A METHOD OF MEASURING EYE WINKS USING IR TRANSCEIVER FOR HUMAN COMPUTER INTERFACE

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Abstract-This paper aims at the planning of operative the mouse pointer of the laptop by IR transceiver, that discover the eyeball movement of the user for Human PC Interface Use the left or right arrow keys on your keyboard to navigate through your matches supported by the physical implementation of Eye bit, the detector measurements are currently used within the low-computational least-squares algorithms to estimate discretional gaze directions. because of this light-weight structure, competitive accuracy and low-computational needs relative to video-based eye following systems, the planned system may be a promising human-computer interface for each stationary and mobile eye following applications.

Keywords: IR sensor, Microcontroller, RS-232, Serial to USB converter.

I. INTRODUCTION:

Eye following has become a key technology because of its potential in many applications, starting from human-computer interface systems for folks have disabilities to identification of physiological, neurologic, and ophthalmologic issues in people and mobile systems, like interfaces for wearable computers within the literature, a spread of eye following systems are planned that may be classified supported their natural object or operating vogue. In terms of the natural object, they're classified into head mounted systems or remote systems different categorizations may well be because of being wearable or non-wearable, and being infrared based or appearance based. Eye bit is one in all the light-reflection based eye following systems that's enforced by inserting IR LEDs associated IR sensors around an eyeglasses frame. In this style it carries with it 5 major elements [1]IR Transceiver, that sends out IR energy and appears for mirrored IR energy to discover presence of any obstacle before of the detector module. [2]PIC Microcontroller, the PIC16FXX series has a lot of advanced and developed options in comparison to its previous series. [3]LCD display is used to display the information about signals receiving from the IR sensor. [4]RS-232 stands for suggest customary variety 232. [5]Serial to USB converter, used to transfer information between two devices using a serial communication protocol.

II. RELATED WORK

In this section, we tend to provide an outline of approaches that are utilized in eye following analysis the essential downside in eye following is detection the discriminative options associated with gaze direction as sturdy as potential to estimate the purpose of gaze accurately. There are many alternative approaches planned to unravel this downside. In early eye following analysis, scientists

placed sensors, i.e., electrodes, round the eye to infer info concerning the position of the eyeball this method is named electrooculography and constitutes a really example of a way to acquire options relating to the purpose of gaze. This approach is comparatively in style among the techniques within the eye following history [5] to [9] and it depends on the electrical potential variations of the human skin during this methodology, the attentions are enclosed with electrodes to get the corneo retinal potential that causes associate electrical field before of the eye. The electrodes are placed on the vertical and horizontal axes in such how that they meet on the middle of the attention. Thus, the measure and assortment of vertical and horizontal EOG signals of the attention become potential. Besides higher than approach, there are light-reflection primarily based approaches, that use non-imaging sensors, like photodiodes or phototransistors. With the utilization of non-imaging sensors within the eye huntsman style, extensive quantity of reductions on the nonheritable knowledge and thus, on the specified machine power will be obtained. These approaches merely illuminate the attention section and collect the mirrored lightweight illumination with the fastidiously placed sensors round the eye. Thus, they acquire a 1-D vector together with the data concerning the position of the attention. Note that imaging sensors utilized within the video-based ways acquire 2-D and bigger quantity of knowledge the tactic planned herein will be thought-about during this category of eye trackers.

III.PROPOSEDSYSTEM

The Eye typewriting is intended to be capable of discovering eye clicking gestures and eye gaze direction in period. This capability is because of two straightforward facts. 1)The human eye has 2 main components with reference to the color intensity distribution: albuginea and iris-pupil, whereas the albuginea has principally white color, the iris-pupil circle consists of darker tones like brown, black, etc. This color distribution is fastened altogether humans in infrared(IR) vary. 2) Completely different completely different} color mirror the sunshine in several amounts and around different wavelengths. Considering these basic lightweight reflection principles and also the spherical structure of eye surface, it's potential to accumulate the mirrored lightweight intensities from specific parts of the attention surface and so establish this clicking gesture or eye gaze direction supported the measurements of mirrored lightweight intensities the attention typewriting provides solely a relative eye-gaze direction with reference to absolutely the head direction. Therefore, for the system to represent associate overall pc interface, a chin-rest should be wont to avoid head movements.

