Home Automation through Eyeball Motion for Disabled Persons

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Abstract*: Recent Technological advancements have helped the mankind in essential and significant ways. Disabled persons are valued human resource for the nation and a platform to be provided for their effective participation. A prototype is developed for manage the Home appliances with the movement of Eyeball for cursor control. Camera captures the image of movement of eye and it detects the pupil centre position of the eye. The various changes on pupil position gets diverse instruction for the virtual keyboard. Obtained signals permit the motor driver to collaborate with the virtual keyboard. The prototype moves in various directions depending on the selected signal.

***Index Terms*: camera, disabled, eyeball movement, home automation, pupil.**

I. INTRODUCTION

In India as per 2016 census, the status of Disabled Population is 2.68 Crores persons accounts to 2.21% of the total population.69 %(1.86 Cr) of them reside in Rural areas and remaining 31 %(0.81 Cr) resides in Urban areas. Out of it 56% are Males & 44% are Females. The distribution of Disabled persons in age group is summarized as,17% in 10-19 years,16% in 20-29 years & Elderly (above 60 years) disabled constituted 21% at all India level. Assistive devices such as mobility devices (wheelchairs, prosthetic devices and walkers), hearing aids, cognitive aids, adaptive switches and utensils, physical modification in build environment plays a major role for disabled persons. Government of India defines as Disability as (a) Blindness,(b) Loco motor disability,(c) Mental illness ,(d) Low vision,(e) Leprosy-cured,(f) Hearing impairment & (g) Mental retardation Face recognition system helps in various applications and plays a vital role for disabled person's assistance. Eyeball movement tracking helps the disabled persons for operation/controlling of Home appliances.

II. LITERATURE SURVEY

P.Viola and M.Jones, 2001 discusses about detection of objects based on the approach of Machine learning and accomplishing prominent detection rates. It was distinguished by three key contributions. It is used in live situations, without shifting to image differencing.A.M.Malla, et all, 2010 discussed about a prototype competent enough to monitor on regular basis of intended person alertness which aids in avoiding accidents due to drowsiness. It discusses about the exactness to differentiate between fully opened, closed and half closed eyes.

S.Vitabile, et all, 2010 discusses about a prototype system to determine the Driver's sleepiness levels to avoid vehicle collisions. It focusses on tracing human eye and determining the sleepiness failures. G.Boustany, et all, *2016* describes about a home automation system been operated by eye movement of disabled persons considering the various parameter such as position of pupil, movement and size to be captured by camera. Adarsh Rajesh, 2017 discuses about a prototype of eyeball based movement controlling the wheelchair utilizing neural networks.

III. SYSTEM DESIGN

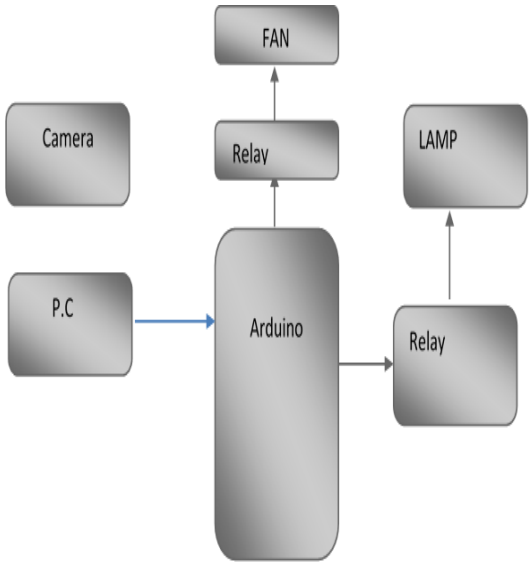

Fig. 1.*Block Diagram*

Fig.1 displays the Block diagram of the proposed module.The prototype uses a Webcam and monitoring unit. Depending on the eye movement with the aid of Open CV, the cursor movement is controlled. The system comprises of ARM11 processor in Arduino board is used along with Pyauto GUI library used for cursor movement.

Revised Manuscript Received on September 22, 2019.

