International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 04 Issue: 12 | Dec-2017 www.irjet.net p-ISSN: 2395-0072

Virtual Automation using Mixed reality and leap motion control

Mayur Bhamare[1], Kavita .J .Mahajan[2]

[1]Dept.of electronics and telecommunication, Late G.N.Sapkal college of Engineering, Nashik, India
[2] Professor, Dept .of electronics and telecommunication, Late G.N.Sapkal college of Engineering, Nashik, India

---

Abstract - *Advanced robotics is the future of technology. In the paramount ways that it can be implemented, there are some devices that can make their use very simple and active entertaining .This paper presents one such device, that is, the leap motion technology and augmented and virtual reality and its implementation in a new age robot. The robotic system developed till now, either needs a google cardboard and smartphone and gesture control sensors to be operated. In other words, some kind of extra machinery or devices is needed to make a robot work . This report defines a robot that needs no such extra help from external devices and runs solely on human command and display the immersive view. The only human effort or manual intervention required in this would be to just make a gesture and see the real and augmented view of the robot in the mobile and the VR box task getting done by the robot. This robot can assist a lot in search and shopping mall and industrial application for making human life simple operations entertainment and inquiry based learning . In the tough world like ours, where it is not possible for humans to reach everywhere and what stuff going on there, especially in the case of natural disasters, technology like this can come to grid aid.*

Key Words: **Virtual Reality, Augmented Reality, Leap Motion, Mixed Reality, Unity3D**

1. INTRODUCTION

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 indusial 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 and control the robot for different activities. By moving our hand in any direction the motion can be controlled. And using Mixed reality for the immersive view to the person that experience to system. This paper is very important since it gives an overview of various gesture-controlled systems and also leaps motion technology for controlling robot and how the Virtual and augmented reality makes human life entertaining and simple. also gives advance and real experience to the user by using mixed reality. Those thing done on the smartphone and using some gaming fundamental build up the mobile app by using unity 3D that gives the augmented view on mobile that view is 3D and realistic and also display the real view on mobile and using google cardboard is give immersive and 360 degree view to the observer.

1.1 Related Work

A lots of work development require for this virtual automation in that for the controlling the robot the Aurdino 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 vive on the mobile display that directly interface to the controller and give output and 3D information contain view on the mobile display 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 smart phone and google cardboard is for the virtual reality experience.

1.2 Architecture

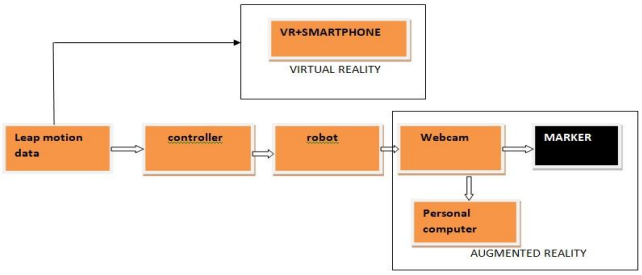

Fig -1: Block Diagram

1.2.1. Leap motion tracking data from hand

Leap Motion is an external device equipped with infrared sensors that focuses on tracking a humans fingers in the space above the sensor[1]. Leap motion is packed with an extreme amount of power. The sensors lo created within the sensor are incredibly 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 there fore handling the robot accurately.

1.2.2. Controller

Controller is performing an important role in the movement of the robotic system also it having interface with the leap motion control sensor Aurdino is one of the controller that interface with leap motion controller and gives tremendous output that reason for movement of robot here required and use Aurdino controller.

1.2.3. 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 Aurdino pi and it contain the Webcam robot vary 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 on computer screen.

1.2.4. 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 treatment entertainment. here the moto of the using augmented reality with the robot is marketing of the products by displaying the 3D and view of the products it may use in the shopping mall with attaching the basket to the robot there are two type of augmented reality marker base and marker less augmented reality the smart computer application done using app development is done using sdk and Unity3D.

1.2.5. 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 available on the official website of the google also Oculus rift SDK is one of the famous company that design SDK for the VR box.

