GITAM

(DEEMED TO BE UNIVERSITY)

TITLE: PCB WORKSHOP REPORT

Subtitle: ANALOG AND DIGITAL CIRCUITS

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Academic Year:2021-25

1)TRAFFIC SIGNAL CONTROL(DIGITAL CIRCUIT):

Traffic Light Signal Simulation:

Overview:

The simulation aims to model the operation of a traffic light system at an intersection. The traffic light cycles through different states (e.g., Red, Green, Yellow) to manage the flow of traffic, ensuring safety and efficiency.

Components:

1. Traffic Lights: Red, Yellow, and Green lights for each direction (e.g., North-South, East-West).
2. Timer: Manages the duration each light stays on.
3. Sensors (optional): Detects the presence of vehicles and adjusts the signal timing dynamically.

States and Transitions:

1. Red Light: Stops vehicles. This state lasts for a specific duration (e.g., 60 seconds).
2. Green Light: Allows vehicles to pass. This state also has a set duration (e.g., 45 seconds).
3. Yellow Light: Warns vehicles that the light will soon turn red. This state typically lasts for a short duration (e.g., 5 seconds).

2)Simulation Results:

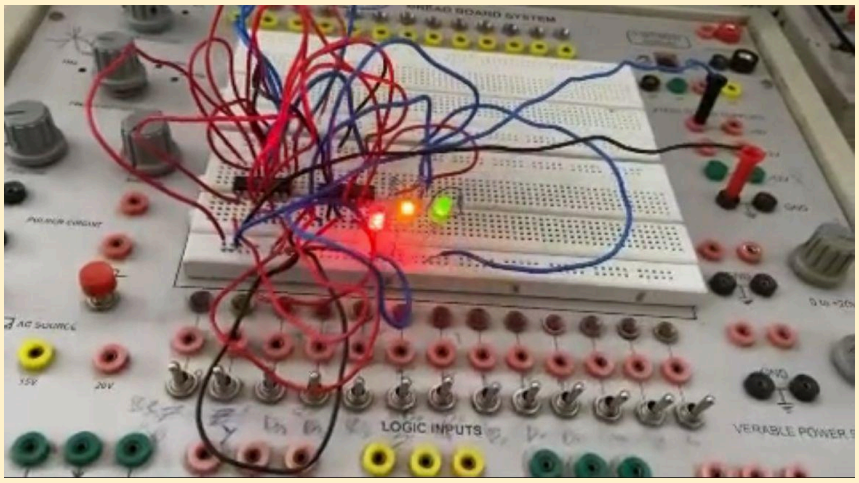
1. **Cycle Timing**:
    - Red Light: 60 seconds
    - Green Light: 45 seconds
    - Yellow Light: 5 seconds
2. **Total Cycle Duration**: 110 seconds (sum of Red, Green, and Yellow light durations).

3. **Traffic Flow**:
    - **Average Waiting Time**: The time vehicles wait at the intersection before moving. This is influenced by the length of the red light and traffic density.
    - **Vehicle Throughput**: Number of vehicles passing through the intersection per cycle. This depends on the duration of the green light and vehicle arrival rate.
4. **Dynamic Adjustment** (if sensors are used):
    - **Adaptive Signal Control**: Adjusts the duration of the green light based on real-time traffic conditions. For example, if no vehicles are detected, the green light duration might be shortened, and the red light duration for the cross direction might be extended.
    - **Reduced Waiting Time**: Sensors help minimize unnecessary waiting by adapting the signal timings to actual traffic conditions.
5. **Simulation Metrics**:
    - **Queue Length**: Average number of vehicles waiting during the red light.
    - **Idle Time**: Time when the intersection is clear but lights are not green.
    - **Safety Metrics**: Number of vehicles passing during the yellow light, which can be an indicator of potential safety risks.

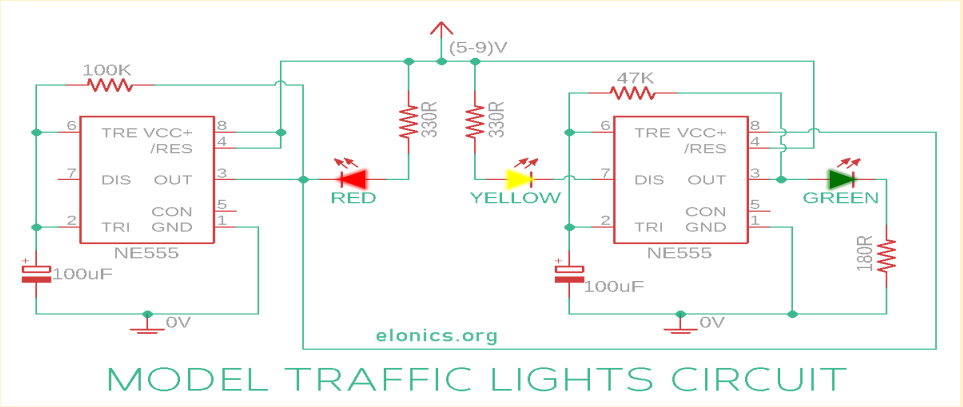
3)Hardware Results:

