Gesture control of Bot using Leap Camera (Sensors)

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Abstract— BOT are the technology which is widely used nowadays for videographer or surveillance. A simple gesture controller can make the task of controlling drone much easier. In this project, the Leap Motion Controller is used for recognition of gestures, which are motion of the hand, and as a result, we can control the same. The Leap Motion Controller is an eight by three centimeter unit, which comprises two stereo cameras and three infrared LEDs. This proposes a hand gesture recognition scheme explicitly targeted to Leap Motion camera. The two cameras that are LEDS are used to capture the gesture and control the BOT. The main advantage of this system is that capturing all the points of hand & will help to control the bot without using any remote.

Key words: Leap Motion Controller, LEDs, Gesture Recognition, Leap Camera

I. INTRODUCTION

Automatons are these days broadly utilized as a part of all sort of uses. Automatons utilized as a part of use like flying videography, photography, reconnaissance and so on. In this investigation, we exhibit our execution of utilizing a movement controller to control the movement of an automaton by means of straightforward human motions. In this undertaking, the Leap Motion Controller is utilized for acknowledgment of signals, that is movement of hand, and accordingly, we can control the movement of the automaton by straightforward motions from the human hand. As of late, hand motion acknowledgment has been created a developing enthusiasm because of its applications in a wide range of fields, for example, human-PC communication, mechanical technology, and PC gaming, programmed gesture based communication elucidation and so forth. The issue was initially handled by the PC vision group by methods for pictures and video. Dynamic hand motion acknowledgment is thought to be the issue of consecutive displaying and classification. The current presentation of the Leap Motion gadget has opened new open doors for motion acknowledgment. Rather than utilizing Kinect, this gadget is straightforwardly focused to hand motion acknowledgment and specifically figures the situation of the fingertips and the hand introduction.

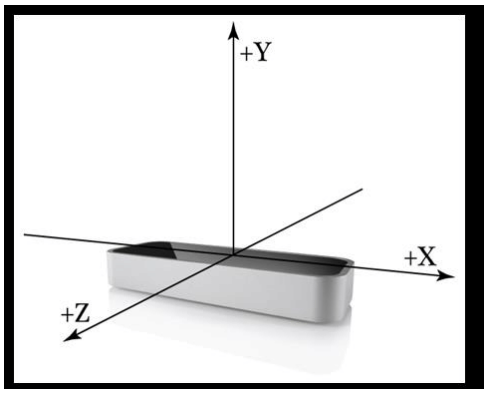

Fig. 1: Leap Sensor Principle

The Leap Motion controller consists of a small USB device which is placed top of the device. It can also be mounted onto a virtual reality headset. Using these two monochromatic IR cameras and three infrared LEDs, the device observes hemispherical area, to a distance of about 1 meter. In this paper, the Leap Motion Controller is used for recognition of hand gestures, which are motion of the hand, and as a result, we can control the motion of the drone. There is some previous implementation to control the drone but in this we will show how capture all the points of hands to control the drone with given gesture.

II. PAST WORK

"Gesture Control of Drone Using a Motion Controller" Ayanava Sarkar, Ketul Arvindbhai Patel, Geet Krishna Capoor, Ganesh Ram R.K [1] examines that Drones nowadays are widely used around the world for a variety of purposes including aerial videographer, photography, surveillance etc. In many cases, there is a requirement of a skilled pilot to perform these tasks using the drone which proves to be exorbitant. In this study, we present our implementation of using a motion controller to control the motion of a drone via simple human gestures.

"Hand Gesture Recognition With The Leap Motion And Kinect Devices" Giulio Marin, Fabio Dominio, Pietro Zanuttigh [2] expresses that the current presentation of novel procurement gadgets like the Leap Motion and the Kinect permits to acquire an exceptionally enlightening depiction of the hand represent that can be misused for exact motion acknowledgment. The paper proposes a novel hand signal acknowledgment conspire unequivocally focused to Leap Motion information. the control of automaton will help us to utilize it in different application for work. An arrangement of highlights is separated from the figured from the Kinect and joined with the Leap Motion ones so as to enhance the acknowledgment execution.

"Dynamic Hand Gesture Recognition With Leap Motion Controller" Wei Lu, Member, IEEE, Zheng Tong, and Jinghui Chu [3] looks at that this paper, we propose a novel element vector which is reasonable for speaking to dynamic hand signals, and introduces an acceptable answer for perceiving dynamic hand motions with a Leap Motion controller (LMC) as it were. The proposed include vector that comprises of single-finger highlights and twofold finger highlights has two fundamental benefits.

"Knobs Control in Virtual Reality by Using Leap Motion Somatosensory Controlled Switches" Bing-Yuh Lu, Chin-Yuan Lin, Shu-Kuang Chang, Yi-Yen Lin, Chun-Hsiang Huang, Hai-Wu Lee, Ying-Pyng Lin [4] states that the investigation displayed a Leap Motion somatosensory controlled switches. The switches were executed utilizing transfer. The "open" or "short" of the exchanging circuit were controlled by the detecting of the Leap Motion somatosensory module. The virtual switches on the screen have intended to be 5 circle catches. Jump movement

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somatosensory controlled changes was executed to help a few people whose hands have been harmed can't play out the switches well.

