ANDROID CAR

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Tajuk Projek : **ANDROID CAR**

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DECLARATION

"I declare that this report "Android Car" is the result of my own research except as cited in the references".

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Special Dedicate:

To my beloved family for their genuine love, prayers and encouragement. Then to my supervisor who guide and give moral support me and to all my friends for your help and support throughout my journey education.

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ABSTRACT

R/C or Radio Controlled car is considered as one of the most popular toys for children as well as adult and had become more popular since the different local and international organizations that have implemented events and contests in R/C car races. In the other hands, usually toy car are controlled through a remote using an RF which is subject to attenuation, noise and has a very limited range as well. In this new sophisticated era, various kind of module has been developed and growth up from many field such as industries, economy, and infrastructure for various purpose. Besides, normal electronics devices applications such as hand phone, computer and washing machine have been widely used by human being. In this project, the PIC microcontroller that has been used and programmed to design the movement of the Android Car based on the packages is PIC16F877A microcontroller. Besides that an application of this remote car also had been designed using Basic for Android as a graphical user interface that allows users to interact with electronic devices with images rather than text commands. This Android Car is suitable to be commercialized with numerous toy car companies that would like collaborate in delivering this project as a product because can implement source like GPS, that can know coordinate of the location when the user plays the android car with other user. The objective of this project is to operate a remote control car by using a smartphone. In this project, Android Car is controller using a Wi-Fi modules device via Smart-phone. This is an innovative project because remote car that can be controlled by using smart-phone is indeed new and it can provide the user to control the car with the first-person view by using android based smart-phone device. The Android Car will be fun and easy to use to society .

ABSTRAK

R / C atau Radio Kawalan kereta dianggap sebagai salah satu mainan yang paling popular untuk kanak-kanak, dewasa dan telah menjadi lebih popular kerana organisasi tempatan dan antarabangsa yang berbeza telah melaksanakan acara dan pertandingan dalam perlumbaan kereta R / C. Kereta mainan biasanya dikawal melalui remote menggunakan RF yang tertakluk kepada bunyi dan mempunyai jarak yang terhad. Dalam era baru yang canggih, pelbagai jenis modul telah dibangunkan dan pertumbuhan dari pelbagai bidang seperti industri, ekonomi, dan infrastruktur untuk pelbagai tujuan Selain itu, alat-alat elektronik biasa aplikasi seperti tangan telefon, komputer dan mesin basuh telah digunakan secara meluas oleh manusia. Dalam projek ini, PIC yang telah digunakan dan diprogramkan untuk mereka bentuk pergerakan Kereta Android berdasarkan pakej adalah PIC16F877A. Selain itu kereta ini jauh juga telah direka dengan menggunakan asas untuk Android sebagai antara muka pengguna grafik (GUI) yang membolehkan pengguna untuk berinteraksi dengan peranti elektronik dengan imej dan bukannya arahan teks. Kereta Android sesuai untuk dikomersialkan kepada syarikat kereta mainan yang ingin bekerjasama dalam menyampaikan projek ini sebagai produk kerana boleh melaksanakan sumber seperti GPS, yang boleh tahu menyelaras lokasi apabila pengguna memainkan kereta android dengan pengguna lain. Objektif projek ini adalah untuk mengendalikan kereta kawalan jauh dengan menggunakan telefon pintar. Android Kereta adalah pengawal menggunakan peranti modul Wi-Fi melalui Smart-telefon. Ini adalah satu projek inovatif kerana kereta jauh yang boleh dikawal dengan menggunakan telefon pintar dan ia boleh memberikan pengguna untuk mengawal kereta dengan menggunakan android berasaskan peranti telefon pintar. Kereta Android akan menjadi seronok dan mudah untuk digunakan oleh masyarakat

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CHAPTER I

INTRODUCTION

1.1 Background

RF or radio frequency is an oscillation rate in a range of between 3 kHz to 300 GHz, corresponding to the frequency of the radio waves and the alternating currents carrying radio signals. RF usually refers to electrical oscillations. Electric currents which oscillate at radio frequencies have special properties that are not shared by alternating current or direct current of lower frequencies. Although radio frequency (or RF) is a rate of oscillation, the term itself is also used as a synonym for wireless radio communication.

