



**DESIGN AND MODELING QUAD ROTOR HELICOPTER FOR
UNMANNED VEHICLE**

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“I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree.”

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ABSTRACT

The quad rotor helicopter mechanism is applied in the unmanned vehicle surveillance robot to have easier and good maneuverability during operation. This added characteristic gives it more flexible in indoor surveillance mission and faster operation such as in climbing through upstairs inside buildings. 2.4GHz (6 channels) of radio communication is used to drive the robot where Pulses Width Modulation (PWM) is generated by microcontroller to control the speed of four rotors by sending it to ESCs. Autopilot system was developed using 5 degree of freedom (DOF) Inertia Measurement Unit (IMU) analog sensor and interfacing with Microcontroller (PIC16F877A) to control motor RPM as well as its position during flights. The sensor will measure mechanical inputs (tilting and motion) in X, Y, and Z axes in term of analog voltage, then processes by microcontroller and sending to ESCs. Fly dynamic analysis for throttle operation (ascending and descending) is done such as rotor RPM and size, thrust force and angle of pitch, roll and yaw. Speed and propeller thrust force testing have been done and indicated that every rotor had different thrust force even though the RPM of the motor have the same magnitude. Effective symmetry configuration and desired centre of gravity (CG) will determine the flight performance as well as reduce the disturbances created by air flow of the propellers. It was proven that without the sensor, the robot cannot have stability flight as well.

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