III. SYSTEM IMPLEMENTATION

A. *Hardware:*

1) Microcontroller:

We are using the ARM based AVR microcontroller-ATMEGA32 which is a 40 pin IC consisting of 5 ports and 32 programmable input/output lines. It operates on an 8 MHz crystal. The microcontroller has an 8-channel, 10-bit ADC and 3 on chip timers. It also consists of 1024 bytes of EEPROM and 2K bytes of internal SRAM.

The PC system are attached to the microcontroller through the Serial communication. The DAC converts the digital values from the sensors to analog. then the values are given to Remote unit.

2) PCF8519P:

The PCF8591P is a 8bit A/D and D/A converter in 16 stick DIP bundle. It comprise a solitary chip, single supply, low power 8bit CMOS information obtaining gadget with four simple sources of info, one simple yield and serial I2C transport interface. The elements of PCF8591P incorporates simple information multiplexing, on chip track and hold work, 8bit simple to advanced transformation and 8bit computerized to simple change. The transformation rate is given by most extreme speed of the I2C transport.

3) MAX232

The MAX232 shows Fig 3.12 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA-232 voltage levels from a single 5-V supply. Each receiver converts EIA-232 inputs to 5-V TTL/CMOS levels. These receivers have a typical threshold of 1.3 V and a typical hysteresis of 0.5 V, and can accept ±30-V inputs.

4) Softwares:

- *mikroC PRO for AVR:* used for coding the microcontroller in embedded C.
- *AVRFLASH:* used to burn the program onto the microcontroller.
- *NetBeans IDE 7.1:* to create the GUI, registration and user login forms for the server.
- *Serilization:* to create the user database.
- *Express PCB:* to design the PCB layout.

B. *Operation:*

The Leap sensor controller as appeared in Fig 2 is a gadget which utilizes calculations for such activities. In equipment of Leap controller, the Controller is an eight by three centimeter unit, which involves two stereo cameras and three infrared LEDs. The two stereo cameras and additionally the three infrared LEDs play out the capacity of following the infrared light.

When the palm portion is completely parallel to the LEAP motion controller, it will be able to detect it. It is because the palm being parallel to the controller, it will recognize it as a single finger after this the drone can be controlled by given direction. The Leap Motion Controller uses its two infrared (IR) stereo cameras and three infrared LEDs to track any hand motion up to a distance of about 1 meter or about 3 feet directly above it.

In this we will first read of all points from leap sensor. All the points taken from the leap camera would be represented as P1, P2,…..PN, respectively. Scaling the points before would help us to find their feature extraction further used for implementing in application. Now start to calculate the features of all points and then calculate the distance factor. The Distance vector formula will calculate all the points i.e D1,D2…..D16, and now it would be used for detecting the feature. Compare the gestures stored in database with the distance vector points and if it matches then the resultant gesture will be given to hardware to control the bot/drone. By using the Cosine similarity algorithm, calculate the angle values for respective points. Then sort the values and find the maximum value out of it, & then create the gesture by the maximum value. at the end the command will be given to hardware ie drone to control it.

The main objective of this project is to developing an application using 3D camera i.e Leap sensor to control drone/bot. In this paper we implement writing codes to capture the hand gesture captured by the Leap. This paper will help us to detect & calculate total 16 points of hand which will be helpful to detect any gestures. The drone/bot responds to any hand gesture and moves accordingly. The points can be determined by using cosine Similarity Algorithm were if the gesture matches with the gesture stored then the drone would be controlled as that.

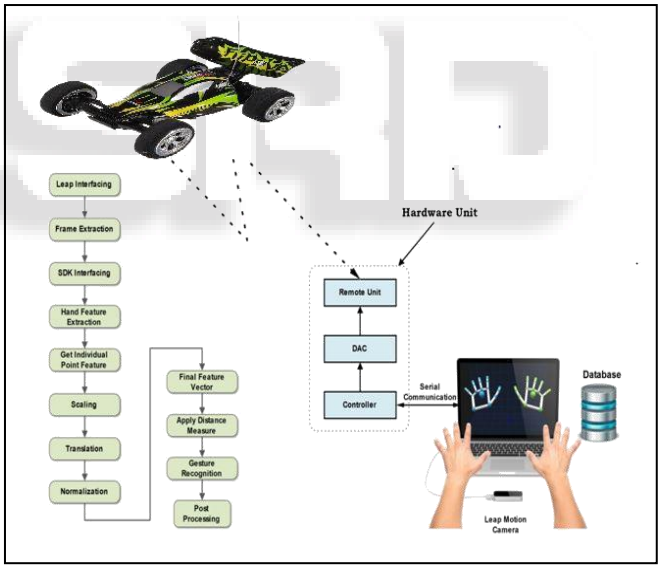

Fig. 2: Block Diagram for Controlling BOT

IV. FUTURE SCOPE

The system helps to detect all the points of hand to control the gesture of bot. Creating a gestures and storing in database will help to find every time the gesture that is recorded and if it matches with the stored database then it would be given as output to the hardware and respectively it will move or control the drone. The proposed feature vector that consists of single-finger features and double- finger features has two main benefits. Future work will work with the joint of the two gadgets keeping in mind the end goal to figure new highlights in light of the blend of the 3D positions registered by the two gadgets, and the acknowledgment of dynamic signals with the two sensors.

