

STUDY AND IMPLEMENTATION OF SPEED CHESS CLOCK

MOHD ZHAFRI BIN MOHD YAACOB

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LIZAWATI BINTI SALAHUDDIN
 Pensyarah
 Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
 Universiti Teknikal Malaysia Melaka (UTeM)
 Karung Berkunci No 1752
 Pejabat Pos Durian Tunggal
 76109 Durian Tunggal, Melaka.

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Supervisor's Name : PUAN AFIFAH MAHERAN BINTI ABDUL HAMID

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I would like to dedicate this thesis to my family especially to my mother Puan Zainun Binti Hj. Abdul Latiff (mother) and Puan Hasidah Binti Hj. Abdul Latiff (aunty), whose encouragement and support was a great help in completing it.

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ABSTRACT

The aim of this project is to develop one unit of Speed Chess Clock (SCC). The SCC is a programmable clock that can indicate player turn defaulted by LED. The sound of buzzer ('beep') is to indicate the time-out is approaching the corner while double beep is time-out. The speed chess clock was digital display and counter to make sure it easily operates and user friendly. This typical project consist of the hardware (prototype of the speed chess clock) while controlled by electronics circuit and some algorithm. This project involved technical survey, design, analysis, assembly as well as testing and refinement of this speed chess clock. The SCC has button as input, mean while LCD, LED and buzzer are the output. All the input and output are controlled by PIC16F877A. This project was developed from the problem of existing chess clock which is expensive and not user friendly. The main objective of this project is to overcome this problem by design and implement the Speed Chess Clock with low cost. After done this project, it succeeds and achieved the objectives. The speed chess clock was developed and work as it function.

ABSTRAK

Projek ini bertujuan untuk menghasilkan satu unit jam catur yang digunakan dalam permainan catur jenis cepat (had masa satu permainan maksimum 15minit). Jam catur ini adalah satu sistem masa yang diprogram supaya dapat menunjukkan giliran pemain itu dan di wakili oleh LED. Apabila buzzer menghasilkan bunyi ('bip'), ia memberi amaran kepada pemain tersebut bahawa beliau menghampiri masa tamat, manakala apabila buzzer berbunyi 'bip' sebanyak dua kali, ia menandakan masa telah tamat. Jam catur ini akan menggunakan paparan digital dan sistem kiraan untuk memastikan ia beroperasi dengan mudah dan mesra pengguna. Projek ini terdiri daripada penghasilan perkakasan yang dikawal oleh bahagian elektronik dan algoritma. Penghasilan projek ini melalui beberapa langkah seperti pencarian maklumat teknikal, merekabentuk dan menganalisis bahagian algoritma serta elektronik, menguji dan menyelesaikan masalah pada bahagian sitem elektronik dan algoritma. Jam catur ini mempunyai butang sebagai bahagian masukannya, manakala LCD, LED dan buzzer sebagai bahagian keluarannya. Semua masukan dan keluaran dikawal oleh PIC16F877A. Penghasilan projek ini disebabkan oleh masalah yang berlaku pada jam catur yang sedia ada, diman ianya tidak begitu mesra pengguna dan agak mahal. Tujuan utama penghasilan projek ini adalah untuk menyelesaikan masalah tersebut dengan menghasilkan dan mengimplementasikan sebuah jam catur dengan kos rendah. Setelah siap dijalankan, projek ini telah berjaya dan mencapai objektifnya. Satu jam catur telah dihasil kan dan ia berfungsi bagai dirancang.

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LIST OF ABBREVIATIONS

SCC	– Speed Chess Clock
PIC	– Programmable Integrated Circuit
LED	– Light-Emitting Diode
LCD	– Liquid Crystal Display
AC	– Alternating Current
PSM	– Projek Sarjana Muda
CPU	– Central Processing Unit

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CHAPTER I

INTRODUCTION

1.1 Overview

This project is about the study and implementation one unit of Speed Chess Clock (SCC). Chess clocks are distinctly unique with two timers built into one unit - one for each player. The two clocks are not running simultaneously, but they rather keep track of yours and your opponent's total used time. This keeps a chess game moving at the desired pace since both players will have a predetermined number of minutes to complete their game.

