

# Inquiry Base Learning Using Immersive Virtual Automation

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**Abstract:** -- Robotics is the future of the modern era and the people wants it more entertaining and the user-friendly. Newly launch controllers that improving the concentration of the developers and programmers towards the robotics. this paper presents the one such device, that is leap motion technology and Augmented and virtual reality and its implementation in new age robot the robotics system developing till now also the new experience to the students and industrial trainees. It needs a google cardboard, personal computer and smartphone and gesture control sensor that is nothing but Leap motion controller. This robot can assist a lot in search and shopping mall and industrial application for making human life simple and entertaining also useful for Inquiry-Based Learning using Mixed Reality and leap motion.

**Keywords:** - Virtual Reality, Augmented Reality, Leap Motion, Mixed Reality, Unity3D, IBL.

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## I. INTRODUCTION

The inquiry based learning if the simple and effective learning technique to student in school or industry for the learn the new things .The interfacing between Man and machine is the beginning of a new era. Humans and machines no longer run parallel to each other, but instead they go hand in hand. This new technology is helping to improve lifestyles. This motivates the creation of a better technology for tomorrow. This is called, the digital circle. The technology used in robotics earlier was of a joystick, and then came the touchscreen, and now it is the advent of gestures and now days integrate with the immersive virtual and augmented reality for advance user experience for gaming inquiry based learning marketing[10] and industrial simulation and training purpose.

There are a lot of sensors and technologies present today, which detect motion and gestures. But the accuracy and speed of these sensors are not much. The main advantage of using LEAP motion sensor is that, it is very accurate and very fast. It is even fast enough to detect handwriting. .The response for this sensor has been tremendous as it provides a wide arena of implementation. Many research projects are still going on for this, as people are trying to find new ways to explore its advantages.

This paper introduces a new technology to track the marker and gives the immersive view to learner by using Personal computer and mobile application that output comes known as the Augmented reality and virtual reality and leap motion sensor is the effective to handle the system.

## II. RELATED WORK

A lots of work development require for this IBL in that for the controlling the robot the Raspberrypi controller is used for the high quality performance here for the performance of the system the programming done through the linux kernel programming because that gives better performance and good feasibility to the robot and the system that we want to do as per requirement of the user.

Robot is basically control by the leaf motion sensor [3] This paper introduces a new technology to track and control the robot arm for different activities. By moving our hand in any direction the motion can be controlled. This paper is very important since it gives an overview of various gesture-controlled systems and also leaps motion technology for controlling. American Sign Language Recognition Using Leap Motion Sensor module proposed by Chuan and Ragina. Classifies the 26 letters of the English alphabet in American Sign Language using the derived features from the sensory data the support vector machine is used. Using movement of fingers they as-sign individual gesture for each alphabet. Also, they additionally introduced the parameter setting in machine learning methods[5] and accurateness of the specific alphabet letter.

Also robot contain the webcam to produce the augmented view on the computer monitor that directly interface to the controller and give output and 3D information contain view on the computer display through webcam it depend on the application it may be from the remote location and may be from the same area. for the development of the app augmented reality SDK available for the unity 3D and for

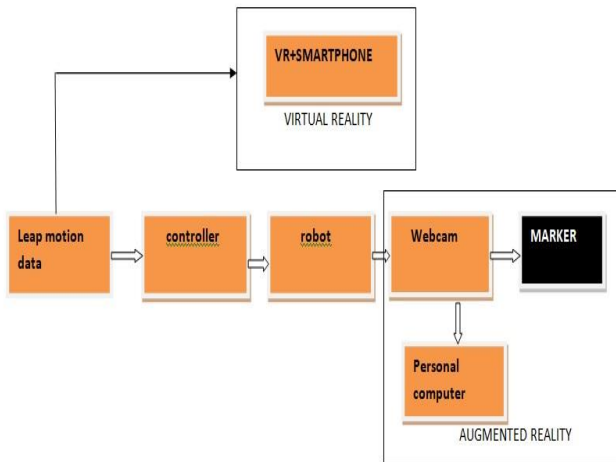
Virtual reality Google Cardboard this is the open source HMD(Head Mountain Display)that done by the google and it gives immersive experience to observer in real time view of the robotic system main advantage of that is cost requirement for that is very low and give best visual experience.in that leaf motion controller is for the control the robot and google cardboard is for the virtual reality experience.

above the sensor[1]. Leap motion is packed with an extreme amount of power. The sensors lo created within the sensor areincredibly fast and accurate, allowing the user to navigate his or her own computer with as much freedom as he or she wants. The Leap Motion has the ability to replace the computer mouse completely, replacing all functions and adding its own functionality to the interaction of a virtual machine and here for handling the robot accurately.

