming Python offers multiple options for developing GUI (Graphical User Interface). Out of all the GUI methods, tkinter is most commonly used method. It is a standard Python[5] interface to the Tk GUI toolkit shipped with Python. Python with tkinter outputs the fastest and easiest way to create the GUI applications. Creating a GUI using tkinter is an easy task.

PYTHON FEATURES:
Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented , imperative, functional and procedural, and has a large and comprehensive library. Python is a multi-paradigm programming language. Object-oriented programming and structured programming are fully supported, and many of its features support functional programming and aspect -oriented programming (including by meta programming and meta objects (magic methods)). Many other paradigms are supported via extensions, including design by contract and logic programming.

PYTHON LIBRARIES
Python's large standard library, commonly cited as one of its greatest strengths, provides tools suited too many tasks. For Internet-facing applications, many standard formats and protocols such as MIME and HTTP are supported. It includes modules for creating graphical user interfaces, connecting to relational databases, generating pseudorandom numbers, arithmetic with arbitrary precision decimals, manipulating regular expressions, and unit testing.

As of March 2018, the Python Package Index (PyPI),[13] the official repository for third-party Python software, contains over 130,000 packages with a wide range of functionality, including:
- Graphical user interfaces
- Web frameworks
- Multimedia
- Databases
- Networking

- Test frameworks
- Automation
- Web scraping
- Documentation
- System administration
- Scientific computing
- Text processing
- Image processing

DEPLOYMENT ENVIRONMENT

Most Python implementations[6] (including CPython) include a read–eval–print loop (REPL), permitting them to function as a command line interpreter for

which the user enters statements sequentially and receives results immediately.

Other shells, including IDLE and IPython, add further abilities such as auto-completion, session state retention and syntax highlighting.

As well as standard desktop integrated development environments, there are Web browser-based IDEs; Sage Math (intended for developing science and math-related Python programs); Python Anywhere, a browser-based IDE and hosting environment; and Canopy IDE,[11] a commercial Python IDE emphasizing scientific computing.

OPENCV-PYTHON

Python is a general purpose programming language started by Guido van Rossum, which became very popular in short time mainly because of its simplicity and code readability. It enables the programmer to express his ideas in fewer lines of code without reducing any readability. Compared to other languages like C/C++, Python is slower. But another important feature of Python is that it can be easily extended with C/C++.[12] This feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper[8] for it so that we can use these wrappers as Python modules. This gives us two advantages: first, our code is as fast as original C/C++ code (since it is the actual C++ code working in background) and second, it is very easy to code in Python. This is how OpenCV-Python works, it is a Python wrapper around original C++ implementation. And the support of Numpy makes the task more easier. Numpy is a highly optimized library for numerical operations. It gives a MATLAB-style syntax. All the OpenCV array structures are converted to-and-from Numpy[9] arrays. So whatever operations you can do in Numpy, you can combine it with OpenCV, which increases number of weapons in your arsenal. Besides that, several other libraries like SciPy, Matplotlib which supports Numpy can be used with this. So OpenCV-Python is an appropriate tool for fast prototyping of computer vision problems.

Since OpenCV is an open source initiative, all are welcome to make contributions to this library. And it is same for this tutorial also. So, if you find any mistake in this tutorial (whether it be a small spelling mistake or a big error in code or concepts, whatever), feel free to correct it

And that will be a good task for freshers who begin to contribute to open source projects. Just fork the OpenCV in github, make necessary corrections and send a pull request to OpenCV. OpenCV developers will check your pull request, give you important[7] feedback and once it passes the approval of the reviewer, it will be merged to OpenCV. Then you become a open source contributor. Similar is the case with other tutorials, documentation etc. As new modules are added to OpenCV-Python,[10] this tutorial will have to be expanded. So those who knows about particular algorithm can write up a tutorial which includes a basic theory of the algorithm and a code showing basic usage of the algorithm and submit it to OpenCV. Remember, we together can make this project a great success !!!

V.   CONCLUSION

This paper has presented a wheelchair system using eye movements, in which pupil detection that is segmentation is donein which pupil looks is decided by fixing range to the particular direction as user looks. Detection of pupil is done even on illumination unless the illumination is covering whole eye, this is because when the light hits the pupil and illumination spreads on the pupil covering whole pupil which ignores those pixels so as we treat the illumination spots it will leave behind a maximum change edges that cannot be determined and the operator will consider another position to be an iris location. This process works even if image taken in little dark environment.

VI.   CHALLENGES OF THE SYSTEM

However, the only drawback with this project is as the wheel chair requires eye-ball movement as input to the controller for its working, a lot of strain is created to the eyes.

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