

**ANALOG TO DIGITAL CONVERTER REMOTE CONTROL FOR
HELICOPTER MODEL**

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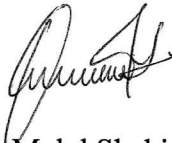
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DEDICATION

Specially dedicated to my parents and sisters;

Mr. Balan

Mrs. Rajeswary

Ms. Poovarasi

Ms. Kavina Nishanthini

Who have encouraged, guided and inspired me throughout my journey of education.
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Abstract

Analog to digital converting remote controller for helicopter model is an attempt to create something new for the market since there is no digital remote controller. This digitally controlled model helicopter will transmit data from transmitter to receiver. The main purpose of the project is to develop a model of a helicopter, identify and also implement control strategies for controlling the helicopter. With wireless camera one can see beyond the visible, turn night into day for perimeter and point security, search and rescue, vehicle pursuits, maritime surveillance and many others. Wireless camera used to view people/objects, in daylight or in darkness, through smoke, haze or other adverse weather conditions. RC helicopter model and modified its rotors, installed a camera on it and attached a transmitter & receiver. The transmitter is designed based on PIC 16F877A and the receiver circuit is based on PIC16F876A. The 6-channel remote control is changed to a 4-channel.

Abstrak

Model helikopter dengan menggunakan alat kawalan jauh yang menukar analog ke digital merupakan satu alat yang direkapipta untuk pasaran baru. Kawalan untuk halikopter ini akan menghantar data dari pemancar ke penerima. Objektif utama projek itu adalah untuk membangunkan sebuah model helikopter, mengenalpasti dan membangunkan satu alat yang sistematik bagi mengawal helicopter. Dengan menggunakan kamera tidak berwayar, ianya dapat dilihat dalam keadaan tidak nampak(*invisible*), malam bertukar siang untuk garis keliling dan keselamatan titik, mencari dan menyelamatkan, kenderaan yang dikejar, pengawasan maritim dan lain-lain. Dengan menggunakan camera tidak berwayar kita boleh melihat orang atau objek walau dalam keadaan siang atau malam, dalam keadaan asap atau jerebu atau keadaan cuaca buruk yang lain. Model halikopter RC yang diubah rotornya akan diletakkan sebuah kemera dan menggunakan sebuah alat pemancar dan penerima. Selain itu, satu litar pemancar telah direka menggunakan PIC 16F877A dan satu litar penerima denan menggunakan PIC16F876A. 6 saluran kawalan jauh akan berubah ke 4 saluran.

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LIST OF ABBREVIATIONS

RF	-	Radio Frequency
FM	-	Frequency Modulation
Tx	-	Transmitter
Rx	-	Receiver
Hz	-	Hertz
Km	-	Kilometers
PM	-	Phase Modulation
ADC	-	Analog-to-Digital Converter
DAC	-	Digital-to-Analog
LED	-	Light Emitting Diode
EM	-	Emitter Modulation
PIC	-	Peripheral Interface Controller
UV	-	Ultra-violet
Ir	-	Infrared

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CHAPTER I

INTRODUCTION

1.0 INTRODUCTION

RC Helicopter is a game which one of the funniest and adventurous gadget. But this thrilling game can be easily used for security purpose since it is upgraded to digital version in this project. Usually helicopter remote control is very hard to play since only the practiced and skilled people can control or play it. This is because two buttons has to be pressed at the same time to stabilize the helicopter. Can never deny the fact that, it is very hard to stabilize and control helicopter using remote control. This factor really brings down the market value and applications for remote control helicopter. So the purpose of this project is to create a PIC based and analog to digital converting remote control. The PIC based RF helicopter use PIC to remote control helicopter motion. It consists of 1 transmitter module and 1 receiver module. There are 4 control buttons to control 2 servos and 2 dc motor on the helicopter. The combination output of the control buttons will move the helicopter forwards, left, right, up, down or stop. The whole system operates at 315MHz frequency its communication range is from 0-50 meters. This new product has good future especially in spying and navigation industry since anyone can control it now since don't have press many buttons to stabilize the helicopter.

