LOW COST MP3 PLAYER USING SD CARD

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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ABSTRACT

A portable MP3 player with standard functionality is being designed and built. The central mission in this project is to create the portable MP3 player with a low cost and with attributes such as small in size, lightweight, durable, high performance and long battery life. This player enables a user to play and share music with friends anytime and anywhere they want. From a hardware perspective, the major devices include the PIC microcontroller, MP3 decoder chip, SD card or multimedia card that is function as storage. Microcontroller is the heart of the whole design. It control how data flows and send the song which is streamed serially from the SD card to the decoder. The decoder converts the digital stream to the equivalent analog signal. After being amplified this analog signal is the sound that we can hear. From software perspective, all components must be programmed to successfully function with one another to produce the desire output. As for default capabilities, the product will embody the same default function as other portable MP3 player as available in the market today. These include creation play list, skipping forward or backward, pausing and stopping song.

ABSTRAK

Sebuah alat pemain muzik dengan fungsi yang lengkap akan dan direka dan dibina. Matlamat utama projek ini adalah untuk menghasilkan sebuah alat pemain muzik dengan menggunakan kos yang rendah serta dilengkapi beberapa kelebihan seperti saiz yang kecil, ringan, tahan lama, bateri yang tahan lama dan boleh diguna dalam tempoh yang panjang. Alat pemain ini akan membolehkan seseorang untuk mendengar muzik di mana-mana pada bila-bila masa sahaja yang mereka mahu bersama kawan-kawan yang lain. Dari sudut perkakasan dan komponen, "PIC" serta "mp3 decoder chip" akan menjadi komponen yang paling penting dalam projek ini. Kad memori juga menjadi komponen yang harus ada kerana kad memori akan bertindak sebagai tempat penyimpanan lagu-lagu. "PIC" akan mengawal semua pergerakan data dalam litar, manakala pengekod cip pula akan berfungsi untuk menukar isyarat digital ke dalam bentuk analog. Seterusnya selepas isyarat ini dikuatkan, ia akan menjadi bunyi yang boleh kita dengar. Dari sudut perisian pula, setiap komponen haruslah diprogramkan supaya ia dapat berfungsi dan berkomunikasi antara satu sama lain dengan baik bagi mendapatkan hasil seperti yang kita inginkan. Alat pemain muzik ini akan mempunyai fungsi yang sama seperti alat yang sedia ada di pasaran termasuklah beberapa fungsi seperti butang kawalan untuk main, henti, pergi ke lagu seterusnya atau sebelumnya.

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LIST OF ABBREVIATION

MP3 - MPEG-1 audio layer 3

SD - Secure Digital

PIC – Peripheral Interface Controller

PSM – Projek Sarjana Muda

LCD – Liquid Crystal Display

PCB – Printed Circuit Board

IC – Integrated Circuit

LED – Light Emitting Diode

DAC – Digital to Analog Converter

VSM – Virtual System Modelling

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CHAPTER I

INTRODUCTION

The Introduction chapter is explained about the whole project. That includes the synopsis, objectives, problem statement, scopes of work, methodology and thesis outline of the project.

1.1 Project Synopsis

In the past people would have accumulated music on various formats such as tape, vinyl. All of these formats were analogue based, these days the focus has shifted from analogue music formats to digital formats. Where music may be downloaded using a series of peer-to-peer (P2P) networks. Digital format music collections are effectively files that may be stored on computer hard drives, and may even be transferred to portable media players like Apple's iPod, or a plethora of other digital media players.

This MP3 project is to design the mp3 device that can read SD card and it will be the memory of the device. The purpose of this MP3 Player is to store as many songs as possible. So, by using the SD card as the memory we can easily upgraded the memory up to 4GB or 8GB.

Nowadays, this SD card is very popular memory card and it is widely used in hand phone, camera, PDA and others. This mp3 will use low power operation so it can be used longer than conventional mp3 player. The circuit will get the power source from a battery to start operate. The PIC will be programmed; the mp3 decoder chip will read the data from the SD card and play the songs. Then it will display on the LCD panel. By using the SD card we can easily transfer the songs from computer.

1.2   Project Objectives

- To built a low cost mp3 player with SD card using the PIC microcontroller.
- To design mp3 player circuit which able to read SD card, FAT file system and stream mp3 data.
- To program the PIC and SD card.

1.3   Scopes of Work

This project aims to develop of an mp3 player that the memory using SD card so that it can be easily upgraded. Have to understand the concept of microcontroller because microcontroller will be the heart of the system that will communicate with the SD card socket and other device.

Among of the scopes of work for this project are to create the source code for the mp3 player using the CCS compiler and MPLAB, design the PCB circuit and some of the part will be soldered on the PCB. Then create the LCD is created by using old nokia3310 LCD. For the final part have to program the PIC have to be programmed so that it can play the MP3 songs. Then have to interface between the hardware and software.

