Department of Computer & Software Engineering

National University of Science and Technology, College of E&ME, Rawalpindi

Final Project Report

Logic Seq. Circuit Design

Project Name:

Secure Check Pass Counter System

Submission to
Asst. Professor Dr. Soyiba

Group Members	Registration #	Degree
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Submission Date
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Project Description:
Our project involves utilizing logic gates to create a system. In this system, we are now implementing a 4-bit memory register which will store a 4-bit password. And we will pass that stored password later in our system that will check user entered password and stored password for authentication. There will be four seven segments that will display password entered by user. Our system will verify the entered password by user, and if it is correct, a green light will illuminate. In case of an incorrect password, a red light will turn on. Additionally, the system will indicate the total number of correct passwords through a counter, counting and displaying the attempts made using 2 seven segments display. Moreover, when the counter becomes a multiple of 10, a yellow light will be activated (means for segments displaying 10, 20 etc., buzzer will activate). This will indicate that 10 correct passwords have been entered.

Project Objectives:
The primary objective of our project is to design and implement a secure access control system using logic gates. The specific goals include:

- Logic Gate Implementation
- Password Establishment/ Storage
- User Input Verification
- Visual Indicators
- Entry Attempt Counter
- Threshold Activation
- Security and Reliability

Project Deliverables:

Proteus Simulation:
A fully functional Proteus simulation showcasing the project's logic gate-based Secure Check Pass Counter system.
Practical Circuit on Breadboard:
Implementation of the project's circuit on a breadboard for testing and verification.

How is Memory Register storing values and how it is designed?

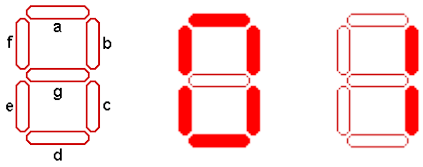
Our memory register is designed using four D flip flops, each flip flop can store one bit in it. We have even not used IC of D flip flop, rather we prefer to design each D flip flop by using NAND and NOT gates for making our design capability and concepts strong.

Why Comparator Circuit?

In our password security project, our authentication system is actually a comparator circuit. It looks at the 4-bit password that user type in and checks if it's the same as the one saved in our memory. If it matches, it will give output as 1 or 0 representing that either passwords are correct or wrong.

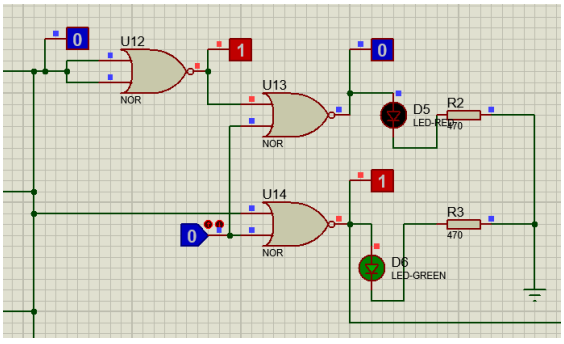
How Seven Segments displaying 1 and 0 as entered by User?

Later in this report, you will find the complete explanation of how seven segments are working without BCD converter IC7447.



Here, Segment b, c and g will remain same all the time, only a, d, e, and f will change according to the bit entered by the user.

How Small Circuitry used for illuminating Green and Red Light?



I used NOR gates that will work for illuminating green and red LEDs. When the Authentication system will give 1, it will be given to the NOR gate whose output is connected to red Led, and other input of NOR is connected to ground (value zero). If the output of authentication system is 1, means the password is correct, then this NOR gate will not turn on red Led. However, at the time, green Led that is connected with the output of other NOR gate will illuminate because the password is correct as authentication system has give 1 as its output.

Why we used diodes in our circuit?

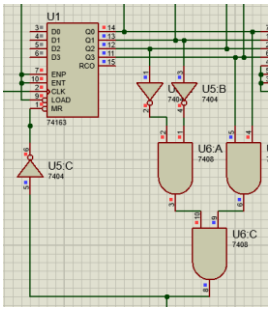
Clearly, we know that diodes are unidirectional electronic component. They only allow current to flow in one direction, so for displaying our led lights, we placed diodes in their way to more stable the current in one direction so that LEDs will glow better.

Working of Counter Display System

When the password entered by the user will match with the password that is stored in our memory register, that specific output will be given to IC74163 (four-bit synchronous IC) as a clock signal. This clock signal will act as an input for IC74163, and it will start working, then the output of IC74163 will be given to IC7447 connected with seven segment display used to display counter.

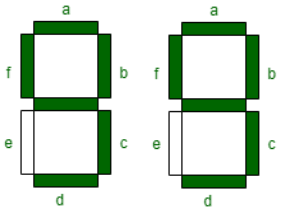
How we overcome Issue of 74163 that it can count to 15, but we want up to 9?