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IV. HARDWARE MODULE

Fig. 2.*Snapshot of Hardware module*

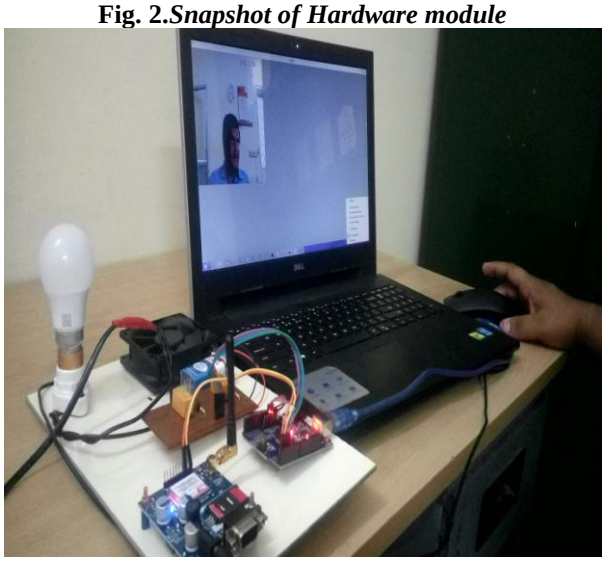

Fig. 3.*Snapshot of Proposed Module setup*

Fig. 2 displays the snapshot of Hardware module.Fig.3 displays the snapshot of proposed module setup.The Camera captures the Image of Eye movementThe center position value of pupil is made as a reference and then the next the different value of X, Y coordinates will be set for a particular command.The prototype allows the Disabled person to regulate mouse cursor depending on eyeball movement. The position of the Camera should bewith good illuminated condition for effective operation.

V. RESULT AND DISCUSSION

Fig.4 displays the demonstration of results. Fig. 5 displays Light is On.Fig.6 displays the snapshot of the right click pressed through eyeball movement.Fig.7 displays the snapshot of the button pressed.Fig.8, Fig.9 & Fig. 10 displays the snapshot of Fan is On status.Fig.11 displays the snapshot of Fan is On status in prototype.Fig.12, Fig.13 & Fig.14 displays the snapshot of the prototype experimentation. The Face Capture & Recognition system plays an effective tool providing safety and security with active or passive recognition of subjects. The system can stand alone for surveillance purposes or be integrated into access control or other third party systems to enhance functionality.

