

Laser Projection Keyboards:A Review Paper

Abhinandan Garg¹, Harjot Singh Gill²

¹Student, Department of Mechatronics Engineering Chandigarh University,
Gharuan

²Assistant Professor, Department of Mechatronics Engineering Chandigarh
University, Gharuan

abhig1123@gmail.com

Abstract

Technology is ever changing with getting, smaller, lighter, Faster and Stronger. With the advent of new tech more ideas emerge which pump the never ending cycle of development. As Printing came into existence , along with it came Typewriters. Then computers came in which transformed the typewriter into keyboards. As the Virtual Reality Gears have started coming in market better techniques are required to make the information feed better as the current keyboard tech is not efficient, too big to use. Many techniques are available to achieve the feat. Gesture ,Speech , switch or a combination of these technologies is used . This Report focus on one of those tech which is Laser projection based Virtual Keyboards ,what are the merits and de-merits of using this technology and using a specific UI (User Interface) for it to achieve max wpm (word per min).

The Technology is useful in Medical Industry for the voice impaired, blind or people with damaged fingers to type your enter information. The tech utilizes the motion of hands rather than the necessity of typing on accurate location, due to this minor inaccuracies can be neglected and the o/p depends more on how fast the human interacts as compared to how precise he/she is. The system is easy to learn.

Keywords: Keyless keyboards, Keyboard, Laser keyboards, motion sensing devices.

Introduction

Invention of Virtual keyboards started a long time ago , using image processing the motion of hand was recorded and processed to be simulated on a computer screen. It's uses a lot of different techniques to generate the desirable o/p. Most common mode used in all the techs is a camera module. It is used to capture motion data. The type of camera required can vary as per requirement. Most of the cameras use either a video processing camera or a Ir (Infrared Ray) camera. The Infrared ones could easily detect motion of objects in low light but a full fledged camera is useful for tasks requiring object detection.

Problems with Chiklet Style Keyboards

- Needs a plane surface to work on.
- Consumes Space
- Cannot be equipped to wearable technology.
- Not easy to use with VR Gear.

Need of plane surface:

Working on a uneven surface strictly effects typing experience and it increases error to max. This is a big de-merit of using keyboard .

Consumes space:

Everyday when we use our personal computers there is a required amount of space which is consumed by keyboard. If the size of the keyboard is variable or changed according to requirement then this issue could be solved.

Cannot be equipped to wearable technology:

World is developing , So is the tech. With the advent of wearable technology, we have Google glasses, smart cap, Smart Watch, Digitized dresses. All these devices required the input of information.

Not easy to use with VR:

Since the increase in popularity of VR headsets it's has turned into a requirement to have a keyboard structure which makes it east to type in details while using the headsets.

Due to the structure of keyboard, its difficult and in accurate to type while wearing a headset. So a new interface is required.

How Laser keyboard solves these issues?



Figure 1: The Laser projection keyboard, hand movement

This is a Laser Projection keyboard. It uses Low intensity laser rays which help the user to work easily without being harmed and for device to consume less power. It notes down the position of position at which the person pressed the key. It scans the image by sensing the reflected Ir rays from the finger and calculates the position of key and sends a corresponding signal to the computer.

What's the difference, it's just a keyboard which is in laser or say virtual form?

Yeah, it solves some of the issues like, compactness, need of space for use but how can it be used by the blind!?

Well, the next part can be solved by some prototyping i.e. with the change in the keyboard interface to PizzaText[1]. It's a UI which lets the people work faster and better. Watching

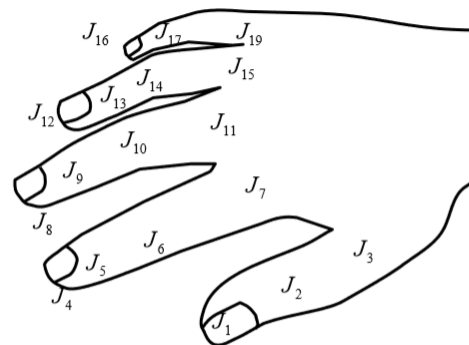


Fig. 5. Hand Representation by Parametric Approach.

the current speed of Laser Keyboards, the new interface will be faster as not need to search keys.

How shall the keys must be placed?

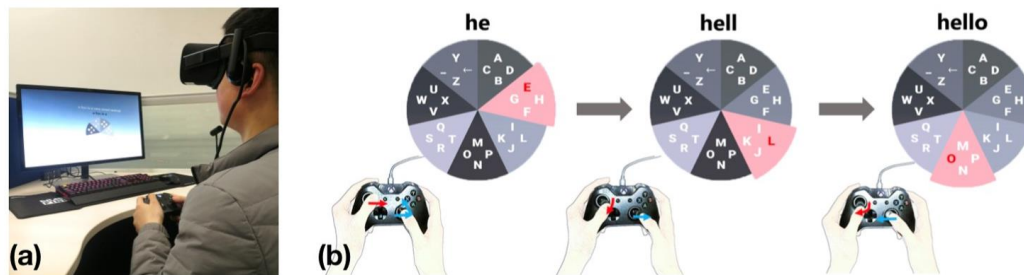


Figure 2:Person using PizzaText with a joystick[2]

The keyboard uses your 2 hands or 1 as you like. In 2 hand mode, the person has a screen with two pizza's being made of letters (as show in above figure 2). As there are total 104 keys(on original keyboards) approx. on a key board. 26 for alphabets, 10 for numbers, 6 operations , 12 for functions and more. So to make the interface simple, take on 50 keys. Each pizza has 25 keys, and the pizza is divided in to 5 slices and each slice has further 5 keys.

To select a letter, look on which Pizza(left one or right one) it is(Generally the letter will be divided in serial order). Move your hand to select that piece with your finger and move the other hand's finger in the direction it is. Thus the letter will be selected.

[1]The original PizzaText design results indicated that participants could achieve an average of 8.59 WPM (s.e. = 0.58) using the best performing technique (the 4 keys per slice layout)

Acknowledgments

I thank my teachers and University to help me out and publish this review paper. It was a great hep to read topics form IEEE Digital journal library. The idea came from the Wikipedia as I got to know about how keyboards work and different technologies used in making keyboard work. I read about Optical technology used and got to know about Laser keyboards . Thanks to youtube 's Matt Schaefer ,I got to know about the problems and advantages of using laser keyboards.

References

- [1] Difeng Yu, Kaixuan Fan, Heng Zhang, Diego Monteiro, Wenge Xu, and Hai-Ning Liang, "PizzaText: Text Entry for Virtual Reality Systems Using Dual Thumbsticks", DOI 10.1109/TVCG.(2018).2868581, IEEE Transactions on Visualization and Computer Graphics
- [2] Hafiz Adnan Habib, Muid Mufti, Member, IEEE," Real Time Mono Vision Gesture Based Virtual Keyboard System", Manuscript received October 15, 2006 0098 3063/06/\$20.00 © (2006) IEEE
- [3] Toshan Sabni¹, Jayant K Yavatkare², Divyanand S Yadav³, Prof. Vinit Kakde⁴ Department of Computer Engineering, Government College of Engineering, Jalgaon^{1,2,3,4} , Laser Projection Virtual Keyboard: A Laser and Image Processing based Human-Computer Interaction Device, ISO 3297:(2007) Certified Vol. 6, Issue 3, March 2017

Online

<https://www.youtube.com/watch?v=YRMsKjmiU4>

Matt Schaefer

Testing a Laser Keyboard