CLOSED ROOM MULTIPLE SENSING FOR DISPLAY AND STORAGE ON PC

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Bachelor of Mechatronics Engineering

2009

"I hereby declare that I have read through this report entitle "Closed Room Multiple Sensing for Display and Storage On PC" and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Mechatronics Engineering"

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A report submitted in partial fulfillment of the requirements for the degree of Mechatronics Engineering

Faculty Of Electrical Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2009

I declare that this report entitle “Closed Room Multiple Sensing for Display and Storage on PC” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : …….

Name : Mohd Zahari Bin Puteh

Date : 11 May 2009

Dedicated, in thankful appreciation for support, encouragement and understandings to my beloved mother and family.

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ABSTRACT

Closed Room Multiple Sensing for Display and Storage on PC is a project that integrates the usage of computer to the previous project which is called *Pengesanan dan Pengawasan Alat Pengesan Bilik Tertutup*. The PC is interfacing with microcontroller for data acquisition and monitoring multiple sensors in the closed room. The status of the sensors is collected using PC via serial communication, interfaced through a microcontroller. This project can be divided into two main parts which are hardware and software. The hardware part consists of developing the interface circuit between microcontroller and PC while the software part is developing Graphical User Interface (GUI). The GUI is used for displaying and storing the status of the sensor. This project will produce alarm in the form of buzzer, LED and LCD display for alert the user about the insecure or unsafe condition in the closed room. Furthermore, this project will also equip the system with flash memory storage as data backup if there is any power breakdown on PC. GSM system is another additional feature that needs to be integrated for the purpose of sending an alarm message when the user is away from the room. By developing this project, the application or implementation of closed room monitoring can be broaden for further applications such as in industrial buildings, to alert the user in the case of intruders and dangerous situations like fire and flood

ABSTRAK

Pengesanan Berganda Bilik Tertutup untuk Pemaparan dan Penyimpanan di dalam PC merupakan satu projek yang mengintegrasikan penggunaan komputer terhadap projek sebelumnya yang dikenali sebagai Pengesanan dan Pengawasan Alat Pengesan Bilik Tertutup. PC akan diantaramukakan dengan mikropengawal untuk perolehan data dan pengawasan pelbagai penderia yang terdapat di dalam Bilik Tertutup. Status kesemua penderia dikumpul menggunakan PC melalui komunikasi sesiri yang diantaramukakan dengan mikropengawal. Projek ini boleh dibahagikan kepada dua bahagian utama iaitu bahagian perkakasan dan perisian. Bahagian perkakasan melibatkan pembangunan litar antaramuka di antara mikropengawal dengan PC sementara bahagian perisian melibatkan pembangunan Pengataramuka Grafik Pengguna (GUI). Pengataramuka Grafik Pengguna (GUI) digunakan untuk memaparkan dan menyimpan data berkenaan status penderia. Isyarat amaran dalam bentuk buzzer, LED dan paparan LCD akan dihasilkan untuk memberi amaran kepada pengguna tentang keadaan tidak selamat dan berbahaya di dalam Bilik Tertutup. Dalam pada itu , projek ini turut dilengkapi dengan penyimpan memori kilat sebagai perlindungan data sekiranya berlaku kehilangan kuasa pada PC. Sistem GSM merupakan satu lagi penampilan tambahan yang perlu diintegrasikan dengan tujuan untuk menghantar mesej amaran kepada pengguna yang tiada di bilik. Dengan membangunkan projek ini, aplikasi dan implementasi pengawasan bilik tertutup dapat diperluaskan kepada aplikasi yg lebih jauh seperti bangunan industri dengan tujuan untuk memberi amaran kepada pengguna tentang kewujudan penceroboh dan situasi yang berbahaya seperti kebakaran dan banjir.

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ADO	-	ActiveX Data Object
ADC	-	Analog Digital Converter
AT	-	Attention
COM	-	Component Object Model
CMOS	-	Complement Metal Oxide Silicon
DAO	-	Data Access Object
FAT	-	File Allocation Table
GSM	-	Global System for Mobile
GUI	-	Graphical User Interface
IDE	-	Integrated Development Environment
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MMC	-	Multimedia Card
MSSP	-	Master Synchronous Serial Port
OLE	-	Object Linking and Embedding
PC	-	Personal Computer
PCB	-	Printed Circuit Board
PIC	-	Peripheral Interface Controller
PIR	-	Passive Infrared Sensor,
PWM	-	Pulse Width Modulation
PSM	-	Projek Sarjana Muda
RAM	-	Random Access Memory
RAD	-	Rapid Advance Development
RDO	-	Remote Data Object
RTC	-	Real Time Clock
SD	-	Secure Digital
SMS	-	Short Message System
SPI	-	Serial Peripheral Interface

SPP	-	Slave Synchronous Serial Port
TTL	-	Transistor-Transistor Logic
UART	-	Universal Asynchronous Receiver Transmitter
USART	-	Universal Synchronous Receiver Transmitter
USB	-	Universal Serial Bus
VB	-	Visual Basic

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CHAPTER 1

INTRODUCTION

1.1 Project Overview

Closed Room Multiple Sensing for Display and Storage on PC is a project which is based on interfacing PC with microcontroller for data acquisition and monitoring sensors in closed room. Actually, this project is a continuation of a previous closed room monitoring system project. The said project only monitors the sensors and produces alarm in the form of buzzer, LED and LCD display using PIC16F877A as the main controller. Apart from this, this continuation project introduces some additional improvements. All data about the sensors is collected using PC via serial port, interfaced through a microcontroller. The time at which the sensors detect any abnormal situation will also be recorded in the PC. The Graphical User Interface will be developed for presenting the data logging system graphically. Furthermore, this project will also equip the system with flash memory storage as data backup if there is any power breakdown on PC. GSM system is another additional feature that needs to be integrated for the purpose of sending an alarm message when the user is away from the room. By developing this project, the application or implementation of closed room monitoring can be broaden for further applications such as in industrial buildings, to alert the user in the case of intruders and dangerous situations like fire and flood.

