Otto-von-Guericke Universität Magdeburg

Arbeitsgruppe für Eingebettete Systeme und Betriebssysteme
Prof. Dr. Jörg Kaiser

Theoretisches Aufgabenblatt 5

Abgabetermin: 24.11.-26.11.2012

1. Develop a sequential logic circuit , which detects the binary sequence 011 within its input stream. Whenever the last 3 bits of the input equalled 011 shall the output of the automaton be 1, otherwise 0. Construct the Mealey-Automaton as a state diagram. Use 4 states mapping the number of the state to the number of correctly detected bits in the input.

   a) Construct the state graph completing Figure 1
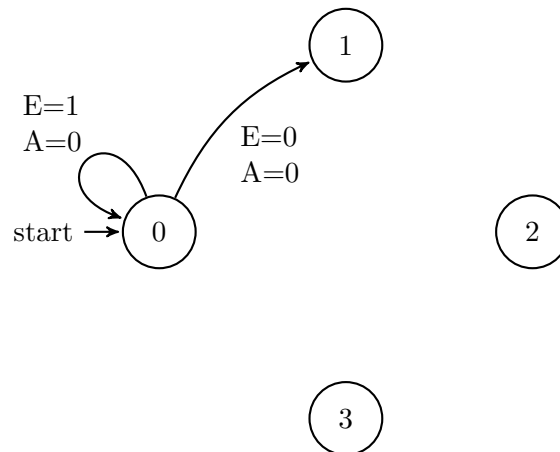

Abbildung 1: State graph

   b) Construct the state transition table and the thruth table of the output. Use 2 D-Flip-Flops as storage units. Derive the boolean formula of the output.

   c) Draw the logic circuit or simulate it in LogiSim.

Tabelle 1: State Transition Table

Input State	current State	binary	next state	binary

2. Émile Baudot (whose name was the source of the „Baud") developed 1870 a 5 Bit letter code, which simplified telegraphy and was the precessor of modern character codes.

   a) Investigate the properties of the Baudot-Code.

   b) Encode the text „42Grad" in Morse-Code.

   c) Compare the Baudot-Code and the Morse-Code? Which benefits and drawbacks can be observed?

3. Decode the following binary ASCII-text:

ASCII	dezimal	char
1010010		
1100101		
1100011		
1101000		
1100101		
1101110		
1110100		
1100101		
1110011		
1110100		

4. Your task is the constrcution of an absolute angle sensor using Gray-Code. The sensor shall have a resolution of 15°. Derive the necessary Gray-Code.

5. Why is a long code word usefull for single bit correcting codes? Explain your statements using a diagram. How is the relation between the number of detection bits and the length of the code word? Why are no overlong code words used in practical situations?