3D Holographic Display with Gesture Controller
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Abstract:
In this digital era, there is this humane urge to keep up with technology. Owing to the recent trends in 3D display and the level of realism they provide, multiple technologies have come up to deliver a convincing 3D viewing experience. The 3D images using lens displayed today will soon be a thing of past. Now, with the advent of holograms reinventing the display features that steer the way for various strategic applications, marketing, political and medical purposes. Hologram projectors, render 3D projections whether its inside a glass tube or suspended in thin air. 3D multi-dimensional images enable users to interact with content from a 360-degree viewing point. The system produces holographic projections created from picture by refraction through the interference design, without losing any light, working with more productivity. In this paper, we have proposed the working of 3D Holographic Display with gesture using Raspberry pi.

Index Terms: Holograms, Gesture, Raspberry Pi.

I. INTRODUCTION
Holographic projection is a technology that has tremendous applications in various fields like science, education, art and business among numerous others. 3D Holography is achieved by a device called a holoprojector. A holoprojector uses the various optic principles to project giant scale, high resolution photos onto varied viewing sur-faces(or simply suspended in air), at completely different focal lengths, from comparatively small projection devices.[3] Considering the most recent movies being viewed in 3D, focus lies on 3D holographic projections so that the viewing of 3D movies may be possible without the need of 3D glasses.

II. RELATED WORK
The holographic display is formed by deriving the Pepper’s Ghost technique that uses four cameras to capture the high quality picture of the object from all the four sides, which when given to the Unity 3D software ‘Prismatic’ for rendering the image formed in a 3D manner. [4]. Glass object or any reflective material can be used to create holographic display using light that is reflected back from the object for projection All four distorted views that are front, back, left and right, captured by the cameras 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 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 [5]. Using AR tracking and then configuring the hologram, authors have proposed the final implementation of software development for establishing access to intended users. The proposed implementation has certain drawbacks including the small size of object displayed on the holographic screen, difficulty in interacting with the input device, etc. Although with limited constraints, this is a revolutionary step in the field of interactive learning experience for students[1] In [2], the authors have proposed 3D output generating systems taking input from Kinect 2.0 sensor for sensing the user and the skeleton movements made by the users are tracked and the gesture made in thin air is processed and required action is performed. It is an excellent innovative idea for gesture controlling over the traditional methods used today. Although the framework is defined precisely, sensitivity and area defined for gesture movements are the two critical areas to be controlled according to the system requirements.

III. PROPOSED IMPLEMENTATION
A. System Requirements
Raspberry Pi 3.
Gesture Interface Board.
Mini Display Screen(LCD/LED). Connectors.
Power Supply Circuit. Outer Frame(Metal).
Programming Language: Python.

B. Methodology
The power supply unit is designed such that it is connected to both the Raspberry Pi board and the Gesture Interface board simultaneously, both circuits are provided with different voltage and power requirements. We already know that the Raspberry pi board works at 2.5A5V. The peak power consumption of the Raspberry Pi 3 when under heavy load is about twice that of the Raspberry Pi 2 (750mA vs 360mA). The power supply unit consists of a bridge rectifier, capacitive filters and voltage regulators (LM7805). The proposed system uses a Raspberry Pi controller based system to achieve holographic projections. Here the Raspberry Pi controller is loaded with the recorded videos which are to be projected onto the display system through monitor and the code, which controls the whole set up. It is interfaced with a microcontroller that processes the voltage levels of IR sensors and thus gives input to the Raspberry Pi and required gesture is acted upon. Now we use a gesture sensing board for Raspberry Pi to detect the gesture input provided by user and then use it to go forward or rewind to previous
projections without even touching the panel. We have designed a gesture interface circuit using IR sensors and comparators (LM2576) which was a cost effective alternative to ready-made gesture interface boards which are again bulky and costly.

![Figure 1: Hardware Design](image)

The figure represents the basic block diagram of the 3D Holographic Display Technology. It works on the principle of varying voltages between the two IR sensor and receiver pairs. The gesture inputs are processed by the microcontroller (Atmega328P) and the output is fed to the Raspberry Pi board which processes the action to be taken according to the given gesture. In this way we can easily navigate through the videos without any delays. The LCD display is used to provide part live videos to the projector in order to get the desired 3D hologram. Our frame is constructed to project images and videos in 3D state. We have designed a gesture interface circuit using IR sensors and comparators (LM2576) which was a cost effective alternative to ready-made gesture interface boards which are again bulky and costly. It works on the principle of varying voltages between the two IR sensor and receiver pairs. The gesture inputs are processed by the microcontroller (Atmega 328P) and the output is fed to the Raspberry Pi board which processes the action to be taken according to the given gesture. In this way we can easily navigate through the videos without any delays.

IV. FUTURE SCOPE

CAR Driver Training at 200 mph with Future Technology of Holographic Projection; the projected image would be ahead of the car to allow the driver to get use to corner, turns, drafting and driving next to other cars. Martial Arts Partners, to prevent major injury and to practice for countless hours alone. Modeling Holographic Projection to Study Hurricanes and projecting these in the classrooms for weather modification scientists to study. To practice Public Speaking in Virtual Reality, project the crowd in front and getting used to talking in front of very large groups. Holographic Art, instead of building models of concept cars, designs, simply designing virtual models, we can save them and allow one to make necessary modifications. Holographic Companions, when people go off to work, their children and elderly parents can have a holographic human friend, to keep company. Holographic Projection and Accident Recreation in Virtual Reality to determine what happened and prevent it in the future and enable engineers to examine the accident and to recognize the part failures thereby coming up with preventive methods in the future designs. Hang Gliding Training using Holographic Projections, learning to fly a hang glider is a dangerous task and VR holographic simulation would be another great application. Celebrity Debates in Holographic Future Virtual Reality, thus the debates could be done without the participants actually meeting together. Saving Endangered Species with Virtual Reality Holographic Projection, so that we can study it forever from anywhere. Training Teachers with a virtual Holographic Classrooms would assist the new trainees help adapt to the chaotic class-room situations.

V. CONCLUSION

We have used recorded videos of high quality and adjusted its resolution according to the aspects of the display system used. The Raspberry Pi controls the interfacing and processing of user input along with the microcontroller. The gesture controller board responds to be given hand gesture precisely and processes the output instantly by switching between the videos. This technology is sizable and is feasible in comparison to other methods such as use of holotable, RGB projectors, etc. the use of holographic elements could be the future of Augmented Reality applications without using bulky AR helmets.

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VI. REFERENCES


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