

**UNIVERSITI TEKNOLOGI MARA
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**PERFORMANCE ANALYSIS OF
LOITER AND AUTO MODE OF
QUAD-COPTER USING
MISSION PLANNER**

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ABSTRACT

In the past few years, Unmanned Aerial Vehicle (UAV) had increased drastically because it was very helpful in the military, scientific and civilian sector. The UAV especially Quad-copter have many abilities and consist with flight modes that can be used Stabilize, Loiter, Auto, Circle, Return to launch. With technology today's, Loiter and Auto mode are widely used in various areas. Those modes can be configured using firmware like Mission Planner. However the accuracy and stability of these modes is questionable due to several payload and specification of Quad-copter. Therefore, this project was investigated the efficiency and accuracy of Auto Mode then were investigated the stability of Loiter Mode. The Quad-copter is developed and configured using Mission Planner and tested at several different criteria. The error between the algebra and set parameter was calculated. The performance of Loiter mode is in good condition at Altitude 15 meter and above. For Auto mode, the performance of Quad-copter is not really efficient if many the Quad-copter required to turn in so many angle. From the data analysis, the people can know the level of stability, accuracy, and efficiency of Quad-copter thus can reduce the accident of Quad-copter.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

In the past few years, Unmanned Aerial Vehicle (UAV) has increased drastically and brought significant impact to military, scientific and civilian sector [1]. The MIT Technology review even listed the UAV as one of the 10 breakthrough technologies of 2014 [2]. The applications of using UAV are very widely such as scientific research, aerial surveillance, weaponry, transportation, search and rescue, remote sensing and so on[3]. This application can also be justified by the fact that this UAV are very versatile[4].

The UAV especially Quad-rotor or Quad-copter has many abilities such as hover capability, high maneuverability, vertical take-off and landing, and agility [5]. The control of Quad-copter consist some flight modes that can be used such as Stabilize, Loiter, Auto, Altitude Hold, Acro, Return to Launch, Circle, and so forth. The pilot can use the flight mode of Quad-copter based on application use. With technology today's, Loiter and Auto modes are two important modes and widely used in various areas. Loiter mode is where the Quad-copter will automatically attempt to static or maintains the current location, altitude, heading and will compensate for any wind [10]. Then, Auto is a mode where the Quad-copter will operate fully automatic and with no input needed from the pilot. In Auto mode, the Quad-copter will follow a pre-programmed mission script stored in the microcontroller using Mission Planner Software. The example application of using Loiter mode is to investigate and record the crack of bridge or dam [6], it needs the Loiter mode to make sure the Quad-copter is in a static position. If the Loiter mode is not stable, the image of recorded by Quad-copter will blur and data also are not accurate to investigate. Then, an example application for Auto Mode is to spread fertilizers across the field of the plant in agriculture. It needs Auto mode to make the Quad-copter follow the desired waypoint. If