1.1 OBJECTIVES

The objectives of this project are:

- a) To modify the helicopter model in order to give it a stabilized in different directions.
- b) To overcome the leakage in security.
- c) To be able to transmit video and audio signals remotely to a central output.
- d) To use simple and cheap product to give a very good secure (created our own controlling panel for the airborne system)

1.2 PROBLEM STATEMENT

Nowadays, all most all the condominium, apartment and certain housing areas hire security guards since the rapid growth of crime in our country. But there are still crimes are happening in housing areas regardless of the presence of guards. It is probably mankind will be very lazy and careless when being guard to other people's property. It is also dangerous to go and examine dark places at ought hours. Therefore, to avoid more criminal cases and to upgrade the security system, this project is designed. Furthermore since human's naked eye can be make mistakes and to avoid errors, infra red cameras will be attached to give clear vision.

Besides that this project also can be used inspections of power lines, pipelines, bridges, oil platforms. These types of places are hard to be accessed by human kind and very dangerous. But we need keep an eye at these or need to repair when there is breakdown. So to check out this type of places this project will be very beneficial since by just send the helicopter and view the areas with the help of attached camera.

Nevertheless, this helicopter model also can be used to search and rescue operation. There are many times many people has gone lost in jungle and other dark places. Since the helicopter model can get into even the tiny holes where the real helicopter can't get into, really help to handle the situation very easily.

In this project there will conversion of signal twice since the helicopter is based on the analog signal. This is because rotor of the helicopter can work under digital signal. The circuit of remote controller will be smaller than the existing remote control. It is because PIC microcontroller will be programmed and attached into the circuit.

1.3 SCOPE OF WORK

- a) The scopes of this project consist of three main parts which are
 - i. Program PIC using C language program
 - ii. Interface between software and hardware
 - iii. Design a circuit of a digital remote controller
- b) Visual inspection using PC based.
- c) Modification of 6-channel remote control in to a 4-channel.

1.4 PROJECT METHODOLOGY

For this project, there are some procedures and methods which will be used to produce a set of complete RF helicopter remote control. The detailed explanation about the methodology used is discussed in Chapter III. The project workflow is described in Figure 1.4.

