"I admit that I had read this report and in my opinion this report is sufficient in the manner of scope and quality, to be awarded with a Bachelor Degree of Electronic and Computer"

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WIRELESS CONTROL VEHICLE

This Report Is Submitted In Partial Fulfillment of Requirements for the Bachelor Degree of Electronic Engineering (Computer)

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"I admit that this report is done by my own effort except for the summary and statement which I had already mention the source from"

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Acknowledgement

I have had the opportunity to work with a great group of knowledgeable people that made my project a pleasurable and exciting experience. Their help and support throughout my Degree Final Project is greatly appreciated. Firstly, I would like to give a highest gratitude to my supervisor, Mr. Ho Yin Hwa, for his help throughout the project especially during the documentation phase and always helping me work through difficulties and also not forget thanks to my beloved parents for their non stop encouragement and moral support.

I would like to give a special thanks to all my housemates Mohd Ikhwan b. Hussin, Muzaini Azrul b. Mukhtar, Mohd Khairul Anwar b. Zainol, Hasrul Hisyam b. Rosly for and especially Zulfadli b. Mohammad for their help and support. Lastly thanks to all the members of the Electronics and Computer Faculty for all their support and providing assistance in this project.

ABSTRACT

The purpose of this project is to design and build a system that can control a remote control car from personal a computer as base platform. The key arrow at the keyboard will be use to navigate the car movement such as forward, reverse, turn left and turn right. The main objective of this project is to provide an add-on features so that any enhancement could be add in order to increase the application of remote control car. This project is a combination of hardware and software. A parallel cable has been used to make a connection between computer and RF transmitter. There are four line data will be send to define the car movement based on the key being pressed. With Visual Basic, this system is come with interesting and user-friendly software. This system is able to let user to define first, save and then load each the movement of the remote car. It also has a guideline or help to guide user on how to use the software correctly.

ABSTRAK

Projek ini bertujuan untuk membina sebuah sistem yang dapat mengawal kereta kawalan jauh melalui komputer peribadi yang dijadikan sebagai tapak pelantar. Kekunci anak panah pada papan kekunci digunakan untuk pergerakkan kereta samada kedepan, belakang, kiri dan kanan. Objektif utama projek ini ialah menyediakan satu '*add-on*' sistem dimana ciri-ciri tambahan dapat ditambah bagi meningkatkan penggunaan atau aplikasi kereta kawalan jauh yang kini adalah terhad. Projek ini menggabungkan penggunaan perkakasan dan juga perisian. Kabel selari digunakan bagi menghubungkan antara komputer dan juga penghantar. Terdapat empat data akan dihantar bagi menentukan pergerakkan kereta kawalan jauh berdasarkan kekunci yang ditekan. Dengan menggunakan perisian seperti Visual Basic, sistem ini dilengkapi dengan perisian yang menarik dan juga mesra pengguna. Turut disertakan ialah panduan atau cara menggunakan perisian ini dengan betul. Selain daripada mengawal kereta kawalan jauh secara terus, sistem ini juga mampu menetapkan terlebih dahulu, menyimpan dan menyambung semula setiap pergerakkan kereta kawalan jauh.

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Introduction

1.1 Introduction

Radio Control is one very similar to a remote control hobby. It involves controlling the movement of aircraft, ships, boats or cars by means or radio-controlled equipment. Radio Control Hobbies are popular all over by the world with kids and adult alike. While kids generally prefer the toy versions of radio-controlled gadgets, adults go in for the hobby and slightly advanced versions. When we said remote car, it will has two components; hand remote and remote car. If we are using the hand remote, we could only navigate the car movement. Nowadays, peoples are aiming to advance the radio control technology for another purpose and not just for hobby. In this project the car movement will be controlled and navigated by a personal computer. By entering the arrow key on the keyboard, user can control the car movement. The movement of the car possibly can be defined first so that the car will move itself after execute. When personal computer is counted in the radio control technology definitely it has tremendous advantage and it can be widely expanded for other and future research.

1.2 Problem Statement:

Since year 1893, Radio frequency technology was used in remote control. It was used on military purpose in the beginning and when the war is over, the scientists begin to experiment to find nonmilitary uses for the remote control. Year by year, the radio control technology has become very useful to our life. One of the applications of radio control is remote control car.

After several years the existence of remote control car still has only a function; to control the car movement (forward, backward, left and right). This limitation has inadequate the use of the remote control car. In the future, people will demand a more flexible remote car that not just for hobby and amusement but some others additional features so that the remote car could be applied to do a job or task.

1.3 Objectives

The main objective of this project is to provide an add-on features that will eliminate the limitations of the remote control car. These are the elements that being need by this project to achieve the objective:

1. Design and implement a system that can control a remote car from such distances by using a personal computer as a platform.
2. Establish connection between PC to transmitter (hand remote) by using parallel interface.
3. Develop software by using Visual Basic to run this system.

1.4 Scope of Works

The scope of this project is to design a system to control a remote car from a personal computer. In order to carry out this task, this project will integrate hardware and software element.