WORKING:

This system consists of 2 units initial unit consists of eye glass frame with IR sensors to discover eye blinking. It doesn't send signal for traditional eye blinking. It responses only if over 2 blinking then it sends this info to laptop different unit laptop runs on .NET Framework that processes the information in step with user's blinking the attention movement are perceived by the array of IR sensors that are fastened within the glass frame while not glasses. Those outputs from the IR sensors are decoded by signal learning unit and which can run because the input to the pic16F877A microcontroller.
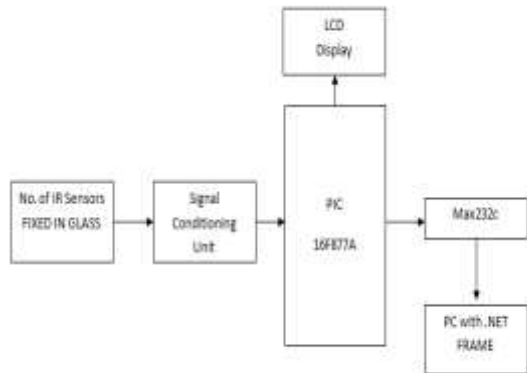

Fig.3.1.Block Diagram

Then the information are processed within the microcontroller and so it's passed on to the IC RS-232, that is associate telecommunication Integrated circuits with twin transmitter and receiver having the potential of changing the output into TTL logic. The output is received through zigbee and is given to serial to USB converter that is directly connected to the host device. As a result, supported the received knowledge we will management file handling operation. Considering these basic lightweight reflection principles and also the spherical structure of eye surface, it's potential to accumulate the mirrored lightweight intensities from specific parts of the attention surface and so establish this clicking gesture or eye gaze direction supported the measurements of mirrored lightweight intensities. Elder folks and disabled folks get a lot of advantages by victimization this method. With the employment of eye movements we will operate wheel chair as a result of hand disabled folks couldn't operate this vehicle this method extremely appropriate to disabled folks. We tend to boot add home automation wherever we will operate our home appliances by our eye blinking. This same system will be used with laptop wherever we will handle file operations.

1.HARDWARE MODULE

A.EYE TOUCH GOGGLES:

Eye bit specs are associate eyeglasses frame with none lenses the attention bit specs were designed to with efficiency capture lightweight reflectivity from numerous parts of the human eye. In our previous experimentation stages, 2 infrared sensitive gawk prototypes were developed. so as to discover the iris movements, the specs are equipped with twelve infrared LEDs that illuminate each eyes and scale back the chance of close lightweight to deteriorate the system performance, and with twelve infrared sensitive phototransistors that turn out voltage values with reference to the collected quantity of sunshine in spectrum, each left and right frame parts embrace six LEDs and sensors.

Fig.3.2.Eye touch

It should be noted that the amount of sensors (phototransistors) may be a style parameter there's a considerable relationship between the amount of sensors and also the system accuracy.

As way because the variety of LEDs cares, it will be totally different than the amount of sensors. Since the most purpose of getting LEDs on the specs is illuminating the attention section homogeneously at a convenient luminance, many of them are placed to forestall the illumination variances. In Appendix A, we tend to gift helpful info concerning the attention questions of safety of infrared emitted by the specs. The IR sensitive sensors used on the specs are light-to-voltage optical sensors. These sensors reply to the sunshine in 800–1100 nm wavelength vary with a pointy peak at 940 nm. Since the IR LEDs used emit lightweight at the wavelength of concerning 940 nm, the pairs match well.

B.ZIGBEE MODULE:

ZigBee Module may be a cheap , low-power, wireless mesh networking customary. The low price permits the technology to be wide deployed in wireless management and observation applications, the low power usage permits longer life with smaller batteries, and also the mesh networking provides high reliableness and bigger vary, Temco has developed a embedded antenna of wireless digital communication module, that adopts customary ZigBee wireless technology. This module is in line with the trade customary applications of wireless digital communication module. This module can do clear knowledge transmission between several devices, and it will type a MESH network. This device has the characteristics of little volume, ultra-low power consumption and cheap. It will be either as associate freelance knowledge transmission termination or be simply embedded into a spread of product to make a short-range wireless knowledge transmission resolution.

