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Fighter Quadcopter Control Using Computer System

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ABSTRACT*:* This research is developed for military rescue mission for target tracking and minimize the loss of military solders and also reduce the man power. This project mainly based on remotely control via computer system. The Quadcopter is controlled through graphical user interface (GUI). Communication between GUI and Quadcopter is done by using wireless communication system. The Quadcopter balancing condition is sensed by F3 controller and CC3D, 6DOF sensor. For smooth landing, Quadcopter is equipped with ultrasonic sensor. All signals from sensors are processed by Arduino Uno microcontroller board. Output from Arduino Uno microcontroller board used to control Quadcopter propellers. GUI is designed using Visual Basic 2008 Express as interface between control base and Quadcopter. The experiment shows that Quadcopter can hover with maintain it balancing and stability. Quadcopter can accept load disturbance up to 400g (without battery) during it hover condition. Maximum operated time of Quadcopter is 10-14 minutes using 1500mAh 25c Lip (4s ready) battery and operate time can be increase by using largest battery capacity. Quadcopter with camera 1000TVL w/low light.

KEYWORDS: Quadcopter, Microcontroller, Wireless Camera, Lesser Gun, RF Transmission and Receiving, Computer System.

I. INTRODUCTION

Research and development of unmanned aerial vehicle (UAV) and micro aerial vehicle (MAV) are getting high encouragement nowadays, since the application of UAV and MAV can apply to variety of area such as rescue mission, military. Quadcopter operated by thrust that produce by four motors that attached to it body. Quadcopter or quad rotor aircraft is one of the UAV that are major focuses of active researches in recent years. Compare to terrestrial mobile robot that often possible to limit the model to kinematics, Quadcopter required dynamics in order to account for gravity effect and aerodynamic forces. Quadcopter has advantages over the conventional helicopter where the mechanical design is simpler. Besides that, Quadcopter changes direction by manipulating the individual propeller's speed and does not require cyclic and collective pitch control.

II. LITERATURE SURVEY

[1] A Study on the 3-DOF Attitude Control Of Free-flying Vehicle.
Author : Duckage Park, Moon-Soo Park, Suk-Kyo Hong

This paper is studying on the 3-DOF attitude control of helicopter. The characteristic to be heavily coupled with input and output and the serious non-linearity appear in the flying helicopter system. Due to this characteristic of a helicopter, a people apply the non-linearity control, multi-variable control or optimal control for the attitude control of helicopter and it is too hard to define the relations of input and output in a view of dynamics, therefore others also study this them in a view of AI control. In this paper, we assume that those characteristics heavily coupled system and non-linearity reduce considerably. In this paper, we assume that those characteristics are able to be disregarded in hovering. The mode helicopter system that constructed with three independent SISO system is acquired by system identification method and then the PD-control is applied individually to three independent SISO system for an 3-DOF attitude control of model helicopter in hovering.

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[2] Flight PID controller design for a UAV quad rotor.
Author : Atheer L. Salihl, M. Moghavvemi1, Haider A. F. Mohamed and Khalaf Sallom Gaeid

This paper presents the modeling of a four rotor vertical take-off and landing (VTOL) unmanned air vehicle known as the quad rotor aircraft. The paper presents a new model design method for the flight control of an autonomous quad rotor. The paper describes the controller architecture for the quad rotor as well. The dynamic model of the quad-rotor, which is an under actuated aircraft with fixed four pitch angle rotors was described. The Modeling of a quad rotor vehicle is not an easy task because of its complex structure. The aim is to develop a model of the vehicle as realistic as possible. The model is used to design a stable and accurate controller. This paper explains the developments of a PID (proportional-integral-derivative) control method to obtain stability in flying the Quad-rotor flying object. The model has four input forces which are basically the thrust provided by each propeller connected to each rotor with fixed angle. Forward (backward) motion is maintained by increasing (decreasing) speed of front (rear) rotor speed while decreasing (increasing) rear (front) rotor speed simultaneously which means changing the pitch angle. Left and right motion is accomplished by changing roll angle by the same way. The front and rear motors rotate counter-clockwise while other motors rotate clockwise so that the yaw command is derived by increasing (decreasing) counter-clockwise motors speed while decreasing (increasing) clockwise motor speeds.

