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Gesture Controlled Arduino Quadcopter using Kinect Sensor

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Abstract - *In this project focuses on developing a hand gesture-based quadcopter. Gesture recognition technology helps you to communicate or control any other devices. Here we use a Kinect motion sensor to control the quadcopter. The user can make these gestures in front of Microsoft Kinect devices, in the Kinect device, it has three motion cameras to track the user hand gesture.in this project, we piloting an Arduino-controlled quadcopter using a Microsoft Kinect device.*

***Key Words*: Quadcopter, Microsoft Kinect sensor, Arduino uno microcontroller, xbee usb dongle.**

1. INTRODUCTION

1.1 Now day many robot and devices are designed according to parameters and their requirement. There are many ways to control robot or devices like voice control, remote control etc. but gesture control is something new and unique. Its system requirement is transmitter and receiver. Transmitter is like an antenna which transmits the data. Receiver is a sensor which receive the data from transmitter. Gesture control is not a difficult controller it just uses wave human hand with bend sensor and receiver. Gesture control use in many device and equipment's like robotic arms, drone etc. it is very useful for defense system.

1.2 TECHNOLOGY - This gesture control technology is wireless technology we control devices without any remotes or keypads controller. Gesture controller is basically observing a human hand motion through 3D camera and detect the command. now in current face this technology focus on emotion recognition and gesture recognition so any user can easily control any device without and remotes or keypads and it's a touchless without any touch people can control and device with own hands movement. many other methods using and some algorithms to explain the sign language. Here we use concept of gesture control with some hand movement, it is possible to control any device with own hand movement and it will move accordingly. it is conventional input device such as keyboards, touchscreen, mouse etc. gesture control is a new technique to control any device.

2. OBJECT USE: QUADCOPTER

2.1 Quadcopter is UAV (unmanned aerial vehicle) a flying device. Which is use for surveillance, land mapping etc. it has four brushless motor's which control the speed, rotation and direction according to users. it movie in three axis.

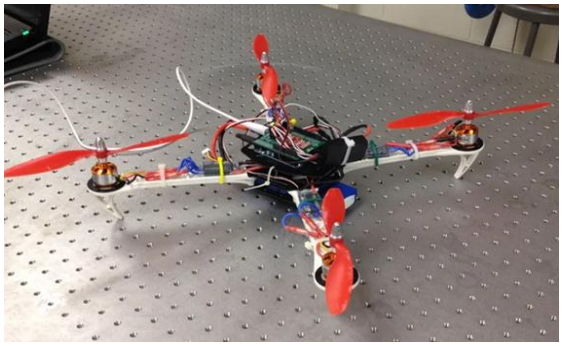

Fig.1 Quadcopter

Basically, quadcopter control by remote. Here quadcopter control by the gesture motion with the help of Kinect motion sensor. In this method Kinect tacks a user's hand movement and converts

2.2 QUADCOPTER PARTS

1. Four brush less motors
2. Four propellers
3. Glass fiber frame
4. Arduino uno
5. Esc (electronic speed controller)
6. Microsoft Kinect senor
7. 5000mah battery
8. MPU-6050 3-axial gyroscope and accelerometer
9. Xbee usb donge
10. Xbee module for Arduino them to xyz coordinates.

2.3 ARDUINO

Fig.2 Arduino uno board

. Arduino uno is a microcontroller board.

. Main component is microcontroller

. It has 13 digital pins used to connect output pins. Here we connect output component.

. Analog pins to connect input like sensor.

. Power supply for input and output components.

. Power jack to give power to Arduino

. USB port is used to upload the program.

. While upload the program and start again we use the reset button.

2.4 KINECT SENSOR

Fig.3 Microsoft Kinect sensor

It is a line of motion input device allow user to interact without any intermediator device. Camera setup: RGB camera (For taking color image), IR camera (Emits IR rays), monochrome camera (It receives IR rays). it detects fully body 3D motion and 2D skeleton tracking. It also works in low light conditions.

2.5 GYROSCOPE AND ACCELEROMETER

Fig.4 MPU6050 (MEMS) Micro Electromechanical System.

It is micro electro-mechanical systems.it consist three axis accelerometer and three axis gyroscopes inside it. It used to measure orientation, displacement and many other motions.

