UNMANNED AERIAL VEHICLE FOR BUILDING CONSTRUCTION

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ABSTRACT

There are currently two types of unmanned aerial vehicles (UAVs): autonomous aircrafts and remotely piloted aircrafts. Remotely piloted aircrafts are tough to control using handheld remotes. We propose an intuitive approach to controlling these UAVs, using hand gestures rather than remotes.Our project will allow a user to control a quadcopter (a type of UAV) using hand gestures.The operator will make these gestures in front of a Microsoft Kinect device, which can sense both colored light and depth of field. Using a Kinect allows us to define more complex gestures that take advantage of the distance of the operator's hands from the camera. Furthermore, they may allow us to discard the typical colored gloves usually worn by 6.111 students that enable easy hand-tracking by color matching .When an operator makes a correct gesture, the FPGA will classify it, and send the appropriate signal to the quadcopter's remote controller, which will then send an infrared signal to the quadcopter commanding it to perform a particular action .Due to time constraints, we chose to limit the number of ways the user can control thequadcopter. Manually holding a quadcopter's altitude constant without complicated controls and avionics is a challenge on its own. Therefore, we decided it is best to only allow the user to turn the quadcopter on and off and control its elevation, leaving out the ability to turn left or right.

Keyword:-*Introduction ,Project Details & Analysis,Block Diagram,Hardware,,Interfacing, Algorithm,Advantages,Application,References.*

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1. INTRODUCTION

Quadcopter, also known as quadrotor, is a helicopter with four rotors. The rotors are directed upwards and they are placed in a square formation with equal distance from the center of mass of the quadcopter. The quadcopter is controlled by adjusting the angular velocities of the rotors which are spun by electric motors. Quadcopter is a typical design for small unmanned aerial vehicles (UAV) because of the simple structure. Quadcopters are used in surveillance, search and rescue, construction inspections and several other applications. Quadcopter has received considerable attention from researchers as the complex phenomena of the quadcopter has generated several areas of interest

1.1 Aim

The aim of this work is to create a human–robot interaction framework to allow a quadrotor both to perform autonomous navigation tasks (by completing path-following missions constituted by a sequence of pre-specified

way-points) and to be controlled by user's body postures. The main requisites needed to implement a systemcapable of controlling the aerial vehicle by means of user's posture are:
(1) extracting spatial information from specific parts of the body.
(2) recognizing postures from this information.
(3) associating recognized postures to specific commands to be sent the quadrotor.
In this work, the Microsoft Kinect is used as gesture tracking device.

1.2 Objective

i. To reduce manpower requirement
ii. To automate building construction
iii. To increase speed of work

2. PROJECT DETAILS AND ANALYSIS

Our design is composed of two main parts: gesture recognition and quadcopter control.The gesture recognition component is responsible for capturing information about the operator in the form of video and depth sensing, recognizing the operator's hands, and
then mapping the operator's hand movements to predetermined gestures. The quadcopter control component is responsible for interfacing with the infrared transmitter that controls the quadcopter and sending signals that correspond to the controls indicated by the gestures.

2.1 Gesture Recognition

The gesture recognition component is composed of a five step pipeline shown in figure 1.The first step consists of capturing hand gestures using a Kinect camera. The subsequent steps allow us to detect the location of the hands, transmit the data to the FPGA and determine which gestures correspond to the operator's actions.

2.2 Kinect Camera Input

We will be using a Kinect camera to capture the user's hand gestures. The Kinect camera affords us a 3D representation of the space: it provides us with an RGB image stream as well as a depth stream.TheKinect camera will be connected to a PC and a few computations will also be computed on the PC so that we can can use less bandwidth when sending data to the FPGA.

2.3 Hand Classifier

This module finds the center of mass of each of the operator's hands. It takes in depth data from the Kinect, and potentially color stream data that has been mapped from RGB (Red, Green Blue) to HSV (Hue, Saturation, Vibrance) color space.

3. BLOCK DIAGRAM

Kinnect sensor is connected to the computer system using USB. Quadcopter & computer system is interfaced using wi fi connection.Kinnect sensor captures human movements & sound gestures.We are providing the commands which are human movement gestures.For particular command , single human gesture is stored in the database.
This database is stored in the computer & quadcopter is programmed according to that.
Quadcopter is build with the arm which is used to pick & place the brick like structure for construction of building wall.

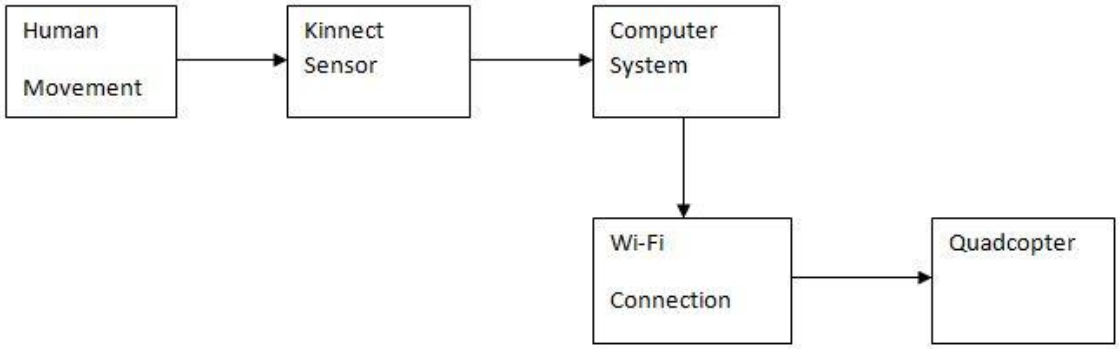

Fig-1:Block diagram of project

4. CONCLUSION

Kinnect sensor senses the human guestures and passes it to Quadcopter.Quadcopter follows that commands and do process according to that commands.It will help us in future to make a world autonomous.

6. REFERENCES

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