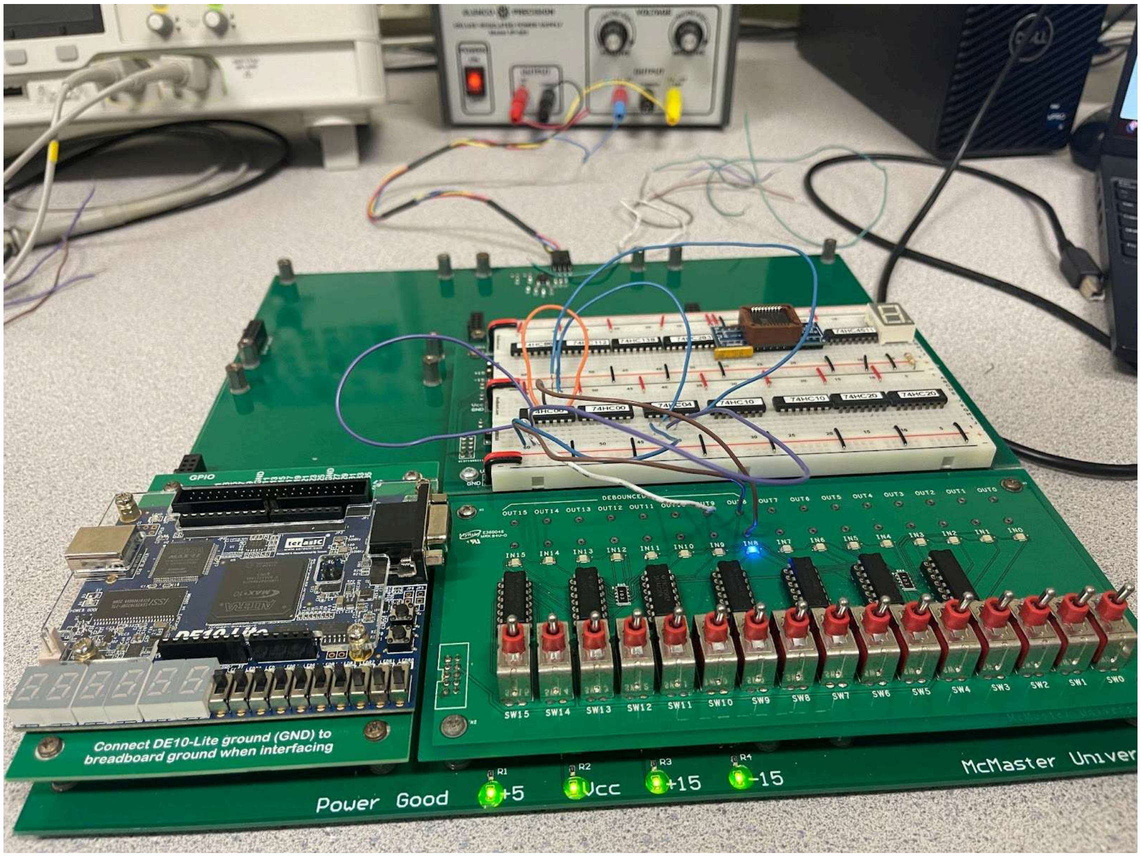
4.1



4.1

$$F(a,b,c,d) = \Sigma(0,2,5,7,8,10,13,15)$$

$$f = a'b'c'd' + a'b'cd' + a'bc'd + a'bcd + ab'c'd' + ab'cd' + abc'd + abcd$$

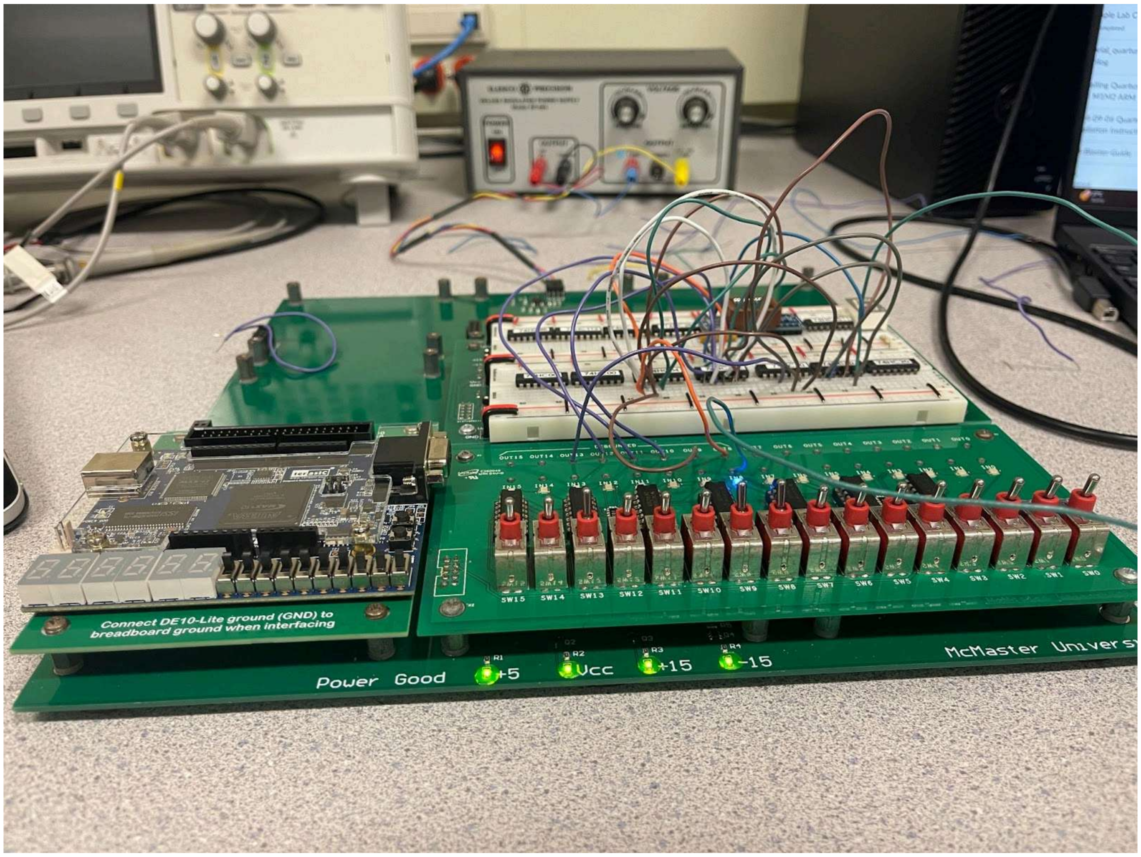
$$m_0 + m_8 = b'c'd'$$