[3] Visual Tracking and Control of a Quad copter Using a Stereo Camera System and Internal Sensor.
Author : Markus Achtelik, Tianguang Zhang, Kolija Kuhnlenz and Martin Buss.

In this paper a complete system is designed and implemented, in which the notion of a quadcoptor is stably controlled based on visual feedback and measurements of inertial sensor. We focus on developing a cost effective and easy-to-setup vision system. Active markers were finely designed to improve visibility under various perspective as well as robustness towards disturbance in the image-based pose estimation.Moreover, position and heading controllers for the quadcopter were implemented to show the systems capabilities. The performance of the controllers was further improved by the use of inertial sensor of the quadcoptor. A closed-loop control system is successfully conducted.

[4] Intelligent Fuzzy Controller of a Quadcopter.
Authors : Matilde Santos, Victoria Lopez, Franciso Morata

The aim of this work is to describe on intelligent system based on Fuzzy logic that is developed to control the quadcopter. A quadcopter is a helicopter with four rotors, that make the vehicle more stable but more complex to model and control. A quadcopter has six degrees of freedom, three of them regarding the position: height, horizontal and vertical motions and other three are related to the orientation: pitch, roll and yaw. A Fuzzy control is designed and implemented to control a simulation model of the quadrotor. The input are the desired value of the height, roll, pitch and yaw. The outputs are the power of each of the four rotors that is necessary to reach the specifications.

[5] Dynamic Analysis and PID Control for Quadcopter.
Authors : Jun Li, Yuntang Li

In order to analyze the dynamic characteristics and PID controller performance of the quadcopter. This paper firstly describes the architecture of the quadrotor and analyzes the dynamic model of it. Then, based on the classic scheme of PID control, this paper designs a controller, which aims to regulate the posture of the 6 d. o. f. quadrotor. Thirdly, the dynamic model is implemented in Matlab/Simulink simulation, and the PID control parameters are obtained according to the simulation results. Finally, a quadrotor with PID controllers is designed and made. In order to do the experiment, a flying experiment for the quadrotor has been done. The results of flying experiment show that the PID controllers robustly stabilize the quadrotor.

III. EXISTING SYSTEM

In existing system, Quad copter can be controlled automatically by encoding the map pattern. UAV can engage in finding an unusual objects and they can perform their surveillance. Unmanned Aerial Vehicle (UAVs) is controlled

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from the control room. The commands given to the UAV receiver is a human command rather than the machine command. The received Clips of the surveillance location is also been saved.

