Eye Camera

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ABSTRACT
The power of vision is taken one step ahead with the introduction of sophisticated eye-tracking and gaze-tracking techniques which track the movement of the eye and the gaze location to control various applications.

This eye camera can be developed in many ways, some of them are we can build it by programming a microcontroller, by using DAQ or by using Arduino board. Here we are going to build the eye camera using LabVIEW and a Arduino board which can be build easily and cheaply.

Eye camera is developed so that we can control the camera with the help of eye blink. The whole system was developed in such a way that whenever eye is blinked it must take capture an image. Here we use the LabVIEW technology where we write a code to turn the camera on and off which is interdependent on the eye blink. Firstly we need to check whether the eye blinked or not for this we use IR module which is placed right in front of the eye.

This is a new method of controlling the camera using software. It is not portable now but once it becomes portable, it can be used by hikers, paragliders, and reporters and also by paralyzed people because it just works with the blink of an eye.

Keywords— LabVIEW, IR Module, Arduino, Webcam.

I. INTRODUCTION

Eyes are the organs of vision. They detect light and convert it into electro-chemical impulses in neurons. In higher organisms, the eye is a complex optical system which collects light from the surrounding environment, regulates its intensity through a diaphragm, focuses it through an adjustable assembly of lenses to form an image, converts this image into a set of electrical signals, and transmits these signals to the brain through complex neural pathways that connect the eye via the optic nerve to the visual cortex and other areas of the brain.

A camera is an optical instrument that records images that can be stored directly, transmitted to another location, or both. These images may be still photographs or moving images such as videos or movies. The term camera comes from the word camera obscura (Latin for "dark chamber"), an early mechanism for projecting images. The modern camera evolved from the camera obscura. The functioning of the camera is very similar to the functioning of the human eye.

So, the similarities between eye and camera made the device eye camera. This is controlled with the blink of eye. Virtual instrumentation is the use of customizable software and modular measurement hardware to create user-defined measurement systems, called virtual instruments.

Traditional hardware instrumentation systems are made up of pre-defined hardware components, such as digital multimeters and oscilloscopes that are completely specific to their stimulus, analysis, or measurement function. Because of their hard-coded function, these systems are more limited in their versatility than virtual instrumentation systems.

LabVIEW (short for Laboratory Virtual Instrument Engineering Workbench) is a system-design platform and development environment for a visual programming language from National Instruments. The programming language used in LabVIEW, also referred to as G, is a dataflow programming language. Execution is determined by the structure of a graphical block diagram (the LabVIEW-source code) on which the programmer connects different function-nodes by drawing wires. These wires propagate variables and any node can execute as soon as all its input data become available.

LabVIEW software is ideal for any measurement or control system, and the heart of the NI design platform. Integrating all the tools that engineers and scientists need to build a wide range of applications in dramatically less
time, LabVIEW is a development environment for problem solving, accelerated productivity, and continual innovation.

II. BLOCK DIAGRAM

The mechanism behind the implementation of eye camera is done by using the IR module and Arduino Uno and labview.

The block diagram of the eye camera is as follows:

- Spectacles with IR emitter
- Arduino Uno
- Lab view
- Web cam

Figure 1: Block Diagram of eye camera

The design involves spectacles with IR sensors attached to it. IR sensors are constantly powered by supplying 5v to the IR module. The IR module has 3 pins on PCB they are Vcc, GND and output. The output pin is connected to the Arduino board where this is fed to the labview by interfacing the Arduino with labview. This is where we also interface the webcam with labview.

III. FLOW CHART

The flow chart of the designing the eye camera for capturing the images is as follows:

- START
- IR SENSORS OUTPUT TO ARDUINO BOARD
- IF INPUT TO LABVIEW IS 1
  - IF OUTPUT IS 1 THEN TURN ON THE CAM AND TAKE AN IMAGE
  - IF OUTPUT IS 0 DISPLAY THE MESSAGE "EYE"
- STOP

IV. IMPLEMENTATION

Hardware Implementation

In this paper we have two hardware components
1. IR module and
2. Arduino Uno.

Firstly the purpose of IR module is to identify the state of the eye i.e. whether it is closed or opened. IR module has two sensors they are IR emitter and IR receiver where the emitter emits the IR signals on to the eye, if the eye is closed the IR signals get reflected and the receiver receives the signal hence the output will be high and if the eye is opened.

Figure 2: IR circuit

Technically known as "infrared radiation", infrared light is part of the electromagnetic spectrum located just below the red portion of normal visible light. Essentially, each time you press a button on a remote, a small infrared diode at the front of the remote beams out pulses of light at high speed to all of your equipment. When the equipment recognizes the signal as its own, it responds to the command.

Figure 3: IR module

A. Software Implementation

The software implementation is done in two steps:
Step 1: Taking the Arduino output
Step 2: Capturing of the images according to the input
Step 1: Taking the Arduino output:

Figure 4: Arduino interface in labview

Step 2: Capturing of the images according to the input:

Figure 5: Camera interfacing and saving the captured image using labview.

We have written the code in labview. Where the code consists of taking the input from Arduino board and it is given to a case structure which has two values as 0 and 1. We wrote the code in such a way that if the input is 1 then the camera has to be turned on and should capture images i.e. at the time eye is blinked. If the input is 0 that is the eye is opened and the code gets executed and displays a message “eye did not blink”.

V. RESULTS

Figure 6: When Eye is closed

Figure 7: IR module output when the eye is closed.

Figure 8: When Eye is opened

Figure 9: IR module output when the eye is opened.

Figure 10: Final result of eye camera

VI. CONCLUSIONS

Using this device the images can captured any anytime just with the blink of the eye. The results has been observed and displayed in above chapter.

In this project we have shown how the implementation can be done using labview and how can we control the things
using labview. Thus we came to know how the labview simplifies the programming part just by drag and drop and connecting them neatly it can turn any complicated task to a simple one.

Finally the implementation has been done in labview and also by using the Arduino Uno board which reduced the cost a lot as it doesn’t consists of expensive hardware. This labview made the implementation of eye camera simple and was built inexpensively.

REFERENCES