1.4   Problem Statements

Nowadays, MP3 player is widely used by people all over the world. People who love to listen to music usually will bring their mp3 player wherever they go. The space to store the mp3 file will be limited as the memory of conventional mp3 is fixed. By using the SD card we can buy SD card with the big memory capacity and listen to the music as many as it can.

1.5   Thesis Outline

This report structure built on five chapters. Each chapter detailing the core of the title and have continuity between each other. The following is the description of chapters itself.

Chapter one is a simplified introduction that consists of several sub chapters that literally overview about this project. This includes introduction, objectives, problem statement, scope of work and lastly methodology used to accomplish this study.

Chapter two discuss the literature review that had been done during project. Review start from what is MP3 and SD card, programmable integrated circuit, and MP3 decoder chip and software simulation. Then, the concept of study had been cleared up in this chapter. Moreover, early assumptions had been made in chapter two.

Chapter three discussed the methodology used throughout this study. Methodology starts with explanation of project block diagram and flow chart of the project. Then, the hardware and software part will then explain.

Chapter four is discussed about results and circuit analysis. It explained about the output and the result that have been gained from the project. The circuit analysis explained about the analysis of the circuits that has been done in this project.

Chapter five discussed the conclusion and recommendation of this project. It concludes all the works that have been done to complete this project.

CHAPTER II

LITERATURE REVIEW

2.1 What is MP3

MPEG-1 audio layer 3 or , more commonly referred to as MP3**,** is a digital audio encoding format using a form of loss data compression. MPEG layer 3 is a type of audio codec where processed by significant compression from the original audio source with very little loss in sound quality.

The compression up to 12:1 produces a very little degradation. Tighter compression can be achieved, but it will effect in sound degradation results. To obtain certain compression, we must adjust the bit rates. The standard bit rates near cd quality result are 128 or 112 kbit/s. The advantage of MP3 is that it can be broken up into pieces, and each piece is still playable. The popularity of MP3 comes from its practical uses. Music tracks in WAV format are extremely large in file size, averaging around 50MB in size.

Since it is so large, it is not practical to send WAV files through email or offer them for download on the Internet. MP3, however, compresses WAV audio on average of 10 to 12 times smaller than the original size. The result is audio tracks around 3 to 4 MB in size, perfect for downloading and sending through the Internet. Thus, custom MP3 format CDs can be created with 10 to 12 times the amount of tracks of a normal 12-15 track audio CD, producing CDs with over 100 tracks easily.

The format is also popular for turning the PC into a jukebox of hundreds or thousands of songs or loading them into a portable mp3 player and taking your music collection wherever you want.

2.2   What is SD Card

Secure Digital (SD) is a non-volatile memory card format developed by Matsushita, SanDisk, and Toshiba for use in portable devices. Today it is widely used in digital cameras, handheld computers, PDAs, mobile phones, GPS receivers, and video game consoles.

Standard SD card capacities range from 8 MB to 4 GB and for high capacity SDHC cards 4 GB to 32 GB as of 2008. Today more than 1,100 companies involved in the design, development, manufacture or sale of products using SD technology. SD memory cards are available in a variety of formats, capacities, and speed classes. Like other flash card technologies, most SD cards ship preformatted with the FAT or FAT 32 file system.

The ubiquity of this file system allows the card to be accessed on virtually any host device with an SD reader. Also, standard FAT maintenance utilities such as. ScanDisk can be used to repair or retrieve corrupted data.

However, because the card appears as a removable hard drive to the host system, the card can be reformatted to any file system supported by the operating system. SD cards are based on the older Multimedia Card (MMC) format, but have a number of differences:

- The SD card is asymmetrically shaped in order not to be inserted upside down, while an MMC would go in most of the way but not make contact if inverted.
- Most SD cards are physically thicker than MMCs. SD cards generally measure 32 mm × 24 mm × 2.1 mm, but can be as thin as 1.4 mm, just like MMCs (see below).
- The contacts are recessed beneath the surface of the card, protecting the contacts from contact with the fingers.
- SD cards typically have transfer rates in the range of 10-20 MBytes/s, but this is always changing, particularly in light of recent improvements to the MMC standard

Devices with SD slots can use the thinner MMCs, but the standard SD cards will not fit into the thinner MMC slots. Mini SD and micro SD cards can be used directly in SD slots with a simple passive adapter, since they differ in size and shape but not electrical interface. With an active electronic adapter, SD cards can be used in CompactFlash or PC card slots. Some SD cards include a USB connector for compatibility with desktop and laptop computers, and card readers allow SD cards to be accessed via connectivity ports such as USB, FireWire, and the parallel printer port.