$$m_2 + m_{10} = b'cd' \Rightarrow F = b'd' + bd$$

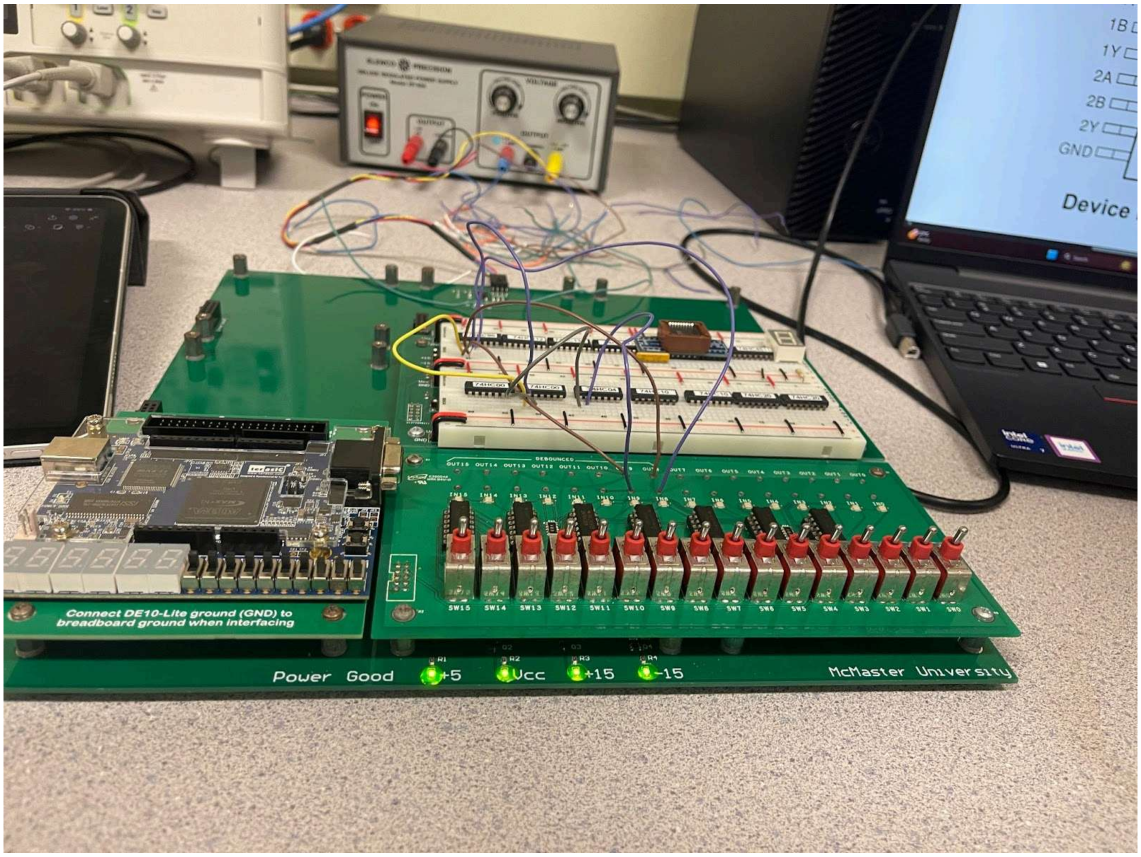
$$m_5 + m_{13} = bc'd \qquad = ((bd)' \cdot (b'd')')'$$

$$m_7 + m_{15} = bcd$$

4.2


Connect DE10-Lite ground (GND) to breadboard ground when interfacing
Power Good
+5
Vcc
+15
-15
McMaster