The SCC is a programmable clock that can indicate player turn it is and defaulted by LED. The sound of buzzer ('beep') is to indicate the time-out is approaching the corner while double beep is time-out. This speed chess clock will be using digital display and counter to make sure it easily operates and user friendly. This project consists of software and hardware development. The software will be developed using PIC and the hardware involves designing the electronic component to be used in developing the speed chess clock.

Firstly, player will select and set the time that they wanted before start the game. After make the selection, it will start the game and the time also starts to countdown. The counter is for the player in turn and the LED will default that player. When player A finishes his turn, he will push the button for player B. Then the LED for player B is lighted as the timer for player B also started to countdown and time for player A is paused. After finish his turn, he will past to player A and that how this clock operate until the player win or the times up.

1.2 Objectives

The objectives of this project are:

- i) To design and implement the Speed Chess Clock with low cost.
- ii) To understand the concept of digital clock system.
- iii) Applied PIC programming and implement it on the hardware installation.
- iv) To construct and design the wiring system and connectivity for software and hardware.

1.3 Problem Statement

This speed chess clock develop to improve the current speed chess clock. The weakness of current speed chess clock are:

- i) It is an analog clock as their clock timer.
 - Most of existing chess clock are using analog timer. This analog timer is not efficient because it is not so accurate and do not have a lot function. By using digital clock, the time is more accurate and it easy for user to see the time. Therefore, they can give more attention to the game.

ii) Have functional limitation.

- The existing analog clock do not have a lot of funtion. It can not set the time as accurate as digital and also do not have systematic system to alert user about his time limit. Since SCC clock is using programmable microcontroller, it can being design to have a lot of function. It also use LED and buzzer as a system to alert user about their time limit.

iii) Not so user friendly.

- Existing product is not user friendly because it is difficult to set the game time. Using this SCC, user can select the desire time they want by pressing the button that already represent the set of time.

iv) Existing product are expensive.

- From the observation in market, analog chess clock cost is between RM130 to RM200 while digital chess clock can up to RM300. On the other had, the Speed Chess Clock is only cost about RM90.

1.4 REPORT STRUCTURE

This thesis represented by five chapters. The following is the outline of Speed Chess Clock in chapter by chapter.

Chapter I - focus on the brief introduction of the project carried. The important overview or description, project objectives and project problems statement are well emphasized in this part.

Chapter II - is based on the literature review of the project. Literature review is important in order to understand previous work done in the same field. It is mainly focused on the history of email notification system and mail notification system. It will describe the related theory of components and devices that will be chosen in this project. It also covers the datasheet that will be used for this project.

Chapter III - explain the project methodology. Project methodology can be reuse as a guide line to someone who wants to make improvement to this project. This chapter explains the procedures that have used in order to complete this project. It is include the hardware development and software development.

Chapter IV - mainly focuses on the result and analysis done for this project. This chapter will figure out a few tests that had been conducted in a several times and stages to successful rate of the project. All testing and verification result are attached with the aid of figure and table.

Chapter V - is a complimentary of the previous four chapters. It describes on the overall project, discussion and future recommendation for the project. Future recommendation is the ideas of upgrade that can be made to this project to make it more reliable in the future. All matters arise including the problems and unachieved objectives will be described clearly in this part.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction of Game Clock

A game clock consists of two adjacent clocks and buttons to stop one clock while starting the other, such that the two component clocks are not run simultaneously. Game clocks are used in two-player games where the players move in turn[1]. The purpose of the game clock is to keep track of the total time each player takes for his or her own moves, and ensure that neither player overly delays the game.