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V. RESULTS & DISCUSSIONS

The bot responds to any hand gesture and moves accordingly. The hand gestures relayed are converted to linear and angular displacements and stored in an array. Thus, this project captures all the points of hands & detects the gestures as per the design and controls the bot.

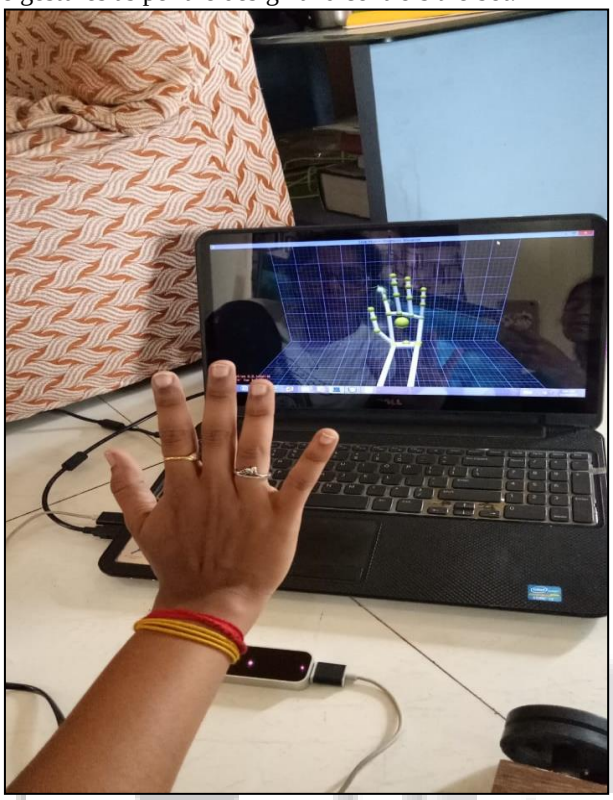

Fig. 3: Forward direction

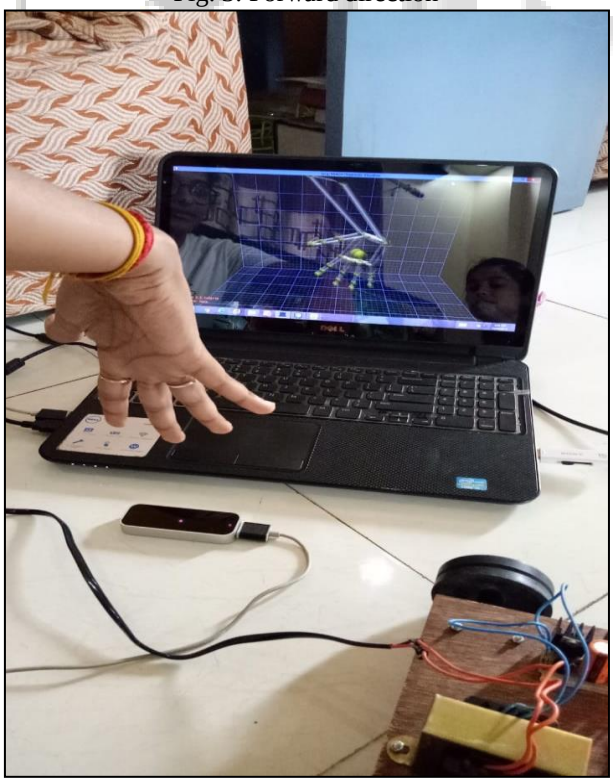

Fig. 4: Reverse direction

VI. CONCLUSION & DISCUSSIONS

Using LEAP Motion Controller, we are able to control the bot by using hand motion. The bot responds to any hand gesture and moves accordingly. It forms a hemispherical area above itself whose radius is about 1 meter and recognizes any hand motion occurring in that plot of volume. While Creating a gestures and storing in database will help to find every time the gesture that is recorded and if it matches with the stored database then it would be given as output to the hardware and respectively it will move or control the drone. The hand gestures relayed are converted to linear and angular displacements and stored in an array. Hence, it can be concluded that with the help of the Leap Motion Controller, we can use bot to perform various tasks such as aerial videography, performing acrobatic tasks, to name a few. This project concludes of detecting all 16 points and controls the drone respectively for the further application.

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