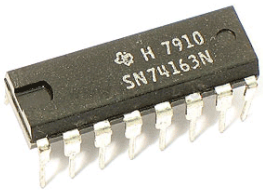
IC74163 can count up to 15 but as we have given its output to IC7447 and it can display only up to 9, so when IC74163 reaches 9, after 9 seven segments will start displaying garbage values which is something unacceptable in our project. So, to overcome this issue, we designed a circuit that will reset IC74163 when it reaches 9, there is a pin in IC74163 that is used to reset the values, so whenever the counter reached 9, it will reset the counter to zero.



Can seven segments display number 99?

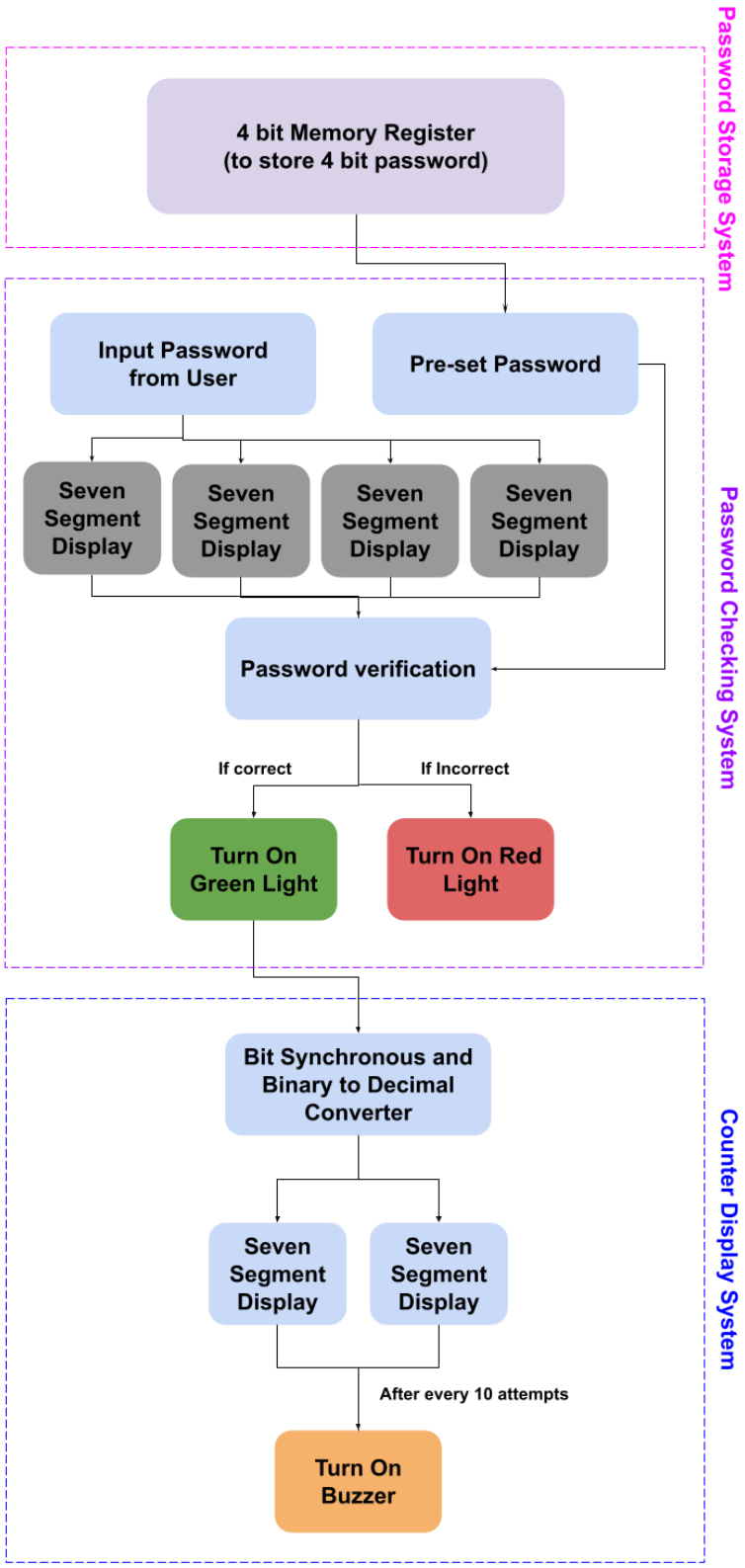
Yes, we have used two seven segments that can display together up to 99. When one seven segments will reach 9 and the moment it turns zero, a circuit is also designed using AND gates that give input as clock to the other IC74163, this IC74163 is connected with BCD converter IC7447 and that is further connected to the other seven segment display. This is second seven segment that will display 1 when first seven segment will reach zero after 9. Similarly, again when first seven segment reaches zero after 9, second seven segment will display 2 and so on.



