

CHILDREN LOCATOR USING RF

MOHD SUFIAN BIN MOHD FADIL

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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MOHD SUFIAN BIN MOHD FADIL

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

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2009



UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : CHILDREN LOCATOR USING RF

Sesi Pengajian : 2008/2009

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For my lovable parent:

Mr. Mohd Fadil Bin Muhidin

Mrs. Salumah Binti Sutaman

For my one and only beloved wife:

Nurulaini Binti Muhamad

For my supportive family members:

Mohd Redwan Bin Mohd Fadil

Muhammed Taufiq Bin Mohd Fadil

Nurunnabiha Binti Mohd Fadil

ACKNOWLEDGEMENT

Praise is to Allah S.W.T. for giving me chances to complete my PSM. First and foremost, I would like to thank my beloved parent, Mr. Mohd Fadil Bin Muhidin and Mrs. Salumah Binti Sutaman for their support and always give me ideas. I would like to thank all Faculty of Electronic and Computer Engineering (FKEKK), UTeM's lecturers and staffs especially to my PSM supervisor, Mr. Mohd Riduan Bin Ahmad for his great ideas and supervision. Last but not least, I also offer my thankness for my entire friend whom giving me advices and moral support on finishing this study. Without all of you, I cannot achieve what I have today. May Allah bless you all. Thank you.

ABSTRACT

Children abduction case is the hottest issue nowadays and worrying most parents who have underage children. Less awareness and loose from parent's sight will give an advantage to abductor. This is always occurring at mart or supermarket when parent are busy doing shopping. Due to the problem, by implementing communication technology with specialized on the use of radio frequency, new device will be design to detect and locate missing children. This project is to create a children locator which is it can track and locate missing children. The project contains two units, parent unit and children unit. The parent unit will give alarm sound when the child is not in the safe range anymore. The safe range can be program anytime because this project will use on board programmable technology. The direction of the children can be known by pointing the device to any area. If the area is correct, the LCD display mounted on parent unit will tell us. The buzzer will also giving the beep sound. This project is developing by using RF technique which is economic compare to GPS technology. It is also using microcontroller as a brain of the device. With the help from this device, parents have no worries to bring their children to shopping mall. In the same time, the children abduction cases can be reduce.

ABSTRAK

Kes penculikan kanak-kanak adalah merupakan isu hangat pada masa kini yang membimbangkan para ibubapa. Kurang memberi tumpuan dan hilang dari pandangan mata ibubapa merupakan satu bonus untuk si penculik menculik mangsa. Ini seringkali berlaku di pasar borong mahupun pasaraya ketika ibubapa sedang sibuk berbelanja. Oleh yang demikian, dengan mengaplikasikan teknologi telekomunikasi iaitu radio frekuensi, satu alat dicipta di mana ianya dapat memberi amaran tentang kehilangan kanak-kanak dan boleh digunakan untuk mengesan dimana lokasi kanak-kanak tersebut. Projek ini terdiri daripada dua unit iaitu unit ibubapa dan unit kanak-kanak. Unit ibubapa akan memberi bunyi amaran apabila kanak-kanak berada pada jarak yang tidak selamat. Jarak ini boleh diubah pada bila-bila masa mengikut kesesuaian kerana projek ini menggunakan kaedah pemrograman diatas litar. Arah kanak-kanak yang hilang tersebut boleh diketahui dengan mengacukan alat pengesan ini pada mana-mana arah. Apabila arah yang diacukan betul, paparan LCD pada alat pengesan ini akan menyatakan arah tersebut adalah betul dan pada masa yang sama akan memberi bunyi beep. Projek ini menggunakan teknologi RF untuk beroperasi kerana ianya jimat berbanding teknologi GPS. Ia juga menggunakan mikropengawal sebagai pusat pemproses. Dengan bantuan alat ini, ibubapa tidak perlu lagi risau tentang anak-anak mereka dan sekaligus dapat membantu mengurangkan kes-kes penculikan.

