Perspectives in Communication, Embedded-Systems and Signal-Processing (PiCES)
ISSN: 2566-932X, Vol. 2, Issue 3, June 2018

# Real time Video surveillance with State of Art

Pavan Kumar E[1], Jyotsna D[2], Bilvika S[3], Keerthi G Hegde[3], Manasa R[3]

1. Assistant Professor, Department of Electronics and Communication, Sai Vidya Institute of Technology, Bangalore, India.
2. Student, Department of Electronics and Communication, Sai Vidya Institute of Technology, Bangalore, India
jyotsnadhanwant@gmail.com
3. Student, Department of Electronics and Communication, Sai Vidya Institute of Technology, Bangalore, India.

***Abstract:*** ***Visual Tracking is the process of locating, identifying, and determining the dynamic configuration of one or many moving objects in each frame of one or several cameras. Visual tracking plays an important role in the area of computer vision. This method has a great application in the field of defence to improve the security system. The security system is demonstrated using a radio controlled aircraft. A RC aircraft with a camera is used for intruder detection using image processing. Visual Tracking helps to capture minute movements of the intruder and is displayed in a real time video.***

***Keywords: Camera, Image processing, Python, Visual Tracking, Radio controlled aircraft***

## I. INTRODUCTION

The armed forces have high value resources dispersed at various locations within the perimeter of military airfields. These are high risk, high consequence of disruption facilities that need to be protected so as to prevent the damage that will be caused to these assets These establishments have a large perimeter across which no entry is allowed. Intruders, who intend to breach the perimeter, should be detected. The surveillance is carried out by aircrafts. Image processing and Visual Tracking methods can be used for efficient surveillance.

This paper describes an RC aircraft with a camera which displays real time video of the captured movements of the intruder by the method of visual tracking. Visual tracking in general is a very challenging part due to the loss of data caused by the projection of the 3D world on a 2D, noise in images, cluttered-background, reflection, blur images, complex object motion, partial or full occlusions, illumination changes as well as real-time processing requirements, etc.Tracking is the process to locating the target frame by frames, from its first appearance to its end destination.

The block diagram shown below describes the overall system. It has two parts transmitter section and receiver section.

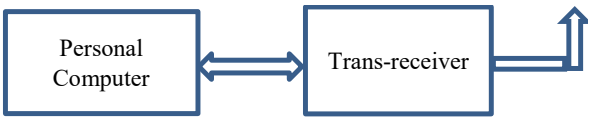


Fig 1. Transmitter section

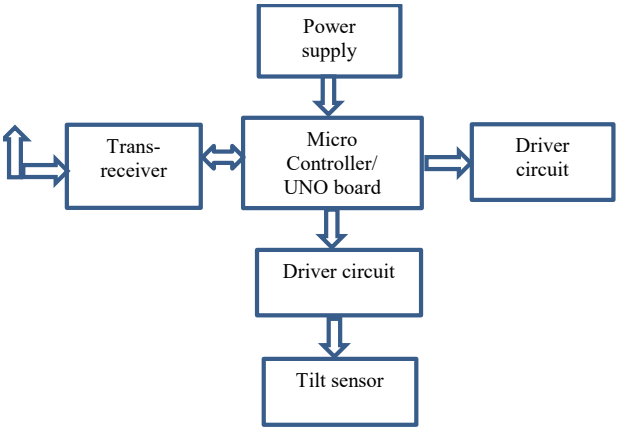


Fig 2. Receiver section

The transmitter is the PC which is used to run the code. The receiver end is the aircraft which is designed using ESC, motor, servo and it has a camera to capture the video continuously.

## II. SYSTEM ARCHITETURE

The hardware used in this system are described below.

### *A. Servo motor*

A servo motor is an electrical device which can push or rotate an object with great precision. To rotate an object at some specific angles or distance servo motors are used. It is just made up of simple motor which run through servo mechanism. We can get a very high torque servo motor in a small and light weight packages. Due to these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc. It consists of three parts: Controlled device, output sensor and feedback system. Here DC servo motors are used to set the tilt angle of the aircraft.