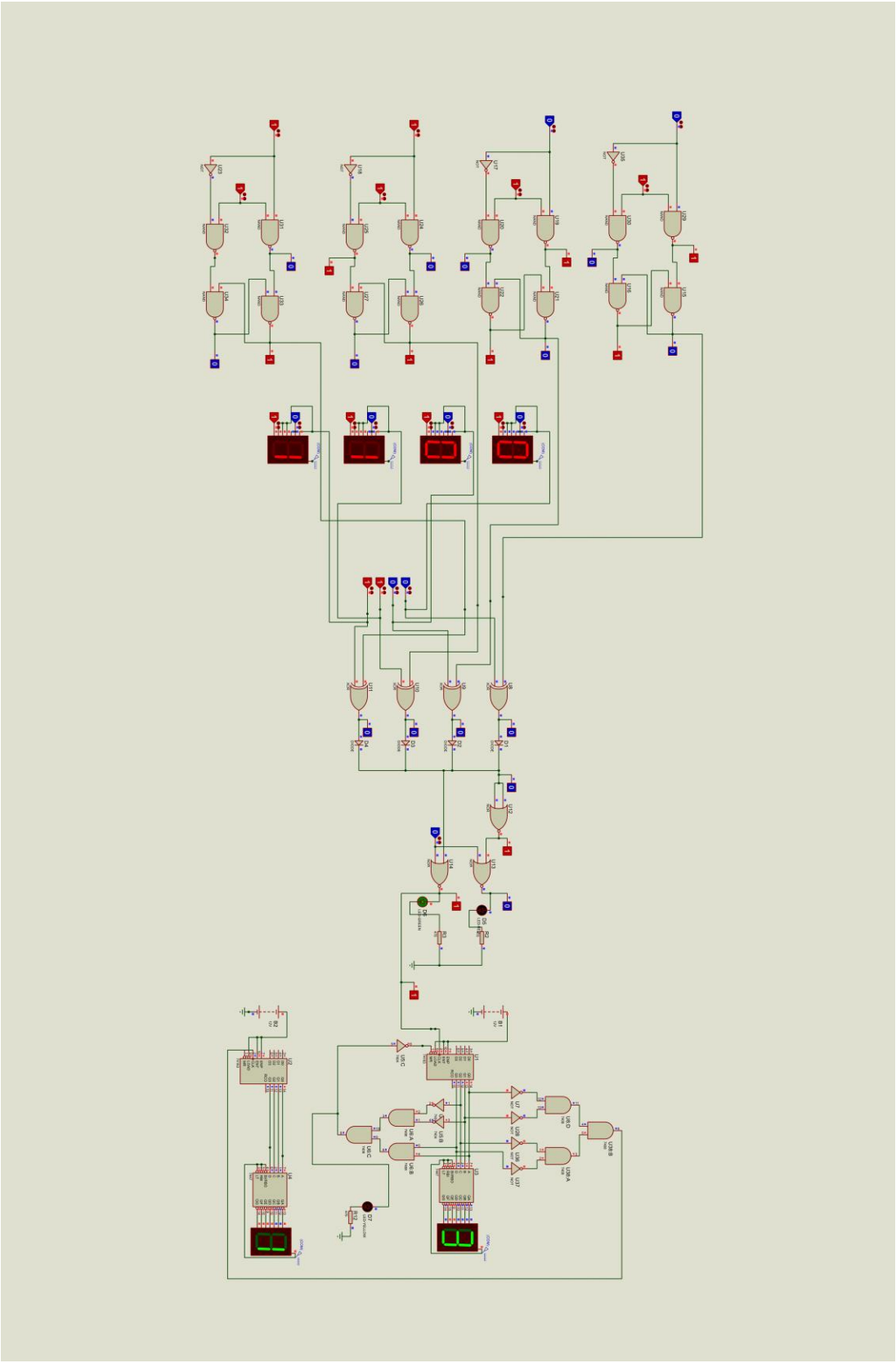


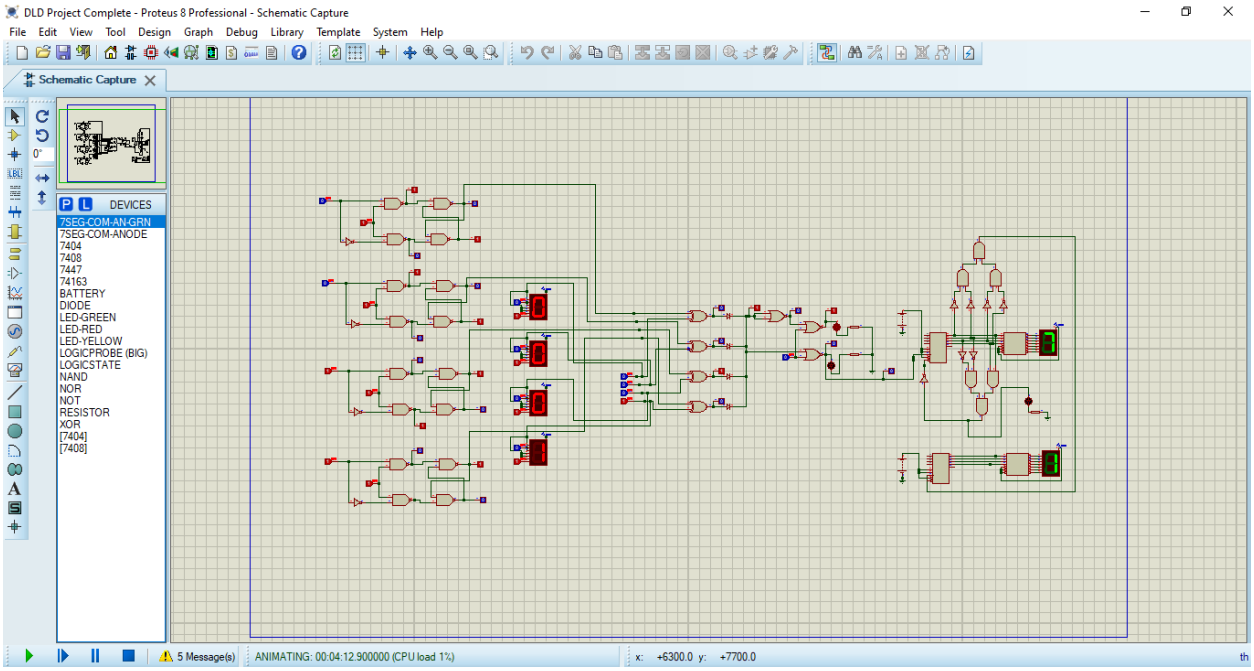
Calculations and