

INTELLIGENCE SEJADAH USING VHDL AND FPGA

WAN MOHD NAZMIN BIN WAN MAHMUD

**This thesis is presented in partial fulfillment for the award of the
Bachelor of Engineering (Hons) Electrical**

NOVEMBER 2008



**BACHELOR OF ENGINEERING (HONS) ELECTRICAL
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
PULAU PINANG**

ACKNOWLEDGEMENT

Alhamdulillah which means “All praise belongs to Allah” with God permission I am able to complete this Final Year Project. I would like to express my gratitude to all the people who has given me their support during the period of completing this project.

Firstly, I would like to express my special gratitude to my Final Year Project supervisor, Ms Irni Hamiza Bte Hamzah that have been come out with the great idea on designing new project and will be a new environment for Muslim nowadays. Thanks for continuous guidance, support, commitment, valuable opinions and give me special enthusiasm to complete this project. Mention also to those lecturers are evaluating for the assessment of this Final Year Project.

Then, genuine gratitude and appreciation to my beloved family and friends who are always stand by me with full support and encouragement in doing this project. I would never forget to those people around me by supporting directly or indirectly. Genuine thanks for all the consideration, cooperation and the concern of each and every single assist I asked, persons who had given treasured point of designing environment with a lot of self motivational support.

ABSTRACT

This project is to develop a hardware that includes of designing, synthesizing and evaluation skills based on Field-Programmable Gate Array (FPGA) by using Project Navigator Xilinx ISE's Software as a workspace for VHDL and ModelSim Simulation Software as a platform to simulate and analysis the design environment with Timing Diagram. Spartan-3 Kit Board will be used as hardware interface and directly connected to the Model of Intelligence Sejadah by using I/O ports. The design rule is based on counter controller described in ASM Chart and then is translated into VHDL descriptions. This project aims to design an Intelligence Sejadah that can count the number of rakaat was and will perform by the user during Solat. The Intelligence Sejadah helps to keep the worshipper alert with rakaat and comfortable during the prostrations of prayer. Intelligence Sejadah will count the rakaat based on Touch-Switch Circuit and displaying the number of rakaat on Seven-Segment LED Display as indicator for user controlled by FPGA user I/O pins.

Keywords: VHDL, FPGA, ASM, Spartan-3.

TABLE OF CONTENTS

INTELLIGENCE SEJADAH USING VHDL AND FPGA

TITLE	PAGE
DECLARATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	vii
LIST OF TABLES	viii
ABBREVIATION	ix
CHAPTER 1	1
INTRODUCTION	1
1.1 BACKGROUND	1
1.2 OBJECTIVES	2
1.3 SCOPE OF WORK	2
1.4 OUTLINE	3
CHAPTER 2	4
LITERATURE REVIEW	4
2.1 INTRODUCTION	4
2.2 APPLICATION OF INTELLIGECE SEJADAH	4
2.3 DESIGN OVERVIEW	5
2.4 SOFTWARE AND HARDWARE	6
2.4.1 XILINX ISE'S	6
2.4.2 FACTORS FOR CHOOSING VHDL	7
2.4.3 SPARTAN-3 BOARD	7

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

There are many Prayer Mat as known as *Sejadah* in existing today which have been taken care of for more than 100 years. *Sejadah* is a piece of fabric often decorated used by Muslims during their five daily prayers as known as *Solat* that obligatory to perform for person who was Baligh that refers to a person who has reached maturity or puberty and has full responsibility under Islamic law. Each daily prayer is made up of a different number of *rakaat*.

- ***Subuh*** — The Dawn prayer: 2 *rakaat*
- ***Zohor*** — The Noon prayer: 4 *rakaat*
- ***Asar*** — The Afternoon prayer: 4 *rakaat*
- ***Maghrib*** — The Sunset prayer: 3 *rakaat*
- ***Isyak*** — The Night prayer: 4 *rakaat*

In this project, the *Sejadah* will be modified to be an Intelligence *Sejadah* that can count the number of *rakaat* in each *Solat*. Though the *Sejadah* is not required for prayer, the *Sejadah* helps to keep worshiper cleans and comfortable during the prostrations as known as *Sujud* of prayer. In addition to keep worshiper alert and focus on *Solat*, the Intelligence *Sejadah* will be helpful for user as indicator or reminder of the number of *rakaat* that was and will perform by the user.