1.4.1 Hardware

These followings are the parts of the hardware element:

1. Observe the function of each pin of parallel port.
2. Established a connection from transmitter to personal computer by using a parallel transmission.

1.4.2 Software

These followings are the parts of the hardware element:

1. Develop the software by using Visual Basic programming language. This software should be able to access and send signals to the parallel port.
2. Develop the software which could let the remote car move by itself.

1.5 The chapter summary

This thesis consists of five chapters. Below is the summary of each chapter.

Chapter 1:
This is the introduction chapter where the objective, problem statement and work scope are explained thoroughly.

Chapter 2:
This chapter is the clarification about the background study that has been done. It covers the topics that associated to this project.

Chapter 3:
The methodology for this project was explained in this chapter. All the implementation on doing this project is explained step by step including flowchart.

Chapter 4:
All the results and analysis that has been obtained in this project are included in this chapter.

Chapter 5:
This chapter consists about the discussion and conclusion. The discussion is mainly about the shortcomings in this project and the solutions for future research.

Chapter II

Literature Study

2.1 Introduction

It is significant to have some understanding before starting any project. All the associated information should be gathered and study from trusted source such as books or internet. The discussion with supervisor also important to ensure that the information gathered can be trusted so that the project implementation can be efficiently done. Lastly, the discussion with fellows who have the expertise or capabilities in this field also contributed some useful information.

2.2 The remote control history

One of the earliest examples of remote control was developed in 1893 by Nikola Tesla, and described in his patent, U.S. Patent 613809, named Method of and Apparatus for Controlling Mechanism of Moving Vehicle or Vehicles. The first remote-controlled model airplane flew in 1932. The use of remote control technology for military purposes was worked intensively during the Second World War, one result of this was the German Wasserfall missile.

The first remote intended to control a television was developed by Zenith Radio Corporation in the early 1950s. The remote unofficially called "Lazy Bones" used a wire to connect to the television set. To improve the cumbersome setup, a wireless remote control was created in 1955. The remote called "Flashmatic" worked by shining a beam of light onto a photoelectric cell. Unfortunately, the cells did not distinguish between light from the remote and light from other sources. The Flashmatic also required that the remote control be pointed accurately at the receiver.

In 1956 Robert Adler developed "Zenith Space Command", a wireless remote. It was mechanical and used ultrasound to change the channel and volume. When the user pushed a button on the remote control it clicked and struck a bar, hence the term "clicker". Each bar emitted a different frequency and circuits in the television detected this noise.

The invention of the transistor made possible cheaper electronic remotes that contained a piezoelectric crystal that was fed by an oscillating electric current at a frequency near or above the upper threshold of human hearing, though still audible to dogs. The receiver contained a microphone attached to a circuit that was tuned to the same frequency.

Some problems with this method were that the receiver could be triggered accidentally by naturally occurring noises, and some people, especially young women, could hear the piercing ultrasonic signals.

There was even a noted incident in which a toy xylophone changed the channels on these types of TVs since some of the overtones from the xylophone matched the remote's ultrasonic frequency.

Remote or radio control exist for many other devices as well: scale model airplanes, helicopters and other radio-controlled models are popular children's toys; many robots are remotely controlled, especially those which are designed for doing perilous tasks; and some state of the art military fighter jets are operated by remote control.

For radio control purpose it uses high frequency which has 3 – 30 MHz frequency range. The Table 2.0 shows the spectrum of radio frequency and its use.

Band name	Frequency Wavelength	Example uses
Extremely low frequency	3–30 Hz 100,000 km – 10,000 km	Communication with submarines
Super low frequency	30–300 Hz 10,000 km – 1000 km	Communication with submarines
Ultra low frequency	300–3000 Hz 1000 km – 100 km	Communication within mines
Very low frequency	3–30 kHz 100 km – 10 km	Submarine communication, avalanche beacons, wireless heart rate monitors
Low frequency	30–300 kHz 10 km – 1 km	Navigation, time signals, AM longwave broadcasting
Medium frequency	300–3000 kHz 1 km – 100 m	AM (Medium-wave) broadcasts
High frequency	3–30 MHz 100 m – 10 m	Shortwave broadcasts and amateur radio
Very high frequency	30–300 MHz 10 m – 1 m	FM and television broadcasts
Ultra high frequency	300–3000 MHz 1 m – 100 mm	television broadcasts, mobile phones, wireless LAN, ground-to-air and air-to-air communications
Super high frequency	3–30 GHz 100 mm – 10 mm	microwave devices, mobile phones (W-CDMA), WLAN, most modern Radars
Extremely high frequency	30–300 GHz 10 mm – 1 mm	Radio astronomy, high-speed microwave radio relay
	Above 300 GHz < 1 mm	Night vision

Table 2.1 Radio frequency spectrum

2.3 FM Modulation

Frequency modulation (FM) is a form of modulation which represents information as variations in the instantaneous frequency of a carrier wave. (Contrast this with amplitude modulation, in which the amplitude of the carrier is varied while its frequency remains constant.) In analog applications, the carrier frequency is varied in direct proportion to changes in the amplitude of an input signal. Digital data can be represented by shifting the carrier frequency among a set of discrete values, a technique known as frequency-shift keying.