Explanations:

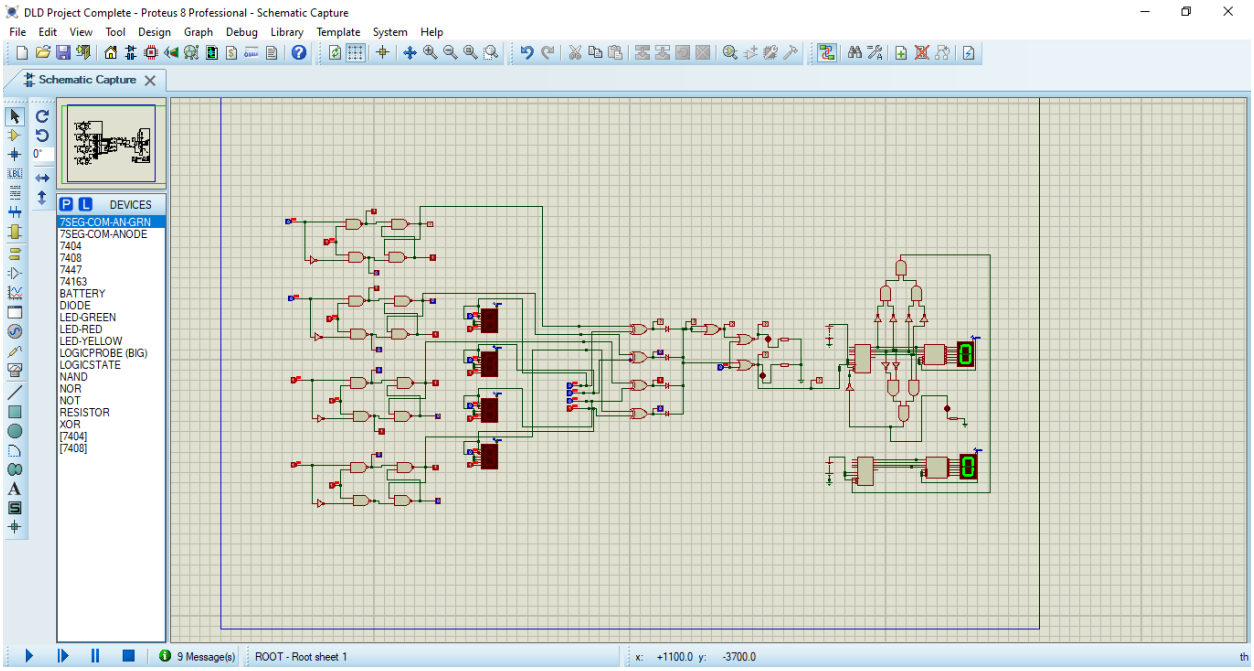
Block Diagram:



Proteus Simulation:




