GESTURE RECOGNITION USING DEPTH AND RGB CAMERA WITH NIGHT VISION

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Abstract: In project, the depth sensor of Kinect is an infrared camera, the lighting conditions. Signer's skin colors and clothing, and background have little impact on the performance of this system. The accuracy and the robustness make this system a versatile best component that can be integrated in a variety of system in a daily life. Gesture recognition using Depth Camera and RGB Camera with Night Vision is investigated for providing accessibility to the computer systems with using Kinect Sensors for gesture control. The motive of this project is to create a more interactive system that could naturally interact with human with using hand gestures. This system is based in creating computer vision at night as well as at day, in this project we are using different method of capturing and processing images, traditional image processing use 2D images for image processing 2D provides pixel value in color bits. We are using 3D images for processing so that the camera output provided in distance that means in pixel provide its value in millimeters for recognizing gestures and further processing done on Raspberry PI.

Index Terms **- 2D image, 3D image, IR Laser, Triac, ADC, 3D Image Feature Extraction, Pixel, ZCD.**

I. INTRODUCTION

 Human gestures represent a variety of motion expressed by the body which includes facial expressions and hand movements. Among all the variety of gestures, hand gesture is the most expressive and the most rarely used and proves an excellent means for the physically disabled people as well. Direct use of hands as an input device is an modern method for providing natural Human Computer Interaction which has its inheritance from text- based interfaces through 2D graphical-based interfaces, multimedia based interfaces, to full-fledged multi-participant Virtual Environment (VE) system. To obtain more accuracy in the detection we have introduced Depth Camera to capture depth data up to 30 frames per second. It extracts hand and fingertips from the acquired depth image. It recognizes the movement and click gesture by analyzing the location and shape change of fingertips. The users hand region will be extracted in each frame by analyzing the depth map output of the Kinect sensor, which is done by shareholding, applying some morphological operations, and finding connected components. by implementing this project, we would be able to obtain improved image processing, and human to computer interaction will get Acceleration.

The development of computer technology and new equipment, the traditional multimedia equipment can no longer meet people's requirements. Equipment as projector, advertising and other equipment are all one-way transmission, the user can only accept information passively. At present, the emergence of new intelligent devices such as intelligent bracelets and running shoes greatly improve the situation, indicating the enhance of human-computer interaction. As gesture has the advantages of natural and intuitive, gesture interaction will become one of the main ways of human-computer interaction. At the same time, gesture recognition has been widely used in mobile phones, computer control, sense modality games and robot control. The current method of hand gesture recognition is to locate the hand position and angle of the human body with external devices such as data glove and finger tracker then control the relevant equipment by analyzing these data through the computer terminal. Such gesture recognition methods have a great impact on human Comfort and naturalness, and these external devices are expensive. And later gesture tracking with optical mark was proposed to reduce costs. Therefore, the data gloves and optical markers are dependent on external device, and it's not convenient enough to operate.

II. MOTIVATION

Automation is the primary need for the present world. There are various types of automation like building automation, industrial automation, home automation, artificial automation etc. Smart can be a potential system which provides support to elderly or disabled persons. Home automation is the use and control of home appliances remotely or automatically. Day by day the gap between machines and humans is being reduced. Nowadays hand gesture based home automation is getting more importance.

Gesture recognition refers to recognize the motion of the human parts like hand, face etc. Most of the electronic components manufacture focuses on the hand gesture basis. In our project, we are using Depth camera to capture depth data   up to 30 frames per second. It extracts hand and fingertips from the acquired depth image. It recognizes the location and shape change of fingertips. Along with that we are using RGB camera and Arduino.

III. LITERATURE SURVEY

1. Arathi P.N,S.Arthika,S.Ponmithra (2017 IEEE), "Gesture Based Home Automation System", UG Scholar Department of Electronics and Instrumentation Engineering Sri Ramkrishanan Engineering College, Coimbatore, Tamil Nadu, India
 In this proposed work we have implemented the gesture controlled home automation using MATLAB simulation software through the microcontroller. Taking in concern the day to day challenges in the world with growing technologies in normal life, the following proposed work was created. The problem of disability is gaining more and more importance all over the world. At the same time there is a network of Non-Governmental Organizations' working for the development of persons with physical disabilities. Therefore providing solution for the inabilities is the prime moto of this work.

