REMOTE CONTROL OF A MOVING VEHICLE

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DECLARATION

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Signature : _____

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Date : 17TH NOVEMBER 2008

DEDICATION

Specially dedicate to
My beloved family and those people who have guided and inspired me
through out my journey of education.

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the most Gracious, the ever Merciful, Praise is to Allah, Lord of the universe and Peace and Prayers be upon His final Prophet and Messenger Muhammad S.A.W.

First, I would like to express my acknowledgment and gratitude to my supervisor, Mrs. Nurul Haslina binti Noordin for the encouragement, advice, information, motivation, guidance and co-operation that been given throughout the progress and to complete this project.

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Finally, special thanks extended to my beloved family who had given me moral support and prayed for my success.

Thank you,

Suzaley Bin Sulaiman

ABSTRACT

The remote control of a moving vehicle is a project that uses a radio frequency to control the maneuver and movement of the model car. The Peripheral Integration Controller (PIC) 16F877A is used in this project. The LCD is placed at the remote control to help user to determine the maneuver angle of the model car. The potentiometer is used as a joystick for the transmitter. There are 2 potentiometer used in this project. The first potentiometer is used to control the maneuver angle and the other one is used to control the movement of the car. The stepper motor is used instead of DC motor to maneuver the car. This is because the stepper motor is more precise than DC motor. DC motor is used to for the movement of the car. The stepper motor and DC motor are interface with PIC on receiver board. The frequency of RF module that used is 343MHz. The car will maneuver to the left or right with the exact angle and the angle is already program in PIC. The angle that has been program in the PIC is 5°, 15° and 45°. To ensure the maneuver more precise, the movement of the motor will stop whenever the car is maneuvering to the left or right. The head light will automatically ON when the car detect the surrounding a little bit darker than usual. The bottom light of the car will automatically ON whenever the surrounding is completely dark. There are also 2 other head light that can be ON using the remote control.

ABSTRAK

Projek ini mengguna gelombang radio frekuensi untuk mengawal pergerakan kereta. PIC 16F877A digunakan di dalam projek ini. LCD dipasang pada bahagian alat kawalan jauh bagi memudahkan pengguna menentukan sudut belokan yang dikehendaki. Perintang boleh laras digunakan sebagai alat kawalan. Terdapat 2 perintang boleh laras yg digunakan, satu perintang digunakan untuk mengawal sudut belokan kereta dan satu lagi digunakan untuk mengawal pergerakan kereta. Kereta ini menggunakan "stepper motor" untuk mengawal sudut belokan. "Stepper motor" adalah lebih cekap berbanding DC motor. DC motor digunakan untuk mengawal pergerakan ke depan atau ke belakang kereta. DC motor dan "stepper motor" disambung ke PIC. Frekuensi gelombang radio yang digunakan adalah 343MHz. Kereta akan bergerak ke kiri atau ke kanan berdasarkan sudut belokan yang telah diprogramkan di dalam PIC. Sudut yang telah diprogramkan di dalam PIC adalah 5°, 15° dan 45°. Untuk memastikan sudut belokan adalah tepat, kereta akan berhenti ketika kereta membelok ke kanan atau ke kiri. Lampu hadapan akan menyala secara automatik apabila keadaan sekeliling berubah menjadi lebih gelap daripada biasa. Lampu bawah akan menyala apabila keadaan berubah menjadi terlalu gelap. Terdapat 2 lagi lampu hadapan yang boleh dikawal dengan menggunakan alat kawalan jauh.

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LIST OF ABBREVIATIONS

Component	The Description
PIC	Programmable Interface Controller
LCD	Liquid Crystal Display
DC	Direct Current
RC	Radio-Controlled
vs.	Versus

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CHAPTER 1

INTRODUCTION

1.1 Overview

Nowadays, we often heard about nature disaster and how it can kill thousands of people. For an example, sometimes when a building collapsed, there are still survivors under the ruin but we can't enter and search for the survivors under the ruin because it is too dangerous and sometimes there is just a small opening. Besides that, sometimes it is dangerous to enter dark area bluntly. We can get hurt or worst we can die because we enter without knowing what is beyond it.

