Team Number-: 04

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Statement-:

Build a single circuit that is capable of performing both 2 bit parallel addition and 2 bit parallel subtraction. You need to use 1-bit full adder for the implementation and Implement the circuit

Truth table :

For Adder :

A1	A0	B1	B0	Carry-In	Sum1	Sum0	Carry-Out
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	1	1	0
0	1	0	0	0	0	1	0
0	1	0	1	0	1	0	0
0	1	1	0	0	1	1	0
0	1	1	1	0	0	0	1
1	0	0	0	0	1	0	0
1	0	0	1	0	1	1	0
1	0	1	0	0	0	1	0
1	0	1	1	0	0	0	1
1	1	0	0	0	1	1	0
1	1	0	1	0	0	0	1
1	1	1	0	0	0	1	0
1	1	1	1	0	1	0	1

For Substractor :

A1	A0	B1	B0	Borrow	D1	D0
0	0	0	0	0	0	0
0	0	0	1	1	1	1
0	0	1	0	0	1	0
0	0	1	1	0	0	1
0	1	0	0	1	1	1
0	1	0	1	1	1	0
0	1	1	0	1	0	1
0	1	1	1	1	0	0
1	0	0	0	0	1	0
1	0	0	1	0	0	1
1	0	1	0	0	0	0
1	0	1	1	1	1	1
1	1	0	0	0	0	1
1	1	0	1	1	0	0
1	1	1	0	0	1	1
1	1	1	1	0	1	0

Table 1 : Truth Table for the project

Intermediate process-:

NIL

Expression(s)-:

1. Sum bit 0 expression:

For addition: (A0 XOR B0) XOR Sub

For subtraction: (A0 XOR B0) XOR NOT(Sub)

2. Borrow bit 0 expression:

For addition: ((A0 XOR B0) AND Sub) OR (B0 AND A0)

For subtraction: ((B0 XOR A0) AND NOT(Sub)) OR (A0 AND B0)

3. Sum bit 1 expression:

For addition: (A1 XOR B1) XOR (A0 XOR B0 XOR Sub)

For subtraction: (A1 XOR B1) XOR (A0 XOR B0 XOR NOT(Sub))

4. Borrow bit 1 expression:

For addition: ((A1 XOR B1) AND (A0 XOR B0 XOR Sub)) OR ((B1 AND A1) AND (A0 XOR B0))

For subtraction: ((B1 XOR A1) AND (A0 XOR B0 XOR NOT(Sub))) OR (A1 AND B1 AND NOT(A0 XOR B0 XOR NOT(Sub)))

Circuit Diagram-:

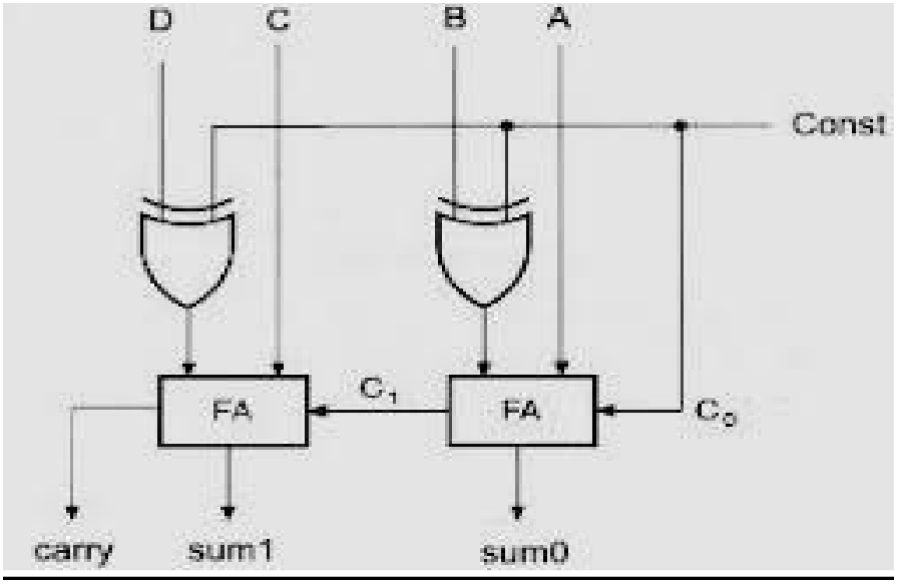

Figure 1 : Circuit Diagram

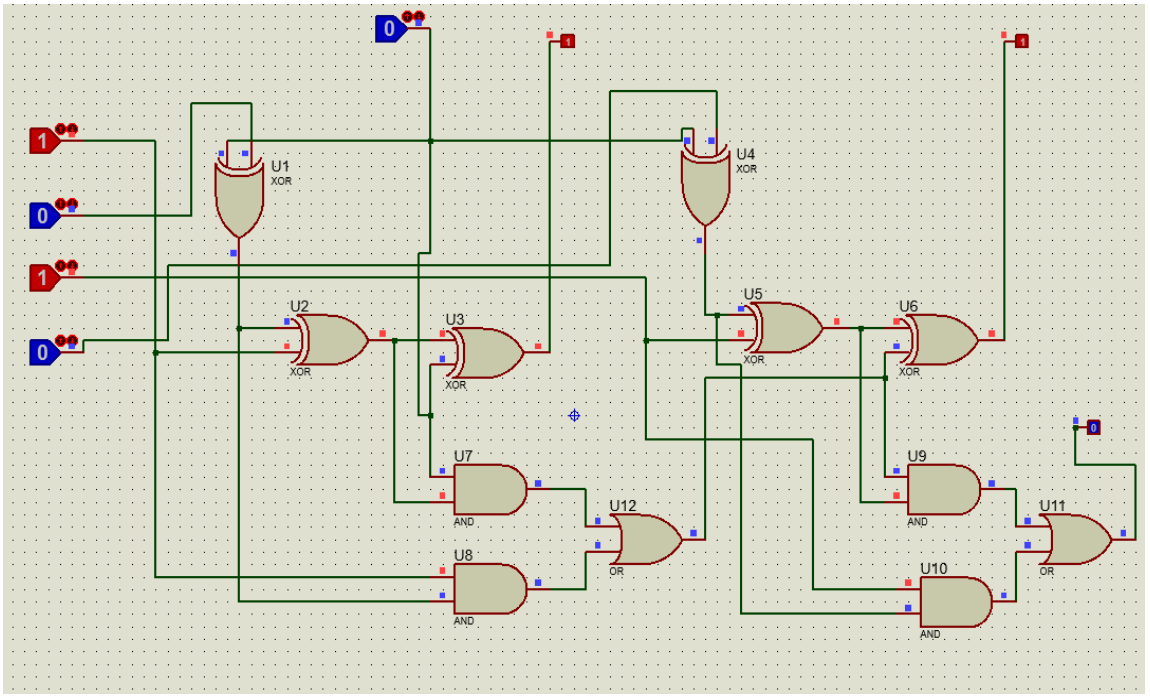

Figure 2 : Simulation Diagram

IMPLEMENTED CIRCUIT :

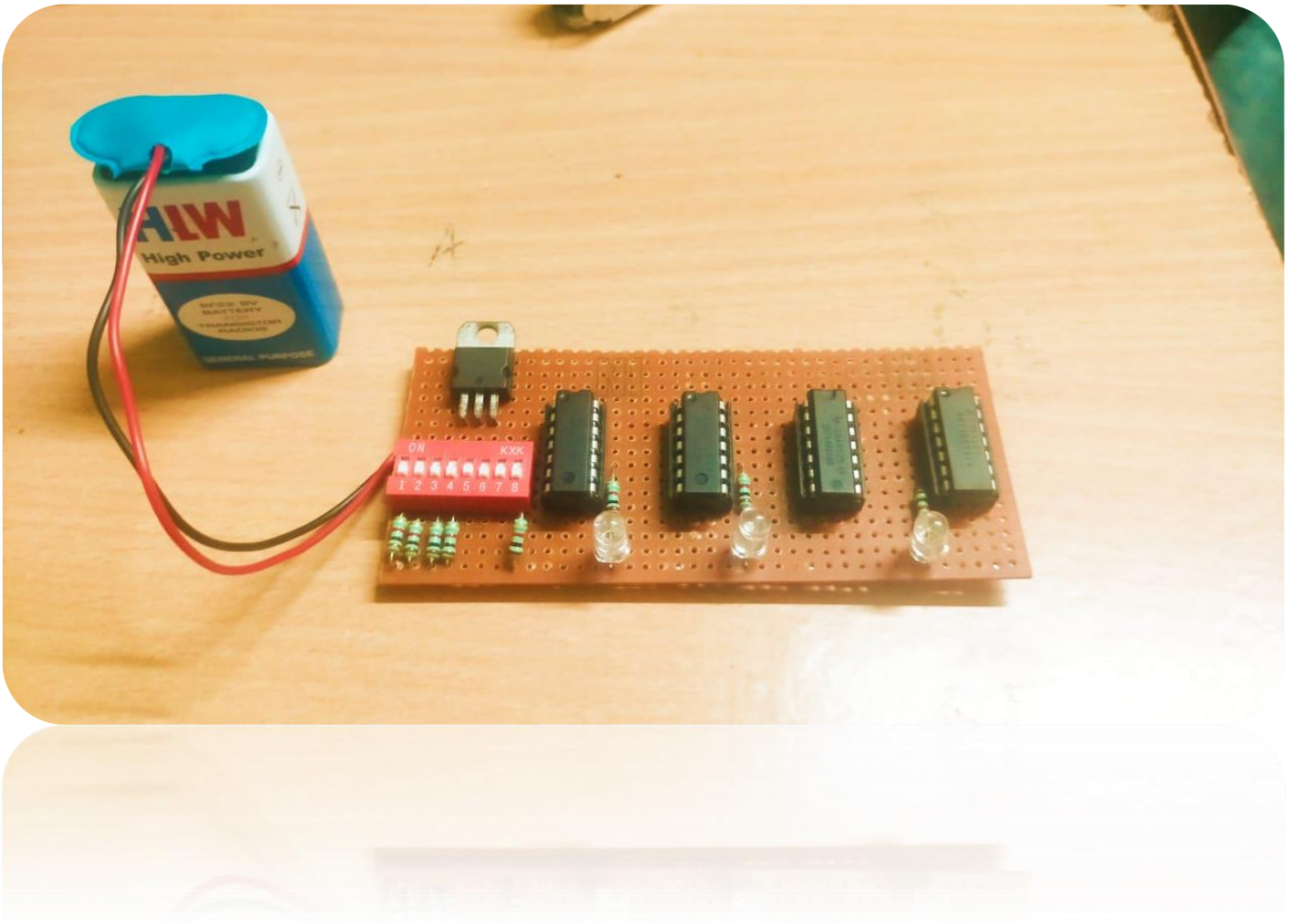

Figure 3 : Circuit Implementation

Staff Incharge