Gesture plays a major role in this proposed work. A gesture is a form of non-vocal communication in that human body actions can be able to communicate the particular speech or communication or even messages. Gestures include movement of the hands, face, or other parts of the body. Gestures allow individuals to communicate a variety of feelings and thoughts, from contempt and hostility to approval and affection. There are other Systems which could be controlled by a gestures include media players, remote controllers, robots, etc. Gesture recognition is the mathematical interpretation of a human motion by a computing device.

2. Guangjun Dai, Lei Yu[*], Jun Huang (2017 IEEE), " Dynamic and Interactive Gesture　Recognition AlgorithmBased on Kinect", College of Mechanical and Electrical Engineering, Soochow University, Suzhou 215021, China
The development of computer technology and new equipment, the traditional multimedia equipment can no longer meet people's requirements. Equipment as projector, advertising and other equipment are all one-way transmission, the user can only accept information passively. At present, the emergence of new intelligent devices such as intelligent bracelets and running shoes greatly improve the situation, indicating the enhance of human-computer interaction. As gesture has the advantages of natural and intuitive, gesture interaction will become one of the main ways of human-computer interaction. At the same time, gesture recognition has been widely used in mobile phones, computer control, somatosensory games and robot control. The current method of hand gesture recognition is to locate the hand position and angle of the human body with external devices such as data glove and finger tracker, and then control the relevant equipment by analyzing these data through the computer terminal. Such gesture recognition methods have a great impact on human comfort and naturalness, and these external devices are expensive. And later gesture tracking with optical mark was proposed to reduce costs. Therefore, the data gloves and optical markers are dependent on external device, and it's not convenient enough to operate.

3. Hung-Kuan Liu (2015),' Three-Dimensional Gesture Interactive System Design of　Home Automation for Physically Handicapped People', Department of Electronic Engineering National Taipei University of Technology Taipei, Taiwan

Due to the physical limitation, handicapped people cannot use home appliances well. In order to furnish them convenient life, home automation system for physically handicapped people should be developed. How to design the well user interface of electric appliances become more and more important. Well-designed user interface will provide physically handicapped people comfortable environment. Based on the reason, many papers discuss different kinds of user interfaces. Borisenko presents a low cost bidirectional Human-Computer Interface that provides the user with a faster training time and discusses the design, implementation and testing of the device.

4. A.Messaci (2015), 'Design and Implementation of Appliance Control', Centre de Dévelopement des Technologies Avancées CDTA Alger, Algerie.
To exploit virtual and augmented reality, the concept of interaction was introduced. However, experiments in this field have shown that the use of 2D interfaces in virtual environments was not effective at all from the point of view of the interaction that is what led to the 3D interaction. The interaction plays a very important role in the effective use of a computer and its different Systems. The interaction can be defined as a language of communication between man and machine. This language is the set of actions/reactions loop and computer through sensor and motor interfaces and interaction techniques. The fundamental tasks of 3D interaction are: (i) Navigation, it includes all view point movements of the users in virtual environments. (ii) Selection, it is the task of acquisition or designation of a target. (iii) Manipulation, it represents the process that allows to change the properties of an object or a set of objects. Virtual world and System control allow users to run a command to achieve a specific goal.

IV. EASE OF USE

A. RGB Camera

For Gesture Recognition, we adopt an approach which discerns the hand from image data from an RGB camera. RGB camera is nothing but the 2D camera which is used to capture color images.

B. Depth Camera

The system uses a 3D depth camera to capture depth data up to 30 frames per second. It extracts hand and fingers from the acquired depth image. It recognizes the movement and click gesture by analyzing the location and shape change of hand movements are they close or fa away from the sensor.

C. Arduino (Wi-Fi)

Arduino is an open source electronics prototyping platform composed of a microcontroller, a programing language, and an IDE. Arduino is a tool for marketing interactive application, designed to simplify this task for beginners but still flexible Enough for experts to develop complex projects. Wi-Fi module is used for future enhancements.