FM is commonly used at VHF radio frequencies for high-fidelity broadcasts of music and speech (see FM broadcasting). Normal (analog) TV sound is also broadcast using FM. A narrowband form is used for voice communications in commercial and amateur radio settings. The type of FM used in broadcast is generally called wide-FM, or W-FM. In two-way radio, narrowband narrow-fm (N-FM) is used to conserve bandwidth. In addition, it is used to send signals into space.

FM is also used at intermediate frequencies by most analog VCR systems, including VHS, to record the luminance (black and white) portion of the video signal. FM is the only feasible method of recording video to and retrieving video from magnetic tape without extreme distortion, as video signals have a very large range of frequency components from a few hertz to several megahertz, too wide for equalizers to work with due to electronic noise below -60 dB. FM also keeps the tape at saturation level, and therefore acts as a form of noise reduction, and a simple limiter can mask variations in the playback output, and the FM capture effect removes print-through and pre-echo. A continuous pilot-tone, if added to the signal as was done on V2000 and many Hi-band formats which can keep mechanical jitter under control and assist time base correction.

FM is also used at audio frequencies to synthesize sound. This technique, known as FM synthesis, was popularized by early digital synthesizers and became a standard feature for several generations of personal computer sound cards.

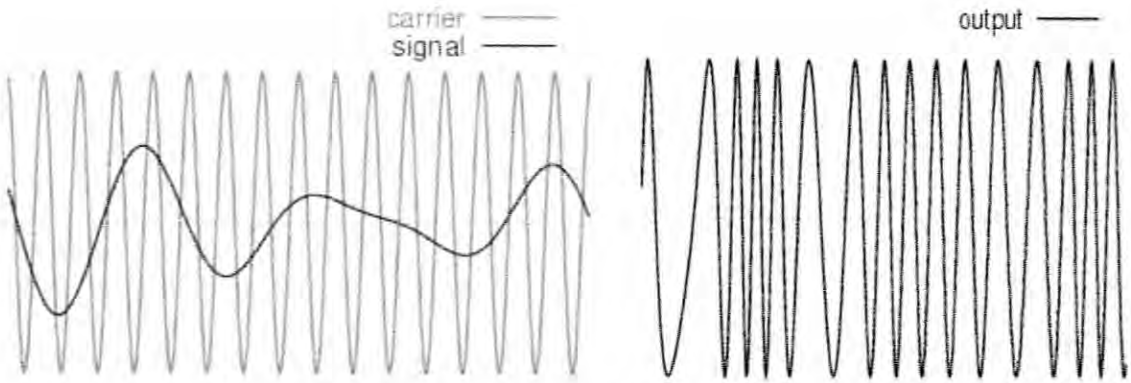

Figure 2.1 Frequency Modulation Process

(source: www.wikipedia.org)

Wideband FM (W-FM) requires a wider bandwidth than amplitude modulation by an equivalent modulating signal, but this also makes the signal more robust against noise and interference. Frequency modulation is also more robust against simple signal amplitude fading phenomena. As a result, FM was chosen as the modulation standard for high frequency, high fidelity radio transmission: hence the term "FM radio" (although for many years the BBC insisted on calling it "VHF radio", which is quite logical, since commercial FM broadcasting uses a well-known part of the VHF band; in certain countries, expressions referencing the more familiar wavelength notion are still used in place of the somewhat mysterious modulation technique name).

FM receivers inherently exhibit a phenomenon called capture, where the tuner is able to clearly receive the stronger of two stations being broadcast on the same frequency. Problematically, however, frequency drift or lack of selectivity may cause one station or signal to be suddenly overtaken by another on an adjacent channel. Frequency drift typically constituted a problem on very old or inexpensive receivers, while inadequate selectivity may plague any tuner.

An FM signal can also be used to carry a stereo signal: see FM stereo. However, this is done by using multiplexing and demultiplexing before and after the FM process, and is not part of FM proper. The rest of this article ignores the stereo multiplexing and

demultiplexing process used in "stereo FM", and concentrates on the FM modulation and demodulation process, which is identical in stereo and mono processes.

This is a very important part of the frequency since it provides a way to continue with the correct signal on the output side.

2.4 The remote control car

A radio-controlled car is a powered model car driven from a distance using a radio control system. Inputs from joysticks on a transmitter are sent the car's onboard receiver. Radio controlled (or R/C) cars can be categorized in two ways, electric powered and gas powered. Electric cars use small but powerful electric motors and rechargeable nickel-cadmium, nickel metal hydride, or lithium polymer cells to power them. Some radio controlled cars use small internal combustion engines fuelled by a special mixture of nitro methane, methanol, and oil (either castor oil or synthetic oil), which are referred to as "gas" cars.

Recently, exceptionally large models have been introduced that are powered by small gasoline engines. Electric cars are generally considered easier for the novice to work with than fuel-driven models, but can be equally as complex at the higher budget and skill levels.