AUTOMATIC RADIO FREQUENCY CONTROLLED OBJECT CHASER

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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek	:	Automatic Radio Frequency Controlled Object Chaser
Sesi Pengajian	:	2007/2008

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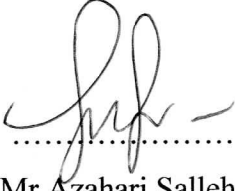Tarikh: 5 Mei 2008

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Signature   : ....

Supervisors Name: Mr.Azahari Salleh

Date   : 5 May 2008

To all the great peoples out there

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ABSTRACT

This project is based on motor control and radio frequency. These are the two important elements that used in this project. It named as "Automatic Radio Frequency Controlled Object Chaser." There is such system in use these days. But there are two disadvantages in those systems. That is it always controlled manually by man power. By that there lots of chances to occur human error while navigating the system that chases an object. Secondly in the current object chasing system, the motor also will be attached with the set that will chase the object. This makes it to appear big in size and heavy. The main objective of this project is to come up with a new design and method of the current widely used system to chase an object in the racing tracks or normal tracks. There are several methods that used to collect data, analysis data, model flow chart etc. One of those is the experimental method. Different kind of method is approached if the system doesn't work using a certain method. But precaution methods also taken time to time to avoid accidents happens since in some point high voltage has to be dealt with.

ABSTRAK

Projek ini adalah berdasarkan kepada pengawalan motor dan gelombang RF. Kedua-dua ini adalah aspek yang terpenting dalam projek ini.Projek ini dinamakan sebagai "Pengejar Objek Automatic Dengan Bantuan Radio Frekuensi."Sistem sebegini memang wujud pada masa ini. Tetapi terdapat dua kelemahan dalam sistem yang sedia ada sekarang.Ia dikawal oleh tenaga manusia. Dengan itu terdapat banyak kemungkinan untuk kesilapan berlaku semasa mengawal atau pun memandu sistem yang sedia ada tersebut.Kelemahan yang keduanya ialah pemasangan motor pada bahagian yang mengejar sesebuah objek itu. Ini membuatkan sesebuah model itu besar dan mahal. Tujuan utama untuk idea ini dalam projek ini adalah untuk mengatasi masalah-masalah tersebut yang dialami oleh sistem yang sedia ada tesrsebut.Terdapat beberapa cara yang digunakan untuk menganalisis sesebuah jadual atau pun data. Salah satunya ialah kaedah cuba-cuba. Maknanya sekiranya sesuatu cara yang gunakan itu tidak memadai atau tidak berfungsi seperti yang sepatutnya ia berfungsi, cara yang lain digunakan.Mahupun begitu, langkah-langkah keselamatan tetap diberi keutamaan.

CONTENT

LIST OF FIGURES

LIST OF CHARTS

LIST OF ABBREVATION

V_{CC}	-	Supply Voltage
V_O	-	Output Terminal Voltage
T_{opr}	-	Operating Temperature
T_{stg}	-	Storage Temperature
V	-	Volts
°C	-	Celsius
Vs-	-	Negative power voltage range for comparator
Vs+	-	Positive power voltage range for comparator
V-	-	Negative input for comparator
V+	-	Positive input for comparator
emf	-	Electro Magnetic Field

LIST OF APPENDIX

CHAPTER 1

INTRODUCTION

1.1   Project Background

This project is based on motor control and radio frequency. These are the two important elements that used in this project. It named as "Automatic Radio Frequency Controlled Object Chaser." Means an object will be followed according to its speed and direction. This will be more suitable to say that the object will be chased where ever it goes. There is one condition for it to be chased that is; it must move in a linear line and not in any direction. The common example where this system can be applied is in racing tracks. The requirement that this project need is fulfils there. The object will be moving in a linear route that is within the track. Radio frequency used in this project. This is one main advantage of this project. The signal from the sensor that detects the distance sends its signal to the motor control circuit and comparator using radio frequency signal. Four modes had been set for motor movement; that is reverse, stop, fast forward and slow forward. The motor responds according to the distance of the object to the sensor. The next step that the motor will do after responding to the distance of the object is moving the rail that contains comparator circuit, transmitter circuit and the sensor forward and reverse to follow the object.

1.2 Problem Statement

There is such system in use these days. But there are two disadvantages in those systems. That is it always controlled manually by man power. By that there lots of chances to occur human error while navigating the system that chases an object. This kind of errors should not take place for any reason if this system is used in race tracks. Since the system that I had developed is being controlled automatically by a distance sensor, there will be no any margin for error to happen during the operation of this system.

