

# **TRACKING SYSTEM**

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**This report is submitted in partial fulfillment of the requirements for the award of Bachelor of Electronic Engineering (Industrial Electronics) With Honours.**

**Faculty of Electronic and Computer Engineering  
Universiti Teknikal Malaysia Melaka**

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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**  
**FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER**

**BORANG PENGESAHAN STATUS LAPORAN**  
**PROJEK SARJANA MUDA II**

**Tajuk Projek : TRACKING SYSTEM**

**Sesi Pengajian : 2007 / 2008**

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"I hereby declared that this report entitled Tracking System is a result of my own work except for the works that have been cited clearly in the references."

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"I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the scope and quality for the award the Bachelor of Electronic Engineering (Industrial Electronics) With Honours"

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Date : 7/5/2008

**To my beloved parents, family, fellow friends and supervisor, thanks for all supports in successfully producing this projects.**

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## ABSTRACT

This project develops a tracking system by using radio frequency. This tracking system using radio frequency is proposed to locate a child around home areas. Nowadays, many cases about children missing from home. A child can go wherever they want to go without parent monitoring. The main objective of this project is to develop a tracking system which is it can locate a child around home area. This system will detect a child when the child goes outside the range or bound set in radius of 100m. A RF transmitter will attach to the children and the transmitter will transfer signal to the RF receiver. The RF receiver will always detect the signal from RF transmitter when child in range 100m. When the child went out of range, the signal will loose; an alarm should be on to notify that the children are out of range. This project is consists of hardware and software design. The transmitter and receiver circuit were developed for signal transmission as well as the PIC programming for signal selection.



## ABSTRAK

Projek ini adalah bertujuan membangunkan satu sistem pengesan dengan menggunakan frekuensi radio. Sistem pengesan ini adalah bertujuan mengesan pergerakan anak-anak di sekitar kawasan rumah. Pada masa sekarang, kejadian kanak-kanak hilang dari rumah semakin berleluasa. Kanak-kanak bebas bergerak kemana-mana sahaja tanpa ada pengawasan daripada pihak ibu-bapa. Objektif utama projek ini adalah untuk membina sistem pengesan yang boleh mengesan pergerakan kanak-kanak di sekitar kawasan rumah. Sistem ini berupaya mengesan pergerakan kanak-kanak apabila kanak-kanak itu keluar daripada had kawasan yang telah ditetapkan iaitu 100meter daripada kawasan rumah. Satu pemancar frekuensi radio akan diletakkan pada kanak-kanak dan pemancar akan memancarkan isyarat kepada penerima. Penerima akan sentiasa mengesan isyarat daripada pemancar apabila kanak-kanak berada dalam jarak 100m. Apabila kanak-kanak bergerak keluar dari kawasan yang telah ditetapkan, signal daripada pemancar tidak dapat dikesan oleh penerima, penggera akan berbunyi untuk menandakan kanak-kanak telah keluar dari kawasan yang telah ditetapkan. Projek ini terdiri daripada rekabentuk perkakasan dan perisian. Litar pemancar dan penerima dibangunkan adalah untuk penghantaran isyarat merujuk kepada perisian yg telah direka untuk pemilihan isyarat.

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## LIST OF ABBREVIATION

AM	-	Amplitude Modulation
BB	-	Base Band
BER	-	Bit Error Rate
DC	-	Direct Current
FM	-	Frequency Modulation
GPS	-	Global Positioning System
IF	-	Intermediate Frequency
LO	-	Low Oscillator
PA	-	Power Amplifier
PCS	-	Personal Communication Services
PIC	-	Programmable Integrated Circuit
PLL	-	Phase-locked Loop
POR	-	Power on Reset
PWRT	-	Power up Timer
RF	-	Radio Frequency

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# CHAPTER I

## INTRODUCTION

### 1.1 Overview

Throughout the years, a great amount of research has been done in the area of positioning and tracking systems. A multitude of systems has been developed for a wide range of applications from military to civilian. This tracking system is a local positioning system that will be used primarily for tracking system applications, specifically, for a child. Nowadays, there are many cases in Malaysia about children missing from home. Every time a child steps out from house, he or she puts his or her life in danger. This project hopes to alleviate some of this problems, or at least make it easier for parent to locate their children. Current positioning technology has been developed using many different types of tracking systems. One of the most popular positioning devices on the market today is Global Positioning System (GPS), which uses satellites signals to triangulate position on the face of the earth. Although this is a very accurate system, it requires line of sight positioning which cannot be accommodated inside of a building. Also, GPS is an expensive system. Many companies have implemented various similar tracking mechanisms using a range of signals and frequencies.

## 1.2 Project Objectives

The objectives of this project are:

- i. To develop a tracking system by using radio frequency.
- ii. To design tracking system are consist a RF transmitter, RF receiver and PIC circuit.
- iii. To design a transmitter circuit such as bracelet design to attach to the children.

## 1.3 Problem Statement

Nowadays, many cases in Malaysia about children missing from home. The danger for that problem has created the need for a reliable tracking method that will allow the children to stay contact with parents in area 100m. This tracking system will aim to facilitate these problems. The focus will to explore the possible method and select and implement the most effective design. The major design issue that must be determined is the type of wave to use for positioning as well as communication purposes. A tracking system in market is expensive because it uses a Global Positioning System (GPS). Radio frequency was the viable methods that can be used for the project. Radio frequency proved to be the most practical and inexpensive method among others.