**TABLE I: List of component and respective acronyms**

AR	Augmented Reality
VR	Virtual Reality
MR	Mixed Reality
IBL	Inquiry Base Learning
HMD	Head Mountain Display

**I. ARCHITECTURE**



**Fig.1. Block Diagram**

Above fig.1 shows the detail working of the mixed reality and leap motion IBL[10] system in detail and explanation below:

**A. Leap Motion Tracking Data From Hand**

Leap Motion is an external device equipped with infrared sensors that focuses ontracking a humans fingers in the space

**B. Controller**

Performance of the system is totally depend on the controller that control the hole system here we also want to mobile support for displaying the and processing the augmented reality app and it having the mobile support and external support for the web base support interfacing facility and for the robot it also control the motor driven circuit the version use for that integrated virtual automation system is Raspberrypi3 module it handle and process the hole system it contain the 40 pins for interfacing it fulfils the all requirement of developer we should change the controller as per requirement of user.

**C. Robot assembly**

Robot assembly and working is totally done by the leap motion [4]also it having motor driven circuit for the working of the robot whole module interface with the Raspberry pi and it contain the smartphone display robot varry form one place to another place and detect the various markers and display the real 3D and augmented view on the smartphone and also displays the product information.

**D. Augmented reality**

Augmented Reality (AR), also known as Mixed Reality, aims to combine virtual and real scene together to achieve that virtual ones are belong to the real world. Being characteristic of integration of virtual and real scene, many applications of Augmented reality are emerging, such as in field of education,medical,Gaming,medical treatement[10].Here the main moto of using Augmented with the robot is marketing of the product by displaying the 3D and view of product and information related product it may use in the shopping mall with attaching the basket to the robot there are two type of the augmented reality marker base and marker less augmented reality here we using the marker base augmented reality the Smartphone app development is done using windows application that runs on the computer as well as android mobile phones by using Unity 3D and some C sharp programming.

**A. Virtual reality**

Main purpose of using virtual reality is for the inquiry base learning[10] for industrial training and simulation purpose and it also integrate to the leaf motion control for hand moves in real time and offline also google cardboard sdk avialabe on the official website of the google also Oculus rift SDK is one of the famous company that design SDK for the VR box.

**II. EXPERIMENTAL RESULT**

**A. Leap Motion**

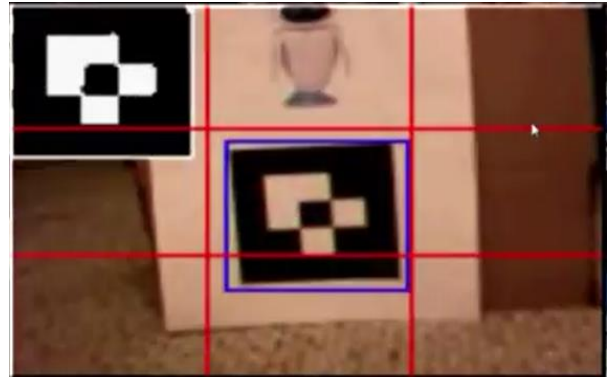
Leap motion is an American company that manufactures and markets a computer hardware sensor device that supports hand and figure motion as a input,analogus to a mouse.but requires no hand contact or touching in 2016 this company introduces the new software designed for the hand tracking in virtual reality.I used leap motion sensor with the interface of UNITY3D software and gives the input to virtual reality and also using some UI interface to that for easy to user freindly and interesting to user following are the some output of the system in picture below.



*Fig.2 Virtual reality based immersive view*

**B. Augmented Reality And Virtual reality**

After the working of the leaf motion the impotant part of the integration is the Mixed reality part the by using Unity 3D and And android SDK we deveope the smartphone app for marker detection for visualise the 3D(Augmented)[2] view of the product then after developing the application result was get and it was really awesome to the observer below Fig.2 shows the some augmented from the smartphone interface to the robot.



*Fig.3 marker detect and giving the information*

There is no any lagging in the App that gives the information smoothly and detect the multiple marker ang gave information on smartphone.and also using leap motion control simulation using the VR cardboard give immersive output as shown in the fig.4



*Fig.4. Real time hand gesture and 3D view for the VR cardboard it generate immersive 3D surrounding[2].*

**CONCLUSION**

In this paper we describe the new era IBL using robotics and Mixed reality that beyond from aur thinking Mixed reality and leap motion give the immersive robotic experience and very useful for the virtual automation and Inquiry base learning also gives the advance robot for the shopping lovers that gives the 3D product information by using computer application largely beneficial for the shopping mall and shops automated shopping trolley that interfacing with augmented reality for giving augmented or 3D view of the product also it having huge area of the applicatios and augmented reality mobile applications for school colleeages and industries for IBL and virtual automation.

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