Realizing this problem, this project is developed to help us scout the surrounding inside a dangerous area and unreachable to human. We can control the movement of the vehicle using a joystick. The vehicle can be control within a range of 7 meter. When entering a dark place, the vehicle will automatically switch on the vehicle light to make the vision clearer. A camera is attached to the vehicle to help us see the visual inside the area.

In the first phase, this project will only focus on making the vehicle movement according to the joystick and move within the range of 7 meter. After the first phase is successfully done, the vehicle will be added with a vehicle light that will automatically

on when entering a dark area. After finish adding the vehicle light, a camera will be attached to the vehicle and connected to a laptop or a computer.

1.2 Problem Statement

There is some areas that can not be entered by human being such as a small hole and a place that dangerous to human. This project is developed to help human scout the surrounding inside a dangerous area and unreachable to human.

1.3 Objective

The main objective of this project is to build a device that can control a vehicle maneuver and movement within a range of 7 meter.

1.4 Scope

This project is focused to design and build the model of a remote control and a model car that would be used to scout the dangerous and unreachable areas to human. Therefore, this model will cover the scope as followed:

(i) The vehicle can be control in a range of 7 meter.

(ii) The vehicle can move forward, reverse, left and right.

(iii) The degree movement of the vehicle can be control precisely.

1.5 Methodology

The purpose of this project is to control the movement of a vehicle using the input from the joystick. The vehicle can move forward, reverse, and turn left and right. The joystick is controlling the vehicle using radio frequency. The potentiometer is used as the joystick.

The hardware contains 2 parts that is the transmitter (Figure 1.1) and the receiver (Figure 1.2). In the transmitter part, the joystick will be connected to the PIC 16F877A and the PIC 16F877A will send the signal to the encoder (TWS-434).

The receiver will receive the signal from the transmitter using the decoder (RWS-434) and sent the signal to PIC 16F877A. The PIC 16F877A will send a signal to the motor driver and the motor will run according to the joystick input.

