AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Engineering

Lab Report Cover Page

Assignment Title:	Designing Multiplexer (MUX) and Demultiplexer (DEMUX), Encoder and Decoder Circuits.			
Lab Number:	04	Date Submission:	of	17 October 2022
Course Title:	DIGITAL LOGIC AND CIRCUITS LAB			
Course Code:	00868	Section:		N
Semester:	Fall 2022-23	Course Teacher:		RETHWAN FAIZ

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No	Name	ID	Program
1	MD. RIFAT HOSSAIN	18-38939-3	BSc [CSE]
2	ABDULLAH AL MAHMUD	19-39500-1	BSc [CSE]
3	MD. OLI ULLAH RAFI	20-42934-1	BSc [CSE]
4	PARTHA MALAKAR	20-42908-1	BSc [CSE]
5	MD. ATIKUR RAHMAN ATIK	19-40033-1	BSc [CSE]

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Assignment Title:	Designing Multiplexer (MUX) and Demultiplexer (DEMUX), Encoder and Decoder Circuits.			
Lab Number:	04	Date of Submission:	26 October 2022	
Course Title:	DIGITAL LOGIC AND CIRCUITS LAB			
Course Code:	00868	Section:	N	
Semester:	Fall 2022-23	Course Teacher:	RETHWAN FAIZ	

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Purpose:

The purpose of the experiment is to gather understandings of all labs and solve a real-life problem based on the understanding. In this experiment a real-life problem has been developed. We have used our acquired knowledge to solve the problem. The problem is based on collecting data form multiple source and output into one source. So, Multiplexer has been chosen to solve the problem. Multiplexer is a device that enables the selection of one of numerous analogue or digital input signals and transfers the input into a single media. Data Selector is another name for Multiplexer.

Literature Review:

A data selector, often known as a multiplexer (or mux; occasionally spelled multiplexor), is a device that chooses one of numerous analog or digital input signals and sends it to a single output line [1]. A different set of digital inputs called the select lines controls the selection. The n choose lines in a multiplexer with 2n inputs are used to choose which input line should be sent to the output [2]. The use of a multiplexer can significantly improve a communication system's efficiency. Multiplexers enable the transmission of multiple types of data, such as audio and video, simultaneously over a single transmission line [3]. Instead of having a device for each input signal, a multiplexer enables several input signals to share a single device or resource, such as an analog-to-digital converter or a communications transmission medium. Boolean functions with numerous variables can also be implemented using multiplexers. A switch with several inputs and one output can be used to describe an electrical multiplexer [4]. A multiplexer is represented schematically by an isosceles trapezoid, with the output pin on the shorter parallel side and the input pins on the longer parallel side [5].

Problem Statement:

Manikgonj central prison have four cells and one control room. Control room is used for monitoring all the activities the prison cells. In order to hear the audio activity of the prison room, mechanics have set up one mic in each cell and one speaker in the control room. Now, you have to setup the system in a way that in control room police can hear activities of one room at a time instead of all the cells together as it will create a mess up. In control room there should be dedicated switch for controlling the channel of mics.

Solution:

The problem can be solved using multiplexer. A device that enables the selection of one of numerous analogue or digital input signals and transfers the input into a single media. Data Selector is another name for Multiplexer. As the police station need a device using that they can control multiple voice channel and in their control room they want to hear voice activity of a single cell at a time so only Mux can serve their purpose.

Equipment:

Equipment required for this experiment:

- AND gate.
- OR gate.
- Not gate.
- Trainer board.

Procedure:

In this experiment real-life problem based on the understanding. In this experiment a real-life problem has been developed. After that solution of the problem and implementation step starts. Step by step solution is given below:

1. Development of a problem based on our understanding of digital logic circuits.
2. Findings and research for possible solution of the problem.
3. Finalize the solution and requirements for the development of solution.
4. Creating simulation using NI Multisim based on requirements and solution statement.
5. Analysis of output of the simulation to identify that the solution works or not.
6. Implement the combinational circuit in training board.
7. Compare the output with simulation in order to identify that implementation works.

