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DESIGN AND IMPLEMENTATION OF EFFECTIVE DATA GLOVE IN VIRTUAL REALITY

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Abstract— Human hands are interacting with and manipulating the environment in a huge number of tasks in our everyday life. It is then not surprising that a considerable amount of research efforts has been devoted to developing technologies for measuring and characterize the human hand mechanics, which are critical to many active areas of academic research and commercial product development. These devices vary widely in core sensing technologies, device complexity, data richness (resolution, bandwidth), and mechanical robustness. Commercial motion data gloves usually use expensive motion-sensing fibers and motion analyzers, and are consequently too costly for the consumer market. Hence, some research aim is to lower the cost of such equipment [4] designed the low-cost data glove that used single-channel video instead of expensive motion-sensing fibers or multi-channel video and the visual motion data glove is composed of an inexpensive consumer glove with attached thin-bar-type optical indicators

INTRODUCTION

In our design, the measurements of the inertial and magnetic sensors are used to determine the pose of the hand, and the estimated algorithm is the key technology. According to the three kinds of sensors, there are two independent ways to determine the attitude and heading. One is obtained from open-loop gyros. It has high dynamic characteristic, however, the gyro errors would create wandering attitude angles and the gradual instability of the integration drifting. Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment. On a computer, virtual reality is primarily experienced through two of the five senses: sight and sound.

Fig (1.1): Virtual reality images

The simplest form of virtual reality is a 3-D image that can be explored interactively at a personal computer, usually by manipulating keys or the mouse so that the content of the image moves in some direction or zooms in or out. More sophisticated efforts involve such approaches as wrap-around display screens, actual rooms augmented with wearable computers, and haptic devices that let you feel the display images.Virtual reality is most commonly used in entertainment applications such as video gaming and 3D cinema. A cyberspace is a networked virtual reality. In medicine, simulated VR surgical environments under the supervision of experts can provide effective and repeatable training at a low cost, allowing trainees to recognize and amend errors as they occur. A data glove is an interactive device, resembling a glove worn on the hand, which facilitates tactile sensing and fine-motion control in

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virtual reality. To make this happen we have to leverage the power of Arduino and Processing combined. Processing is an application just like Arduino and it is also open source and free to download. Using processing you can create simple system applications, Android applications and much more. It also has the ability to do image processing and voice recognition.We are using processing to create a simple system application which provides us an UI and track the position of our hand using image processing. We have to make left click and right click using our fingers. To make that happen two magnetic sensors (one on my index finger and the other on middle finger) are used which will be read by the Arduino Nano. The Arduino also transmits the click status to the computer wirelessly via Bluetooth

Fig (1.2): Hardware kit for the implementation of data glove

LITERATURE SURVEY

The Sayre Glove:

The Sayre Glove, created by Electronic Visualization Laboratory in 1977, was the first wired glove. This device used light based sensors with flexible tubes with a light source at one end and a photocell at the other. As the fingers were bent, the amount of light that hit the photocells varied, thus providing a measure of finger flexion. It was mainly used to manipulate sliders, but was lightweight and inexpensive.

In 1982 Thomas G. Zimmerman filed a patent (US Patent 4542291) on an optical flex sensor mounted in a glove to measure finger bending. Zimmerman worked with Jaron Lanier to incorporate ultrasonic and magnetic hand position tracking technology to create the Power Glove and Data Glove, respectively (US Patent 4988981, filed 1989). The optical flex sensor used in the Data Glove was invented by Young L. Harvill who scratched the fiber near the finger joint to make it locally sensitive to bending.

Wired glove:

One of the first wired gloves available to home users in 1987 was the Nintendo Power Glove. This was designed as a gaming glove for the Nintendo Entertainment System. It had a crude tracker and finger bend sensors, plus buttons on the back. The resistive sensors in the power glove were also used by hobbyists to create their own data gloves.

Cyber glove:

The cyber glove, created by Virtual Technologies, Inc. in 1990. Virtual Technologies was acquired by Immersion Corporation in September 2000. In 2009, the cyber glove line of products was divested by Immersion Corporation and a new company, cyber glove Systems LLC, took over development,

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manufacturing and sales of the cyber glove.

5th Glove DFK:

Following the P5 Glove is 5th Glove. A data glove and flexor strip kit (5th Glove DFK) sold by Fifth Dimension Technologies. The package uses flexible optical-bending sensing to track hand and arm movement. The glove can be used with 5DT's ultrasonic tracking system, the 5DT Head and 5DT Hand tracker, which can track movement from up to two meters away from the unit's transmitter.