4.3



4.3

A	B	S	C_{out}
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

$S = A \oplus B$

$C_{out} = A \cdot B$

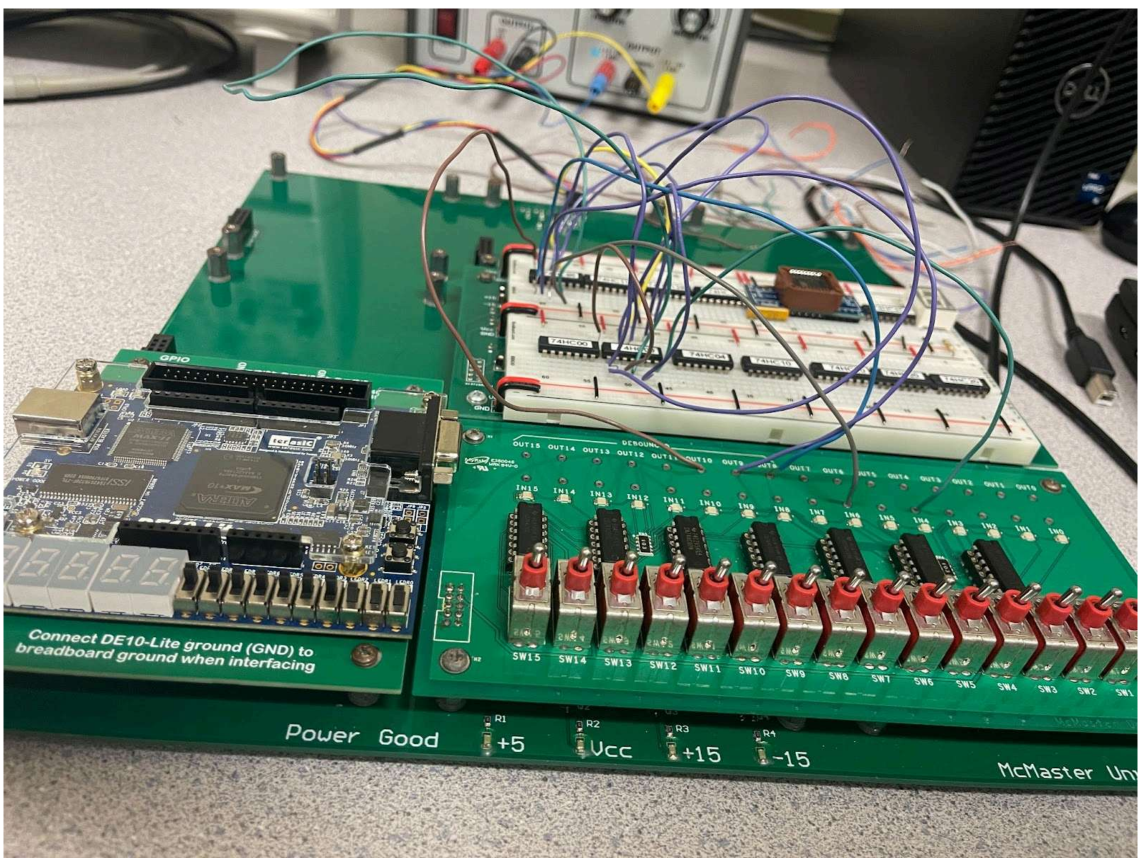
4.4

4.4

A	B	C_{in}	S	C_{out}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

$S = A \oplus B \oplus C_{in}$

$C_{out} = AB + BC_{in} + AC_{in}$



4.5

C0	A	B	Σ	Σ (unsigned)	Σ (2's comp)	C4
0	0000	0000	0000	0	0	0
0	0000	0011	0011	3	3	0
0	0011	0000	0011	3	3	0
1	0011	0000	0100	4	4	0
0	0111	1000	1111	15	−1	0
1	0111	1000	0000	0	0	1
0	1000	1000	0000	0	0	1
0	0011	1111	0010	2	2	1
0	0111	1111	0110	6	6	1
0	1001	1111	1000	8	−8	1
0	1111	1111	1110	14	−2	1
1	1111	1111	1111	15	−1	1