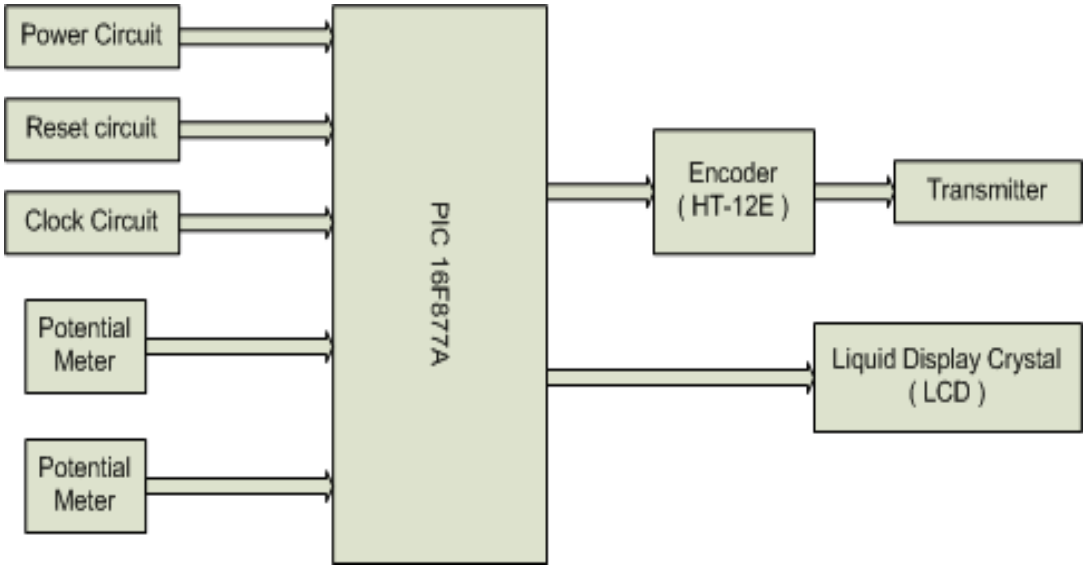

Figure 1.1: Transmitter Block Diagram

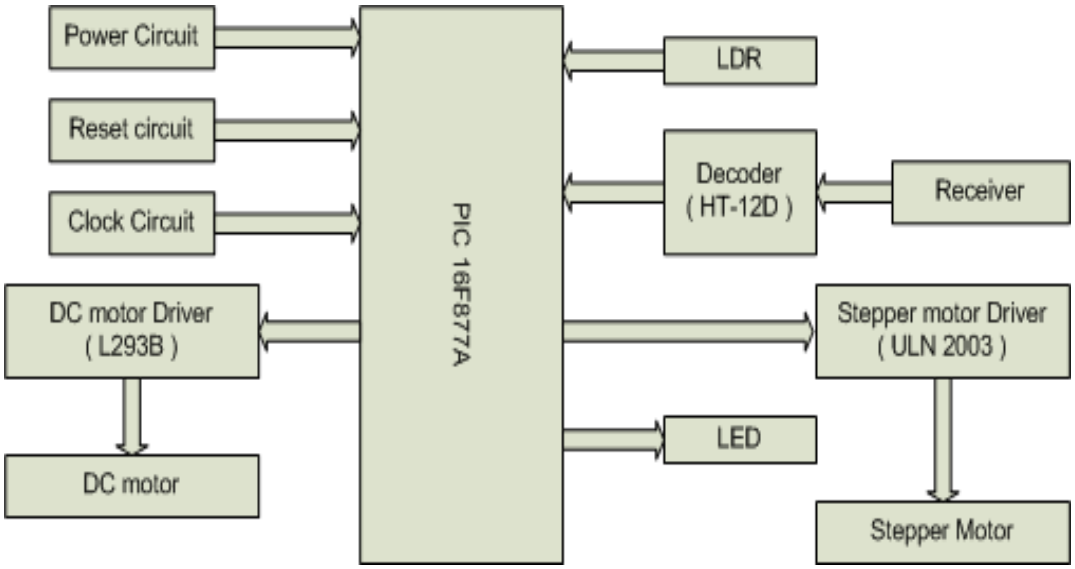

Figure 1.2: Receiver Block Diagram

1.6 Review of the Thesis Content

This thesis consists of five chapters. This chapter discuss about overview of project, problem statement, objective, project scope, methodology and thesis organization.

Chapter 2 will describe about the input, controller, the output of the system and the previous similar project. It will explain about the concept of the components that are used in the project.

Chapter 3 includes the project methodology. It will explain how the project is organized and the flow of process in completing this project. Also in this topic discusses the methodology of the system, circuit design, software design and the mechanical design.

Chapter 4 will be discussing about the result obtained in this project and a discussion about the result. This chapter also discuss about the experimental result, expected performance and performance limit that can be archive.

Finally, the conclusions for this project are presented in chapter 5. This chapter also discusses about the recommendation or future development of the project and cost that involved in the project

CHAPTER 2

THEORY AND LITERATURE REVIEW

2.1 Overview

This chapter reviews about previous system that has been developed and has similarities with the remote control of a moving vehicle. This topic will also discuss about the component that will be used in developing this systems.

2.2 Available Remote Control Car

2.2.1 Ruf Bot 1.1

The article is about constructing a car that can be controlled using joystick. The project is called the Ruf Bot. It is made from a 4 x 8 piece of plastic sheet and has modified servos for motors. The servos are modified in a way that makes them DC gear head motors. The servos internal electronics have been completely removed and only the motor and gears remain (hence the need for an H-Bridge).

The project uses TX/RX pair and the serial communication built into the PICBasic programming language for the PIC's. The actual programming couldn't be easier since it is written in Basic and uses premade serial communication routines.

The position of the Potentiometer in the joystick can be determine using the PICBasic 'POT' command and the result is store in memory at location 'B0'. From there, the contents of 'B0' are sent using the 'SEROUT' command to pin 6 of the TWS 434 transmitter **[1].** On the receiver end, the 'SERIN' command is use to read the incoming data from pin 3 on the RWS 434 and the result is store in 'B0'. The value in 'B0' directly correlates to joystick position, above 150 is right, below 106 is left, and in between is center. By using these numbers a dead zone can be define.

The implication is easier at this point. From the number that is transmitted we can determine the movement of the vehicle. By using the antenna that is made for 900 MHz cordless telephones, the vehicle can be control within the range of 350 feet. The circuit and the model of the project are shown in Figure 2.1, 2.2 and 2.3 below.

