ELEC 204 Digital System Design Laboratory

LAB PROJECT

PRELIMINARY WORK

ARDA DUMAN

Computer Engineering

60609

ELEC 204 LAB B

10.05.2019

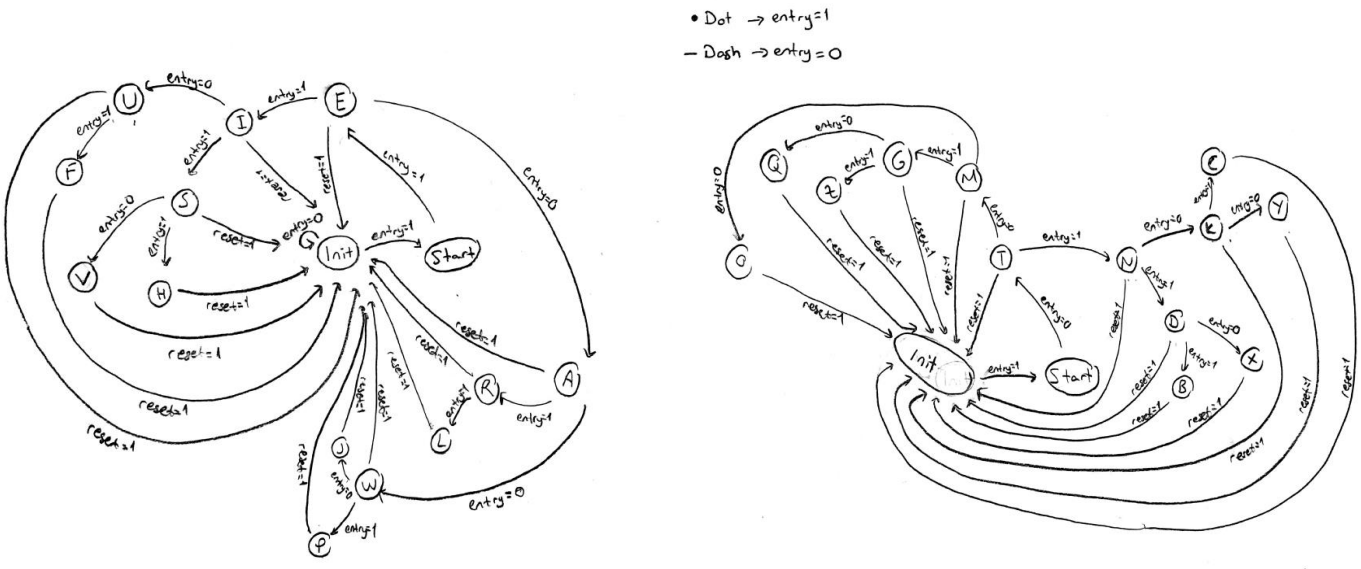
Introduction:

In this project I will be implementing a Morse Code Decoder which takes a Morse Code and gives the corresponding letter and displays on the seven-segment display.

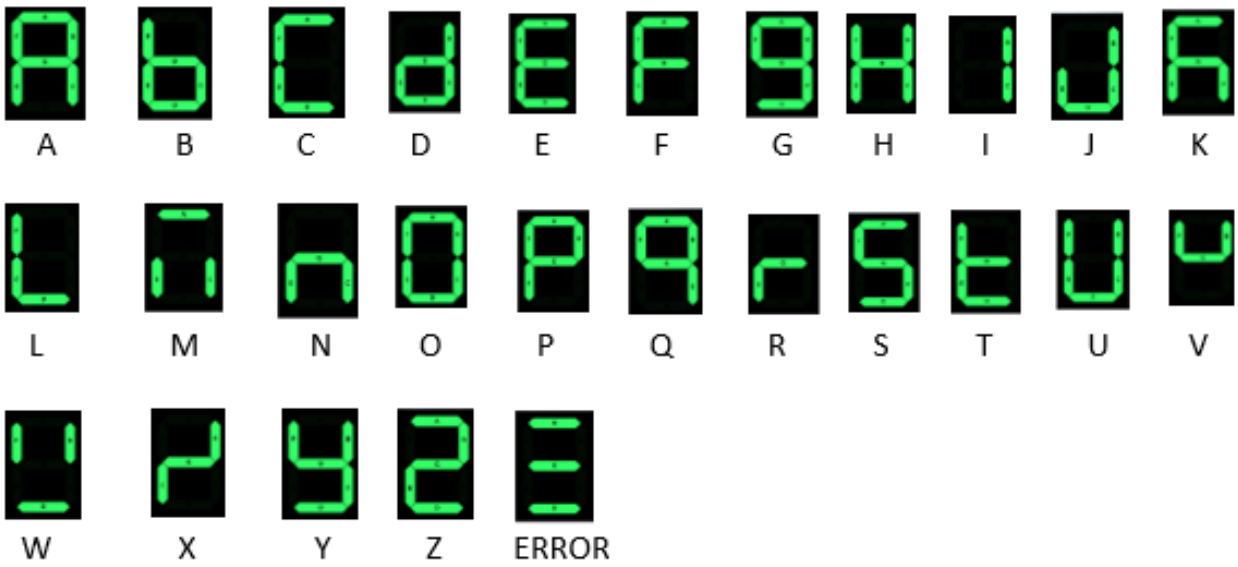
Idea:

In order to create dots and dashes I will implement a clock. While a button is pushed a counter will be increased in every clock cycle. If the counter is lower than a threshold it means it is a dot. Similarly, if the counter is greater than the threshold it means it is a dash. I will be storing the dots and dashes as 1's and 0's. For example, if I want to display an 'A' on the seven-segment display, I will be pushing the button as ". – "and it will be stored as an unsigned number as "10". The maximum digit a Morse Code can have is 4. For instance, the letter 'A' can be stored as "0010". But the starting 0's are not dashes. In order to overcome this problem, I will use 5 digits at most and after the nonsense zeros a 1 will be implemented to start the sequence. Therefore, letter A will be stored as "00110". The zeros before the first 1 are not considered as dashes. And the first 1 is not considered as a dot. The meaningful part will start after the first 1.

State Diagram:



These two state diagrams are the two halves of a bigger state diagram. The left one shows the states when "entry=1" after Start state, and the right one shows the states when "entry=0" after Start state.



Since we have seven-segment display I could not show some letters properly. Instead, I created symbols which are pretty much like these letters.

Behavior of the Circuit:

The circuit will have 4 input buttons: Morse code button, reset button, shift button, display button. When the user gives the Morse code input with the button and pushes the display button it will be displayed on the seven-segment display as letters. If the user pushes the shift button the letters on the seven-segment display will shift to the left. User will be able to enter a new letter next to the previous one. When the letters reach the leftmost anode and no space left, the sequence will be reset. Also, with the reset button, the user will be able to reset the letter sequence anytime.