Game clocks were first used extensively in tournament chess, and are often referred as chess clocks. Often in chess tournaments, the player of the black pieces can make the decision as to what side of the chess board he or she would like the clock to be placed. But their use has been adopted for tournament Scrabble, Shogi, Go, and nearly every competitive two-player board game, as well as other types of

games such as Magic: The Gathering Online. The first time that game clocks were used in a chess tournament was London, 1883 [1].

The simplest time control is "sudden death", in which players must make a predetermined number of moves in a certain amount of time or forfeit immediately. A particularly popular variant in informal play is blitz chess, in which each player is given five minutes on the clock for the entire game, [2].

The players may take more or less time over any individual move. The opening moves in chess are often played quickly due to their familiarity, which leaves the players more time to consider more complex and unfamiliar positions later. It is not rare in slow chess games for a player to leave the table, but the clock of the absent player continues to run if it is his turn, or starts to run if his opponent makes a move[2].

2.2 Chess Clock

Beginning chess players, and those unfamiliar with chess playing software, are often unsure of the reasons why a chess clock is used or how to operate it. Even experienced players who have never played at a chess club or in a tournament become confused when these topics come up.

The reason why chess clocks are used is to ensure that each player has a limited, finite amount of time in which to complete a game. While this might seem obvious or even humorous to us today, the time issue was a real problem back in the mid-1800's. It was not unusual for a player to take literally hours to make a single move. Games between professional players sometimes took days to complete, and a match (a series of games) between a pair of players could consume weeks or even months. If a game or match was contested between a younger and much older player, there sometimes occurred a form of unfair "gamesmanship" on the part of the younger player in which had try to wear down the older player by taking so long with his moves that the older player would become fatigued, even ill.

The chess clock solved this problem. The clock regulates the time consumed by each player individually; the players start with the same amount of time in which to make their moves, and a player loses the game when his time runs out (regardless of the position on the board) [3].

There are two kinds of chess clocks: analog and digital. A traditional analog clock is shown in Figure 2.1.



Figure 2.1: Analog Chess Clock

Since the late 1990's, the digital chess clock has become increasingly prevalent at chess tournaments, primarily because these allow some unusual time settings (which we'll discuss later) that are impossible to use with analog clocks [2]. The typical digital are shown in Figure 2.2.



Figure 2.2: Digital Chess Clock

Although digital clocks are more versatile than analog models, the traditional analog clock shows no signs of going away soon and still seems to be the favorite at chess clubs (at least at the gatherings I attend), mainly due to their ease of use. While digital models produced by different manufacturers often have specific directions for setting them, instructions which differ from model to model, analog clocks have a standard stem which the user turns to set the time.

2.2.1 Digital Chess Clock Revolution

In 1973, to address the issues with analog clocks, Bruce Cheney, a Cornell University Electrical Engineering student and chess player, created the first digital chess clock as a project for an undergraduate EE course. Typical of most inventions, it was crude compared to the products on the market 30 years later and was limited by the technology that existed at the time. For example, the display was done with red LEDs. LEDs require significant power, and as a result, the clock had to be plugged in to a wall outlet. The high cost of LEDs at the time meant that only one set of digits could be displayed, that of the player whose turn it was to move. This meant that each player's time had to be multiplexed to the display when their time was running.

Also in 1973, LSI chips were not readily or cheaply available, so all the multiplexing and logic were done using chips that consisted of four two-input TTL NAND gates, which resulted in excessive power consumption. Being plugged into the wall is obviously a major drawback, but had one advantage: the timebase for the clock was driven off of a rectified version of 60 cycle AC current [1]. Each player had a separate counter, and, in a parallel to the original mechanical architecture, one player's counter was disabled while the other's was running. The clock only had one mode: time ran forward. It could be reset, but not set. It did not count the number of moves. But it successfully addressed the original goals of the project (accurate and matched timing).

Digital clocks and Internet gaming have spurred a wave of experimentation with more varied and complex time controls than the traditional standards. Time