DLD Project Complete - Proteus 8 Professional - Schematic Capture
File Edit View Tool Design Graph Debug Library Template System Help
Schematic Capture
DEVICES
7SEG-COM-AN-GRN
7SEG-COM-ANODE
7404
7408
7447
74163
BATTERY
DIODE
LED-GREEN
LED-RED
LED-YELLOW
LOGICPROBE (BIG)
LOGICSTATE
NAND
NOR
NOT
RESISTOR
XOR
[7404]
[7408]
5 Message(s)
ANIMATING: 00:04:12.900000 (CPU load 1%)
x: +6300.0 y: +7700.0


DLD Project Complete - Proteus 8 Professional - Schematic Capture
File Edit View Tool Design Graph Debug Library Template System Help
Schematic Capture
DEVICES
7SEG-COM-AN-GRN
7SEG-COM-ANODE
7404
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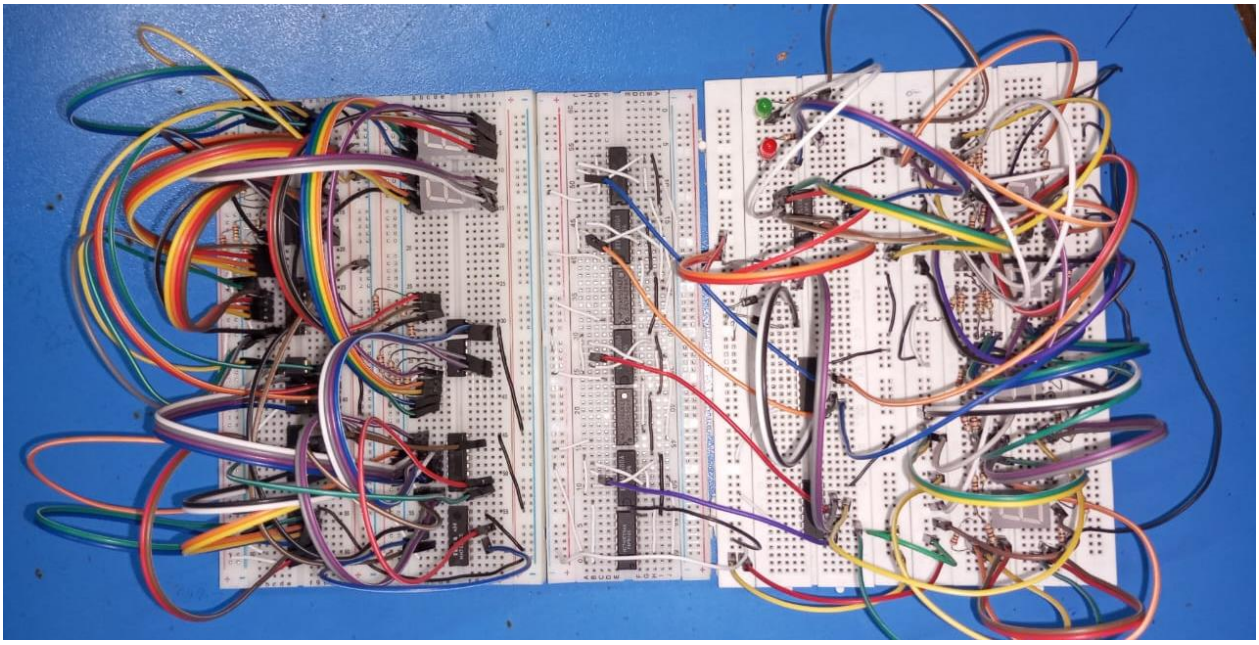
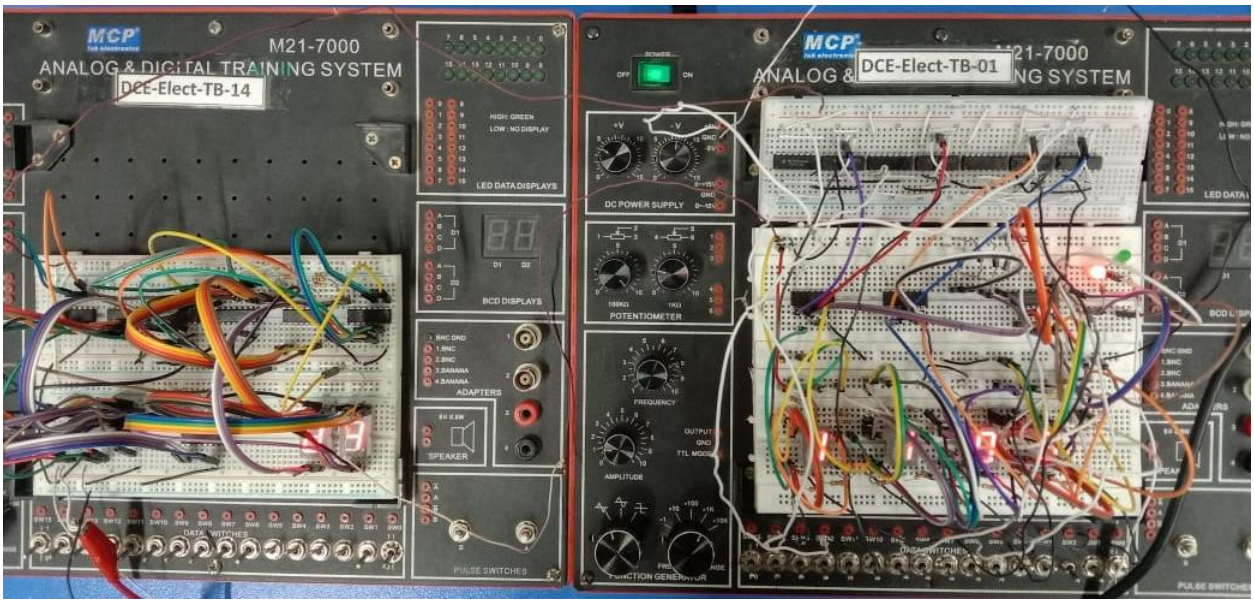
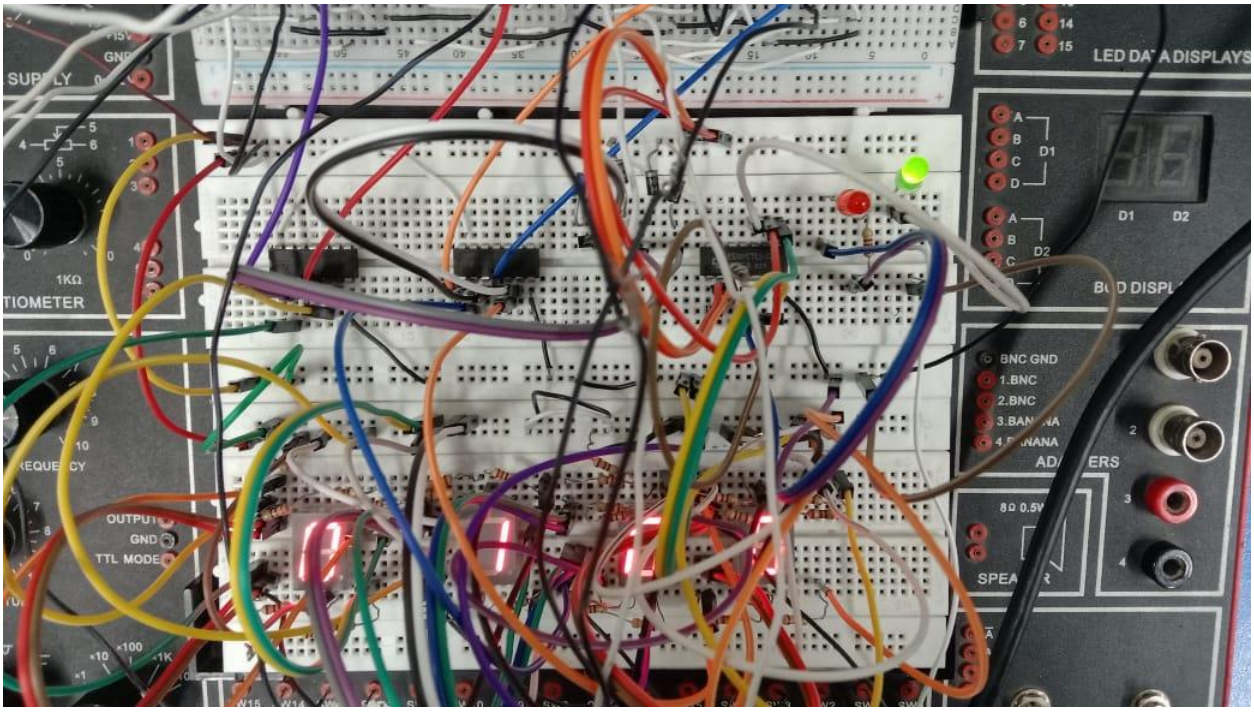
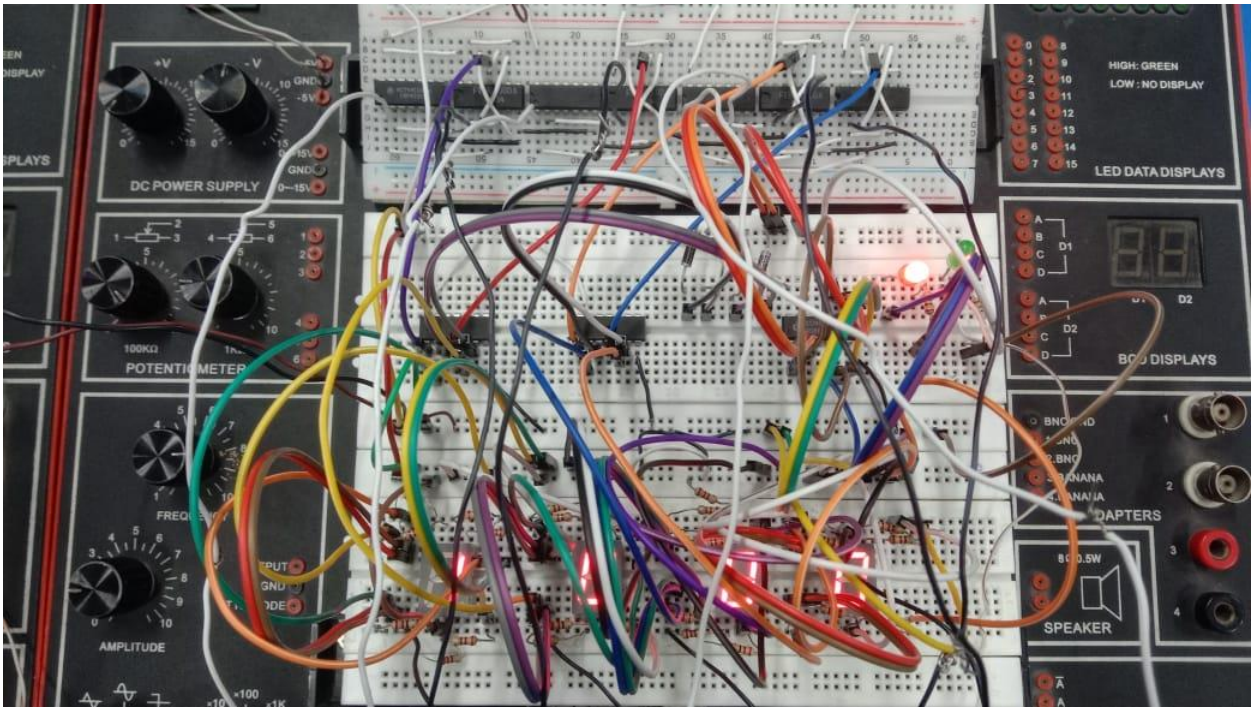
74163
BATTERY
DIODE
LED-GREEN
LED-RED
LED-YELLOW
LOGICPROBE (BIG)
LOGICSTATE
NAND
NOR
NOT
RESISTOR
XOR
[7404]
[7408]
9 Message(s)
ROOT - Root sheet 1
x: +1100.0 y: -3700.0

