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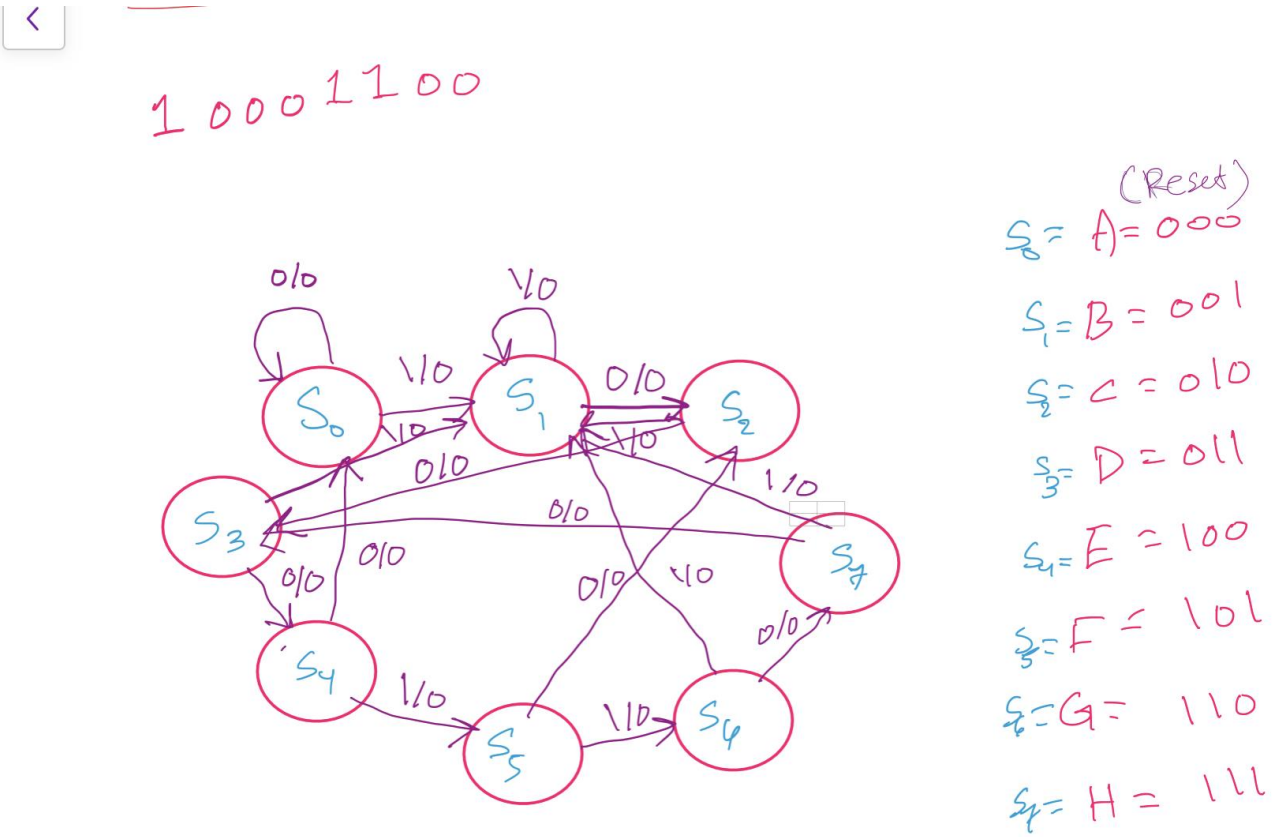
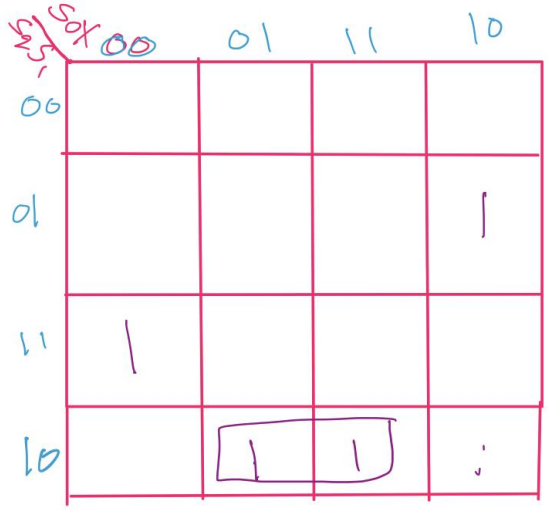
Lab 3 Key: 10001100

There are 2 other files besides this documentation file (Readme). One of the files is the circuit design of my key and the 16-bit lock. It was generated after making a state diagram, state table, and then optimized equations from k-maps. I attached in detail how each one was solved. Furthermore, the second file contains the test circuit. This circuit has the reset, button 0, button 1, and the status (output). The buttons represent the bits of my secret key. The reset button is there to press when we want to reset the circuit.

