**Analysis and Design**

The ALU we are going to design is going to perform the ADD function and bitwise AND.

In our ALU we will take two 4-bits inputs and a separate 1-bit switch input. In order to add numbers we use one half and three full adders. To perform AND operation we use four and gates. Furthermore, to choose from which part of the ALU we want to get the result we use nine AND gates, one NOT gate and four OR gates. In the end we have five LED output (4-bits and one carry). We connect everything using wires.

**Test Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test case no.** | **Input1** | **Input2** | **Switch input** | **Output** |
| 1 | 0,0,0,0 | 0,0,0,0 | 0 | 0,0,0,0,0 |
| 2 | 0,0,0,0 | 0,0,0,0 | 1 | 0,0,0,0,0 |
| 3 | 0,0,1,1 | 1,1,0,0 | 1 | 1,1,1,1,0 |
| 4 | 1,1,1,0 | 1,0,1,0 | 0 | 1,0,1,0,0 |
| 5 | 1,1,1,0 | 1,0,1,0 | 1 | 0,0,1,1,0 |
| 6 | 0,0,1,1 | 1,1,1,1 | 1 | 0,0,1,1,1 |
| 7 | 0,0,1,1 | 1,1,1,1 | 0 | 0,1,1,1,0 |
| 8 | 1,1,1,0 | 1,1,1,0 | 0 | 1,1,1,0,0 |
| 9 | 1,1,1,0 | 1,1,1,0 | 1 | 0,1,1,1,0 |

**Diagram:** <http://simulator.io/board/mUQ7jKrsXp/11>