

**UNIVERSITI TEKNOLOGI MARA  
CAWANGAN PULAU PINANG**

**ELECTRONIC COMBINATION  
LOCK SYSTEM  
USING VERILOG CODING**

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July 2020

## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## **ABSTRACT**

A rapid increase in the burglary cases have drew a huge attention to improve the security of a house. The advancement of technology has introduced an electronic combination lock system in which only the house owner and selected people can unlock the doors. Therefore, the main goal of this paper is to design and develop an electronic combination lock system using Verilog code. This system perhaps can reduce the possibility of a house being burgled. The entrance door of a house will only unlock if the user slides the correct secret code on the slide switches of the Altera DE2-115 Trainer Board. This project consisted of two parts which were simulation and hardware implementation. A Verilog code of the keyless system had been designed and scripted in Intel Quartus Prime Software. In order to perform functional verification, three different testbench codes had been developed. The simulations via testbench waveforms are performed in ModelSim Software. The waveforms are being observed and analysed to ensure that the outcome output is the same with the design coding. When the system detected the entered code matched with the setting code, UNLK waveform went high to indicate that the door is going to unlock. Besides, when the system detected the entered code did not match the setting code, the UNLK waveform went to logic '0' to indicate the door is still unlocked. Then, the Verilog Code of the keyless lock system will be verified and downloaded via Altera DE2-115 Trainer Board. When the user entered correct password, all green LEDs turned on and the LCD displayed "Welcome Home". Besides, when the user entered an incorrect password, all red LEDs turned on and the LCD displayed "Wrong Password". After completing this project, all the output waveforms presented in ModelSim Software are corresponding to the designed testbench codes. As a conclusion, the output displayed are successfully demonstrated on the Altera DE2-115 Trainer Board according to the desired results.

## **ACKNOWLEDGEMENT**

First and foremost, I am very grateful to God Almighty Allah for giving me strength, wisdom, constant flow of ideas and perseverance in completing this challenging journey successfully.

I wish to express my sincere appreciation to my supervisor, Ir. Dr Irni Hamiza Binti Hamzah, who has the substance of a genius who is always convincingly guided and encouraged me to be professional and do the correct thing even when the road got tough. Without her persistent help, the goal of this project would not have been achieved.

I also wish to thank all the people whose assistance was a milestone in the completion of my Final Year Project.

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