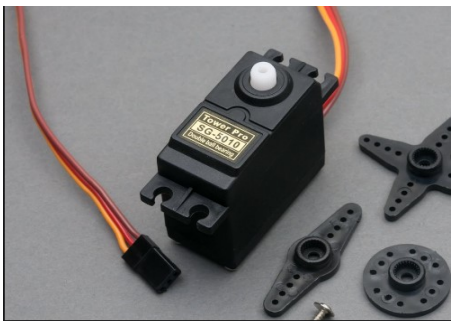

Fig 3. Servo motor

### B. *Electronic Speed Control (ESC)*

An electronic speed control or ESC is an electronic circuit that controls and regulates the speed of an electric motor. It may also provide reversing of the motor and dynamic braking. An electronic speed control follows a speed reference signal and varies the switching rate of a network of field effect transistors (FETs). By adjusting the duty cycle or switching frequency of the transistors, the speed of the motor is changed. Different types of speed controllers are required for brushed DC motors and brushless DC motors. As we use brushless motor the speed of that is varied by adjusting the timing of pulses of current delivered to the several windings of the motor. Brushless ESC systems basically create three-phase AC power, as in a variable frequency drive, to run brushless motors. They have great efficiency, power, longevity and are light weight. ESCs designed for radio-control airplanes usually contain a few safety features. If the power coming from the battery is insufficient to continue running the electric motor the ESC will reduce or cut off power to the motor.

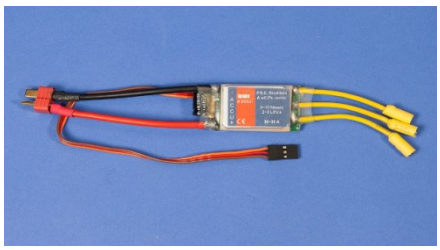

Fig 4. ESC

### C. *Brushless Motor*

Brushless DC electric motor also known as electronically commutated motors are synchronous motors powered by DC electricity via an inverter or switching power supply. This produces an AC electric current to drive each phase of the motor via a closed loop controller. The controller provides pulses of current to the motor windings that control the speed and torque of the motor. The advantages of a brushless motor are high power to weight ratio, high speed, and electronic control. Brushless motors find applications in such places as computer peripherals (disk drives, printers), and vehicles ranging from model aircraft to automobiles. An electronic sensor detects the angle of the rotor, and controls semiconductor switches such as transistors which switch current through the windings, either reversing the direction of the current, or in some motors turning it off, at the correct time each 180° shaft rotation so the electromagnets create a torque in one direction. The elimination of the sliding contact allows brushless motors to have less friction and longer life; their working life is only limited by the lifetime of their bearings. A typical brushless motor has permanent magnets which rotate around a fixed armature, eliminating problems associated with connecting current to the moving armature.

### D. *Controller(RCB6I)*

RCB61 is used to control the aircraft. The controller here used consists of 6 channel transmitter and 6 channel receiver. A unique control mode change allows us to operate in both mode 1 and mode 2. Easy binding (pairing) process as it has BIND button on receiver. It has low ampere draw which helps in longer flight time. It has long range and provides secure connections and it is able to fly safely using this system.


Fig 5. Brushless motor

Fig 6. Controller (RCB6i)

### E. *Propeller*

A propeller is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is produced between the forward and rear surfaces of the air foil-shaped blade, and a fluid (such as air or water) is accelerated behind the blade.

Fig 7. Propellers

### F. *Battery*

The power is supplied to the motors by the batteries. The batteries for flying an RC aircraft are quite different from the convectional batteries as which they are LiPo based which is called lithium polymer batteries which haver the discharge capacity of 30 cycles for a unit charge flow which is measured.

The main characteristics of the aircraft are

#### a) *High wing*

Some of the most successful General Aviation aircraft have been high wing models. High wing aircraft are inherently stable as the centre of mass is located beneath the centre of lift. Short field landings can be shorter

because the drag robbing ground effect is lessened by the greater distance between the wing and ground. Most carburetted high wingers can eschew fuel pumps, as gravity, except during prolonged inverted flight; will serve the purpose of getting fuel from the tanks to the engine.

*b) T Tail*

A T-tail is an empennage configuration in which the tail plane is mounted to the top of the fin. The arrangement looks like the capital letter T, hence the name. The T-tail differs from the standard configuration in which the tail plane is mounted to the fuselage at the base of the fin. The tail plane is kept well out of the disturbed airflow behind the wing and fuselage, giving smoother and faster airflow over the elevators. This configuration may give more predictable design characteristics and better pitch control; but in the case of an aircraft with a tractor propeller, pitch control is reduced because the T-tail takes the control surfaces outside the propeller slipstream. Responsive pitch control is crucial for aircraft flying at low speed, to allow effective rotation on landing.

