3D Holographic Display with Gesture Controller

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Abstract
Hologram makers, render 3D projections whether it's inside a glass tube or suspended in nullity. 3D multi-dimensional images enable users to interact with content uniquely from a 360-degree seeing point. A raspberry pi controller-based system to realize such holographic projections. We then use a display to supply part live videos to the projector founded to induce the required 3d hologram. A pyramid-like structure is accurately designed and is made to project 3d images or videos. A gesture sensing board for raspberry pi to detect the gestures by the user then use It to forward or rewind to previous projections without even touching the panel. In this paper, we have proposed working on a 3D holographic display system with a gesture interface controller.
Keywords: Gesture, Hologram, Pyramid, Raspberry Pi

I.   INTRODUCTION

Holographic projection could be a technology that has tremendous applications in numerous fields like science, education, art, and business among various others. 3D optics is achieved by a device known as a holoprojector. A holoprojector uses the assorted optics principles to project large-scale, high-resolution photos onto varied viewing sur-faces (or merely suspended in air), at completely totally different focal lengths, from relatively few projection devices.[3] Considering the foremost recent movies being viewed in 3D, the focus lies on 3D holographic projections so the viewing of 3D movies could also be attainable while not the necessity of 3D glasses.

II. LITERATURE REVIEW

The holographic show is created by derivation of the Pepper's Ghost technique that uses four cameras to capture the prime quality image of the article from all the four sides, that once given to the Unity 3D computer code 'Prismatic' for rendering the image shaped during a 3D manner. [1]. Glass object or any reflective material can be used to create a holographic display using light that is reflected back from the object for projection All four distorted views that are front, back, left, and right, are captured by the cameras and will be projected onto the display device. The reflective glass makes a 45-degree angle with the screens and lighting to create an illusion of a 3D object. Musion Eyeliner is a projection system designed and patented by Uwe Maass that forms 3D holographic images, which is regarded as a state-of-the-art variation of Peppers Ghost [2], exploitation AR following then configuring the pic, authors have projected the ultimate implementation of computer code development for establishing access to meant users. The projected implementation has sure drawbacks together with the little size of the object displayed on the holographic screen, issues in interacting with the data input device, etc. though, with restricted constraints, this can be a revolutionary step within the field of interactive learning expertise for students[4] In [5], the authors have projected 3D output generating systems taking input from Kinect 2.0 devices for sensing the user and also the skeleton movements created by the user are half-track and also the gesture created in nullity is processed and needed action is performed. it's a wonderful innovative plan for gesture dominant over the normal ways used nowadays. though the framework is outlined exactly, sensitivity and space outlined for gesture movements are the 2 important areas to be controlled in keeping with the system's needs.

III. METHODOLOGY

The power supply unit is intended such it's connected to both the Raspberry Pi board and also the Gesture Interface board simultaneously, both circuits are supplied with different voltage and power

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requirements. We already know that the Raspberry pi board works at 2.5A5V. The highest power consumption of the Raspberry Pi 3 when under heavy load is about twice that of the Raspberry Pi 2 (750mA vs 360mA). The supply unit consists of a bridge rectifier, capacitive filters, and voltage regulators (LM7805). The proposed system uses a Raspberry Pi controller-based system to attain holographic projections. Here the Raspberry Pi controller is loaded with the recorded videos which are to be projected onto the display system through the monitor and therefore the code, which controls the entire setup. it's interfaced with a microcontroller that processes the voltage levels of IR sensors and thus gives input to the Raspberry Pi and therefore the required gesture is acted upon. Now we use a gesture sensing board for Raspberry Pi to detect the gesture input provided by the user and then use it to travel forward or rewind to previous projections without even touching the panel. We can design a gesture interface circuit using IR sensors and comparators which was an economical alternative to ready-made gesture interface boards which are again bulky and expensive.
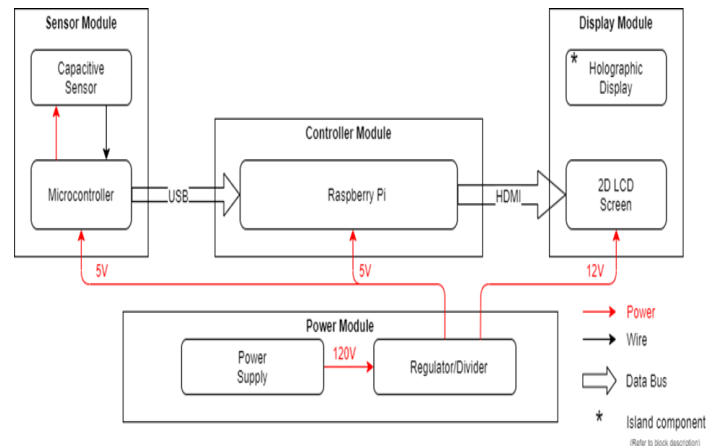