Fig. 3.3.Zigbee

This device network has the characteristics of electrical power-saving, reliableness, low cost, giant capability and security, and it will be wide employed in numerous fields of automatic management. The target application domains are geared toward trade, home automation, measurement and remote, vehicle automation, agriculture automation, medical aid then on, like lighting management automation, wireless knowledge acquisition

and observation detector, oil field, power, mining and provision management etc.

C.IR TRANSCEIVER:

IR Sensor (IR Receiver and IR Emitter):
The basic principle of IR detector relies on associate IR electrode associated an IR receiver. IR electrode can emit infrared incessantly once power is provided thereto. On the opposite hand, the IR receiver are connected and perform the task of a resistor.

Fig.3.4.IR Transceiver

IR receiver will be unreal as a junction transistor with its base current determined by the intensity of IR lightweight received. The lower the intensity of IR lightweight cause higher resistance between collector-emitter terminals of junction transistor, and limiting current from collector to electrode. Amendment this alteration this modification this variation this transformation of resistance can any change the voltage at the output of resistor. In others word, the larger the intensity of IR lightweight touching IR receiver, the lower the resistance of IR receiver and thus the output Voltage of resistor can cut typically the IR electrode and IR receiver are mounted aspect by aspect ,pointing to a reflective surface. The any distance away between electrode and receiver decrease the quantity of infrared touching the receiver if the space between the detector and a reflective surface is fastened. Since the output voltage from resistor varies with the intensity of IR lightweight, and microcontroller isn't employed in this project, a comparator (LM324) is employed to indicate the changes.

D.PIC 16F877A MICROCONTROLLER:

The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology.

Fig.3.5.PIC16F877A Microcontroller

It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used mainly in PIC microcontroller projects. PIC16F877A also have many application in digital electronic circuits.

E.LCD INTERFACING:

LCD (Liquid Crystal Display) screen is associate electronic show module and notice a large vary of applications. A 16x2 (LCD liquid crystal show LCD digital display alphanumeric display) display is incredibly basic module and is incredibly usually employed in numerous devices and circuits. These modules are most well-liked over seven phases and different multi segment LEDs.
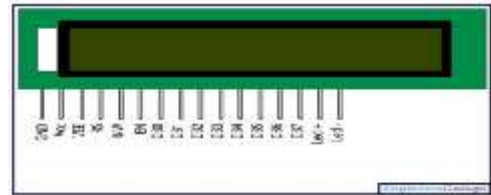

Fig.3.6.LCD

The reasons being: LCDs are economical; simply programmable; don't have any limitation of displaying special & even custom characters animations therefore on. A sixteen x2 (LCD liquid crystal show LCD digital display alphanumeric display) suggests that it will display 16 characters per line and there are two such lines during this LCD every character is displayed in 5x7 picture element matrix. This LCD has 2 registers, namely, Command and knowledge. The command registers stores the command directions given to the LCD. A command is associate instruction given to LCD to try to a predefined task like initializing it, clearing its screen, setting the pointer position, dominant show etc. the information register stores concerning internal the information to be displayed on the LCD. the information is that the ASCII price of the character to be displayed on the LCD.

F.MAX-232:

In telecommunication standard RS-232, Recommended Standard 232 is a standard introduced in 1960 for serial communication transmission of data. It formally defines the signals connecting between a *DTE* such as a computer terminal, and a *DCE*, such as a modem. The RS-232 standard had been commonly used in computer serial ports.
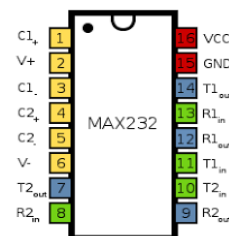

Fig.3.7.MAX-232

The MAX-232 IC is an integrated circuit which consists of 16 pins and it is a resourceful IC mostly used in the voltage level signal problems. Generally, the MAX-232 IC is used in the communication system for the conversion of voltage levels on TTL devices that are interfaced with the PC serial port and the Microcontroller. This IC is used as a hardware layer converter to communicate two systems simultaneously. It is used to exchange the TTL or CMOS logic to RS232 logic levels through the serial communication of Microcontroller with the personal computers. The microcontroller operates at the TTL logic levels with the

voltage of 0-5v, and the serial communication with PC works on the RS232 with the volts of -25V to +25V. The difference of voltage will become the makes difficult to establish the communication with each other The in-between links are provided through the MAX232 interface, it is a transmitter/receiver which includes the voltage generator to the supply of RS232 voltage levels through the 5V supply. The RS232 input converts to 5V TTL/COMS level through these receivers, i.e. R1 and R2 do not exclude the +-30V. The transmitters T1 and T2 are used to convert the TTL/COMS input levels to RS232 level.