1.2 Project Objectives

The main objectives of this project is to design and implement the monitoring system for the closed room monitoring project complete with multiple sensing units for display and storage on PC. In order to achieve the goal of this project, several knowledge about the sensor, PIC circuit, Secure Digital card, Global System for Mobile (GSM) and

compatible interface software need to be determined. Beside the main objectives, this project also aims to meet the following objectives:

1. To develop Graphical User Interface (GUI) as graphical presentation for monitoring the closed room sensors.
2. To build an interface between PC and microcontroller for data acquisition purpose.
3. To reprogram the microcontroller to integrate with additional devices and features.
4. To develop alternative data storage using secure data (SD)/flash memory card for backup purpose.
5. To build an additional security and safety alert system based on GSM for long distance monitoring.
6. To integrate the PC based project with the stand alone controller for a complete system.

1.3 Project Scope

The scope of the project is to design and develop a monitoring system for closed room monitoring that capable in storing and displaying the data on the PC. It consists of designing the electronics circuit for integrating multiple sensing units with the PC through the PIC microcontroller. The function of this monitoring system is to monitor the active and inactive sensors that are attached in the closed room through the PC for providing the alarm signal in the form of SMS. This project will implement the PIC microcontroller as the main brain to control the flow of data to the PC. Secure data card (SD card) will be used as the alternative data storage for the backup purpose in case of power breakdown. It is good to state that only monitoring system will be developed while controlling system for handling abnormal condition in the room is not in the scope of this project. Meanwhile, this project will reuse all sensors and room model from previous project. All the alarm system from the previous project are preserved and combine with the additional GSM based alert system through SMS.

1.4 Problem Statement

Nowadays, home security is one of the primary concerns in any residential area. This is due to the increasing number of crimes in our society. One of the crimes that might take place is private property invasion. The intruders who intend to steal any valuable things or important information usually choose private room as their main target due to the lack of security monitoring compared to other types of buildings, such as factories. Without any security monitoring system, many intruders can easily enter the room and succeed in accomplishing their crime activities. This problem will give fatal financial losses for the owner especially when the target place is factory or industrial building which is usually full of expensive equipment.

Other than that, safety is also another major concern. The dangerous cases such as fire and flood might occur in our house. Compared with other types of buildings equipped with disaster preventing device, houses are always exposed with danger. Similar to the security, this problem can also give fatal losses to the owner if any preventing or monitoring procedure is ignored by the owner. However, the manual monitoring is not so relevant in our busy lifestyle. Hence, the security and safety problem especially in house or closed room requires some engineering solution to replace the manual or conventional monitoring system.

Prior to these two problems, the idea has been generated to develop a solution for closed room security and safety problem. In contrast with other security monitoring system, this idea also include a PC-Based monitoring system for data logging as well as monitoring the sensors attach to the room. The alarm system such as buzzer, LED, LCD display and also GSM system will be implemented all together to improve the ability of the system. In real application, this idea can also be implemented in factory or industrial building due to its high-tech specification.

1.5 Outline of Thesis

This thesis consists of six chapters. In first chapter, the overview of project, project objective and scope of project will be discussed. In chapter 2, all literature review and theory that related to this project will be explained and discussed. Chapter 3 will explain the whole methodology that has been followed during the implementation of this project. The background of this project is also explained in this chapter. Chapter 4 will show and elaborate the result together with some result analysis. The general discussion of the whole result will be found in chapter 5. Chapter 6 becomes the last chapter of this thesis. This chapter will highlight the important finding and conclusion for this project together with several recommendations for future work.

CHAPTER 2

LITERATURE REVIEW AND THEORY

2.1 Introduction

This chapter introduces and explains the source of idea for design, concept, specifications and other information that are related to the project. It is found based on the research in the form of previous similar project and also past papers or thesis. There are one similar project and four related paper that are included in this project. All the theories of all devices and compatible software that are used in this project will also be discussed in this chapter.

2.2 Literature Review

A literature review is an evaluative report of information found that related to the selected area of study. This review will describe the summaries, evaluate and clarify of this literature. There are five literature reviews that will be discussed through this section. All of these literature reviews come from previous researches and papers which are related to this project. All technical issues and idea will be emphasized through this review to identify and evaluate the reliability and relevancy of this project.

2.2.1 First Review: *Pengesanan dan Pengawasan Alat Pengesan Bilik Tertutup*

This project was developed by Mr. Mohd Al-Jufri Bin Md. Zin on August 2007 and successfully completed on Mei 2008 for Universiti Teknikal Malaysia Melaka (UteM). Closed Room Multiple Sensing for Display and Storage on PC is the upgrading of this project. Basically, *Pengawasan Alat Pengesan Bilik Tertutup* is detection system for