4.5

Set $C_0 = 0$

$OV_{signed} = C_3 \oplus C_4$

$S_3 = 1 \Rightarrow$ Negative

Apply A/B

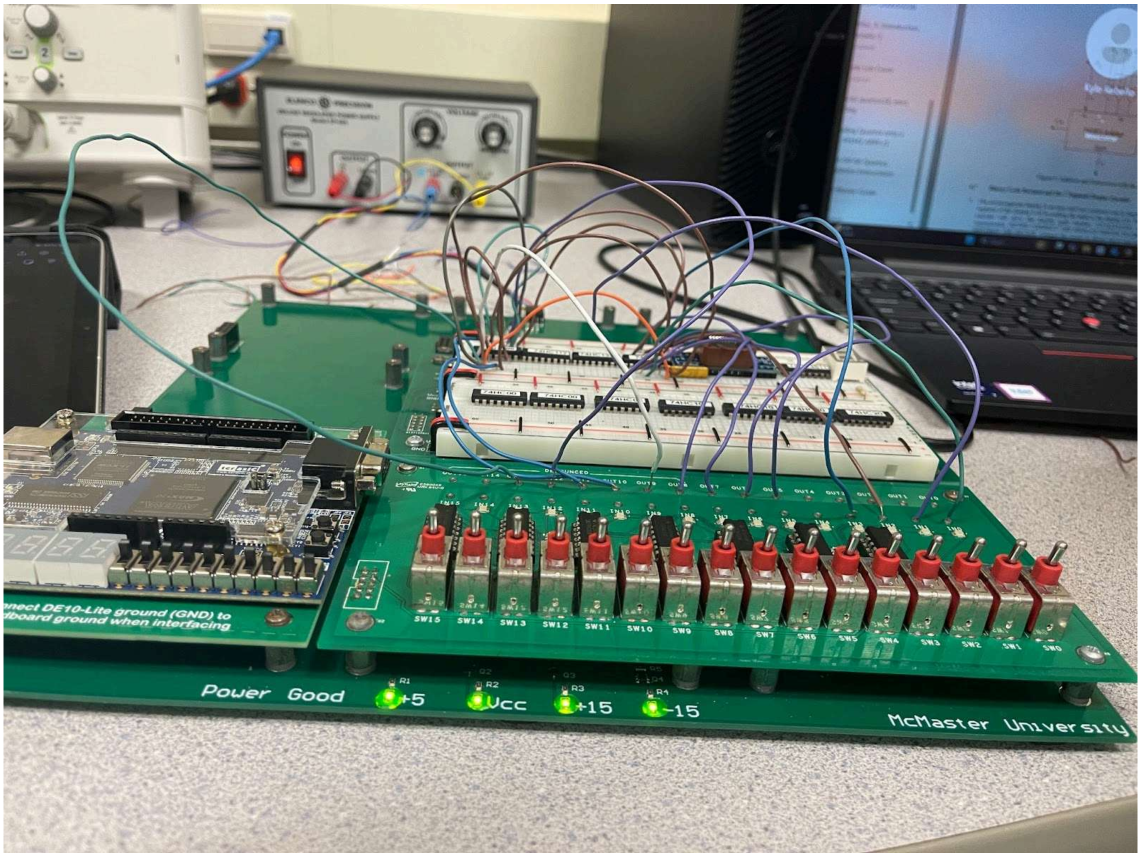
0000 / 0000

0001 / 0011

0111 / 0001

1001 / 0110

4.6



4.6