## 1.4 Scope of Project

The scopes of project are:

- i. The frequency for transmitter circuit can transmit the signal to the receiver circuit which is 434MHz.
- ii. The range of this RF transmitter and receiver circuit in area 100m.
- iii. PIC circuit to select the signal in high and low state.

## **1.5 Report Organization**

Generally, this report is divided into 5 main chapters. Those are introduction, literature review, project methodology, results and conclusion. In Chapter I, is the overview of the whole project is introduced, as well as the objectives and the problem statements. In Chapter II is the literature review. This chapter explains about the theory, concept and method that have been used in this project. For Chapter III discusses the project methodology involved in order to achieve the objectives of the project. Chapter IV explains the result and also some discussions regarding the project. Chapter V is the conclusion that concludes the report including the suggestion for future work.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Overview**

This chapter explains the research related to the wireless communication system and how this knowledge can be manipulated to develop the radio frequency tracking system. Next, the basic information about component parts will be discussed briefly. This chapter will increase deeper understanding about basic wireless communication system and component parts.

#### **2.2 Current Study of Tracking System**

Radio frequency (RF) transmitters emit a short pulse of energy in the form of a radio wave on a specific frequency. A receiver is programmed to detect an electromagnetic pulse and transforms it to either an audible beep or flash of lights. Using the series of beeps or lights as a guide, the receiver operator is able to hone in on the exact location of the transmitter.

Radio waves spread in all directions from the source of the transmission, similar to the ripple effect of a drop falling in a pool of water. The strength of the signal depends on amplitude of waves detected by the receiver. As with a pool of water, waves closer to the source will be closer together and stronger, weakening as they travel away from the source. The antenna's function is to pick up the radio waves such that the receiver can determine the direction of the strongest signal.

Tracking using RF is active and reactive. When the tracking begins, it doesn't know where it is going to end. As the Tracker" that is constantly taking readings, identifying obstacles that may be affecting the signal strength and changing the approach to the transmitter. Based on the information gathered at one "listening" point, a receiver setting must be adjust or change the directions that were headed. RF transmitters are small, lightweight and extremely durable making them a good solution when the tracking system needs to be as covert as possible. For the most part, RF tracking systems provide excellent short to medium range tracking and locating. [9]

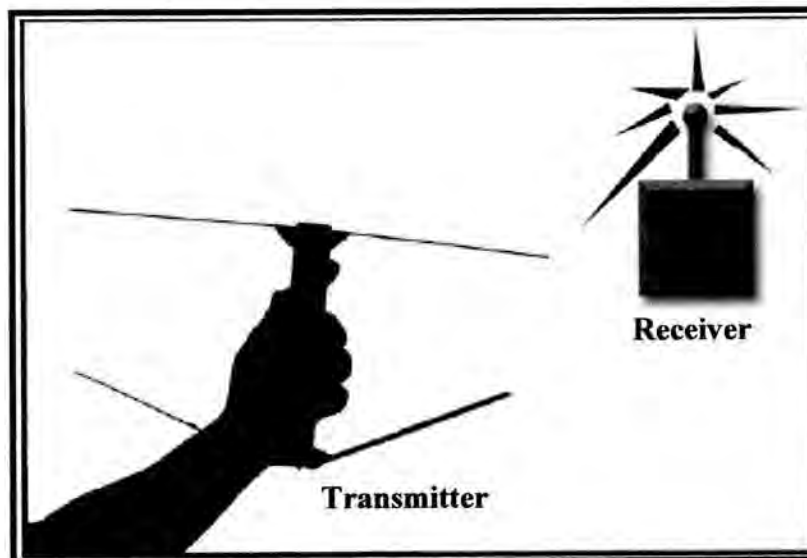


Figure 2.1: How the RF Tracking Works

Table 2.1: Factor for Selecting Tracking Method

<b>Factor</b>	<b>Radio Frequency</b>
<b>Data From</b>	Pulsed signal on a specific frequency
<b>Data Options</b>	Motion sensor, transmitter ID, light sensor, low battery and tilt switch.
<b>Range</b>	Up to 12 miles Line of Sight. 100 miles from the air.
<b>Location</b>	Within 1 meter
<b>External Infrastructure</b>	No needed
<b>Duty cycle with attach battery</b>	Can be up to 5 years. Typically 1 to 6 months.
<b>Display</b>	Signal strength on the receiver
<b>Weight</b>	2 grams to 400 grams
<b>Durability</b>	Very durables in wet environments, G-Force crashes and other challenging conditions.
<b>User Friendliness</b>	Practice and skills required to be proficient with receiver.

### 2.3 History of wireless communication

Wireless signals proved effective in communication for rescue work when a sea disaster occurred. Effective communication was able to exist between ships and ship to shore points. A number of ocean liners installed wireless equipment. In 1899 the United States Army established wireless communications with a lightship off Fire Island, New York. Two years later the Navy adopted a wireless system. Up to then, the Navy had been using visual signaling and homing pigeons for communication.

In 1901, radiotelegraph service was instituted between five Hawaiian Islands. By 1903, a Marconi station located in Wellfleet, Massachusetts, carried an exchange or greetings between President Theodore Roosevelt and King Edward VII. In 1905 the naval battle of Port Arthur in the Russo-Japanese war was reported by wireless, and in