RELATED WORK

Health care sector:

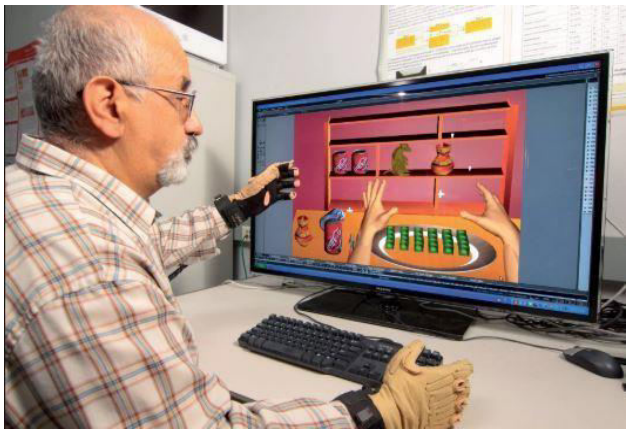
Implementation of Virtual Reality in healthcare sector encompasses surgery simulation, phobia treatment, robotic surgery and skills training. It helps to allows healthcare professionals with its unique features to learn new skills as well as existing ones ensuring a safe environment without causing any danger to the patients. For example, in case of robotic surgery where a surgery is performed by means of a robotic device – controlled by a human surgeon, which reduces both time as well as risk of complications. In this case Virtual reality plays an important role for training purposes and, in the field of remote telesurgery in which surgery is performed by the surgeon at a separate location to the patient. Therefore, implementing Virtual reality in this case helps to provide force feedback as the surgeon needs to be able to gauge the amount of pressure to use when performing a delicate procedure.

Gaming sector:

The concept of Virtual Reality is very popular incase of gaming sector. One of the major development within the world of video games is virtual reality. The gaming market has become the fastest-growing entertainment sector in the world with the evolution of Virtual Reality. Since gaming has became a platform to create digital worlds, Virtual Reality makes the user experience being in a three-dimensional environment and interact with that environment during a game.

Virtual reality in today's world:

Not only in these four sectors Virtual Reality is utilized in all most in every sector. Virtual Reality plays a crucial role in the every day lives of the world's population. Virtual Reality products are now used everywhere in today's world often to test product designs and simulate user interaction. The scope for Virtual Reality , goes beyond today's technology which actually helped it to come a long way. Although it has not yet broken into true mass appeal.



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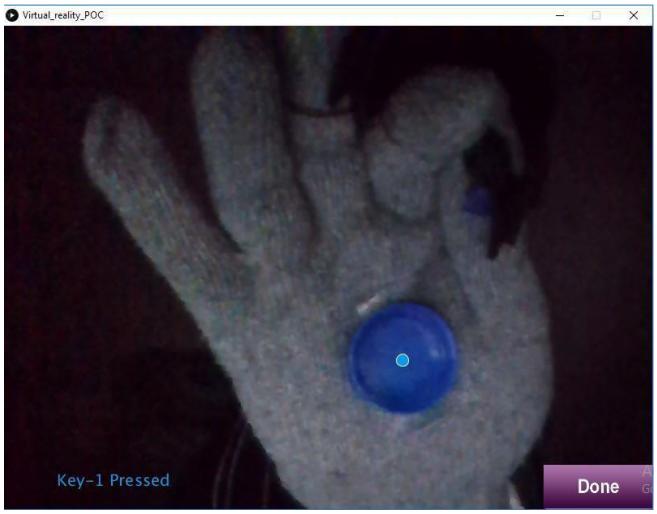
Results and discussion

Once we run the code the following screen will appear in which the object to be tracked have to be selected. In this case the object is the blue cap. The tracking can be done by clicking on the object.

When we touch the index finger with the thumb finger, we can see the message “key 1 pressed” at the bottom of the screen.



Once the DONE button is pressed the main screen will be appeared as shown below.

CONCLUSION

In this way the glove is designed for the use in Virtual Reality systems and is integrated into a suite of applications. As shown in this project we can control the PC using our hands without physically touching it. Virtual reality can be applied in many applications. The idea shown in this project is one of its application.

REFERENCES

[1] Chou W, Fang B, Ding L (2013) Two-step optimal filter Design for the lowcost attitude and heading reference systems. IET Science, Measurement & Technology 7: 240-248.

[2] Yun X, Bachmann ER (2006) Design, implementation, and experimental results of a quaternion-based kalman filter for human body motion tracking. IEEE transaction on robotics 22: 1216-1227

[3] Sabatini AM (2011) Estimating three-dimensional orientation of human body parts by inertial/magnetic sensing, Sensors 11: 1489-1525.

[4] Angelo MS (2006) Quaternion-based extended Kalman filter for determining orientation by inertial and magnetic sensing. IEEE Trans Biomed Eng 53: 1346-1356.

[5]G.J. Grimes. "Digital Data Entry Glove Interface Device." Bell Telephone Laboratories. Murray Hill. NJ.. US Patent 4.414.537. Nov. 8. 1983.

[6]Shin, J.H.; Hong, K.S. Keypad gloves: glove-based text input device and input method for wearable computers. Electronics Letters 2005, 41, 15-16.

[7]Kenn, H.; Megen, F.V.; Sugar, R. A glove-based gesture interface for wearable computing appli818 cations. Applied Wearable Computing (IFAWC), 2007 4th International Forum on 2007, pp. 1-10.

[8]Massimo Banzi. Getting Started with Arduino. O'Reilly Media, Inc., 2011

[9]Piyush Kumar, Jyoti Verma and Shitala Prasad. Hand Data Glove: A Wearable Real-Time Device for Human-Computer Interaction. International Journal of Advanced Science and Technology. Vol. 43, June, 2012.