

CHAPTER I

INTRODUCTION

1.1 Background

Unmanned Aerial Vehicle (UAV) is a flying aircraft that piloted through the use of the Remote Control, also known as autonomous Remotely Piloted Vehicle (RPV). One of the Unmanned Aerial Vehicle (UAV) platform is a drone. It is a remote-controlled flying aircraft that have propellers for lift and manuver, its number of propellers range 3, 4, and even more.[1]

Along with present day technological developments, drones include many features and used for various purposes, especially for transporting some goods. For example, they are used to logistic of supply or delivering letters from one location to another. The unique features of drones to widen its application into the field of aerial imagings, journalism, and research. For aerial imaging, there are already very various types of application ranging from video and image capture, monitoring, to geographic surface records, as well as geographic infomation system (GIS).[2]

Quadcopter is one of the type of drones that have 4 propellers. Quadcopters are not toys that may be flown freely. Pilot who fly drones or quadcopters are required to go through legal guidelines and rules issued through the Minister of Transportation of the Republic of Indonesia that is primarily based totally at the law of the Menteri Perhubungan Republik Indonesia NO PM 90 Tahun 2015 about operation and control of unmanned plane within indonesian. there are numerous rules that cannot be violated by UAV pilots, for example the pilot cannot fly the drone more than 500 feet or 150 meters, and cannot be flying into restricted place or limited airspace [3]. These regulations was form due to the frequent drone accidents, the main factor being that the pilot does not understand the remote control functions of the drone. In addition, the drone cannot detect obstacles and avoid them automatically.

Nowadays, there are numerous drones which have embedded the collision avoidance characteristic within however, the cost is rather expensive. Examples of the drones that have embedded collision avoidance function are the DJI Phantom 3

and DJI Phantom 4. These drones can maneuver away from obstacle and barriers automatically.

Drones includes features such as video recording, photography, mapping, and monitoring. While drones move, there are potential barriers within its flying path, the drone can possibly crash into walls, trees, etc. At some related research there is study designs and builds an obstacle avoidance quadcopter as an alternative solution to helicopters, and the result at the outdoor accuracy rate is 61.25%, and the indoors is 100%[4]. Therefore, the author proposes improvement to the drone to perform automatic collision avoidance function utilizing fuzzy logic. The proposed obstacle collision avoidance is an algorithm to steer away from collision in vehicles specifically within the automotive and aeronautics application. Fuzzy logic method is employed so the drone can avoid several obstacles during its flying maneuver to avoid collision, including hitting walls, trees, and other object. This proposed is expected to improve the automatic movement of drones to be safer.

1.2 Problem Formulation

1. How to design a system of obstacle collision avoidance device for quadcopter drone using infrared sensors.
2. How to evaluate the obstacle collision avoidance system using Fuzzy Logic method on drones when detecting obstacles.
3. Design an economical quadcopter with collision avoidance system

1.3 Purpose and Benefits

Based on the description of the background above, it can be determined several objectives and benefits of this research tool are as follows :

1. Design a system of Collision Avoidance for quadcopter drones using 4 infrared sensors within 85cm away from obstacles with fuzzy logic method
2. the quadcopter drone that has been designed using collision avoidance with the IR sensor can carry out its functions without any obstacles interfere.

1.4 Problem Limitation

The limitations of the problem in this study include :

1. The obstacle collision avoidance system uses 4 Sharp IR sensors.
2. Sensor system using arduino uno.
3. The type of drone used is quadcopter and uses 4 blades.

4. Operated at outdoor.
5. Max obstacle detection is 2.
6. Using static obstacle.

1.5 Research Method

In this research tool, there are several stages that must be carried out as a research method, namely :

1. Literature study
Used to find out the basics of theory needed in making the final project. The sources are reference books or journals, the internet, and discussions with friends and supervisors.
2. System design
Completely design and plan collision avoidance systems for quadcopter drones.
3. Testing
Conduct a test and collect data on the tools that have been made, to find out the results of the system design that has been made.
4. Analysis and Evaluation
Perform data analysis activities on tools that have been made to find out the test results and evaluate the designed system.

1.6 Implementation Schedule

No.	Deskripsi Tahapan	Durasi	Tanggal Selesai	Milestone
1	Choosing Component	2 Week	26 January 2022	List all the component needed
2	Hardware Design	2 Week	9 February 2022	Component Assembly
3	Software Design	3 Week	2 March 2022	Flowchart, Code of the system
4	Testing System	3 Week	23 March 2022	Completed Tesing system

5	Penyusunan laporan/buku TA	2 Week	13 April 2022	Finish Report Book
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Table 1. 1 Implementation Schedule