Secondly in the current object chasing system, the motor also will be attached with the set that will chase the object. This makes it to appear big in size and heavy. This also can be one of the cause where lots of power dissipation to carry out the heavy load during following or chasing an object.

1.3 Project Objective

The main objective of this project is to come up with a new design and method of the current widely used system in chasing an object in the race tracks. These are the few problems that can be overcome using this system.

i) In the currently used device, the motor will be attached with the moving part that will be following the object. This makes the overall size of the part that moves along the object to appear big in size.

ii) The existing device that being used is controlled manually by man power. The speed and the direction of the motor will be controlled. But with the usage of automatically controlled system in this device, the speed and the direction will be

controlled automatically by the circuitries according to the values of the distance that had been set into the device.

1.4   Methodology

There are several methods that used to collect data, analysis data, model flow chart etc. One of those is the experimental method. Means even if don't have idea how a system or a circuitry or equipment works, different kind of method will be approached to learn how it works. But precaution methods also taken time to time to avoid accidents happens since in some point high voltage has to be dealt with.

1.5   Scope of the Project

Even this system can be applied in large scale; it needs to be compiled into a small system since the total budget and the purpose of demo inside a hall. These are some of the specifications that had been used to develop this project.

i)   The Size of the Project

The model of this project is within 1m x 0.5m. Also this project main attraction is its radio frequency receiving motor circuitry.

ii)   Radio Frequency Range

The frequency range that used in this project at the transmitter receiver part is 418 MHz waveband.

iii)   Power Supply

The most power that used in this system is 12V..5V also needed for few circuits such as the receiver.

ix)   Distance Sensor

The sensor that used in this project is Sharp branded sensor with the code GP2D120 [appendix A]. This sensor takes a continuous distance reading and returns a corresponding analog voltage with a range of 4cm (1.6") to 30cm (12").

1.6   Thesis Outline

This thesis consist a total number of seven chapters. The fist chapter is the introduction of this project. In this chapter, the brief and overall introduction has been given about this project. The second chapter covers about the methodology. In this chapter, it has been explained about the methods and the flow of the work that had been done all along during this project had been developed. Also some facts to run a successful project also shared.

Chapter three is about the motor control. Since motor is an important part in this project, a brief explanation had been given about the type of the motor used, the location of the motor at the base, and finally about its circuitries. Moreover, a car automatic antenna that comes up with a DC motor inside had been used in this project. So it is

important to explain how it will contribute in this project and where it will be replaced to move the sensor along the object that will be moving along the track. Chapter four
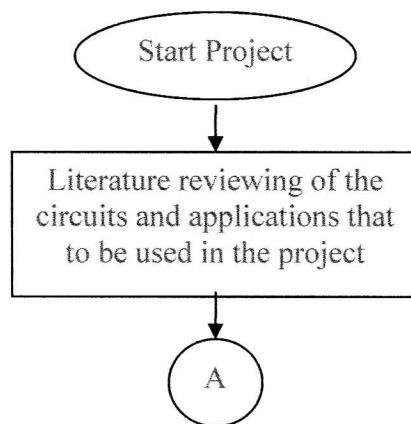
explains about the transmitter and receiver. The circuitries and its contribution to this project had been discussed. Chapter five is about the distance sensor and the comparator. These two parts will be the moving part in his project that will chase down the object that will be moving along the track. The basic of comparator; op-amp also have been discussed in this chapter. Then comes chapter six. All the results have been included in this chapter. Part by part and the ay it connected to make it fully function as a system had been explained in this chapter.

And the last chapter of this thesis is the conclusion and suggestion for this project. In this chapter some of the suggestions to improve this system had been discussed. The last part of this thesis is appendix. The datasheets of the distance sensor along the datasheet of the comparator IC had been attached for further referrals. Also all the circuits that had been used in this project also attached to make sure the reader to get the whole picture of the project.

CHAPTER 2

METHOLODOGY

This chapter will explain about the project methodology and approach taken and a closer look on how the project is actualized. Each achievement and selection taken when the project is implemented will be explained in detail for each stage until the project is completed.

```
        ┌─────────────────┐
        │  Start Project  │
        └─────────────────┘
                 │
                 ▼
   ┌──────────────────────────────┐
   │  Literature reviewing of the │
   │ circuits and applications that│
   │    to be used in the project  │
   └──────────────────────────────┘
                 │
                 ▼
               ( A )
```

A

Assemble all the
components and test the
circuit.

No

Troubleshooting ← Acceptance test

Yes

Fix all the circuit together and
test.