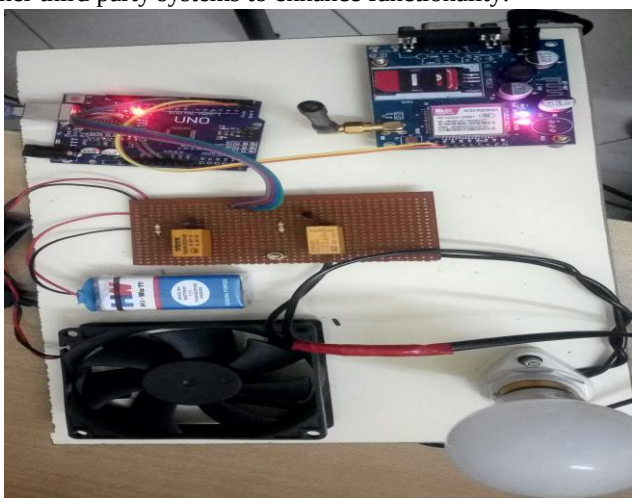

Fig. 4.*Demonstartion of Results*

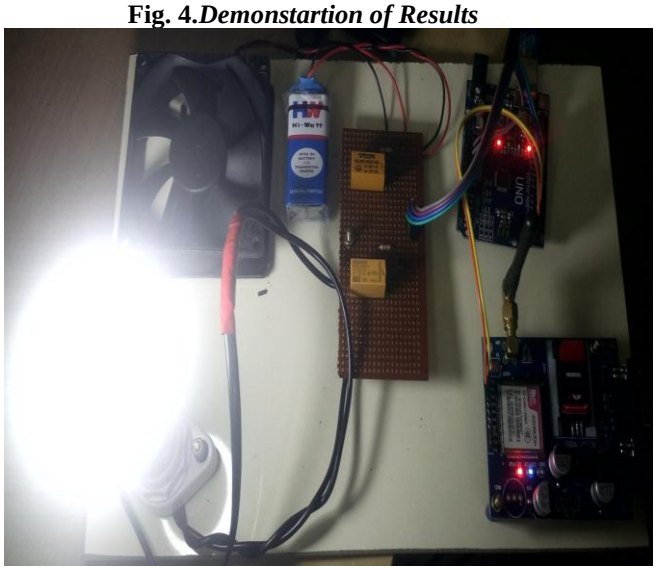

Fig. 5.*Snapshot of Light in On status*

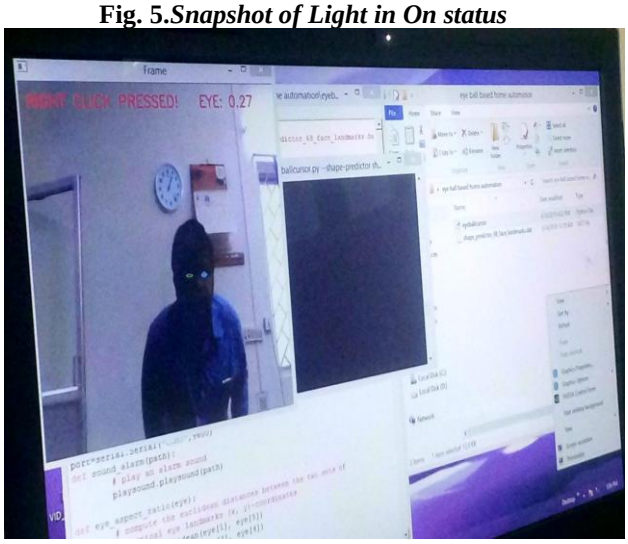

Fig. 6.*Snapshot of Right click pressed through eyeball movement*

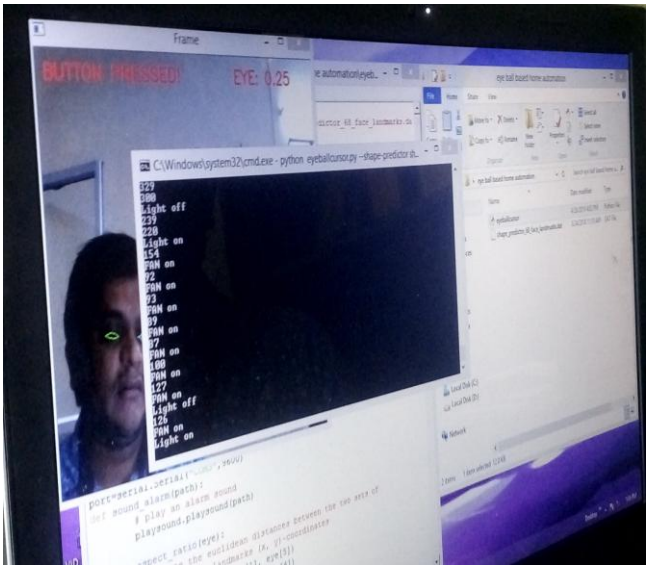

Fig. 7.*Snapshot of Button pressed*

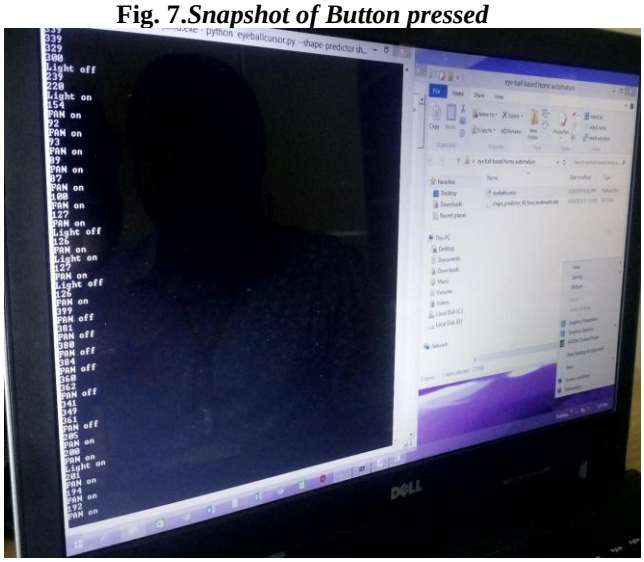

Fig. 8.*Snapshot of Fan is On status*

Fig. 9.*Snapshot of Fan is On Status*

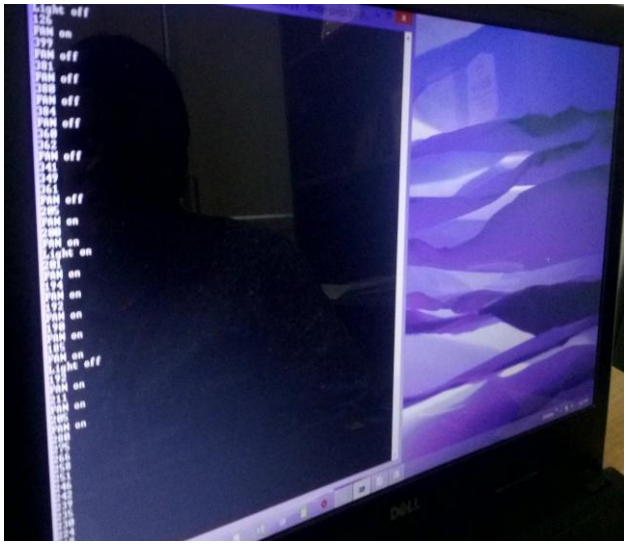

Fig. 10. *Snapshot of Fan is On in Software*