Hardware Components: 5 5 Power Supply, 2Hz, 5 V, 2.5 V, Square Function Generator,Dual D Flip-Flop,uad NOR gate,Red LED,Yellow LED,Green LED,150 Ω Resistor.

HARDWARE OUTPUT:



CIRCUIT OF TRAFFIC SIGNAL LIGHT:



CIRCUIT SIMULATION IN TINKERCAD:

Using Tinkercad, an online 3D design and simulation tool, you can create and simulate a traffic light system. Here's a step-by-step guide:

Step 1: Set Up Tinkercad

Step 2: Add Components

Step 3: Connect the Components

Step 4: Write the Code

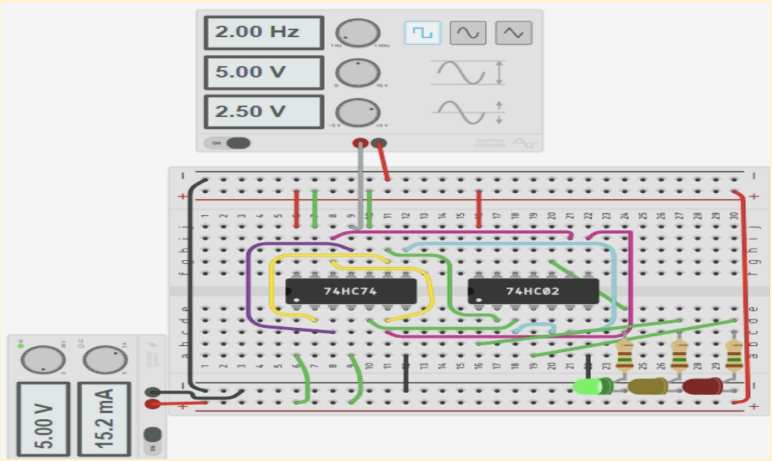
Step 5: Simulate the Circuit

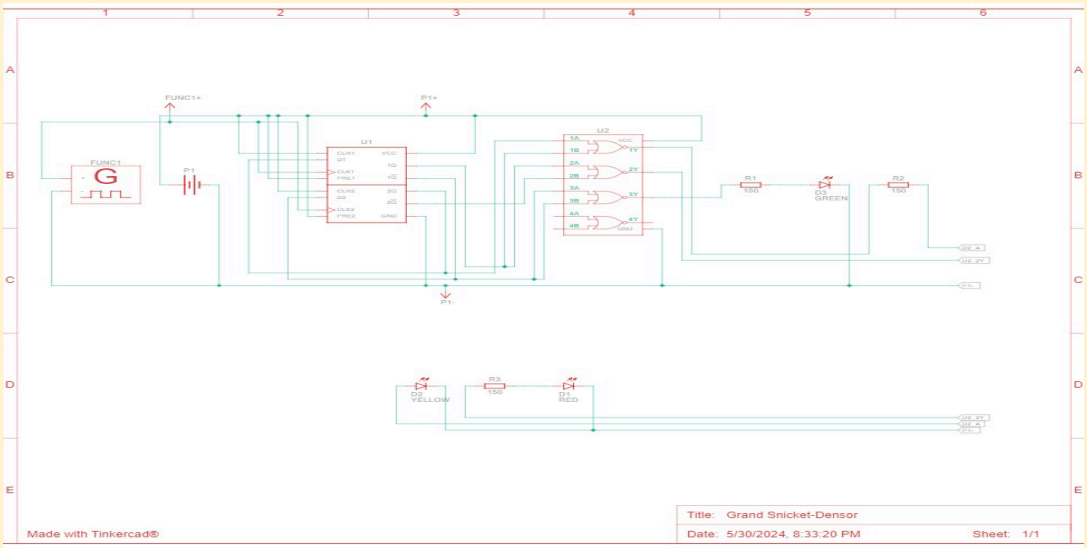
Conclusion:

Using Tinkercad, you can easily simulate a traffic light system, visualize the circuit connections, and test the logic by running simulations. This is an excellent way to prototype and learn about traffic light control systems without needing physical hardware.

