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VIRTUAL KEYPAD FOR DEVICE

Ashish Nayak[1], Chetan Naik[2], Dyanial Wilson[3], P.S.Saravanan[4]
Department of Electronic and Telecommunication Engineering,
K.C College of Engineering& Management Studies & Research, Thane,
Maharashtra, India.
ashishnayak47@gmail.com
naik96chetan@gmail.com
danielwilson555@gmail.com
pssaravan64@gmail.com

Abstract- **The development of a mechanism is presented which will behave as a portable keypad for device on an surface. The system consists of a pattern display and a 3D range camera for detecting the position of finger We analyze threshold information acquired with the 3D camera and detect the finger position using a reference frame which is already fed to the computer. The fingertips are detected by analyzing the hand's colour defined and obtaining the threshold curve with different feature. We perform a detailed analysis of the feature of the threshold curve and determine the position using coordinate system to find which device was selected to be switched on. This part of processing is done by using algorithm and are done by the PC. The system can be used in any application requiring zero form factor and minimizes physical contact with a medium and improves maintenance.**

Keywords: Swissranger, Canasta, CMOS/CCD, Senseboard, Image Processing, Micro-controller

I.INTRODUCTION

Recent years has seen a growth in the computer based systems which can work independently. The keyboards we use in our day to day life observe the drawback of their size. Thus they are bulky to carry and almost always require wiring. To counter these problems , a smaller and more portable touch kepad has been proposed .

This keypad has been designed using image processing .a camera captures an area in video format which is broken into frames .processing is done by computer for which algorithm is made and using suitable program finger movement can be determined to identify which device is to be turned on or off Tracking of finger and finger tracking based interfaces have been an actively researched problem for several years now. Recently, other kinds of sensors have also been used in wearable virtual keyboards. For example Sense board has developed a virtual keyboard system which makes use of two devices made from a combination of rubber and plastic. Such devices recognize typing events by analyzing the data from pressure sensors attached to the user's palm.

Developers have made significant advances in the development of vision based devices that do not require any wearable hardware. For example, Canasta and VKB have designed virtual keyboard systems using infrared cameras to detect the interaction between the fingers and a projected image from a laser diode which is a part of the device.

This paper describes a system based on the Swiss ranger SR-2 camera demonstrator, a novel 3D optical range camera that utilizes both the gray-scale and threshold information of the image to determine position of finger. Since the tracking of the fingers is not based on skin color, the detection system does not require any training to adapt to the user. After initial calibration for environment setup, the system is fully automated and can function without human intervention. As physical contact is not a involved in the system, important applications can be designed for computer users who are disabled and for users operating in hostile and sterile environments are envisioned.

II. LITERATURE SURVEY

The idea of the project came from a smaller and more mobile touch-typing device [1] had been proposed which did not have physical support. This device is known as virtual keyboard [2] or zero-form-factor interface .

In the system we implemented, a single low-quality camera captures RGB images of a user's hands [10], which touch a patterned surface in order to select coordinates.

Finger tracking and finger tracking based interfaces was a big problem. Glove-based systems, such as the "Key-glove" by Won, Lee [3], require the user to wear a tethered glove to recognize signal variations caused by the movement of fingers another sensor was proposed called

Sense board [4] a device which is used to navigate virtually without being in contact with the real world. This project describes a system based on the Swissranger SR-2 camera demonstrator [8], a novel 3D optical range camera that utilizes both the gray-scale and threshold information of the scene. The 3D optical range camera requires certain calibration procedures. To estimate the projection matrix of the camera, we use the classic method proposed by Tsai [6] with respect to a world coordinate frame attached to the table. The depth information supplied by the range camera allows developing simpler and more efficient computer-vision algorithms to estimate the position of fingertips and to locate the corresponding coordinates [5].The curvature of angles can be found by theory proposed by Segen and Kumar who used local curvature extrema [7], but with our specifically configured angle and elevation of the camera we need to determine only x and y coordinates. The algorithm regarding image processing using Matlab was referred from [9] Rafael C. Gonzalez and Richard E. Woods.

III. SYSTEM DESIGN

We use a 3D range camera which is placed several centimeters over the input surface, with the angle facing the working area. The size of the working area, is dependent on the spatial resolution of the camera, we can use a display projector mounted on the camera, facing the same area, which would generate the visual of the keypad and block selected. The proposed system consists of three main hardware modules: (1) 3D optical range camera, (2) visual display, and (3) processing platform. The range camera is connected to the processing platform, presently a personal computer (PC), via a USB2.0 interface. The visual feedback module communicates with the computer via serial port.

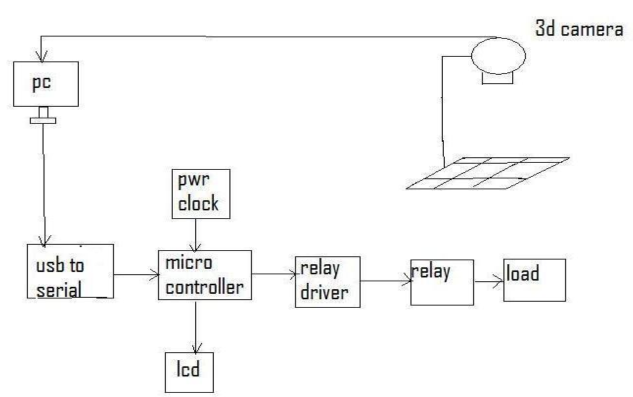

Fig1: Block diagram

The Swiss ranger SR-2 3D optical range camera simultaneously measures gray-scale and threshold of a scene. The sensor used in the camera is based on CMOS/CCD technology and it is equipped with an optical band-pass filter to avoid all background light. It delivers gray-scale and threshold information of the pixels. The light source of the camera is an array of LED modulated at 20 MHz with a total optical power output of approx 800 mW. the output of pc is given to USB to serial converter as the output of pc is USB and it is to be given to microcontroller which uses serial input. Microcontroller is connected to display to show which device is selected. Also microcontroller is connected to relay driver further to relay which are connected to devices

The threshold information supplied by the range camera allows developing simpler and more efficient computer-vision algorithms to estimate the position of fingertips and to locate the corresponding stricken block.