2.5 ESC (ELECTRONIC SPEED CONTROL)

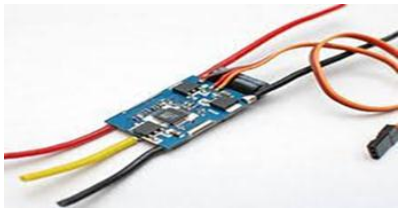

Fig.5 ESC

It controls the speed of quadcopter motors.

2.6 GLASS FIBER FRAME

Fig.6 Quadcopter Frame.

This is quadcopter frame equip motors and batteries and Arduino etc.

2.7 XBEEE MODULE

Fig.7 Xbee wireless communication

It is a wireless antenna used for the long-range communication. Range 1600m in line of sight, 90m in indoor condition.

3. WORKING PROCESS

In this method Arduino controlled quadcopter using a Kinect sensor. Kinect sensor is based on (NUI) natural user interfaces. The Kinect sensor tracks a user's hand motion and converts them xyz coordinates. This output is transmitted in Arduino through xbee transmitter. Using the OpenCV library, we used this application to tracks the wave of user's hand. This application read the Kinect data and sent to an Arduino as analog output. All data after proccing in OpenCV that data is transmit from xbee transmitter to Arduino. When the user stand in front of Kinect senor they track the motion of user's hand and another side Kinect sensor is connect with laptop or pc they receive the data. OpenCV is processing that data and after proccing that data is transmit from xbee transmitter to xbee receiver which is mount on Arduino micro controller after receiving that data. Arduino read it and control the output component

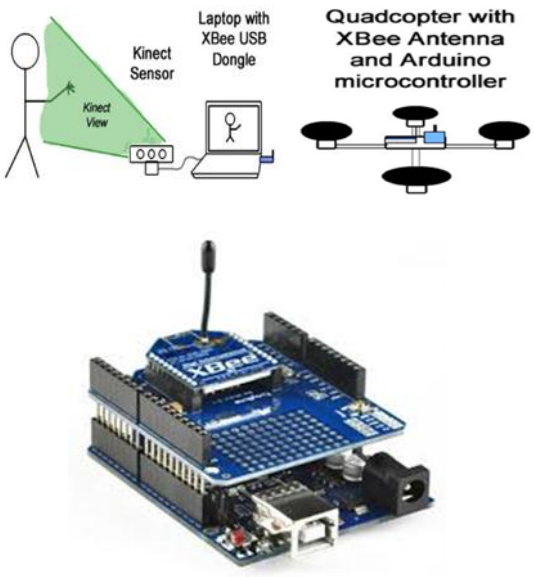

Fig.8

Table-1

Body posture	Command
Right arm above head	Take-off
Left arm above head	Land
Right arm in front of face	Forward
Left arm in front of face	Backward
Right arm flexed right	Right
Left arm flexed left	Left

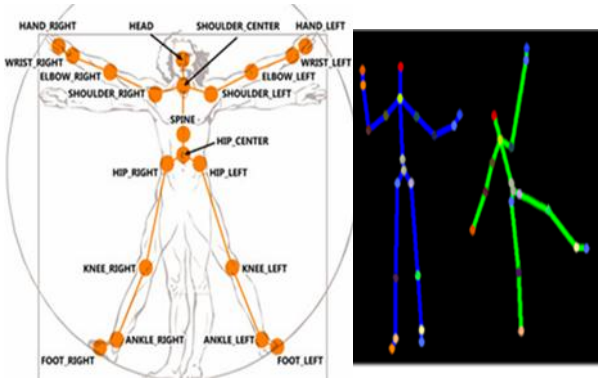

Fig.9 Skeletal Tracking using Microsoft Kinect.

4. APPLICATIONS

1. Military uses: are used for surveillance.

2. It used for land mapping

3. It used in industrial field

4. Gesture application used in medical field for surgery purpose.

5. It used to monitor the disaster areas.

6. It used as assistance for physically challenge people.

5. ADVANTAGES

1. It is portable.

2. It can be placed anywhere.

3. Wireless communication no need of lengthy wire.

4. Here no need any mechanical remote.

5. Easy to control.

6. CONCLUSION

Our project is controlling a quadcopter using hand gestures. We apply some gesture and control the devices. Here we use Kinect sensor to control the quadcopter. User's does not need to handheld any mechanical controller. Gesture control being a more natural way of controlling quadcopters or other devices makes more efficient and easier. we presented an image recognition-based communication to control the quadcopter with hand gestures.

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