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ARM ASSIGNMENT

Roll No. : FWC22053

Sequence Detector

A sequence detector is a sequential state machine that takes an input string of bits and generates an output 1 whenever the target sequence has been detected. In a Mealy machine, output depends on the present state and the external input (x).

Working

A sequence detector accepts as input a string of bits: either 0 or 1. Its output goes to 1 when a target sequence has been detected.

There are two basic types:

- Overlap
- Non-overlap.

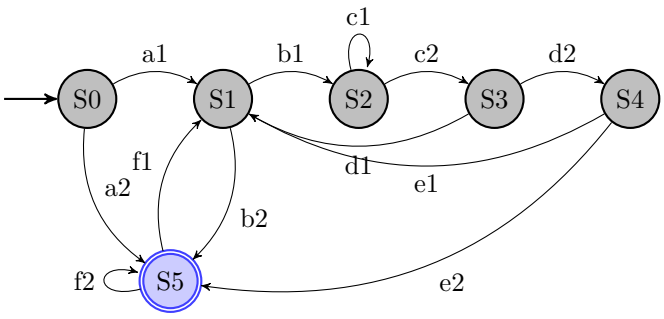
Problem Statement:

Using Platformio CLI wite a programm to identify if the Sequence is either 11 or 00110 .

SOLUTION: Steps for using State Diagram:

1.To detect 00110 and 11 . first input is given to S0 . if the first bit i/p is 0 it will go to next state i.e S1 and o/p will be 0 (LED=OFF) .
2.If the i/p is 1 it will go to state S5. o/p will be 0 (LED=OFF)
3.Same steps will be repeated for all states .
4.when it detects 00110 the o/p will be 1 (LED=ON)
5.Same as above if it detects 11 o/p will be 1 (LED=ON)
6.Again it repeats as it is overlapping.

State Diagram



State Diagram -Input and Outputs

values	Input	output	states	Next state
a1	0	0	S0	S1
a2	1	0	S0	S5
b1	0	0	S1	S2
b2	1	0	S1	S5
c1	0	0	S2	S2
c2	1	0	S2	S3
d1	0	0	S3	S1
d2	1	0	S3	S4
e1	0	1	S4	S1
e2	1	0	S4	S5
f1	0	0	S5	S1
f2	1	1	S5	S5

Components

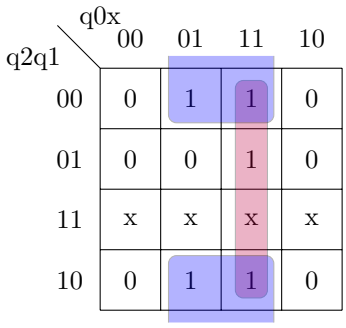
Component	Value	Quantity
Breadboard	-	1
Resistor	220 ohms	1
Arduino	Uno	1
Led	5v	1
Flip Flop	7474	2
Jumper Wires	-	20

Truth table

q2	q1	q0	x	d2	d1	d0	y
0	0	0	0	0	0	1	0
0	0	0	1	1	0	1	0
0	0	1	0	0	1	0	0
0	0	1	1	1	0	1	0
0	1	0	0	0	1	0	0
0	1	0	1	0	1	1	0
0	1	1	0	0	0	1	0
0	1	1	1	1	0	0	0
1	0	0	0	0	0	1	1
1	0	0	1	1	0	1	0
1	0	1	0	0	0	1	0
1	0	1	1	1	0	1	1
1	1	0	0	x	x	x	x
1	1	0	1	x	x	x	x
1	1	1	0	x	x	x	x
1	1	1	1	x	x	x	x
1	1	1	1	x	x	x	x

