FACE DETECTION USING UNMANNED AERIAL VEHICLE FOR SURVEILLANCE AND BORDER SAFETY

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Abstract: *When it comes to large area and unstable climate region, surveillance are become difficult to monitor . Like borders of India , high secured government office. For that we find solution in UAV .The INDIAN MINISTRY OF AVIONICS, has been announced that UAV unmanned areal vehicle could be used in INDIA followed by some set of protocols. Drone can be customized depending on the requirement. These kind of drones can be operated at public places, borders lines, high secured government office, for surveillance and other applications. By using face detection method identifying the particular person, human detection to find number of count in restricted area, which help us in the defence, security and surveillance. By transmitting the wireless video footage for 5km, it become easy to process. the compact size of drone help to fly in the compact building blocks. Which help to surveillance in the dense urban area.*

Keywords: UAV 1, Drone 2, Face Detection 3, Human Detection 4, Unmanned Aerial Vehicle5.

1. Introduction

1.1 Drones

The unmanned areal vehicle can be commonly known as DRONES. We have different kinds of drone like multi rotor, fixed wing, single rotor helicopter, fixed wing. The evolution of the drone has been started before 100 years. Later in 1915, Ni kola Tesla described a fleet of unmanned areal combat vehicle during WW2. The evolution the drone has made a big impact on the defence and research development, but for the usage of public there are some protocols to follow. Face detection using UAV, due to the small size drone can fly in compact building blocks and easy to fly in the different climate and it has the good stability.

Fig: 1 Drone

1.2 Face Recording

The detection of the face falls under the bio metric, which is the key reason why we use this technique to identify the human. We can use the fingerprint scanner, face recognition, iris scanner if we have limited numbers of individuals. Because there is a lot of probabilities, it is difficult to identify the particular one, then we switch towards the approach of face detection,There are several application areas associated with the human face, such as facial recognition and facial expression processing, for the face detection role. While difficulties persist, most specifically in unconstrained environments. We fully focus on the algorithm for precision purposes.

1.3 Human Detection

It is the job of locating in an image and video all the instance of human present and it was commonly accomplished by scanning all image and video at all possible sizes and comparing all people's region location. The two processes in

the video monitoring pipeline and the higher level model in complex processing are usually called human identification.

2. Unmanned Areal Vehicle

In July 1849, the first recorded use of an unmanned aerial vehicle for war-fighting existed, there were several classifications of drones, aim and decoy, providing ground and aerial gunnery a target that simulates an enemy aircraft or weapon, identification providing intelligence on the battlefield, warfare providing high-risk assault capabilities, cargo distribution logistics, analysis and missile Enhancement of UAV technology growth, UAV civil and commercial agriculture, aerial photography, data collection.

2.1 Parts

1. Frame 2.Brush-less motor 3.Propeller4.ESC - Electronic Speed Controller 5.Transmitter and Receiver 6.Control 7.AV Transmitter 8.AV Receiver 9.FPV Camera.

2.1.1 Frame

There are different kinds of frames like tricopter, quadcopter, hexacopter, Y6 hexacopter, octocopter and X8 octocopter etc. This frames are less weight, strong, it also manufactures different material depends on its uses.
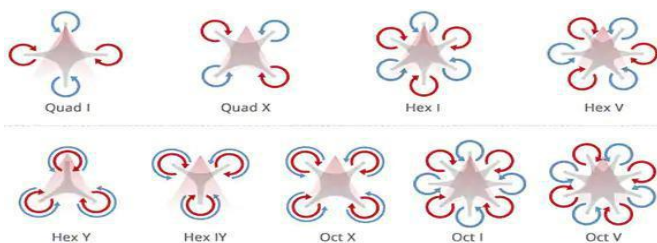

Fig: 2 Frame

2.1.2 Brush-Less Motor

Growing number of applications on brush-less motor for industrial automotive application, home appliances and building controls. And it

has Highest efficiency, Small motor size, Light weight, Longer lifetime, No maintenance, No sparking, Steady operation, Variable speed. For drones brush less motors are recommend for following advantages like absence of brushes, wear and tear is very less, thus making them more reliable and durable. High RPM are possible without much heating. More power to weight ratio. Depend on the KV reading the RPM will be change like 1000 KV gives 1000 RPM in one volt and 2600 KV gives 2600 RPM in one volt.