D. Triac Voltage Control Unit

TRIAC is the semiconductor device widely used in power control and switching systems for AC voltage supply. It finds systems in switching, phase control, chopper designs, brilliance control in lamps, speed control in fans, motors etc. The power control system is designed to control the distribution level of AC or DC.

E. Application:

For this system we are using application that are using application that we are going to control light intensity as per hand gesture is made, for this we require some electronics part to control light intensity that is done by using zero crossing detection unit, and voltage control unit that consists of triac, by detecting zero crossing of AC wave and parallel calculating time for triggering of triac is been done.
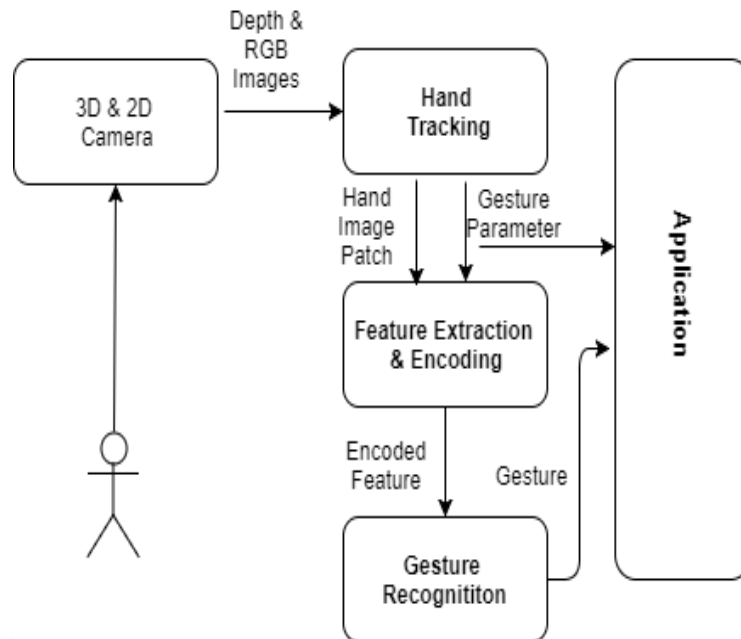
V. SYSTEM ARCHITECTURE
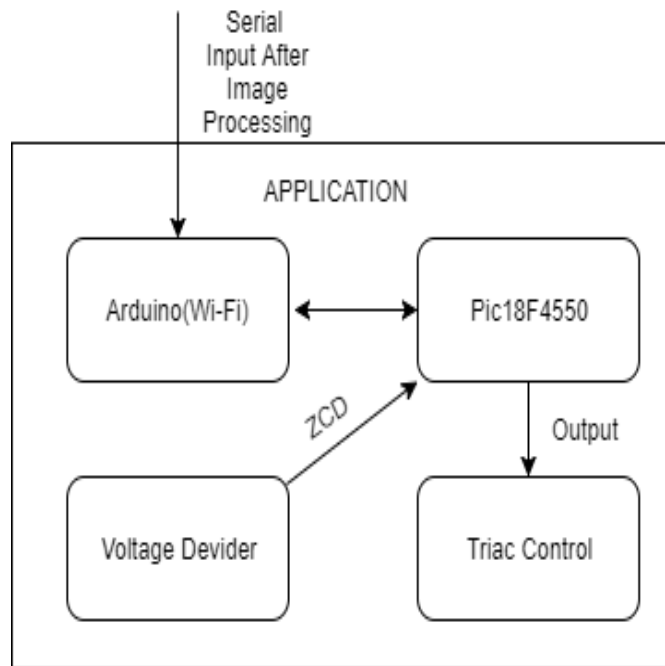

Fig. 1 System Architecture

Fig. 2 Application

VI. RESULTS AND DISCUSSION

As a system in working system used 3D camera which works with infrared light, so we find that the 3D camera working in night Also, we are able to provide gesture input to system in night also without any extra need of light, system is powerful and robust which provides working distance range of 16 feet.

VII. CONCLUSION

The system is motivated by the importance of real time 3D image processing and capable of working in dark environment and background lighting conditions, and is able to track body posture and gesture of person. It is expected that more applications with excellent recognition result will be developed. human interaction will be gestures recognition. As today's generation expects the ease of access and reliability from evolving technology they need more towards automation than the manual use.

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