No

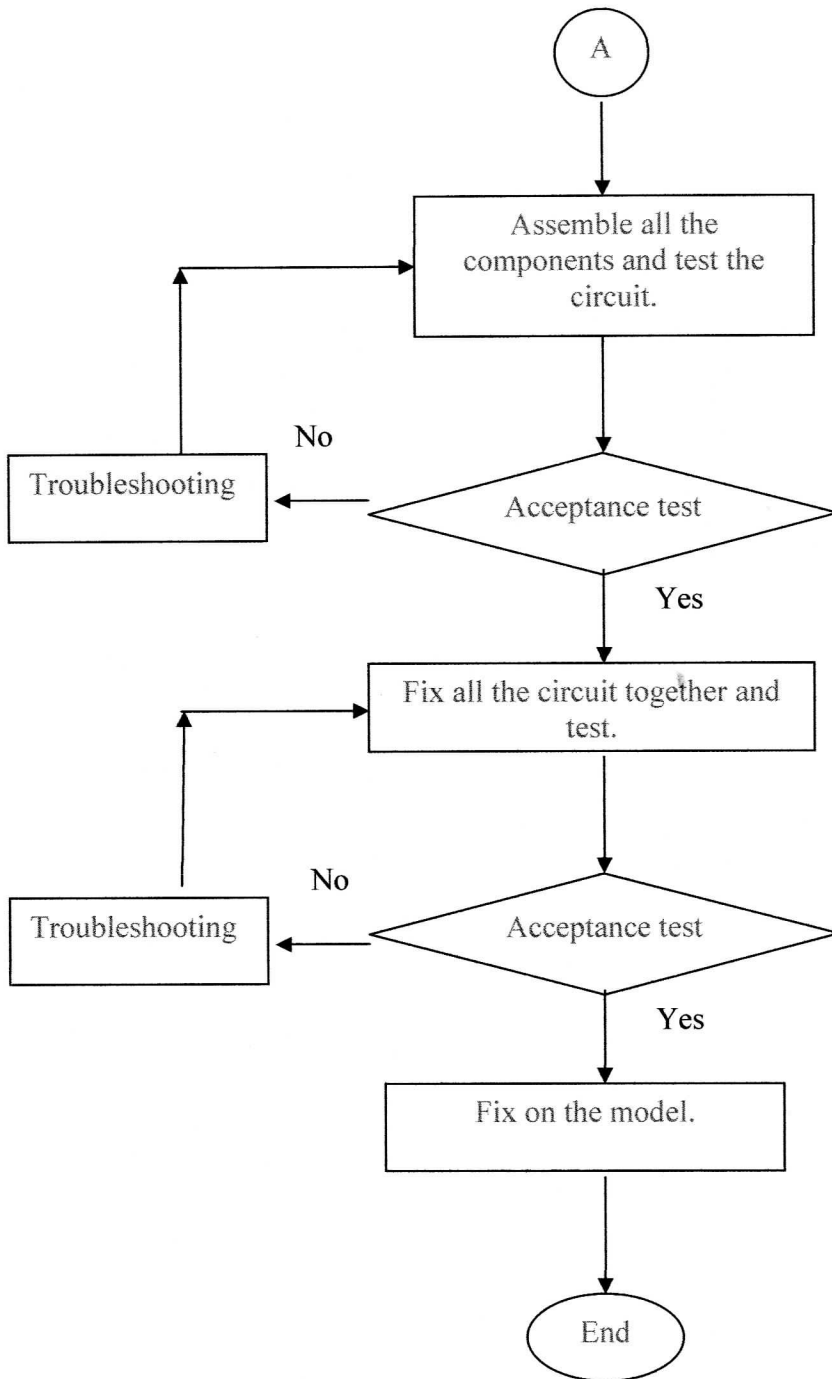Troubleshooting ← Acceptance test

Yes

Fix on the model.

End

Chart 2.1   Schedule Flow Chart of the Project

2.1 Literature Review

The first ever step that took after starting the project is literature reviewing .Literature reviewing is an important part in developing a project. Other steps also included in this phase such as milestone schedule etc. This phase also can be said as the design phase and this might be the longest phase compared to other phases al along during this project development. It is not the intense activity that causes this design phase t be as long as they are [2] Instead it is things like:

- Large amount of documentation has to be produced
- Loss of continuity due to the put-down/pick-up nature of the traditional approach.
- Delay in getting response and/or decisions.
- Difficulty getting the right people at the right time.
- Interruptions
- People having other responsibilities.
- The long time between reviews.
- The natural overhead in traditional project management methods and structure.
- Meetings
- Getting things responded to. Reviewed and approved.
- Reworking and refining.

i) Hardware Studies

In this phase the concept that to be applied in this project had been studies well. The hardware's and the software's that had to be use reviewed and understand well so it can be applied easily during the project development phase