Table.1. Brush-Less Motor

MODEL	KV	VOLTAGE	PROP	LOAD (A)
YW-2204	2300	7.4	5043	9.5
YW-2204	2300	11.1	6*3	10.5
PULL	POWER	EFFICIENCY	LI[PO	WEIGHT(G)
365	105	3.5	2-3S	25
408	117	3.5	2-3S	25

Fig: 3 *Brush-Less Motor*

2.1.3 Propeller

A type of plastic that has strong stiffness but can bend then break if it meets anything heavy it will break, needing to replace the prop is recently created with polycarbonate propellers

2.1.4 ESC -Electronic Speed Controller

Regardless of the throttle stick in and position the motor will not start immediately. Throttle calibration function: different remote throttle travel difference, improve throttle response linearity, with a smooth, delicate feel and excellent speed linear speed low voltage protection mode,Readytosky 20A 2-4S Mini BLHeli-S OPTO ESC used mainly for FPV Race RC Helicopter with great functional and high-

performance and the max working frequency will be 50MHz.Built-in automatic protection of temperature sensor. The ESC support BLHeli-S firmware Can easily upgrade the firmware or parameter online, also support all functions of Blheli_S. It can be programmed to set up the throttle etc. It also supports two-way mode and FPV 3D mode.

Fig: 4 ESC -Electronic Speed Controller

2.1.5 Transmitter(Tx) And Receiver(Rx)

A radio transmitter (TX) is a device that allows the pilots to control the UAV wireless. The signal/commands are the received by a radio receiver (RX) which is connected to a flight controller which help to controlling it .

Fig: 5 *Transmitter And Receiver*

2.1.6 Controller

It is the heart of the quad-copter and controls most on board electrical components with the assistance on an Arduino like microprocessor and an array of sensors. A typical unmanned aircraft is made of light composite materials to reduce weight and increase maneuverability.In the CC3D board is an all-in-one stabilization hardware which runs the Open_Pilot firmware. It can fly any frame.The CC3D board have gained great popularity among UAV. Powerful STM32 32-bit micro controller running at 72MHz, and

can reach at 1.25DMips /MHz when performance at 0 wait state memory access. Integrated with MPU6000 (3-axis high-performance gyros and 3-axis high-performance accelerometer), with16M IC. Support GPS and data transmission. It easy to operate and easy to fly.
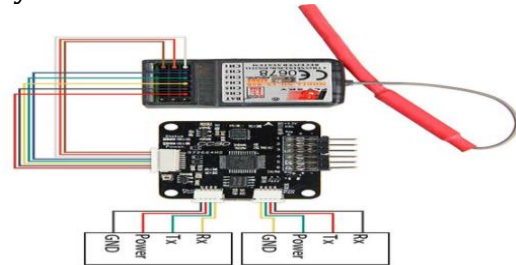

Fig: 6 *Controller*

2.1.7 Av Transmitter

It is an wireless audio video transmitter, by using the channel we can transmit the signal. We are using "TS832 transmitter" it has 5.8G of transmitter and 48 channel, weight of 22g.

2.1.8 AV RECEIVER

In this we are using the "RC832S receiver" for receiving the audio video signal, by using the AV to USB converter we can get the live stream in computer, it has 5.8G high sensitivity receiver, 48 channel.
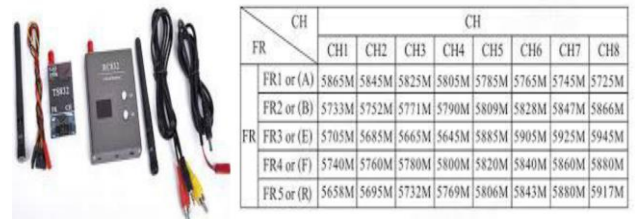