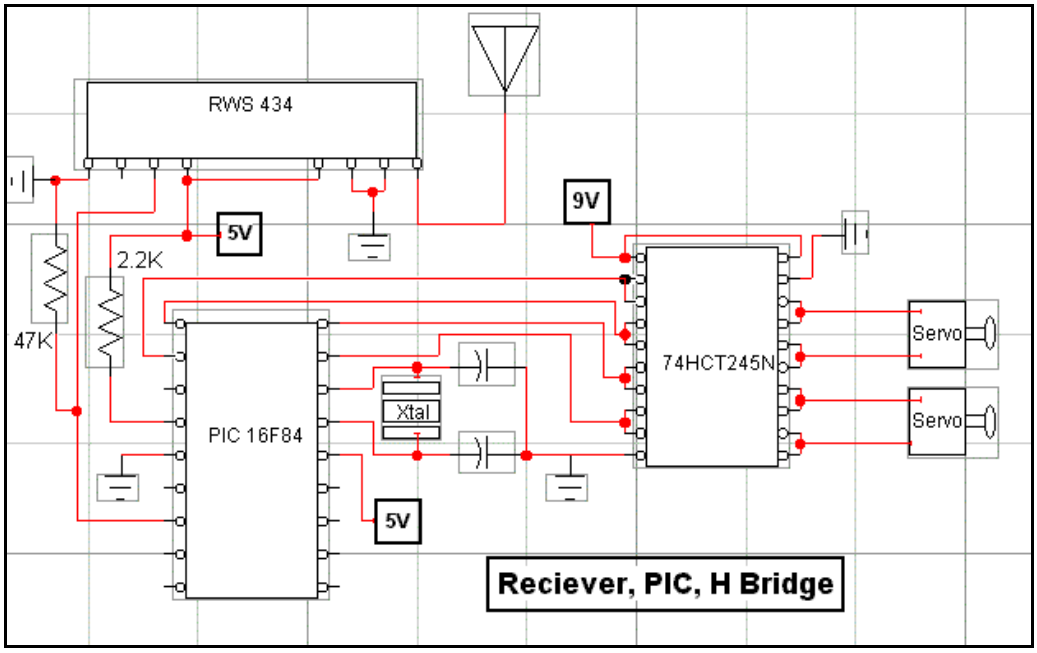

Figure 2.1: Transmitter Circuit

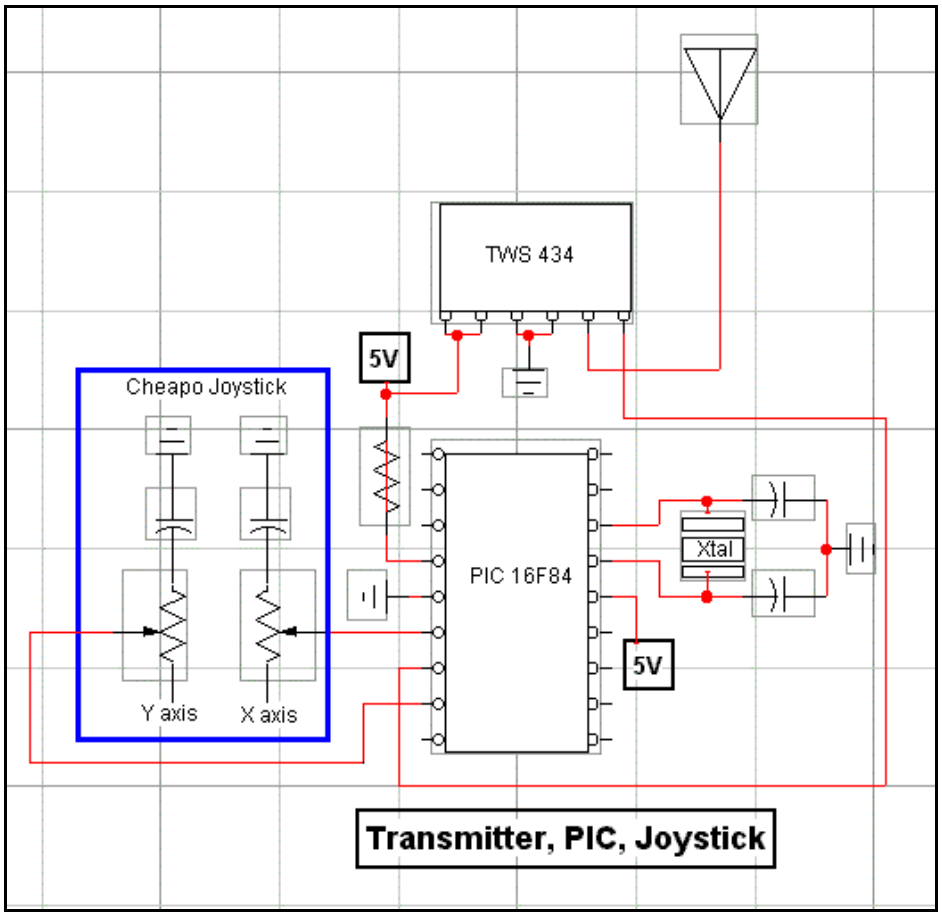

Figure 2.2: Receiver Circuit

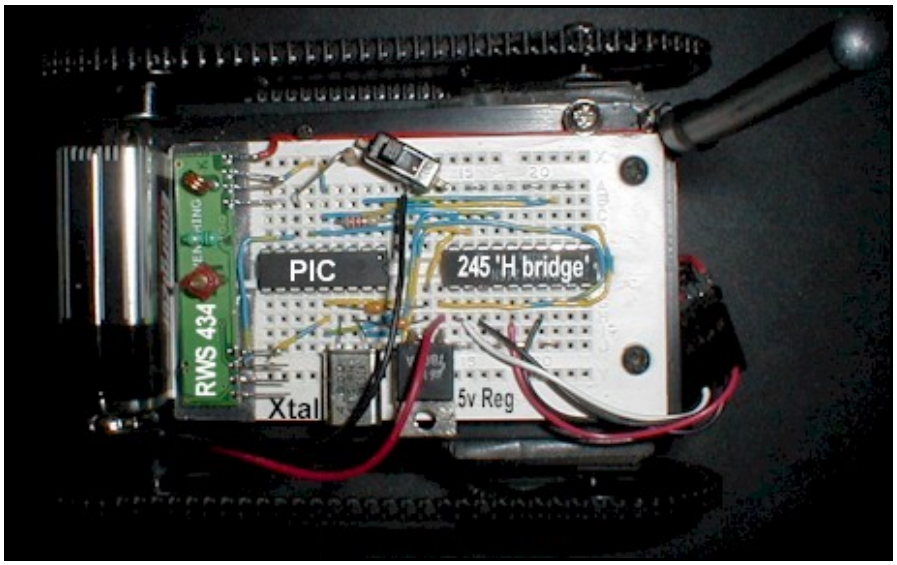

Figure 1.3: Car model

2.2.2 Toy Car Hack - "Synthetic Rodent Development"

This article is about making a light follower toy car. The toy car will follow the light that is beam to the car. It will determine whether the light came from the left, right or center. The car will stop when an object has been hit. The car is built in 5 1/2 inches in length. It is powered by 4 AAA batteries and it has a small dc motor. After gutting the original electronics, a piece of circuit board was cut to size and mounted with one screw. The circuit board is pad-per-hole type and the wiring on the bottom is done with tiny pieces of 30 gauge (wire wrap) wire soldered between points [2].

Visual detection is done using a pair of (matched) photocells. This type of cell works at even very low light levels. The light sources can be determined to be from left, right, or center using a pair in series feeding a 3 level comparator circuit. The photo cells are physically located to 'look' through a hole drilled in the black plastic windshield.

The motor drive circuit has an adjustable current level detector. This detects motor 'stalls' and is used to determine when an object has been hit. To save power in 'sleep' mode, the PIC powers down the entire external circuit (the op-amp and associated resistor networks) when not needed. A permanent magnet 'floats' on a pair of pivots and is held centered by being attracted to a fixed set of metal pole pieces. When power is applied to the solenoid, the pole pieces move the magnet to the left or right [3].

The toy car hack model is shown in Figure 2.4 below.