Simulation:

Simulation is done using NI Multisim:

Channel		Turned on channel of prison cells	Simulation
Switch 1	Switch 2		
0	0	Cell 1	
0	1	Cell 2	

1	0		
1	1		
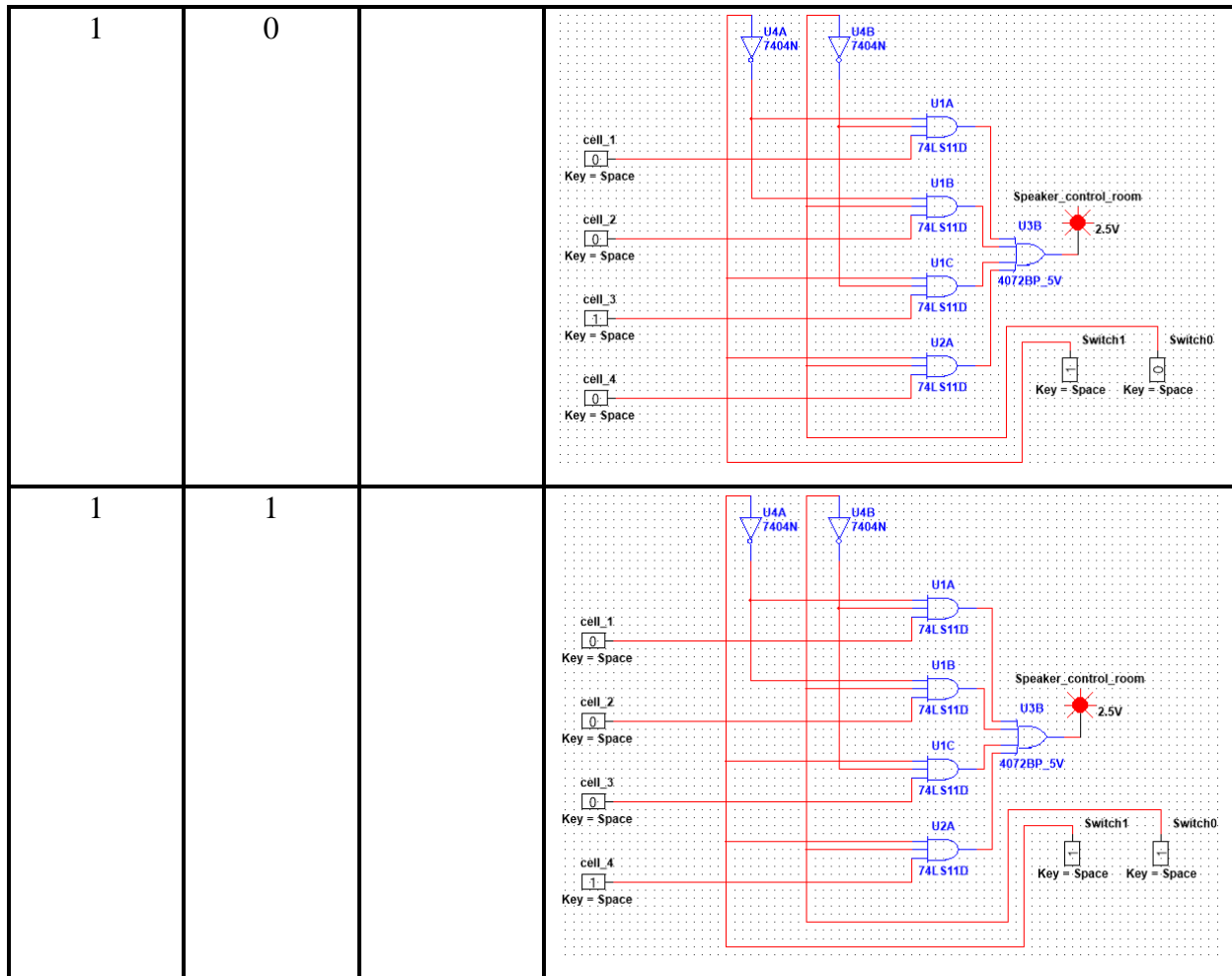
Discussion:

In the experiment we encountered some difficulties such as bread board have some issue all the pin holes weren't working. The pin arrangement of all gates was not same which also cause some issue but after checking the PIN arrangement of the ICs twice before assembling the circuit will help to avoid this problem. The Multiplexer is only implemented in lab and MUX, De-MUX, encoder, decoder are implemented in virtual environment using NI Multisim.

Conclusion:

In this excrement we have learned about working principal and real-life implementation of Multiplexer, De-Multiplexer, Encoder, Decoder. Multiplexer is implemented in lab using training

board others in NI Multisim. Overall experiment was done accurately using both NI Multisim and Trainer Board.

References

[1] A. A. Ankit Dalal1, "A General Overview of Multiplexer and," *International Journal of Research (IJR),* vol. 1, no. 10, pp. 2348-6848, 2014.

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