

Traffic Light System Specifications

1. Overview: The traffic light system is designed for an intersection that controls both car and pedestrian traffic. The system incorporates a 4-bit ripple counter to manage the timing of the traffic lights, with each state of the lights being controlled by the output of the counter. A 7-segment display is used to show the remaining time for each light.

2. Timing and Counter:

- **4-bit Ripple Counter:**

- The system uses a 4-bit ripple counter, which counts from 0 to 15 (16 states in total). This counter is used to manage the timing of the traffic lights and the transitions between the different light states.
- The counter increments by one on each clock pulse and resets after reaching 15, beginning the count again at 0.

3. Traffic Light States: The traffic light system cycles between three main states: Red, Yellow, and Green. The specific timing for each light state is as follows:

- **Red Light:**

- The red light will remain on for **6 seconds** (equivalent to 6 clock cycles from the counter).
- During the red light state, the system ensures that vehicles are stopped and pedestrians are not able to cross.

- **Yellow Light:**

- The yellow light will remain on for **3 seconds** (equivalent to 3 clock cycles from the counter).
- The yellow light serves as a warning that the light will soon turn red or green.

- **Green Light:**

- The green light will remain on for **7 seconds** (equivalent to 7 clock cycles from the counter).
- During the green light, vehicles are allowed to move, and the pedestrian light will be red, indicating that pedestrians cannot cross.

4. Pedestrian and Service Button Functionality:

- **Pedestrian Button:**

- When the pedestrian button is pressed, the system adjusts the counter so that the pedestrian gets a green light.
- The pedestrian light will remain green for a set duration as determined by the system (which could be set manually or timed through the counter).
- Pressing the pedestrian button temporarily overrides the normal vehicle traffic light cycle to allow pedestrian crossing.

- **Service Button:**

- Pressing the service button causes the timer to stop and the traffic light system enters a **service mode**.
- The service mode triggers a blinking yellow light for the vehicles, indicating a service or maintenance condition.
- The counter is halted during this time, and the system will remain in the service mode until the button is released or reset.
- At this time timer get freezed at 1.

5. 7-Segment Display:

- The 7-segment display shows the remaining time for the current light cycle (Red, Yellow, Green).
- The binary value from the 4-bit ripple counter is decoded and displayed on the 7-segment display, which visually shows the number of seconds left for the

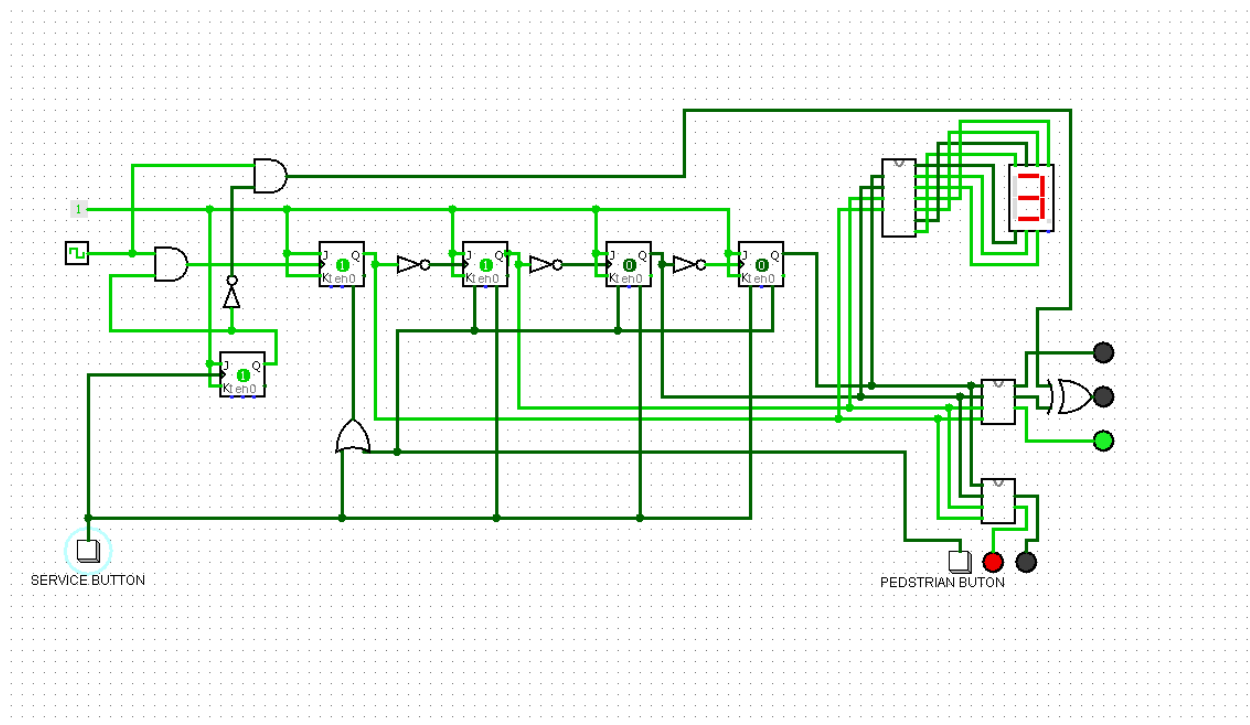
active traffic light.