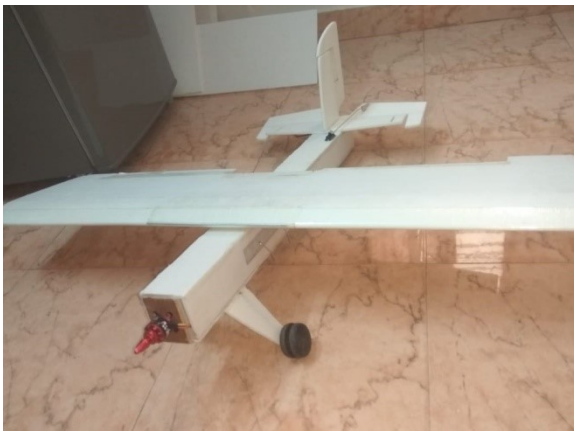

Fig 8. Model Designed

## III. RESULTS

The software which is used in coding here is python. Python is a general purpose programming language and is supported by OpenCV. Important feature of Python is that it can be easily extended with C/C++. This feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper for it so that we can use these wrappers as Python modules. This gives us two advantages: first, our code is as fast as original C/C++ code (since it is the actual C++ code working in background) and second, it is very easy to code in Python. This is how OpenCV-Python works, it is a Python wrapper around original C++ implementation. And the support of Numpy makes the task easier. Numpy is a highly optimized library for numerical operations. It gives a MATLAB-style syntax. Besides that, several other libraries like SciPy, Matplotlib which supports Numpy can be used with this.

The output of system is represented in 3 images:

Fig 9 is the original image captured from the camera which is placed in the model.

Fig 10 is the background subtraction image where background subtraction image means in this case we use a static camera, which takes the some number of images, first we need to extract the person image. We need to extract the moving foreground from static background. If you have an image of background alone, like image of the place without any person etc, it is an easy job. Just subtract the new image from the background. You get the foreground objects alone. But in most of the cases, you may not have such an image, so we need to extract the image and subtract the background image.

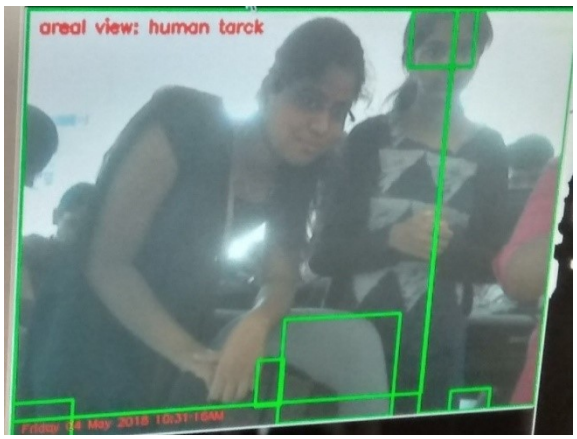


Fig 9. Original Image

Fig 10. Background Subtraction Image

Fig 11. Threshold Image

Fig 11 is the threshold image where a binary threshold is a simple threshold, where the pixels are either 1 or 0. In many cases, this would be white or black, but we have left

our image coloured for now, so it may be coloured still. The two parameter here is the image and the threshold. The next is we chose the maximum value and minimum value. We have got the THRESH_BINARY image.

## IV. CONCLUSION AND FUTURE SCOPE

In this system real time video is displayed on the PC monitor which clearly describes the movements of the detected intruder. Surveillance using visual tracking is a very effective method that can be used in military airfields. This system can be further developed to obtain minute details of the intruder using different filters.

## ACKNOWLEDGMENTS

We like to express our deep sense of gratitude to Prof.Pavan Kumar E, Assistant Professor, Dept. of ECE, Sai Vidya Institute of Technology for all the guidance and support.

## REFERENCES

[1] M. Valera and S.A. Velastin" Intelligent distributed surveillance systems: a review" IEE Proceedings online no. 20041147doi: 10.1049/ip-vis:20041147 .

[2] Mengmeng Wang1, Yong Liu2 and Rong Xiong2" Robust Object Tracking with a Hierarchical Ensemble Framework" arXiv:1509.06925v2 [cs.CV] 10 Aug 2016.

[3] Kevin Leahy and Mac Schwager "Always Choose Second Best: Tracking a Moving Target on a Graph with a Noisy Binary Sensor" Proc. of the European Control Conference (ECC 16) JUNE 2016.

[4] Junseok Kwon, Kyoung Mu Lee "Adaptive Visual Tracking with Minimum Uncertainty Gap Estimation" ieee transactions on pattern analysis and machine intelligence, VOL. 39, NO. 1, JANUARY 2017.

[5] Abdurrahman,F., Gunawan Sugiartaand Feriyonika"implementation of kalman filter on visual"tracking using pid controller" Mechatronics and Applications: An International Journal (MECHATROJ), Vol. 1, No.1, 2016.

[6] Ding Dongsheng 1, Jiang Zengru 2, Liu Chengyuan3 "Object Tracking Algorithm Based on Particle Filter with Color and Texture Feature" Proceedings of the 35th Chinese Control Conference 2016 35th Chinese Control Conference (CCC) Year: 2016 Pages: 4031 4036, DOI: 10.1109/ChiCC.2016.7553983

 