

EYEBLINK CONTROLLED VIRTUAL KEYBOARD USING RASPBERRY PI

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Abstract - For several people who has disability in communication, delivering certain message to other people is a effortful thing to do. To make the exchange of ideas easier for those who are not able to converse their thoughts or has unfitness in motoric function especially hands and legs ,requires a system for communication .To overcome their hardness, in this research a system that can assist them in communication was established. This system uses part of the facial action that is through eyeblinks we can write some information with the implementation of contactless virtual keyboard. The process are user's face is captured by a camera then the camera does face detection to obtain the position of the eye lid then through a eyeblinks some letters can be chosen in the virtual keyboard. The result of the experiment is to print the letters which will be displayed in the monitor that can help people to exchange their thoughts or even get their basic needs with high accuracy.

Key Words: Eyeblink, Open cv, Python Imaging Library, Raspberry pi, Raspberry Pi Software, SD Card Formatter, Virtual keyboard, Webcamera.

1. INTRODUCTION:

Communication is very significant things in human life to connect and make exchange of ideas with others. However some people could not communicate very well on account of some difficulties to do that. Especially people with some unfitness in their motoric function especially hands and legs could not do certain movement and some could not speak the lack communication. Here we use key input device of computer and intelligent device, keyboard plays an irreplaceable role in many areas. However traditional keyboard is bulky and is inconvenient to carry we use an alternative virtual keyboard as an input on portable device. Various techniques have been adopted on the design scheme of virtual keyboard such as gesture based recognition. The method use a virtual keyboard implementation based on finger recognition which allows users to type on any plane to any device which uses device camera[2].A system uses all the features of the keyboard and mouse via sensors connected to a user's body part in which it maintains motor control. By means of a command processor and a key layout tailored to user needs, it sends keyboard and mouse commands for any window applications[5].When user use the face detection to get a position of the eye gaze, Haar Cascade method was used and to get the position of the eye movement integral projection method was used[6].The next

approach presented a system based on FPGA hardware and the centre of gravity algorithm . It captures video via high speed CMOS and a series of binarization operation are adopted.

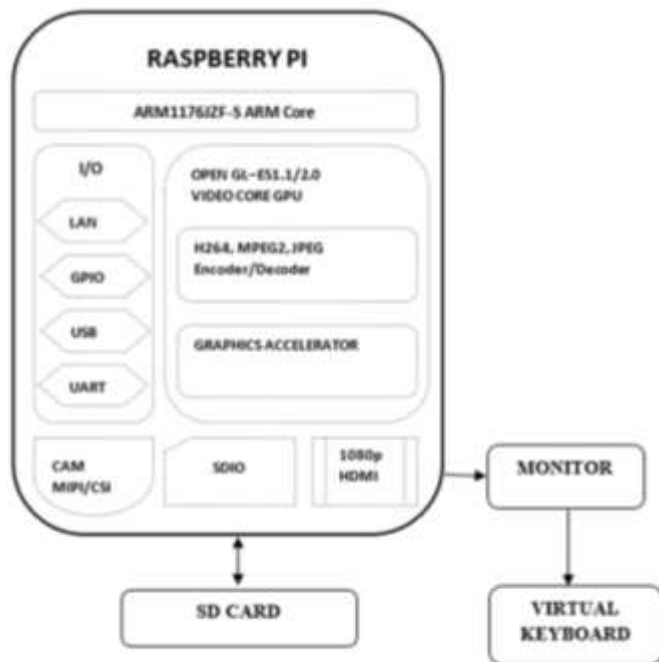
2. OBJECTIVE:

The objective of the project is to make a user friendly interactive device for the communication purpose for those who are unable to make communication or unable to move physically and even unable to express their everyday basic needs but they can still move their heads and still use their eyes . So we can use their eyes to make an alternative means of communication.

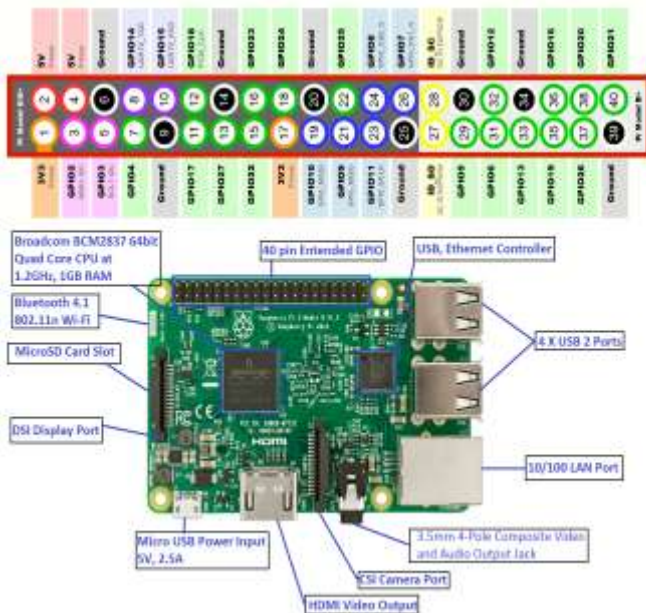
3. PROPOSED SYSTEM:

In this proposed system we use a virtual keyboard which helps people to type the letters and it contains alphabets ,numbers and some punctuations which is displayed in the monitor , it appears to be as same as the traditional keyboard and our model works under the use of a high level programming language which is python. Python is used for its flexibility that can accept the open access libraries and can work on the problems to give accurate solutions. Tkinter library used for virtual keyboard design and Pyautogui library used for mouse pointer movement. These mouse pointer gets automatically shifted through every key, characters can be chosen by making an eyeblink at a particular position of mouse pointer at a certain character. Since we use Raspberry Pi, it does not require Matlab for processing the signal there is no need for any external Bluetooth or wifi.