CH FR	CH							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
FR1 or (A)	5865M	5845M	5825M	5805M	5785M	5765M	5745M	5725M
FR2 or (B)	5733M	5752M	5771M	5790M	5809M	5828M	5847M	5866M
FR3 or (E)	5705M	5685M	5665M	5645M	5885M	5905M	5925M	5945M
FR4 or (F)	5740M	5760M	5780M	5800M	5820M	5840M	5860M	5880M
FR5 or (R)	5658M	5695M	5732M	5769M	5806M	5843M	5880M	5917M

Fig: 7 Av Transmitter & Receiver

2.1.9 FPV CAMERA

First-person view (FPV), also known as remote-person view (RPV), or simply video piloting, is a method used to control the vehicle from the driver. Most commonly it is used to pilot a radio-controlled unmanned aerial vehicle(UAV). From this we are getting the data.

Fig: 8 *FPV Camera*

3. Face Detection

Face detection and recognition is technology which is used to identify a person from a video or image source. In the1960s face recognition was introduced by Woodrow Wilson Bledsoe. He developed a device that could classify photos of faces by hand using which is known as a RAND tablet, a device that people could use to input horizontal and vertical coordinates on a grid using a pen like stylus. Ever since then the recognition system is being improved and optimized constantly, the technology becomes widely used in human daily life. It has been used increasingly for forensics military professionals. The face recognition system is also being increasingly used in the mobiles for device security. In this paper, we propose a face detection and recognition system using python with Open-CV(computer vision) package. This system contains three modules which are detection, training and recognition. Basically, the detection module detects the face which gets into the field of vision of the camera and saves the face in the form of an image in JPG format. Then the training modules trains the system using Haar cascade algorithm which was proposed by Paul Viola and Michael Jones in their paper. Recognition we are detecting the person from the data set.

3.1 Face Data Set

In the python it has cascade classified function in this we are passing the Haar cascade XML file this algorithm helps to identify the face are not and it will store the image in the computer , which the colour image has been converted into

gray scale image, which help to computer understand.

Fig: 9 Face Data Set

3.2 Face Training

In the training we are using the Linear Binary patterns histogram algorithm is a type of visual descriptor used for classification in computer vision, it takes the image which have been stored in computer and making camper with the other images in this we get the average vale and stored in the "trainer.yml file" which help to get more accuracy while deduction.

3.3 Face Recognition

In the recognition we are taking live stream video from the input and converted into gray scale image and camper with the trainer.yml file which it has been trained.

Fig: 10 Face Recognition

4. Human Detection

Human detection is same processes in this we are using the OpenCV features an implementation for a very fast human detection

method, called HOG (Histograms of Oriented Gradients). This method is trained to detect pedestrians, which are human mostly standing up, and fully visible. So do not expect it to work well in other cases. With these parameters, the detection is done almost in real time on my machine. You will see that the detector works better if the person is not too close to the camera. If the person is close, several overlapping boxes are often shown.
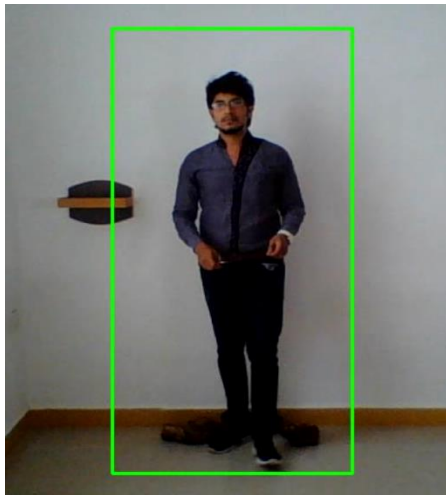

Fig: 11 Human Detection

Conclusion

The UAV is smaller in size, which help to fly in compact building blocks and it has the good stability and can fly in different climate region an it can be operated instant action it will help in border lines of India for the surveillance and detection of human. The video has been record in input device which help to analyze it and help to do many image processes. The manufacturing cost is less and easy to replace.

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