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LIST OF ABBREVIATIONS

AC	Analog Current
ADC	Analog to Digital Converter
ALU	Arithmetic Logic Unit
BOR	Brown-out Reset
CCTV	Closed Circuit Television
CMOS	Complementary Metal Oxide Silicon
CPU	Central Processing Unit
CS	Common Slave
DB	Decibel
DC	Direct Current
DIY	Do It Yourself
EEPROM	Enhanced Erasable Programmable Read Only Memory
FM	Frequency Modulation
FSK	Frequency Shift Keying
GND	Ground
GPS	Global Positioning System
I/O	Input / Output
IC	Integrated Circuit
ICD	In Circuit Debugging
ICSP	In Circuit Serial Programming
ID	Identification Data
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCU	Main Control Unit
PC	Personal Computer
PCB	Printed Circuit Board

PIC	Peripheral Interface Controller
PS	Port Serial
PSM	Projek Sarjana Muda
PSP	Parallel Serial Port
PWM	Pulse Width Modulation
RAM	Random Access Memory
RC	Resistor / Conductor
RD	Read
RF	Radio Frequency
RFID	Radio Frequency Identification
RSSI	Receiver Signal Strength Indicator
RX	Receiver
SMD	Serial Mounted Design
SSP	Synchronous Serial Port
TTL	Transistor Transistor Logic
TX	Transmitter
UART	Universal Asynchronous Receiver Transmitter
USART	Universal Synchronous Asynchronous Receiver Transmitter
USB	Universal Serial Bus
WDT	Watchdog Timer
WR	Write

CHAPTER I

INTRODUCTION

This chapter consists of the introduction, objective, problem statement and scopes of the project. It also gives the overview of the whole project, from the beginning till the end. By reading this chapter, readers can get the basic idea of what this thesis is about. Only short explanation is giving here since the detail is in chapter 2, 3, 4 and 5.

1.1 Introduction

The purpose of this project is designing a circuit for detecting a loss child and at the same time gives the direction of the missing children. This project is important because it help a lot the parent to keep the save of their children. The project was divided into two development which is hardware development and software development. The hardware was divided into two parts which are the control system part and the transmission part. The control system part is where the microcontroller PIC is connects to the inputs and outputs. The inputs are from the receivers and the outputs are buzzer and LCD. The most challenging part is the transmission part which is contains the transmitter and receiver and also the antenna.

For the hardware development, both units of the device (parent unit and children unit) are connecting each other by using RF technology. How the device

working is when the children circuit is turn on, it will always transmitting the signal. The parent circuit also should be on and will receive the signal from the transmitter. One receiver with RSSI indicator connecting to Omni-directional antenna will detect the distance of the transmitter and the other one receiver connecting to Uni-directional antenna will use to detect the direction of the transmitter if the antenna is point directly to the transmitter. With this idea, the device can differentiate the distance of the transmitter and in the same time can be use to get the direction of the transmitter. The PIC then will process the signal and decide the output condition for the children. The output is alarm sound from buzzer or some information show in the LCD. By alerting sound, parent will know that their children is not in the safe range anymore and from the LCD, parent should be know which direction to go to trace back their missing children. Since RF technology is use, blocking from wall or whatever medium is not a problem.

The software development is writing the PIC programming according to the need of the hardware and burned into the PIC. The programming is difficult to find since it is a new project so no resource from internet, journal or book can be found.

1.2 Objective

The project objective should be determined before starting the whole process. This is to ensure the progress is in the range. Ideas and solutions will come after in order to complete the objective. In this project, only two objectives are aimed.

1.2.1 Project Objectives

- I. To create a system that can give the direction of the missing children.
- II. To combine the function of alerting and locating into one circuit.

1.3 Problem Statement

As we know, nowadays we can always hear the cases of children abduction. Present of CCTV or whatever security system cannot help to trace back the missing children. So, the best way is to prevent it before it occurs. The tracker devices sell in the market also cannot completely help in this problem since they can only track the missing children but not give an alerting sound when the children is far from their parent. This always occur when the parent only realize their children is already missing. So the main problems in this project are first, there is no children locator device that can give the accurate direction of the missing children and second, the shortages of the children locator device in the market that can give alerting function when the children is lost and in the same time can give the user the direction of the victim.

