CHAPTER I
INTRODUCTION

1.1.   Preliminary

The Quadcopter Drone is one of Unmanned Aerial Vehicle (UAV). Quadcopter drone flights are operated remotely by human operators or with varying degrees of autonomy and up to fully autonomous aircraft that do not require human intervention. Quadcopter drones are a type of helicopter with four rotors. Quadcopter drones are easy to build, able to maintain hovering state, and have easy vertical take off and landing (VTOL) capability [1]. making it a popular UAV research platform. Quadcopter configurations are relatively easy to program for autonomous flight missions. By only controlling the propeller rotation we can achieve autonomous flight control that can be used in many field such as cinematography, security and surveillance, military operations, disaster rescue, agriculture, and transportation or logistics

UAV drones are developing rapidly all over the world. Video cameras are now a widely used device installed in drones, and are often used to collect information and documentation[2]. Using video camera allows the drone to capture or record images from a unique perspective. Video is an engaging form of content especially with the popularity of video blogging, shortened as vlogging. In late of 2011, vlogging has gained much popularity worldwide especially now with the rise of video sharing platform such as YouTube[3] and other social media platform. Since video provide more expressive and engaging format, vlogging is a popular video format for online influencers to create online content. Whether it is just a personal video, product review, marketing video, or even used in education as an instructional video and lectures, vlogging obviously requires a camera. The advent of drones has raised the bar for content creation quality and visual storytelling. Compared to traditional cameras that need to be carried or tripods to be stationed in a place. drones are highly maneuverable to capture video, especially if the drone are able to perform autonomous following

Image processing can be applied to images captured by drones for a variety of purposes. Image processing is the processing of digital images through algorithms using a computer. One example is a face detection algorithm that can detect human faces in front of a camera. The purpose is to find and extract the facial area from the background. It also has multiple uses in areas such as content-based image retrieval, video coding, video conferencing, crowd monitoring, intelligent human computer interfaces [4]. Not only to detect face, image processing also enables a computer to identify the person of interest that are detected in an image.

Based on the ideas from the final project proposal described, the author designs a system that can be applied to the DJI Ryze Tello, one of the quadcopter drones that can be purchased on the market and has programming capabilities. The system created can detect the location of the face using the Haar Cascade method and then identify it using a Linear Binary Pattern Histogram. The face from the person of interest who has been trained in the system can then be followed by the drone based on the person's face location and direction of motion. Therefore, the author conducted final project research entitled "Human Follower Quadcopter Drone Based On Face Recognition For Vlog."

1.2. Problem Formulation

Based on the background above, the problem can be formulated, namely:

1. How to develop a system that can detect and identify a face on a video feed from a DJI Ryze Tello drone?
2. How to implement the result of face recognition program as an input to control DJI Ryze Tello to achieve autonomous human following movement?
3. How far the face recognition system able to recognize face and act as input to control DJI Ryze Tello movement?

1.3. Objectives

The objectives of this research are as follows:

1. Designing a face recognition system using the haar cascade feature classification as a face detector and a linear binary pattern histogram as a face identifier
2. Processing the output of the face recognition system so that it can be input for the control of the autonomous quadcopter drone.
3. Face recognition can recognize a face at 40 - 190 cm away from the camera and enable Tello to follow the face to keep the face on the center of the frame.

1.4. Scope Of Problem

The scope of the problem from this research based on the formulation of the problem above are as follows:

1. Subject face do not use attributes that block facial
2. Face distance cannot be more than 3 meter from camera
3. Face recognition only trained with one face of interest
4. Drone movement control is limited to throttle, pitch, and roll
5. Drone is flown in a well lit room with more than 100 Lux
6. Drone is flown at time range of 9.00am to 18.00pm

1.5. Research Method

1. Literature Study

   This stage used to find out basic theory needed for completing the final project. The sources are reference books, article journal, proceeding, website, and discussion with supervisors. Reference used are related to image processing, face detection, quadcopter drone, and autonomous drone.

2. System Planning

   At this stage, system requirements analysis is performed for hardware and software to use. Drafting flowchart and block diagram for the system. Analysis and drafting is performed so that the system can perform as expected.

3. System Prototyping

In this phase, the hardware and software designs are developed. Develop the face detection application using an algorithm to a microcomputer, develop an algorithm to control quadcopter propeller rotation based on the face detected, and then apply the design to the drone.

4. System Testing

System prototype that has been made is tested thoroughly and in orderly manner. Software testing of face detection algorithm, testing of the propeller rotation control, testing on the drone in flight mode.

5. System Evaluating and Analysis

At this stage, an evaluation of the system is made with reference to the test results carried out earlier. Troubleshooting a problem if an error is found, and then problem boundaries that have been made will be studied further

6. Report Preparation

This stage is the final stage of the work by compiling a research report accompanied by other necessary documentation to support the validation of the research that has been carried out.

1.6. Timeline.

The following is the implementation plan that will be carried out in the final research

Table 1.1 Timeline

No.	Stage	Duration	Date Of Completion	*Milestone*
1	Selection of facial recognition method	2 minggu	23 June 2022	Determine Suitable Method
2	Develop face recognition algorithm	2 minggu	9 July 2022	Face Recognition Output
3	Implemet the program to quadcopter drone	1 bulan	9 August 2022	Control Drone
4	Undergraduate Thesis book compilation	2 minggu	23 August 2022	Undergraduate Thesis book complete