2 Experimental Result

2.1. Leap Motion

There are various type of leap motion sensors are now days here the moving of four wheel robot by hand gesture and leap motion sensor and also the flex sensor for moving the object or robot that interface with the VR and Android mobile phone the robot is work fluencly and doing its work very prominently.

2.3. Augmented Reality and Virtual Reality

After the working of the leaf motion the important part of the integration is the Mixed reality part the by using Unity 3D and android SDK we develop 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. There is no any lagging in the App that gives the information smoothly and detect the multiple marker and gave information on smart phone and also using leap motion control simulation using the VR cardboard give immersive output as shown in the fig.3

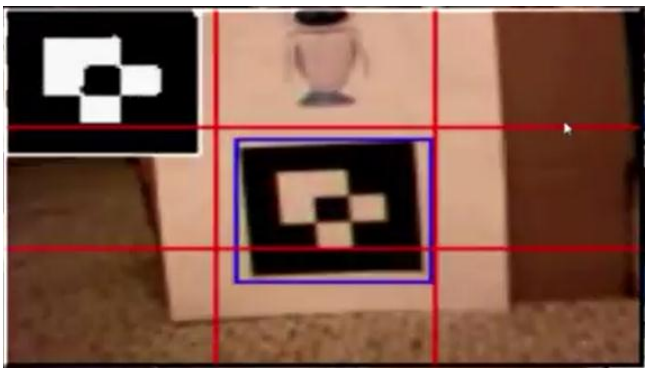

Fig -2: Marker Detection and giving the information

Fig.3: Real time hand gesture and 3D view for the VR cardboard it generate immersive 3D surrounding

3. CONCLUSIONS

In this paper we describe the new era of robotics that beyond from our 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 smartphone largely beneficial for the shopping mall automated shopping trolley that interfacing with augmented reality for giving augmented or 3D view of the product also it having huge area of the applications.

REFERENCES

[1] Howell,E., 2014, "Mars Curiosity: Facts and Information," from http://www.space.com/ 17963 mars curiosity.html

[2] Marlos Dantas Baraga Brazil,2016 Symposium on augmented and virtual reality"technology integration of immersive virtual reality on smartphone with real-time motion capture"2016 IEEE DOI 10.1109/ SVR_2016

[3] Allen, P.K.; Timcenko, A.; Yoshimi, B.; Michelman, P., "Automated tracking and grasping of a moving object with a robotic hand-eye system," inRobotics and Automation, IEEE Transactions on, vol.9, no.2, pp.152-165,Apr 1993.

[4] Marin, G.; Dominio, F.; Zanuttigh, P., "Hand gesture recognition with leap motion and Kinect devices," in Image Pro cessing (ICIP), 2014 IEEE Inter-national Conference on, vol., no., pp.1565-1569, 27-30 Oct. 2014.

[5] Ronald T. Azuma, A Survey of Augmented Reality, In Presence: Teleoperators and Virtual Environments 6, 4 (August 1997), 355-385

[6] 2015 International Conference on Interactive Mobile Communication Technologies and Learning (IMCL) 978-1-4673-8243-4/15/ ©2015 IEEE19-20 November 2015, Thessaloniki, Greece

[7] http://blog.t-immersion.com/2010/09/08/germaine-et-les-martiens-first-augmented-reality-apps-on-iphone-for-pos-advertising-and-augmented-packaging/

[8] M. de Oliveira, R. Ellem, J. C. Oliveira. "A Kinect-based Oil Platform Training Application". In Proc. XVI Symposium on Virtual and Augmented Reality (SVR), IEEE, 2014.

[9] E. S. Silva , M. A. F. Rodrigues. "Um Sistema de Controle Gestual de Apoio a Procedimentos Cirurgicos", In Proc. XVI Symposium on Virtual and Augmented Reality, IEEE, 2013.

[10] Simon creane,Yvonne crotty,"A propose use of virtual and augmented reality for supporting Inquiry base Learning"International conference 2015 interactive mobile communication technology and learning(IMCL)IEEE 2015

[11] Mayur S Bhamare "Integration of immersive Mixed reality and leap motion control for virtual Automation"PGCON,Pune 2017.