$S=0 \quad A+B$

$S=1 \quad A-B$

$B_i' = B_i \oplus S \quad C_0 = S$

$A + B_i \oplus S + C_0 = A+B$ OR $A-B$

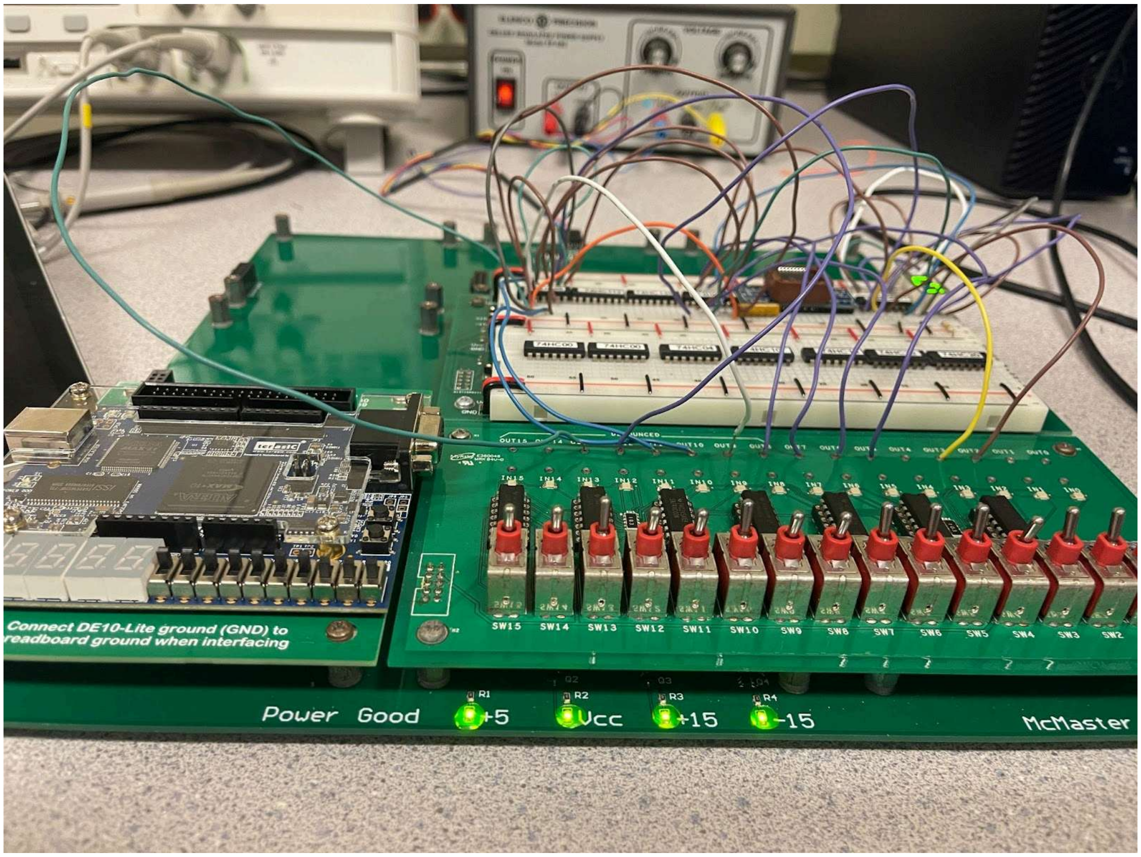
$A+B'+C_0 = A+B$ OR $A-B$

S can either add(0) or Subtract(1)