1.4 Scope Of Work

The scope of this project is creating two circuit; parent and children circuit which are as small as possible to make it easier to bring anywhere. The circuit is implementing RF technique. Two receivers and antennas were used to make sure the system can differentiate the distance of the transmitter from the receiver and to make sure the direction of the transmitter can be detect. The microcontroller PIC16F876A was used as the brain of the system. It is compatible because the microcontroller is an 8-bit microcontroller with 22I/O, operate with 5V supply, operating speed is 20MHz, has self data memory and self programming. It is also operate by using arithmetic and logical operation. The children locator device was mounted with buzzer which can give the alerting sound when the child is out of safe range. The direction will be display in the LCD. Battery 9V DC is use to power up the parent unit and battery 3V DC is use to power up the children unit. The limitation of the project is the cost of hardware components. Some modifications were applied to maintain the cost to below RM200. Another limitation is the component part. Some are hardly to find, so an alternative components were used to replace it.

1.5 Thesis Organization

To help the reader to understand more about this thesis, this thesis organization give the summary of the chapters contain in this thesis. This thesis contains five chapters. Chapter I is about the introduction of the project. The overview of the project was discussed in this chapter. It contains the introduction of the project, the objective of the project, the problem statement, scope of work and lastly the thesis organization. Chapter II cover up on the background study. All the literature reviews were discussed here. Chapter III contain the methodology of the project which is how the project was done. All the steps of methodology were discussed in detail here. The results and findings were discussed in Chapter IV. Chapter V is all about the conclusion of the project. Also, some suggestions are given. These total five chapters are covering PSM II.

CHAPTER II

BACKGROUND STUDY

Before starting a project, there is a need to study about the background of the project. All the basic structure and information in the literature reviews are use to build up the project structure. In this chapter, there is a study about the circuit, component and idea about the project.

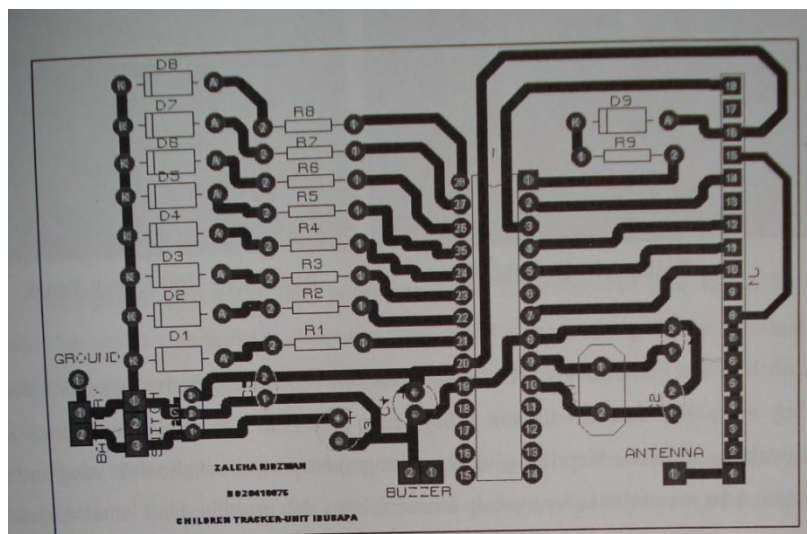
2.1 Reference Circuits

References circuits are needed in order to construct a new circuit. Therefore, several circuits are taken as references to this project. Some part of the circuit are modified or be combined. They are relate to this project and very useful as a guide.

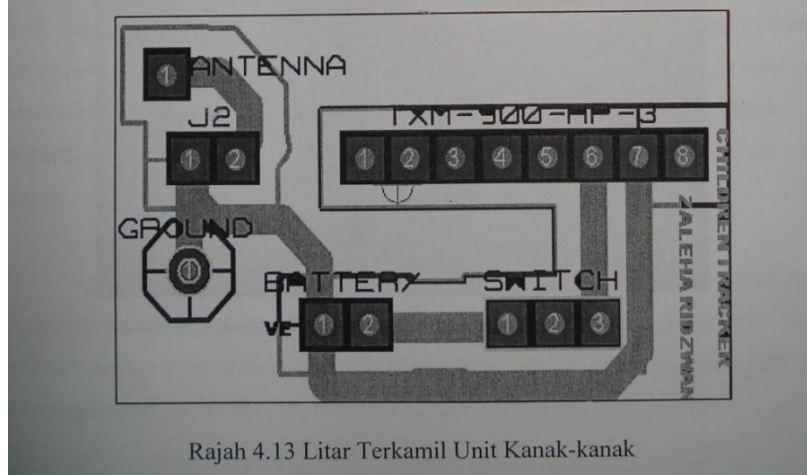
2.1.1 Children Tracker

Children tracker is the main reference circuit for the transmission part which including the transmitter, receiver and antenna. This tracker circuit has the function to detect the distance of the children from the parent by giving led measurement. It uses RF technique to link up both parent circuit and children circuit. Receiver with true RSSI indicator is use so the signal strength can be detected. The operation is, when both circuit is turn on, the children circuit will transmit signal to the parent