In the last decade Smart Phones have increased exponentially in not only popularity, but also technical design. Software of the integrated systems on these handheld devices is under constant development, but is often limited by the increasing demand for compact size. Many current technologies exist that enable smart-phones to use a Wi-Fi connection to control a multitude of end devices. From Wi-Fi modules software to RC cars, smart-phones can control many external technologies when part of a Wi-Fi network.

However, using an Android based smart-phone to wirelessly control the Android Car, the smart-phone must be able to wirelessly send commands for the movement and direction. These wireless capabilities require the use of some form of pre-created network.

Usually Toy Car is controlled through a remote using an RF link which is subject to attenuation, noise and has a very limited range as well.

This project features an Android Car that uses WiFi 802.15.4 standard for its control signals through TCP/IP protocol, which has flow control. This enables uninterrupted and reliable transmission of control signal to the Android Car. WiFi support high data rates which enables good quality for transmission from the Android Car to the smart-phone. Android Car can be controlled through any smart-phone wirelessly through a WiFi module using smart-phone.

Controlling a smart-phone by hand and finger motions alone is more intuitive than using both hands to control the smart-phone. To be able to control the car with one hand, forward throttle was mapped to index finger motions while reverse throttle was mapped to a pushbutton located on the thumb. Turning was mapped to hand motions to take advantage of the hand's natural ability to roll left and right.

This Android Car is capable of moving with speed of 12Km/h up to a distance of 200m from the controlling smart-phone. It has rechargeable batteries which can support 1.5 hours of full operation. WiFi link enables the use of access points between the robot and the smart-phone thus the operating range can be increased several times. It is applicable is areas like blocked tunnels, pipe lines and enemy zones which are not reachable due to high risk level, blockage or because of our physical limitations.

In the ever changing, ever progressing age that we live in today, more and more tasks back then handled by humans are now replaced with toy car. Though some may think those toy cars are slowly becoming a threat to humans especially when it comes to jobs, some toy car are designed to ease a person's life. The toy car commonly used to defuse a bomb, enter into rubble could save a humans life which is more important compared to a mere job. Therefore, this project was chosen.

This project is just the beginning to multiple future advancement of a remote control car. This Android Car will be able to discover distant terrains be it hazardous or not. By using a smartphone, the Android Car will be able to produce command through the smartphone and provide a live feed of the situation and the location without the controller

having to be in a close range of the Android Car. This will provide a safe atmosphere for the controller in which if the condition of the location is deemed hazardous such as in places with land mines or with high radiation.

The basic idea of this project is to have an Android Car that will be able to scout an area without having to put its controller in jeopardy. Its tasks are also simple which is just to go into a certain terrain and provide its controller with shots and images of that area. With that in mind, the robot developed is as simple as it gets, with the basic function of Wi-Fi controller, live image feed and mobility. With the accomplishment of these three criteria, the robot will be able to conduct its intended duty.

1.2 Objectives

There are three main objectives in pursuing the accomplishment of this project:

i. To study on smart-phone application using android:
Respond to navigation commands triggered through a smart-phone using Android touchscreen smart phone in performing

ii. To control Android Car using Wi-Fi communication:
Maintain continuous wireless connectivity of smartphone

iii. To create a unified technical solution:
To design toy car that guide user using an Android Car in indoor environment or specific location

1.3 Problem Statement

i. Previous mobile car used Radio Frequency (RF) that had problem on transmission frequency, such as low data rate and the frequency sometimes can be shared to other frequency devices.

ii. Utilize a commercially available smart phone (for example an Android phone) to command and control the Android Car. These capabilities are applicable to multiple scenarios including military missions, police surveillance and search and rescue activities. The prototype should be developed and demonstrated using commercially available products.

iii. The range of Android Car has limits, depends to the Wi-Fi in android devices that been use.

1.4 Project Scope

This project is to develop a remote control car using Wi-Fi communication and android devices that will enable control via Smartphone. The Android Car has a limited which is forward, backward, left and right. The speed and direction is not fixed and not potentiometer. This Android Car is high-end car which use to give precise speed and direction control. This project is developing a smart-phone by using c programming language. To designing interfaces wifi module with android phone have to take the Android Car application as a client server socket and lastly, perform system testing through the evaluation of hardware and software.