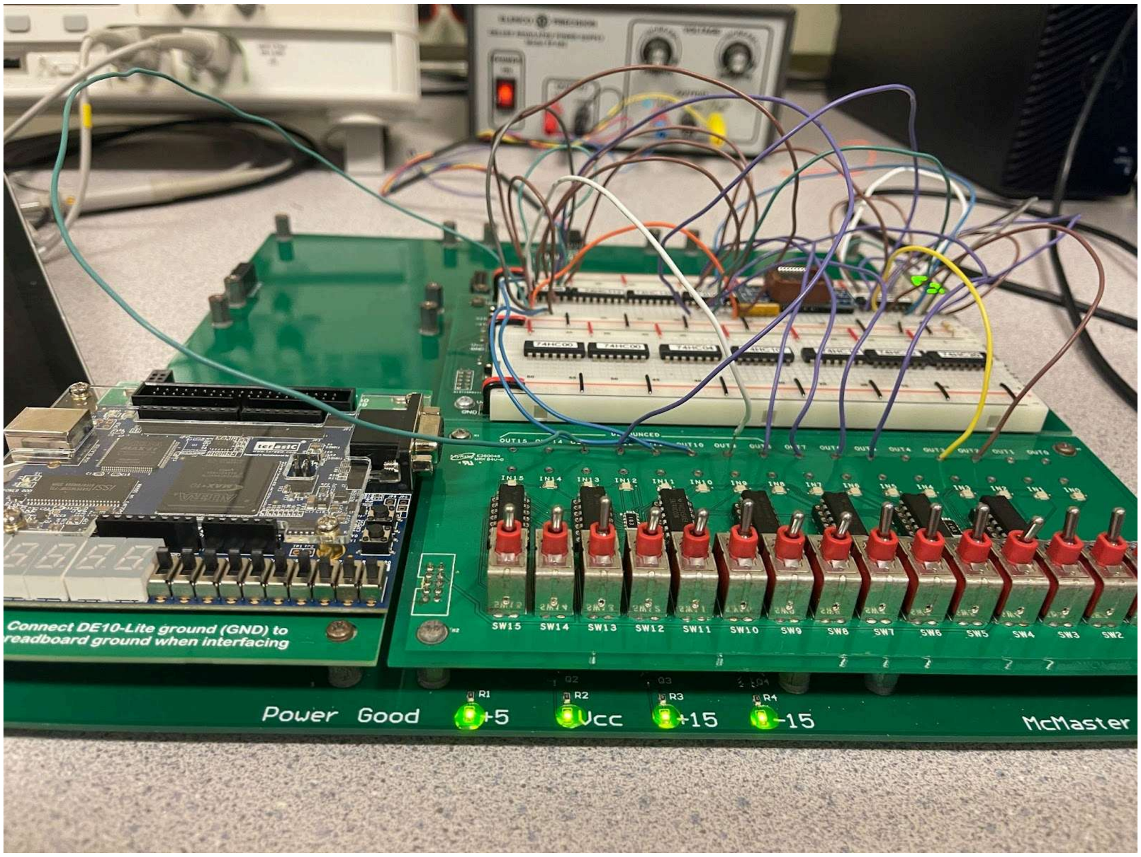
So B_i is passed through XOR with $B_i' = B_i \oplus S$

and $C_0 = S$

4.7


Connect DE10-Lite ground (GND) to
readboard ground when interfacing
SW15 SW14 SW13 SW12 SW11 SW10 SW9 SW8 SW7 SW6 SW5 SW4 SW3 SW2
Power Good
+5
Vcc
+15
-15
McMaster

4.8


Connect DE10-Lite ground (GND) to breadboard ground when interfacing
Power Good
+5
Vcc
+15
-15
McMaster
SW15
SW14
SW13
SW12
SW11
SW10
SW9
SW8
SW7
SW6
SW5
SW4
SW3
SW2
74HC00
74HC00
74HC04