circuit. Parent circuit with RSSI receiver will detect the signal strength and sent the data to PIC. The PIC then gives the output to the LED. The led indicator will show the distance of the children according to the signal strength.



Rajah 4.12 Litar Terkamil Unit Ibu bapa



Rajah 4.13 Litar Terkamil Unit Kanak-kanak

Figure 2.1: Children Tracker Circuit [1]

2.1.2 RFID: Read and Display

RFID circuit from Cytron Technologies is the important reference since the control system part is taken from here. The project circuit is developing as a hobby kit. It is one of the Cytron Technologies DIY Project with series no (PR8). This

project use PIC16F876A and a RFID reader (IDR-232) to control LCD (2X16 characters), LED and buzzer. The features are:

PIC16F876A

- 8-bit microcontroller with 22 I/O
- Operate with 5V supply
- Operating speed 20MHz

LCD (2X16 characters)

- 2X16 character display
- Operate with 5V supply
- Back light

RFID reader IDR-232

- RFID tag reader with serial UART output
- Operate with 5V supply
- Output baud rate 9600bps

SYSTEM OVERVIEW

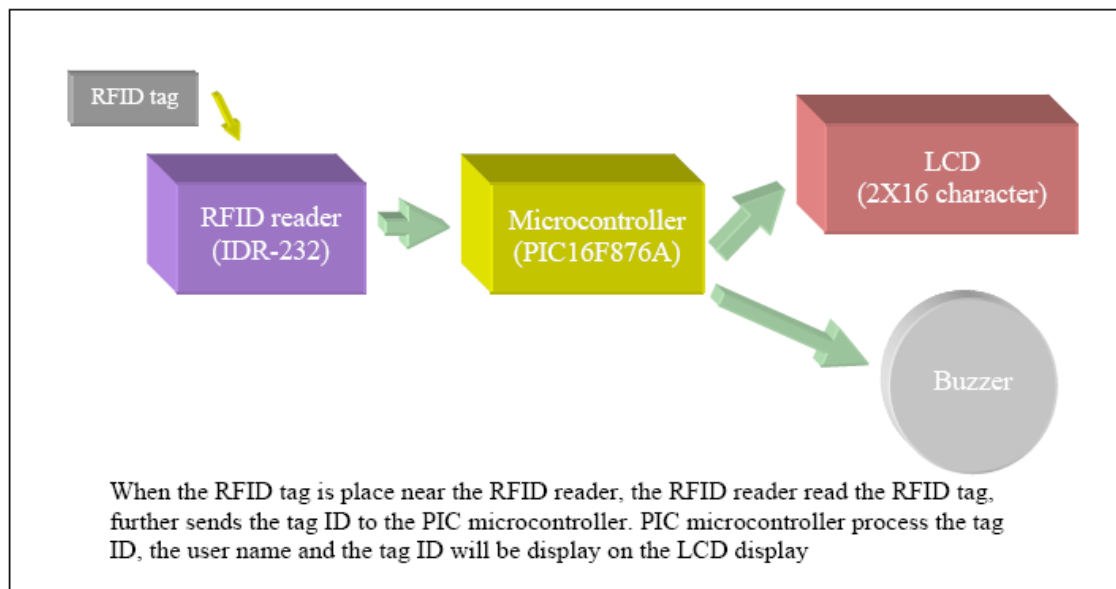


Figure 2.2: RFID: Read and Display System Overview [2]

There are several components and circuits are combining into one circuit to build up this project. It contains an RFID Reader (IDR-232), PIC16F876A, Interface RFID reader (IDR-232) with PIC16F876A, Interface LCD (2X16 characters) with PIC16F876A, Power supply for the circuit, Push Button as input for PIC Microcontroller, LED as output for PIC Microcontroller, Buzzer as output of PIC Microcontroller and ICSP for programming PIC Microcontroller.