



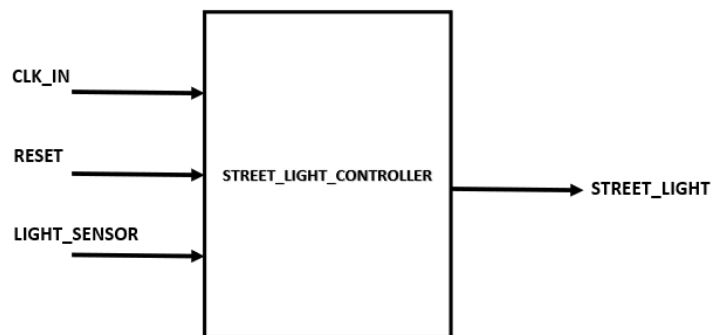
# STREET\_LIGHT\_CONTROLLER

## *INTRODUCTION:*

The street\_light\_controller module is designed to manage the operation of a street light based on input from a light sensor. The street light should turn on during the night and turn off during the day. The module employs a finite state machine (FSM) to handle the transitions between the day and night states.

## *FUNCTIONAL DESCRIPTION:*

The street\_light\_controller module is responsible for controlling a street light based on ambient light conditions detected by a light sensor. The module uses a finite state machine (FSM) to manage the state of the street light, ensuring it turns on during the night and off during the day. This section outlines the specific functionality of the module's inputs, outputs, and internal logic.



Block Diagram of Street\_light\_controller



## *Inputs:*

### 1. **clk (Clock Signal)**

- **Description:** The clk signal is a periodic clock input that drives the state transitions within the FSM. It ensures that the state changes and output updates occur in a synchronized manner.
- **Role:** It synchronizes the module's operations, ensuring the FSM updates its state at the correct times.

### 2. **reset (Reset Signal)**

- **Description:** The reset signal is an asynchronous input that initializes or resets the FSM to a known state, typically the DAY state.
- **Role:** When asserted, the reset signal forces the module into the DAY state and ensures the street light is turned off, regardless of the light sensor input.

### 3. **light\_sensor (Light Sensor Input)**

- **Description:** The light\_sensor input indicates the ambient light level. A value of 0 represents daylight, while a value of 1 represents night.
- **Role:** The light sensor input determines the transitions between the DAY and NIGHT states in the FSM.

## *Outputs:*

### 1. **street\_light (Street Light Control Output)**

- **Description:** The street\_light output is a control signal that indicates whether the street light should be on or off.
- **Role:** In the DAY state, this output is set to 0 (off). In the NIGHT state, it is set to 1 (on).

## **Internal Logic**

- **Finite State Machine (FSM)**

- The FSM consists of two states: DAY and NIGHT.
- **DAY State:**
  - **Description:** The street light is turned off in this state.
  - **Transition:** The FSM remains in this state if the light\_sensor input is 0 (daylight). It transitions to the NIGHT state if the light\_sensor input changes to 1 (night).



- **NIGHT State:**
  - **Description:** The street light is turned on in this state.
  - **Transition:** The FSM remains in this state if the light\_sensor input is 1 (night). It transitions to the DAY state if the light\_sensor input changes to 0 (daylight).

### *conclusion:*

The street\_light\_controller module effectively manages the operation of a street light based on ambient light conditions. By using a finite state machine (FSM), it ensures that the street light turns on during the night and off during the day, based on input from a light sensor. The module's synchronous design, driven by a clock signal, guarantees that state transitions and output updates are reliable and occur at the correct times. The reset functionality provides a means to initialize the module, ensuring it starts in a known state and behaves predictably.