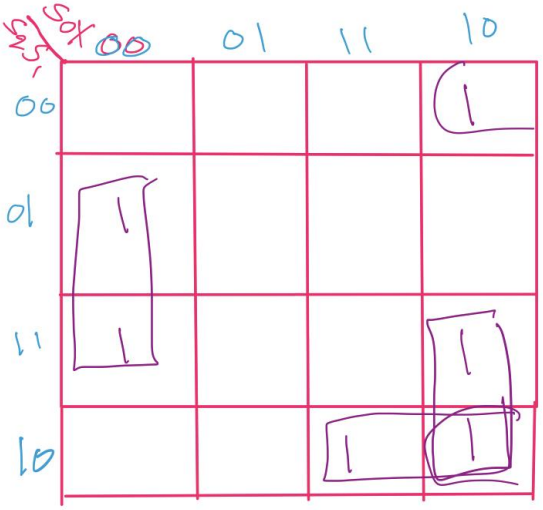
The circuit was designed to detect 8 bits of secret keys. If the secret key was not detected after 2 tries or 16 bits entries, then the owner or the person who has access to the key can reset it.



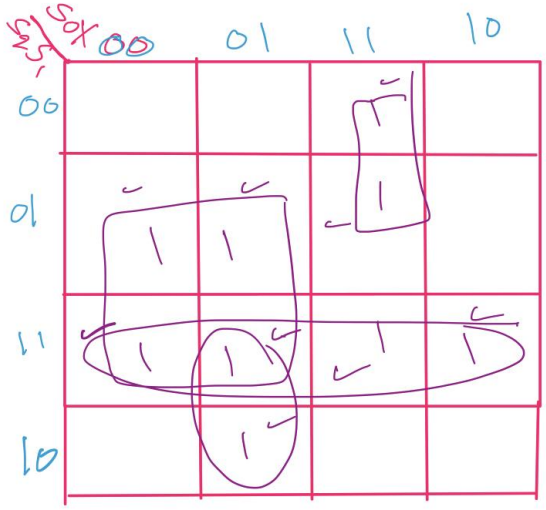
Present State S_2 S_1 S_0	Input X	Next State D_2 D_1 D_0	Output Y
0 0 0	0	0 0 0	0
0 0 0	1	0 0 1	0
0 0 1	0	0 1 0	0
0 0 1	1	0 0 1	0
0 1 0	0	0 1 1	0
0 1 0	1	0 0 1	0
0 1 1	0	1 0 0	0
0 1 1	1	0 0 1	0
1 0 0	0	0 0 0	0
1 0 0	1	1 0 1	0
1 0 1	0	0 1 0	0
1 0 1	1	1 1 0	0
1 1 0	0	1 1 1	0
1 1 0	1	0 0 1	0
1 1 1	0	0 1 1	0
1 1 1	1	0 0 1	1



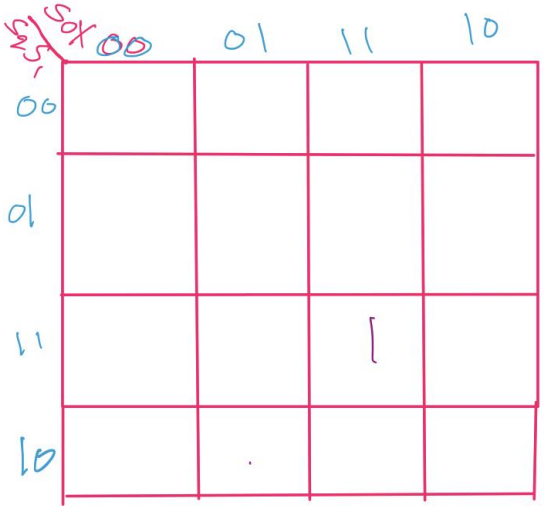
$$D_2 = S_2\bar{S}_1X + S_2S_1\bar{S}_0\bar{X} + \bar{S}_2S_1S_0\bar{X}$$



$$D_1 = S_1\bar{S}_0\bar{X} + S_2\bar{S}_1S_0 + \bar{S}_1S_0\bar{X} + S_2S_0\bar{X}$$



$$D_0 = S_1 \bar{S}_0 + S_2 S_1 + \bar{S}_2 S_0 X + S_2 \bar{S}_0 X$$



$$Y = S_2 S_1 S_0 X$$