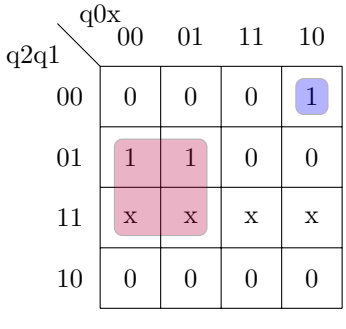
K-Map

K-Map for d2



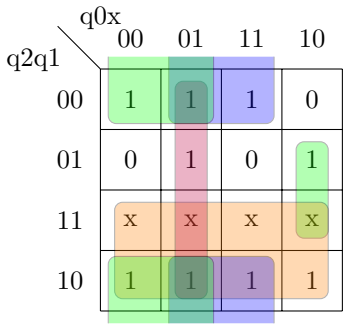
Expression-1: q1'x + q0x

K-Map for d1



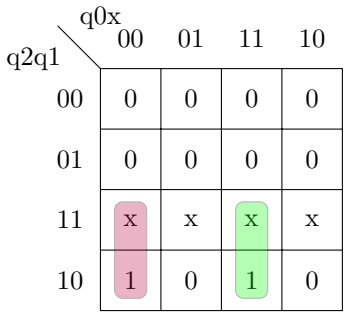
Expression-2: q1q0' + q2'q1'q0x'

K-Map for d0



Expression-3: q2 + q1'q0' + q1'x + q0'x + q1q0x'

K-Map for x



Expression-4: q2q0'x' + q2q0x

Boolean expressions

The boolean expressions for **d** and **x** are:

With don't care(X):

d2 = q1'x + q0x
d1 = q1q0' + q2'q1'q0x'
d0 = q2 + q1'q0' + q1'x + q0'x + q1q0x'
y = q2q0'x' + q2q0x

Without don't care(X):

d2 = q1'x + q2'q0x
d1 = q2'q1q0' + q2'q1'q0x'
d0 = q1'q0'+ q1'x + q2q1' + q2'q0'x + q2'q1q0x'
y = q2q1'q0'x' + q2q1'q0x

SOLUTION

The above truth table can be verified in arduino.

1.consider 4 digital pins 6,7,8,9 as inputs D9 is given to +vcc or ground.

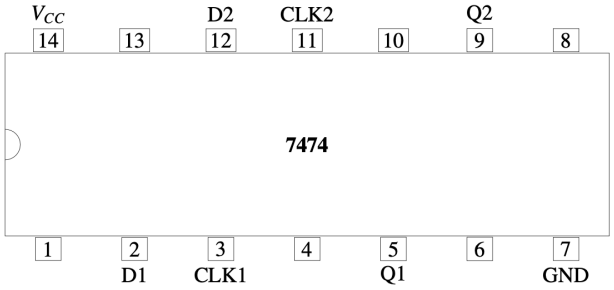
2.Consider 4 digital pins 2,3,4,5 as Outputs. Here D5 is given to LED .

3. D13 acts as clock signal.

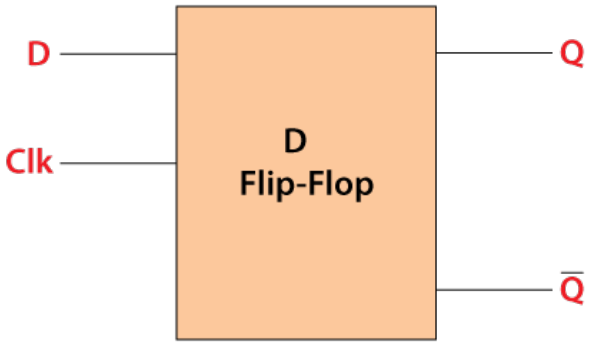
4. The connections are given in the Hardware Connection table.

5. K-map has been implement using Truth table

7474 IC Pin details



D Flip-Flop



Working of D Flip-Flop

CLK	D	Q	$\overline{Q}$
0	0	Q	$\overline{Q}$
0	1	Q	$\overline{Q}$
1	0	0	1
1	1	1	0

The D flip-flop is a clocked flip-flop with a single digital input 'D'.
Each time a D flip-flop is clocked, its output follows the state of 'D'.

How to Run

Connect the ARM board to PC viva USB
Open your termux in mobile and run the following code

Software

Make the connections and connect the Vaman board to the PC via USB. In the location of choice, type the below commands

svn co
https://github.com/chiragshah1244/FWC/tree/main/assign--ment/Assignment_ARM

1. cd seq_dec/GCC_Project/
2. make
3. cd ../../
4. flash shell.sh seq_dec

Download the code
Github link: ARM Assignment.