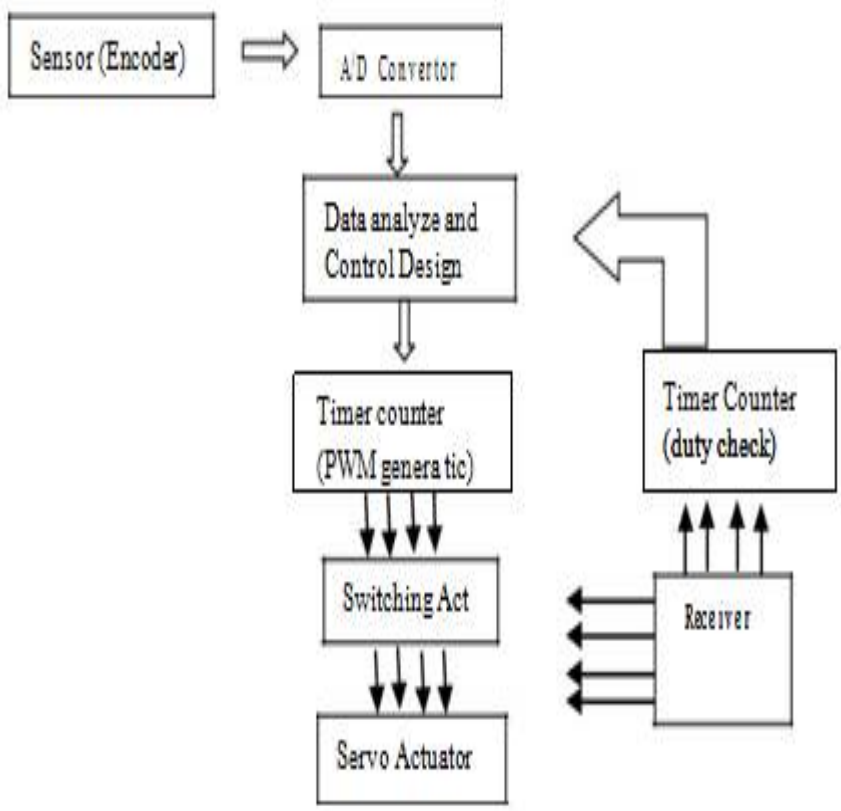

Figure 1. Flow of existing System

IV. PROPOSED SYSTEM

In this approach, provide an application which allows to find out the specific target and if it found then shoot and injured them via laser gun by controlled using computer system with GUI. A significant challenge in developing Fighter quadcopter is to extract and fuse the useful information in a robust manner and to provide stable flight and an accurate navigation. The ultimate goal of the project is to create a live aerial video feed which can be sent to the computer for the surveillance purpose, news reporting and filming by being able to deploy aerial correspondence much faster than normal ones. The results in providing digital video signal to the computer which will pave us a way for future expansions such as UAV sentience, target tracking and video compression. Following are the module in the proposed system:

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A. ADMIN

In this module, Admin control the all the system and monitor all the things in mission including beginning to end.

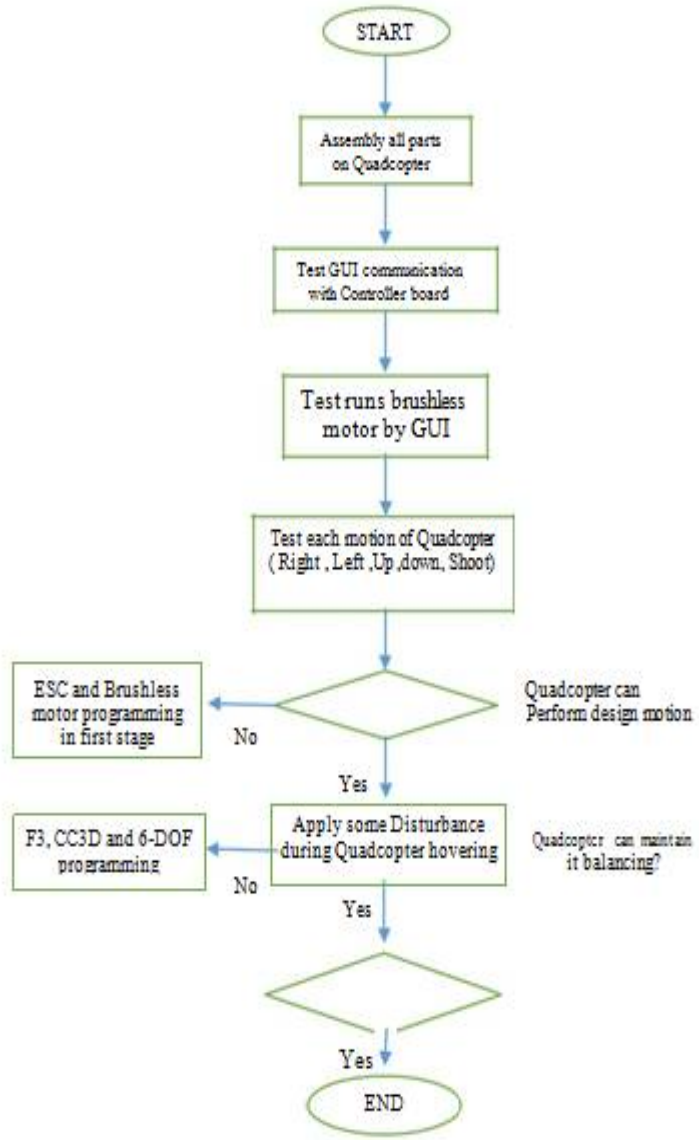

Figure 2.Flow diagram of the proposed system

V. CONCLUSION

This project, mainly developed for the military application, this project minimize the loss of man power and also protect human life in multiple dangerous environments. This project mainly developed for safety and security purpose. This project totally control by computer system.

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VI. FUTURE SCOPE

In Future we are trying to provide more security to army by implementing our device along with wide rage and maximize battery power. Also it should be used in navy and air force. Also with reducing size it can be send to place where human ever gone.

VII. ACKNOWLEDGMENT

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