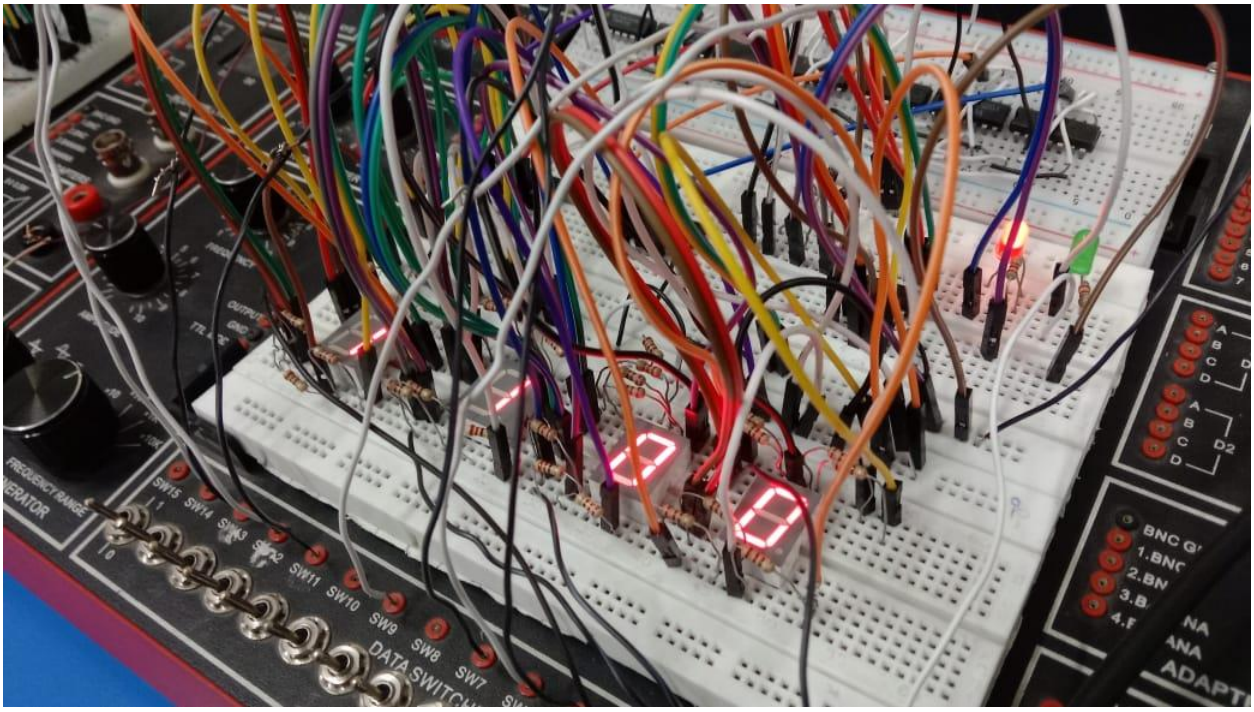
Images of Project on Breadboard:

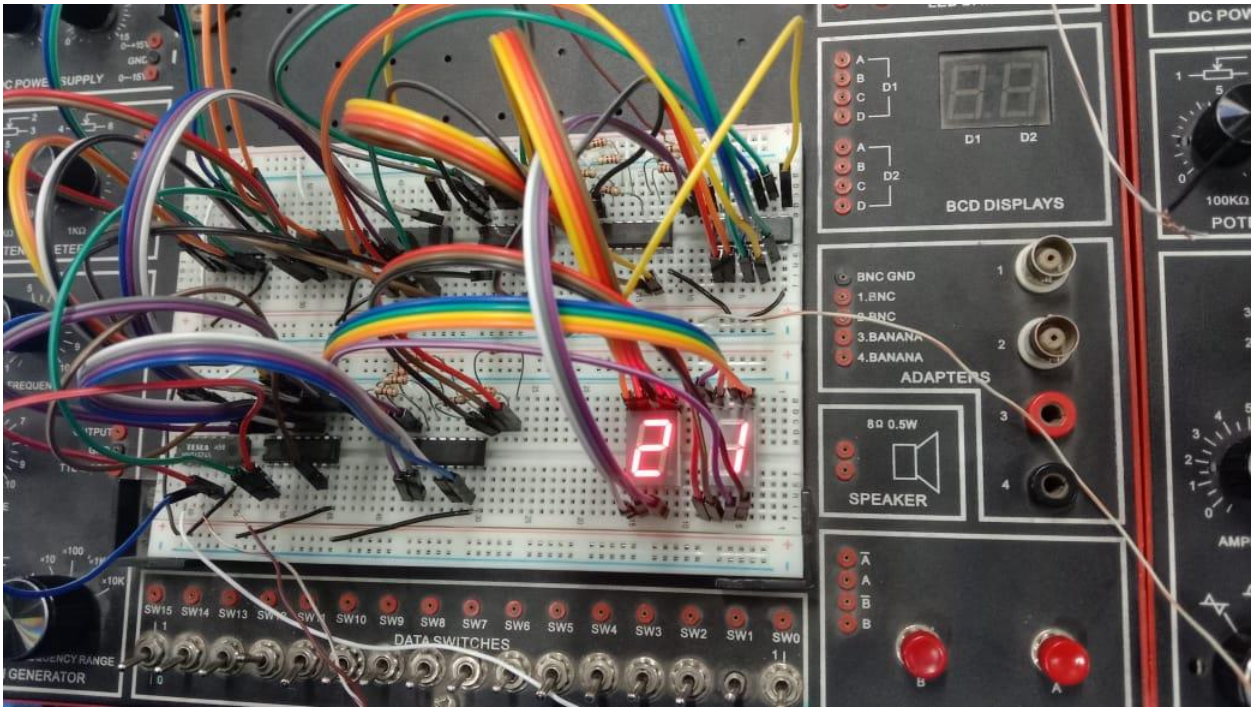





LED DATA DISPLAYS
BCD DISPL
BNC GND
1.BNC
2.BNC
ADAPTERS
OUTPUT
GND
TTL MODE
1KΩ


DC POWER SUPPLY
HIGH: GREEN
LOW : NO DISPLAY
LED DATA DISPLAYS
BCD DISPLAYS
ADAPTERS
SPEAKER
AMPLITUDE
100KΩ


SW15 SW14 SW13 SW12 SW11 SW10 SW9 SW8 SW7
DATA SWITCHES
BNC G
1.BNC
2.BN
3.B
4.F
NA
ANA
ADAPT


D1
D2
BCD DISPLAYS
BNC GND
1.BNC
2.BNC
3.BANANA
4.BANANA
ADAPTERS
8Ω 0.5W
SPEAKER
SW15 SW14 SW13 SW12 SW11 SW10 SW9 SW8 SW7 SW6 SW5 SW4 SW3 SW2 SW1 SW0
DATA SWITCHES
GENERATOR