**Microprocessor Systems**

**Assignment 1**

**4 Bit Microcontroller**

**Instructor: Imran Abeel**

**Group members**

|  |  |
| --- | --- |
| **Azzan Rauf** | **373199** |
| **Muhammad Abdullah** | **393969** |

**About the Assignment:**

We were able to successfully design a 4 bit Microcontroller on Simulator.io. We worked with few of the basic gates along with half and full adders, demultiplexers and multiplexers and few other components.

Our Microcontroller is able to perform the following instructions:

**IN**

**OUT**

**ADD**

**SUB**

**AND**

**OR**

**NOP**

Our ROM consists of 16 address spaces of which we used only the first 7 for the opcodes of our instructions. Since it was a 4 bit controller, we were able to take 4 bit inputs and manipulate them further with our instructions.

There were a few technicalities and problems which were faced. One of the major problems was the lack of user friendliness of the simulator we were working on. It was quite hard to design such a complex circuit on such a simulator where the wires ended up being all jumbled up and there was lack of space for bugs and fixes which were found out later as we moved on with our design.

**Work Contributions**

Since this assignment was done by only two members, the work was divided quite evenly. Abdullah gave us a head start by designing the ALU. Next up Azzan designed the instruction decoder and program counter. Then Abdullah came up with the ROM space we want for our Microcontroller. Then Azzan designed the circuits of IN and OUT commands and Abdullah updated the ALU adding the AND and OR commands. Since it was a complex task, the circuit had to be decoded at each step which was done by the collective effort of both the team members.