There are still some challenges associated with the camera utilized in this project. Problems such as light scattering, and threshold impact and unable to differentiate between finger and knuckle the major problem in the project is that when we move are finger from left to right in the area covered by camera the block over which finger moves should not get on ,so to overcome this problem we use a counter in microcontroller set for three second once finger tip is present in a block for more than three seconds the particular device gets on and counter is reset when we again place finger in the same place for more than three seconds the device gets switched off Moreover, the image resolution of the camera is relatively low, thus restricting for large view window. The current power consumption and size of the range camera are also important for its use in portable applications. Naturally, the current demo system is composed, in part, by prototypes. Based on our research we believe that all these problems will be solved in the near future, and we can get 3D cameras with adequate size and price ranges and resolution.

The visual feedback module is constructed using projection of a dynamically generated image based on a mini LCD display. Whenever the processing algorithm detects a stroke of finger, it sends an UPDATE command to the visual feedback module with specific block information. The feedback module updates the block or device selected.

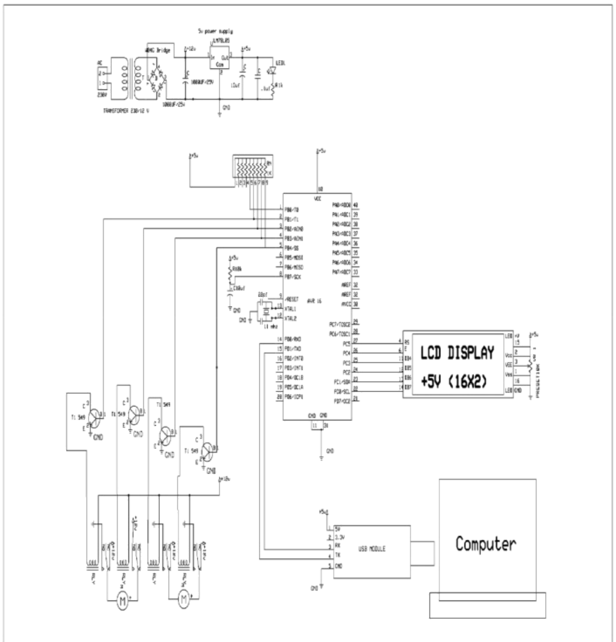

Fig 2 :Circuit diagram

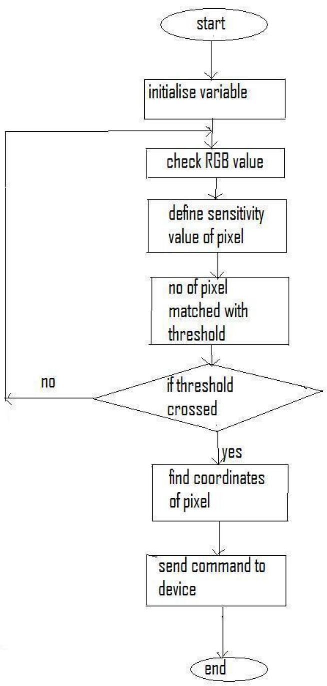

Fig 3: Flow chart

We have constructed algorithm for three things one is coordinates, sensitivity and other is threshold. First we define value of pixel which will be RGB value so that the sensor knows which colour to track for this purpose we keep sensitivity less in order to prevent functioning in day and night effect. Threshold should be defined and it should be kept high in order to prevent generation of event due to noise .thus threshold is used to remove noise effect. We divide the entire area in terms of coordinates to determine which coordinate finger is present or which device is selected.

IV.PROJECT APPLICATION

The *Virtual Keypad* be a help for a person with a handicap like being blind or deaf.

Used in industries

Learning languages, it is proven that children can learn a language faster if it is combined with gestures.

The manipulation of 3D models can be performed with equipment like Leap Motion, and the same functionality can be obtained by VKB.

V. ADVANTAGES

Portability- One of the most important advantages of virtual laser keyboard technology is the relative ease by which these devices may accompany smaller hardware.

Appearance- While not necessarily a practical consideration, it is important to note the significant role that style plays in the development of portable technology.

Maintenance- Unlike conventional hardware switches, virtual laser keypads have no moving parts, and the bulk of their functionality requires no actual contact with the device. Whereas conventional hardware is prone to damage by spills, drops and other malfunctions, virtual laser keyboards are easy to maintain.

VI.LIMITATIONS

Since regular users of the conventional switch are familiar with it because of its physical feel. Getting used to a virtual keypad can take some time.

More precision is required while using a virtual keypad as they are very sensitive to our finger movements

VII .FUTURE SCOPE

Implementing this project we can use this concept for virtual keyboard and ATM machines.

The number of devices can be increased accordingly based on the preference of the user by just adding the number of relays equal to the number of device.

VIII. CONCLUSION

The virtual keypad divides the area captured by camera into blocks depending on number of device .depending on sensitivity identifying the skin tone it determine which block is selected or which device is to be turned on or off by using image processing. Thus this project succeeds in giving portability and easy maintenance of switch .

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