COL-202

Assignment-2

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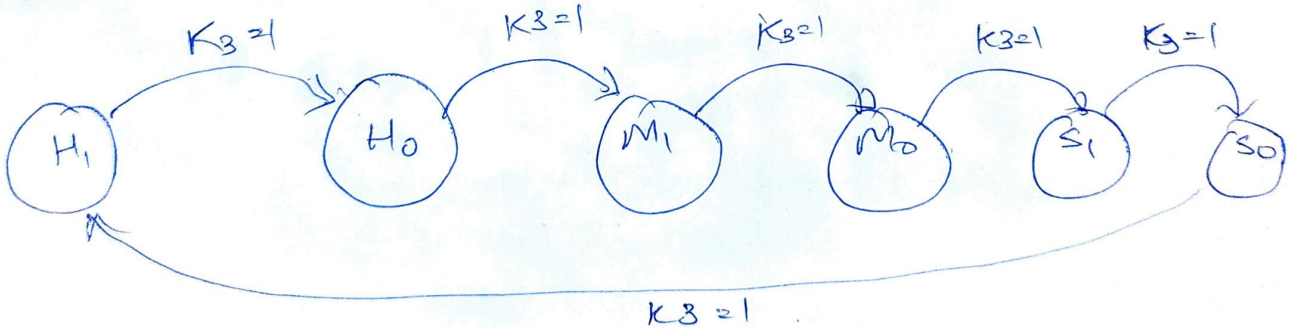
2019CS50421

* Overview of Design:-
  - A clock that can display HH:MM:SS at given instance.
  - format of display:- $H_1H_0:M_1M_0:S_1S_0$.
    1. HH MM
    2. MM SS.
  - when reseted starts from 00:00:00 and counts till 23:59:59 and then again starts from 00:00:00.
  - Push buttons:-
    1. K1. changes ~~the display~~ format of display, remains in the state even after released.
       ~~Keep~~
       - Displaying MM:SS only till button was pressed was also a good idea but not user friendly.
    2. K2. Enters into edit mode.
       - Default ~~cur~~ edit cursor is at H_1.
    3. K3 - Changes cursor to right.
       - $H_1 \rightarrow H_0 \rightarrow M_1 \rightarrow M_0 \rightarrow S_1 \rightarrow S_0$
    4. K4 - Increments current number as per cursor location.
    5. K5 - reset everything to 0.

- Displaying of numbers as per mode.
  - At any point all six values are stored.
  - ~~When called by~~
  - 4 of them are displayed on 7-segment display.
  - When HH:MM mode is on, a dot is also shown which is blinking at 1 Hz to indicate clock is working and is in HH:MM mode.

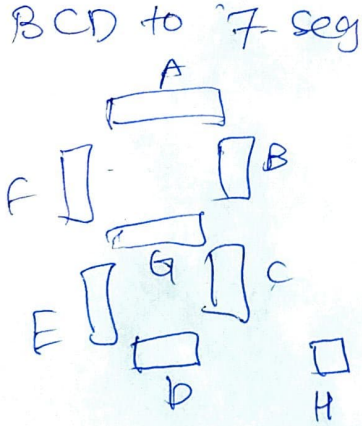
- State diagram:- (triggered by rising edge of K3), for rotating cursor location as key is pressed.
  States:- H1, H0, M1, M0, S1, S0.
  trigger:- K3
  Output:- Cursor location.

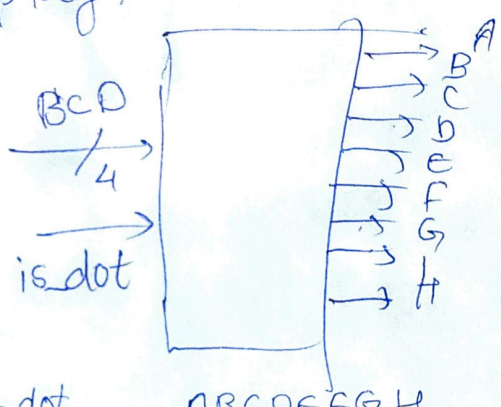


- As its triggered by edge of K3, multiple changes will not occur for single ~~pr~~ button press.

- Multiple button pressing:-
  - Only first pressing is considered.
  - All others pressed are ignored till initially pressed is released.
- Edit mode display:-
  - Current position of cursor is denoted by blinking the number at 1 Hz. making it easier to identify
  - When cursor is shifted to ~~sec~~ :S, display mode is changed to mm:ss format.

- BCD to 7-segment display.