6. System Reset:

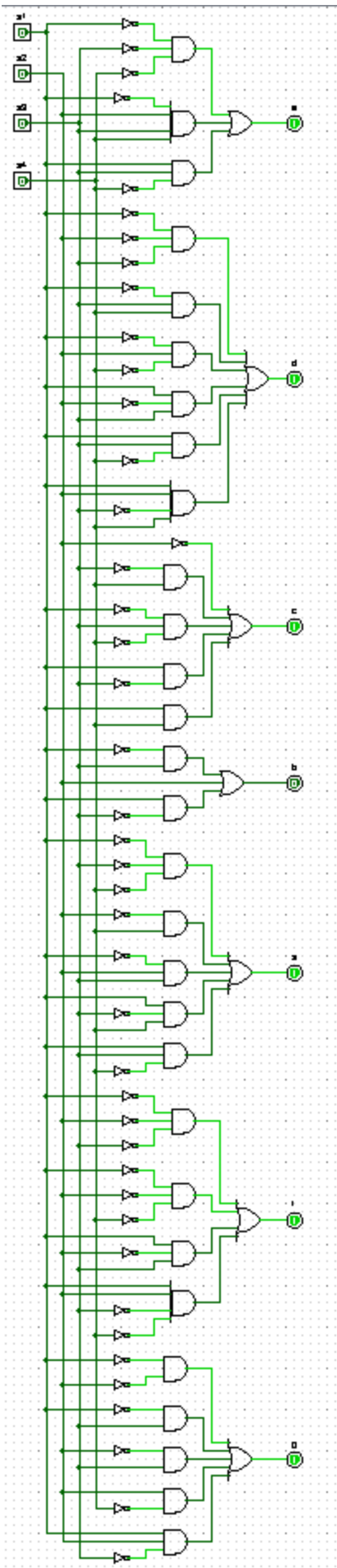
- Upon reaching the maximum counter value (15), the system will reset to 0, initiating the next cycle of light changes.
- This reset corresponds to the cyclical nature of the traffic light, repeating the process indefinitely.

Screenshots

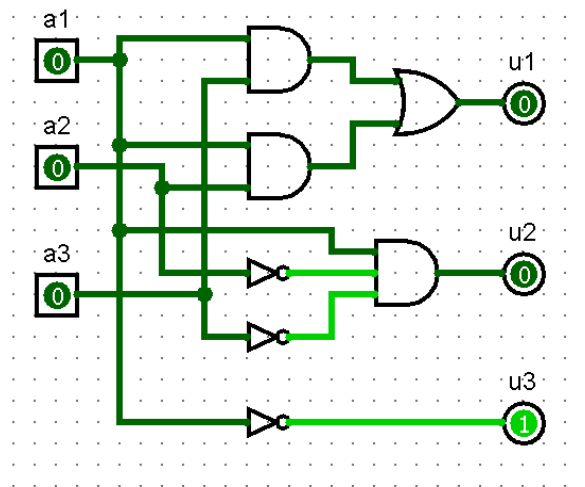
Main circuit.



Binary to 7 segment circuit



Binary to traffic light
(car)



(pedestrian)