Fig. 1: Hardware Design

IV. TECHNOLOGY

Power supply: The power supply circuit is designed in such a way that every component gets the required amount of voltage and it does exceed the peak power consumption of the given component.

Gesture Interface Board: The Gesture Interface Board contains ATmega328P and also the IR sensors, photodiodes, ICs, comparators, etc. and it is designed in such a way that the IR sensors detect the hand movement, and the data is stored and given to the microcontroller. The microcontroller determines whether the given gesture is left to right or right to left and the output is given raspberry pi.

Raspberry pi: Raspberry pi 3 A+ model is used in this design to store the 3d images and videos and a code is written in python in raspberry pi to control the image or video being displayed on the LCD screen according to output of the program.

Python: Python is an interpreted high-level general-purpose programing language. Its language constructs further as its object-oriented approach aims to assist programmers to write clear, logical code for little and large-scale projects. As python is installed on raspberry pi, A code is written in python to change the output that's the image or video as soon as input is received by the raspberry pi from the gesture board.

Display Module: The display module consists of a pyramid-like structure and an LCD screen placed on top of the pyramid-like structure which has a reflective glass that makes a 45-degree angle with the screens and lighting to create an illusion of a 3D object and a 3d image or video is displayed.

V. RESULTS AND DISCUSSION

Fig2 depicts the right to left gesture is being detected by the microcontroller as the hand moves from right to left and detection of the gesture is being indicated by red light as shown in Fig3.The red light indicates the interrupt occurred and a gesture is recognized by the microcontroller and the output is sent to Raspberry Pi. According to the code the image or video is changed on the display as shown in Fig4.Similarly Fig5 and Fig6 indicate the left to right gesture and the result of it.

The Final output of the design is that we can control 3d image without even touching it and can control the previous and next image or videos.
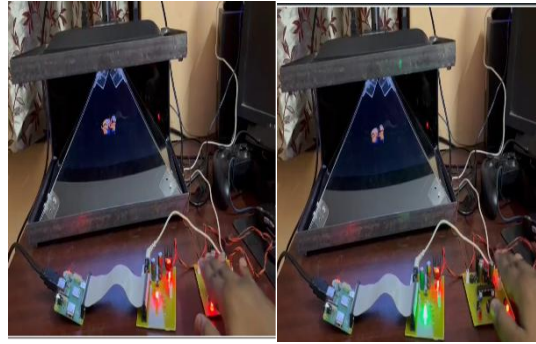
Fig. 2: Right to left gesture

Fig. 3: Motion detection

Fig. 4: Result of right to left gesture

Fig. 5: Left to right gesture

Fig. 6: Result of left to right gesture

VI. CONCLUSION

We have used recorded videos of top quality and adjusted their resolution in line with the aspects of the display system used. The Raspberry Pi controls the interfacing and processing of user input together with the microcontroller. The gesture controller board responds to being given hand gestures precisely and processes the output instantly by switching between the videos. This technology is sizable and is possible as compared to other methods like the employment of holotable, RGB projectors, etc. the employment of holographic elements may well be the long run of Augmented Reality applications without using bulky AR helmets.

In future, further more gestures can be added to this design based on time and also zoom in, zoom out and rotate options can be added to the design.

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