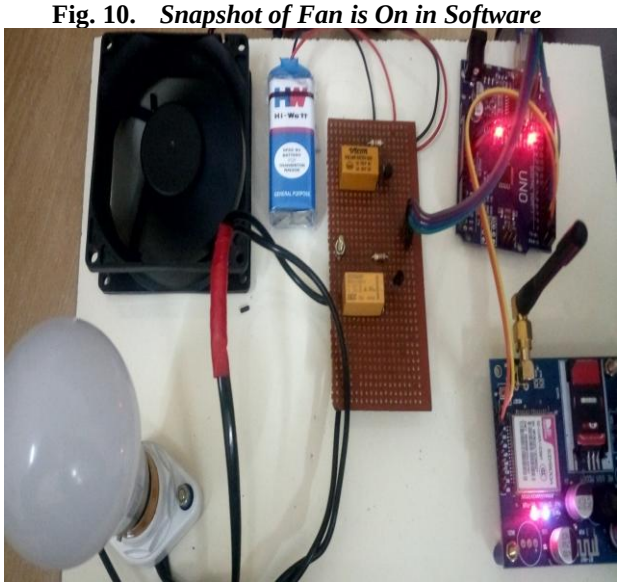

Fig. 11. *Snapshot of Fan is On status in Prototype*

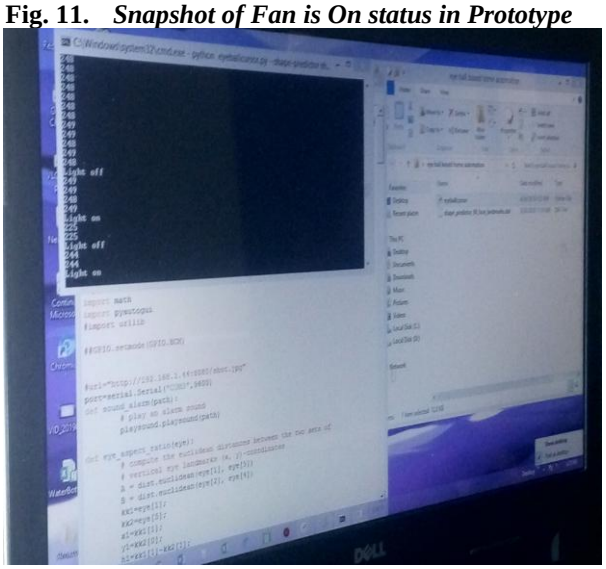

Fig. 12. *Snapshot of Module*

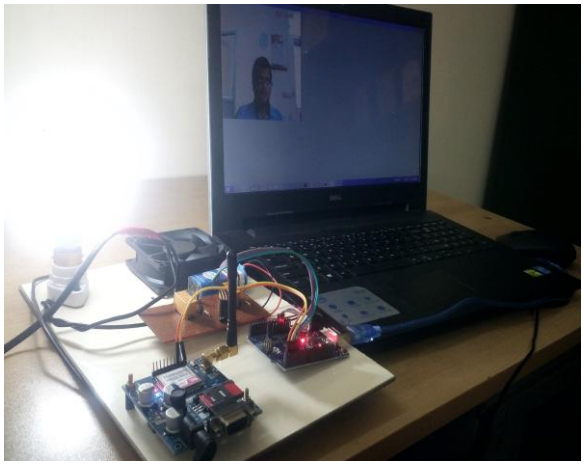

Fig. 13. Snapshot of Working status

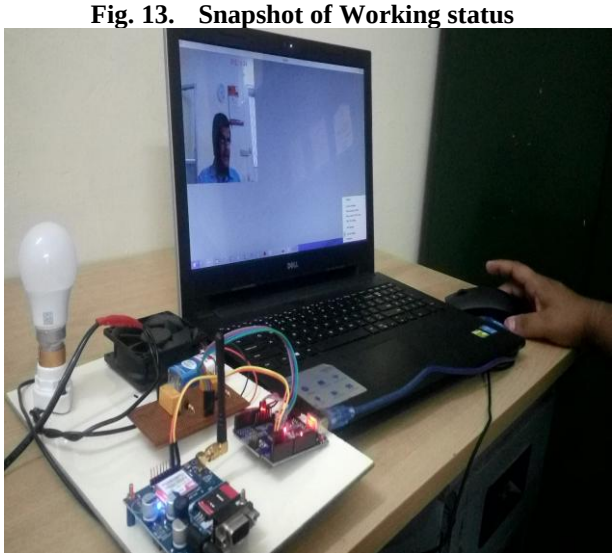

Fig. 14. Snapshot of Experimentation

VI. CONCLUSION

In the demonstration of the prototype, the results provide by eye-tracking results in operation of the devices connected in Home, which helps the disabled persons a great extent.

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