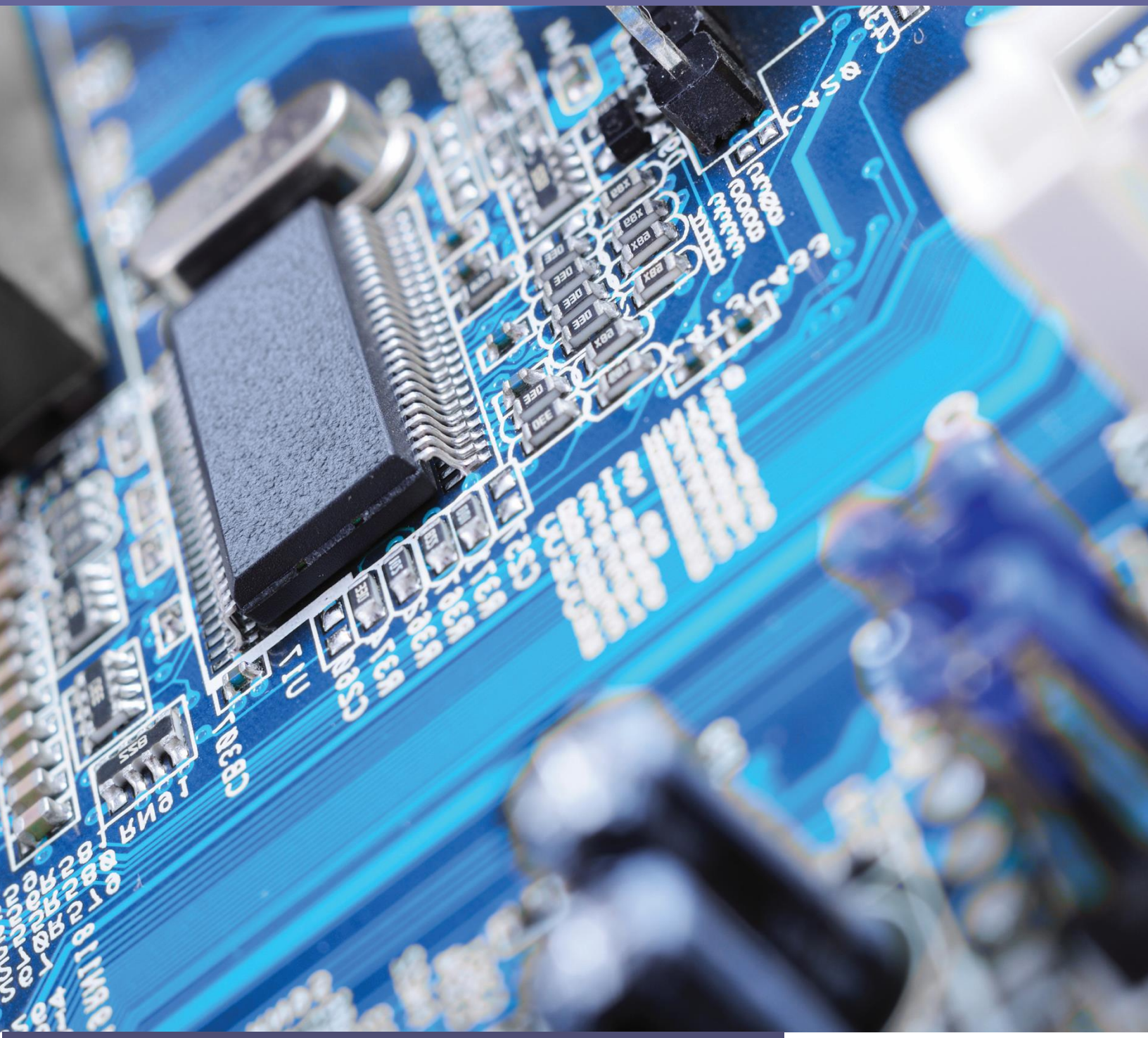
Stopwatch



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Abstract

In this project our team will assemble a simple digital stop watch that counts starting from 00:00:00 and till it reaches 99:59:99 as in (MM:SS:MS)->"Minutes:Seconds:Milliseconds", our design will be as simple as it can be starting with the software representation in order to design a fully functioning stop watch with an accuracy of a millisecond, then moving on to the hardware representation which we expect to be more simple than fancy, the stop watch restarts the count once more from the zero point as soon as it reaches the maximum count acting as a loop of 1 hour and 40 minutes maximum timing capacity.

Keyword(s)

Stopwatch, logic gates, digital representation, low level logical circuit, led stopwatch, clocked simulation, simple stopwatch circuit.