4. BLOCK DIAGRAM:



5. RASPBERRY PI:



System on Chip (SOC) which includes ARM compatible CPU and on-chip graphic processing unit and Vedio-core IV. The key feature from First generation to the Third generation includes: CPU speed ranges from 700 MHz The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This is a powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+. While maintaining the popular board

format the Raspberry Pi 3 Model B brings you a more powerful processor. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs. The heart of the Raspberry Pi is a Broadcom to 1.2 GHz. On board Memory (RAM) ranges from 256 MB to 1 GB.USB slot differs from 1 slot to USB slots. , composite video output and 3.5mm phone jack. Low level output is provided by GPIO pins which support common. protocols like I2C (inter-integrated circuit).Ethernet 8 Position 8 Contact (8P8C).

6. ARM CORTEX- A53 PROCESSOR:

It is inbuilt in a Raspberry Pi board. It is aimed at providing power efficient 64-bit processing. ARM is one of the family of CPUs based on RISC. Processors are designed to perform a smaller number of types of computer instruction. It makes use of an orthogonal instruction set. At most of the time single- cycle execution will be used. Hardware virtualization support.

7. OVERCLOCKING:

Most SoC could be overclocked to 800MHz and some to 1000MHz.Raspian Linux distro the overclocking options on boot. It can be done by a software command running “sudo raspi-config” without voiding the warranty. The Pi automatically shuts the overclocking down if the chip temperature reaches 85degree celcius. A heat sink is needed to protect the chip from serious heating.

8. WEB CAM:

A webcam is a video camera which feeds or streams an image or video in real time to or over a computer to a computer network, similar as the Internet. Webcams are commonly small cameras that settle on a desk, connect to a user's monitor, or are constructed into the hardware. Webcams can be used at the time of a video chat session comprising of two or more people, with communications that include live audio and video. For example, A persons behavior can be observed by any other person who is at a very long distance through the use of the webcam. Even a person doing online assessment can also be monitored from a very long distance. Webcam software permits users to record a video or stream the video on the online network. As video streaming over the Internet needs a lot of bandwidth, those streams usually makes use of compressed formats.



1) Optics

Various lenses are available, the better accepted in consumer-grade webcams being a plastic lens such can be manually displayed in and out to target the camera. Fixed-focus lenses, that have no arrangement for modification, are also available. As a camera system's extent of field is greater for short image formats and is greater for lenses along a broad f-number (small aperture), the schemes used in webcams have a adequately large depth of field such as the purpose of a fixed-focus lens does not involve image sharpness to a extreme limit. Maximum models use simple, focal-free optics or manual focus.

2) Compression

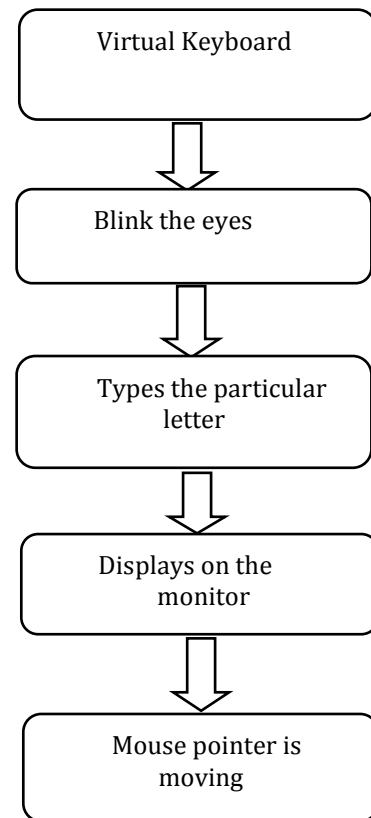
Digital video streams are indicated by extremely large amounts of data, making the transmission difficult (from the image sensor, at that location the data is uninterruptedly created) and storage identical. Most of the cheap webcams appear with built-it ASIC so that they can perform video compression in real-time. Guide electronics read the picture from the sensor also they can transmit that to the host computer.

3) Interface

Typical interfaces used by objects displayed as a "webcam" includes USB, Ethernet and IEEE (labelled as IP camera). Further interfaces includes e.g. Composite video or S-Video that can also be available. The USB video device class (UVC) requirements allows inter-connectivity of webcams to computers beyond the use for proprietary device drivers.

9. DESIGN FLOW:

The virtual keyboard will be displayed on the screen or the monitor .The Pyautogui library is used for the mouse pointer movement and if we blink our eyes at particular letter, it will be printed in the monitor through which communication can take place.



10. CONCLUSION:

The paper proposes a virtual keyboard system based on embedded system and image processing.If we blink the eyes the particular letter will be displayed and if we don't blink our eyes then the particular letter will not be displayed and the mouse pointer changes its position. Then we can achieve human to human interaction.

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