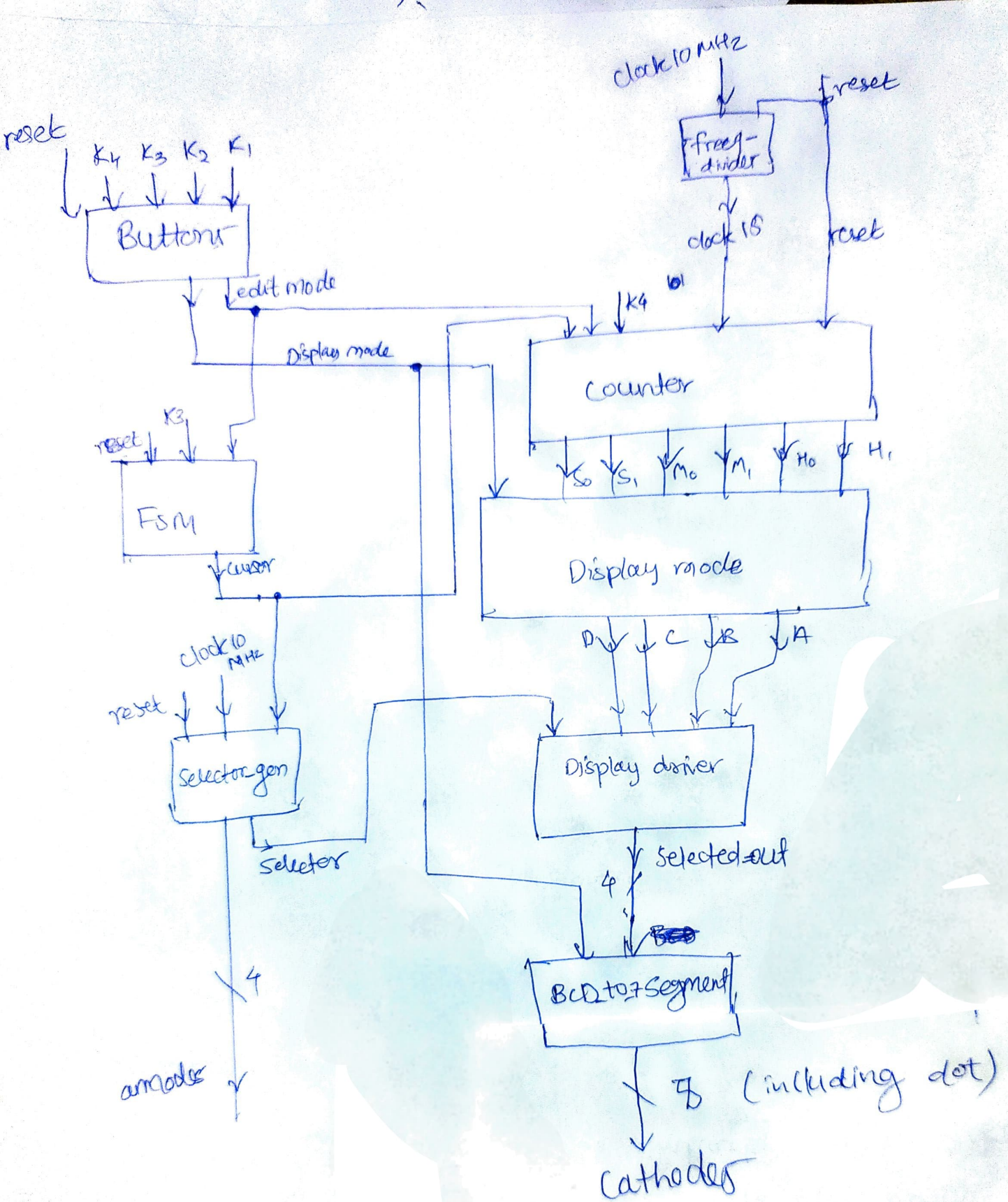




	BCD	is_dot	ABCDEFGH
1.	0000	0	00000010
2.	0001	0	10011110
3.	0010	0	00100100
4.	0011	0	00001100
5.	0100	0	10011000
6.	0101	0	01001000
7.	0110	0	01000000
8.	0111	0	00011110
9.	1000	0	00000000
10.	1001	0	00001000

- Similarly when isdot=1 H bit is changed to 1.

- Frequency for dot is maintained at 1 Hz and Duration between refresher (Refresh period) is maintained at 10.5 ms.


clock 10 MHz
reset
reset
K4 K3 K2 K1
Buttons
f-freq-divider
clock 1S
reset
edit mode
K4
Display mode
counter
reset
K3
FSM
cursor
S0 S1 M0 M1 H0 H1
Display mode
D C B A
clock 10 MHz
reset
selector_gen
Display driver
selecter
selected_out
4
BCD to 7 Segment
4
anodes
7 (including dot)
cathodes