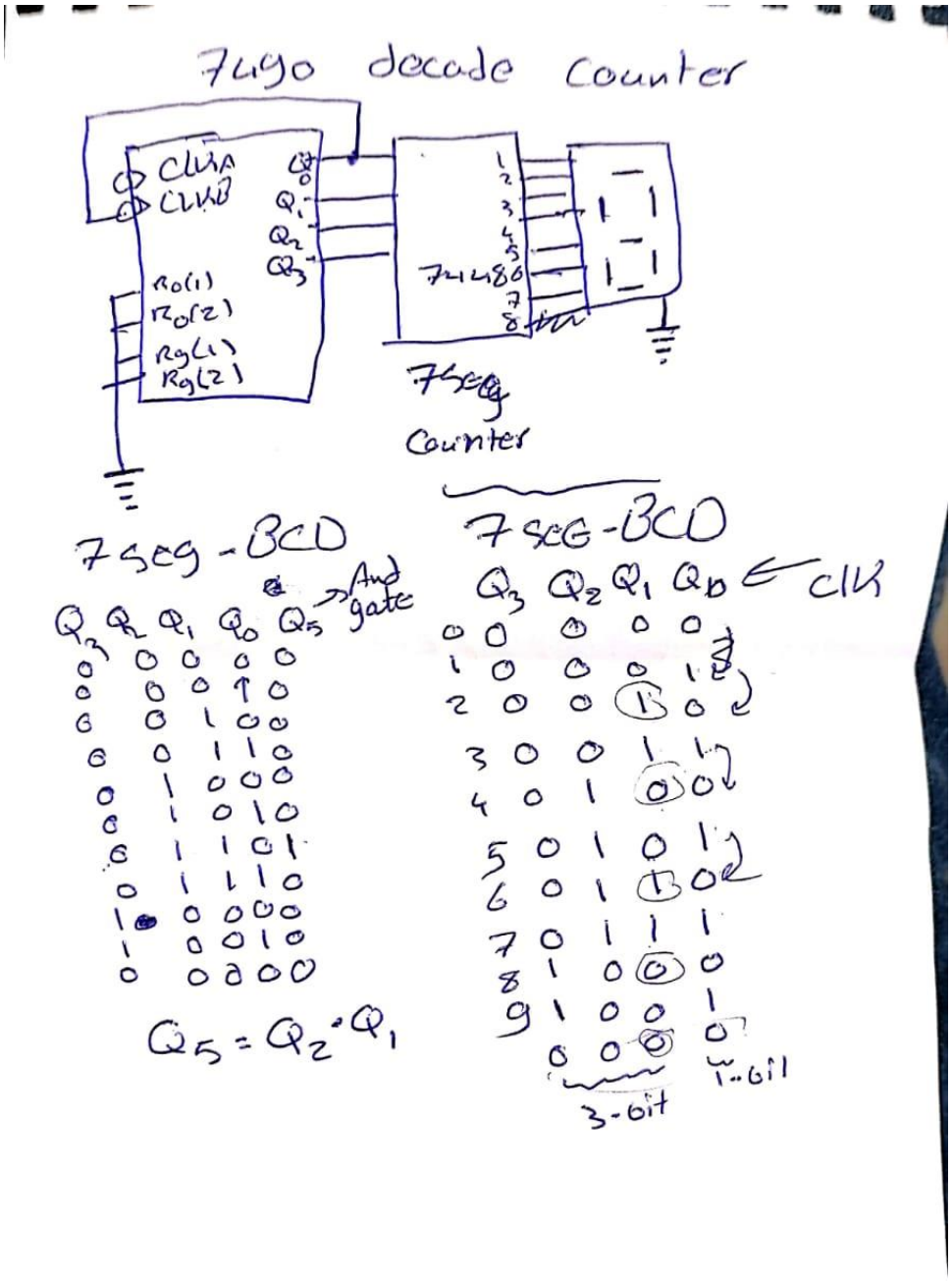

Figure [1] 7490 decode counter

Figure 1 shows the difference between the 7-segment displays reset at 9 and with the influence of the and gate to set it at 6 to implement the minutes.

Truth Table

A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	0
0	0	0	1	0	1	1	0	0	0	0
0	0	1	0	1	1	0	1	1	0	1
0	0	1	1	1	1	1	1	0	0	1
0	1	0	0	0	1	1	0	0	1	1
0	1	0	1	1	0	1	1	0	1	1
0	1	1	0	1	0	1	1	1	1	1
0	1	1	1	1	1	1	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1	0	1	1

K-Maps

for a:

AB \ CD	00	01	11	10
00	1	0	1	1
01	0	1	1	1
11	X	X	X	X
10	1	1	X	X

F(ABCD) = $\neg B \neg D + C + BD + A$

for b:

AB \ CD	00	01	11	10
00	1	1	1	1
01	1	0	1	0
11	X	X	X	X
10	1	1	X	X

F(ABCD) = $\neg B + \neg C \neg D + CD$

for c:

AB \ CD	00	01	11	10
00	1	1	1	0
01	1	1	1	1
11	X	X	X	X
10	1	1	X	X

F(ABCD) = $\neg C + B + D$

for d:

AB \ CD	00	01	11	10
00	1	0	1	1
01	0	1	0	1
11	X	X	X	X
10	1	1	X	X

F(ABCD) = $\neg B \neg D + \neg BC + B \neg CD + C \neg D + A$

for e:

AB \ CD	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	X	X	X	X
10	1	0	X	X

F(ABCD) = $\neg B \neg D + C \neg D$

for f:

AB \ CD	00	01	11	10
00	1	0	0	0
01	1	1	0	1
11	X	X	X	X
10	1	1	X	X

F(ABCD) = $\neg C \neg D + B \neg C + B \neg D + A$

for g:

AB \ CD	00	01	11	10
00	0	0	1	1
01	1	1	0	1
11	X	X	X	X
10	1	1	X	X

F(ABCD) = $\neg B C + B \neg C + A + B \neg D$