G.SERIAL TO USB CONVERTER:

A USB to serial adapter typically converts between USB and either RS232, RS485, RS422 or TCP signals, however some USB to serial adapters have other special conversion features such as custom baud rates, high-speed or other. Even the USB to serial adapter RS232 standard is an older communication protocol it is still used by many modern serial RS232 devices in both business and consumer markets and is also often used for personal and office serial devices.

Fig.3.8.serial to USB converter

It is used to transfer information between two devices using a serial communication protocol.

2.SOFTWARE MODULE

In this software section we are using the following applications

Development device : PC with windows
Target Device   : PIC16F877A
IDE   : MPLAB
C Variant   : Embedded C
Compiler   : Microchip PIC kit 2
PC Application   : .Net using
 MS Visual Studio

A.MPLAB:

MPLAB IDE is a software program that is used to develop applications for Microchip microcontrollers and digital signal controllers. This development tool is called an Integrated Development Environment, or IDE, because it provides a single integrated "environment" to develop code for embedded microcontrollers. This chapter describes the development of an embedded system and briefly explains how MPLAB X IDE from Microchip is used in the process. MPLAB compilers from Microchip provide fully integrated, optimized code for PIC MCUs and PIC DSCs, along with compilers from micro Engineering Labs, CCS and SDCC, they are invoked by the MPLAB X IDE project manager to compile code that is automatically loaded into the target debugger for instant testing and verification.

B.MICROCHIP PICKIT2:

PIC kit is a family of programmers for PIC microcontrollers made by Microchip Technology. They are used to program and debug microcontrollers, as well as program EEPROM. Some models also feature logic analyzer and serial communications (UART) tool.

C.DOT Net MS VISUAL STUDIO:

NET Frameworks a software framework developed by Microsoft that runs primarily on Microsoft Windows. It includes a large class library named Framework Class Library (FCL) and provides language interoperability across several programming languages. Programs written for .NET Framework execute in a software environment (in contrast to a hardware environment) named Common Language Runtime (CLR), an application virtual machine that provides services such as security, memory management, and exception handling. FCL and CLR together constitute .Net Framework FCL provides user interface, data access, database connectivity, cryptography, web development applications. Programmers produce software by combining their source code with .NET Framework and other libraries. The framework is intended to be used by most new applications created for the Windows platform. Microsoft also provides an (IDE) Integrated Development Environment for .Net software called Visual Studio.

CONCLUSION:

In this paper, Eye typewriting, that relies on moveable and low price elements in a very wearable type was planned and enforced for gaze estimation and blink gesture detection for click actions. The elimination of classical video camera and corresponding high machine price will be thought-about as a bonus of the planned system. Besides, this paper gave associate insight and plausible results of a completely unique infrared approach to the detection of gaze direction and eye winks. The experimental results indicated that Eye bit constitutes a promising computer program different in bound circumstances wherever hand management is also inconvenient. As a conclusion, among few approaches to eye following, Eye bit is planned to become an alternate resolution for mobile systems during this specific work, an infatuated computer code was developed for the planned hardware, and tested by many subjects it's argued that the planned tool will simply be placed on associate eye-glasses frame. As a result, it had been finished that the concept of IR detector utilization for eye position sensing may be a promising decide to accurately detection the eye-gaze direction.

FUTURE SCOPE:

In the future, it's planned to integrate the attention bit into a wearable pc having associate HMD instead of victimization the system with a personal computer. Therefore, Eye bit will be an answer for novel and economical user interfaces for numerous applications, like vehicle and chair management for disabled. Eye following soul Interface incorporates principally the development of a watch following hardware victimization IR sensors. It conjointly includes precise and correct calibration in computer code. This device will be used for several video game systems and video games. Eye blinking is a necessary safety system that shields the attention from the harmful environmental exposure. therefore inborn reflex detector is helpful. Even for fatigue identification the attention blink is taken into account to be an acceptable indicator for multiple and totally different tasks of individual activity.

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