1.5 Project Overview

This project has been divided into three parts: Smart-phone (transmitter), a car model (receiver) and software (c programming language). The smart-phone is interfaced to a transmitter on the car model by using a wifi modules connection. This car is consisting of 2-channel transmitter such as left, right, forward and reverse. This action can be control by use c programming language on smart-phone to the car compare to remote control. The smart-phone is able to control the car as well as the conventional remote control car to the system.

1.6 Thesis Structure

This thesis consists of 5 chapters. **CHAPTER 1** explains about overview of project, problem statement, objective, project scope, methodology and outline thesis.

CHAPTER 2 will describe the theory about android car and the literature review in regarding the previous similar project on android car. 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 hardware 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 II

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. To design a suitable Android Cart that reasonable for the application, from combination of several toy acr that available nowadays. This is several robot that a guideline to design the Android Car

2.1.1 Examples of Mobile Robot

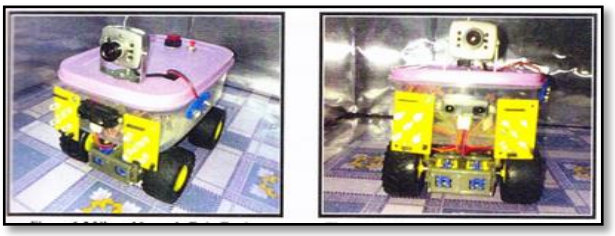

Figure 2.1: RoboExplorer

RoboExplorer designed by UniKL BMI student project that used to monitoring inside ducting to identify the leakage. This mobile robot is using RF signal to control it from the computer and for monitoring they using a webcam.

2.1.2 SRV-1 Blackfin

Figure 2.2: Surveyor SRV-1 Blackfin

Designed for research, education, and exploration, Surveyor's SRV-1 internet-controlled robot integrates a 1000MIPS 500MHz Analog Devices Blackfin BF537 processor, a choice of digital video camera, laser pointer ranging, and WLAN 802.11b/g networking on a quad-motor tracked mobile robotic base that was developed by Inertia Labs. Operating as a remotely-controlled webcam or a self-navigating autonomous robot, the SRV-1 can run onboard interpreted C programs or user-modified firmware, or be remotely managed from a Windows, Mac OS/X or Linux base station with Python or Java-based console software. The Java-based console software includes a built-in web server to monitor and control the SRV-1 via a web browser from anywhere in the world, as well as archive video feeds on demand or on a scheduled basis.

2.1.3 The Wi-Fi enabled mobile robot

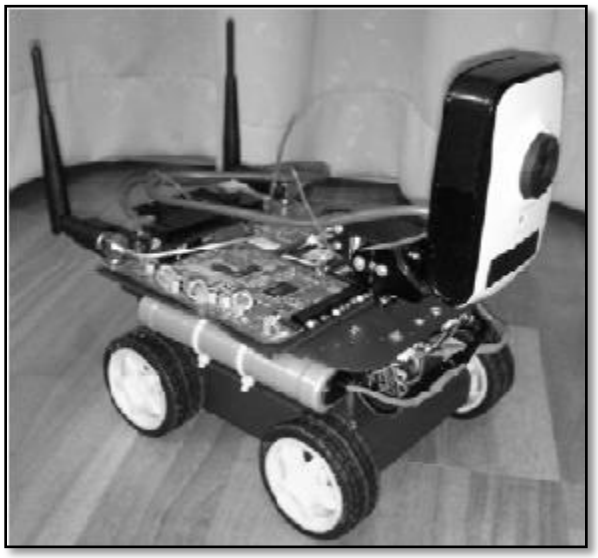

Figure 2.3: The Wi-Fi enabled mobile robot

A robotic chassis kit is used as the base for this robot. 4WD Mobile Platform is chosen as the chassis for the robot and it is manufactured by DFRobot. The chassis is made up of aluminium alloy and it weighs approximately 1 kg. It has four separate motor mountings to drive each wheel. The mobile platform is suitable for the robot as it has pre-fabricated mountings for various circuit boards, sensors and two upper layer platforms. The lower layer houses the four individual drive motors and a voltage sensor. Microcontroller, motor controller and power supply are placed in the first upper layer. The second layer is elevated above the first upper layer. Relay router, camera, servos, sensors and batteries are located in the second upper layer. The completed Wi-Fi enabled robot is shown in Fig.2.3