1.4.1 Project Workflow

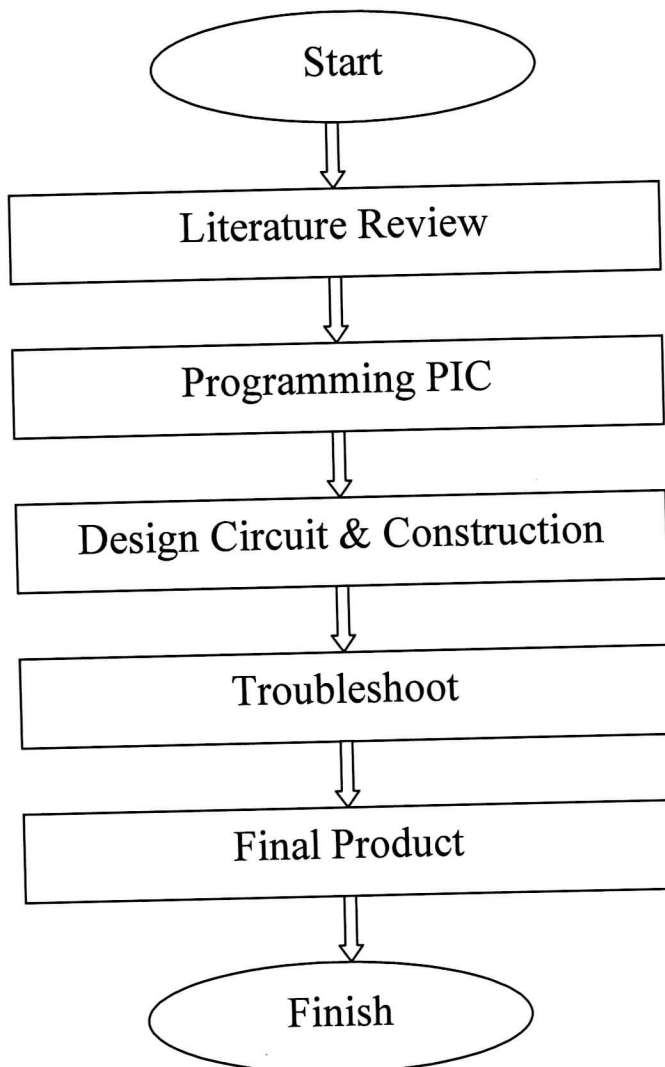


Figure 1.1: The project workflow

1.5 REPORT ORGANIZATION

This report is divided into several chapters. First three chapters are introduction, literature review and project methodology. Forth chapter is on result and discussion. Last chapter is conclusion and also suggestions.

The first chapter is an introduction to the project title. The important overview or descriptions including the objectives, scopes of the project and problem statement have been comprised.

The second chapter is the literature review about the project title. In this literature review, it includes some research about theory of modulation, model of RC helicopter, remote control, microcontroller, PIC and many more.

The third section is about the project methodology. In this chapter, the methods and the project flow has been explained clearly. It also includes information on the research and experiments carried out during the project development.

The fourth chapter mainly focuses on the results and analysis done using the device and discussion. All testing and verification results are attached with the aid of figures, tables, and statistics related to the project. The discussion explains the results obtained as well as their analysis and the overall project.

The last chapter is a complimentary of the previous chapter four. It describes the overall project, concludes this project and provides further suggestions for the project. All matters that were considered to be problems throughout the project are also discussed. Besides that, suggestions for further improvement in the future are given as well.

CHAPTER II

LITERATURE REVIEW

2.0 INTRODUCTION

The second chapter is the literature review about the project title. In this literature review, it includes some research on RC helicopter, practical theories, remote control and PIC.

2.1 HELICOPTER MODEL

2.1.1 History on RC Helicopter Model

Radio Controlled (RC) helicopters are model aircraft which are distinct from RC airplanes because of the differences in construction, aerodynamics, and flight training. Several basic designs of RC helicopters exist, some more maneuverable than others (such as helicopters with collective pitch). The more maneuverable designs are often harder to fly, but benefit from greater aerobatic capabilities[1].

Flight controls allow pilots to control the collective and throttle (usually linked together), the cyclic controls (pitch and roll), and the tail rotor (yaw). Controlling these in unison enables the helicopter to perform most of the maneuvers an aeroplane can do, and many that aeroplanes cannot, such as hovering and

backwards flight; in this manner, they are quite similar in operation to full-sized helicopters.

The various helicopter controls are affected by means of small servo motors. A piezoelectric gyroscope is typically used on the tail rotor (yaw) control to counter wind- and torque-reaction-induced tail movement. This "gyro" does not apply a mechanical force, but rather, electronically adjusts the control signal to the tail rotor servo.

The engines used are typically methanol-powered two-stroke motors, but gasoline, jet turbine and increasingly electric brushless motors combined with a high-performance lithium polymer battery are also used[1].

2.1.2 Types of RC Helicopter

For the time being, there are 4 types of RC helicopters. There are;-

- i. Nitro (nitro methane-methanol internal combustion)
- ii. Electric
- iii. Gas turbine
- iv. Petrol / gasoline

Nitro helicopters are currently more common than electric helicopters. Practical electric helicopters are a relatively recent development and are rapidly developing and becoming more common. Gas-turbine helicopters are also increasing in popularity, although the high cost puts them out of reach of most people.