OUTPUT:

Name	Quantity	Component
P1	1	5 , 5 Power Supply
FUNC1	1	2 Hz, 5 V, 2.5 V, Square Function Generator
U1	1	Dual D Flip-Flop
U2	1	Quad NOR gate
D1	1	Red LED
D2	1	Yellow LED
D3	1	Green LED
R1 R2 R3	3	150 Ω Resistor





CIRCUIT SIMULATION IN EASYEDA:

CIRCUIT:

To build and simulate a traffic light circuit using EasyEDA tools, follow these steps:

Step 1: Set Up EasyEDA

Step 2: Add Components

Step 3: Design the Schematic

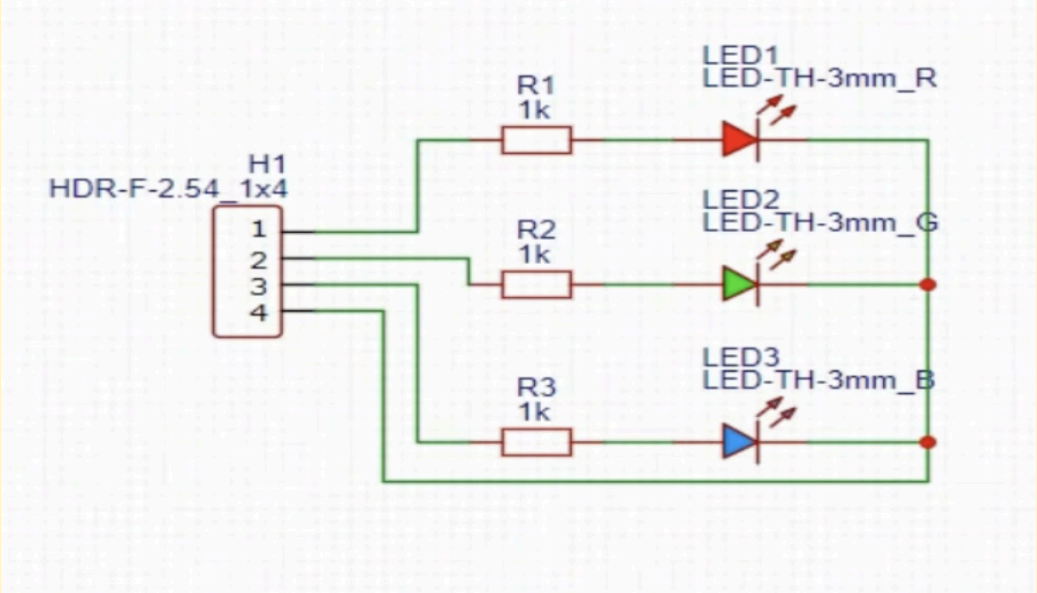
Step 4: Create PCB Layout (Optional)

Step 5: Program the Microcontroller

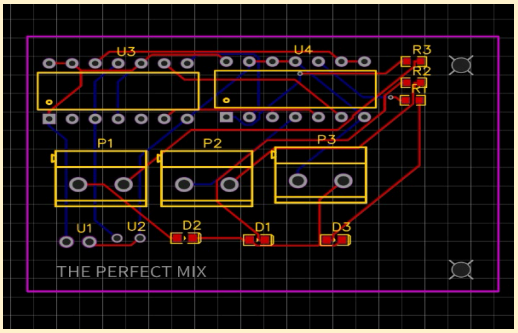
Step 6: Simulate the Circuit

Using EasyEDA for the circuit design and Arduino for programming provides a robust approach to developing a traffic light system. The combination of schematic design, PCB layout, and real-world testing ensures that the final product is both functional and reliable.

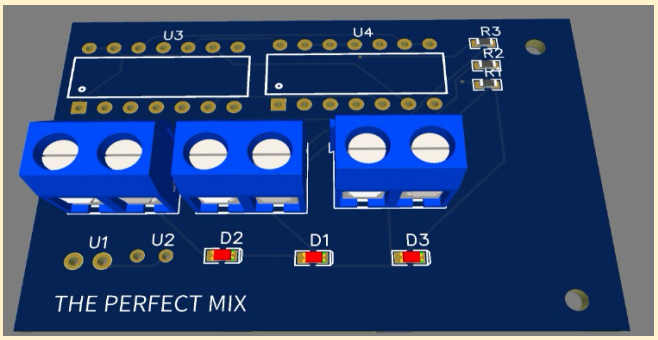
OUTPUT:



2D VIEW:



3D VIEW:



Conclusion:

The simulation results of Hardware, EasyEDA and Tinkercad provide insights into the efficiency and effectiveness of the traffic light system.