

# Smart Traffic Light Adjustment System for Ambulance Emergencies

## 1. Introduction

In urban environments, emergency vehicles, particularly ambulances, often face significant delays due to traffic congestion at intersections. Time lost waiting at traffic lights can lead to critical consequences in medical emergencies. To address this, a smart traffic light adjustment system can be implemented that detects the presence of an ambulance in an emergency situation and adjusts the traffic signals accordingly to facilitate faster passage.



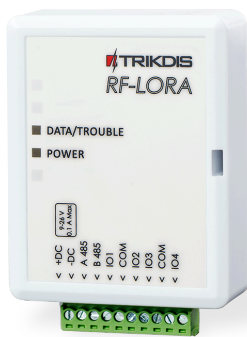
This document details a system where traffic signals detect the presence of an ambulance using sensors. When the ambulance is in emergency mode and within a specific range, the system adjusts the traffic lights, prioritizing the ambulance's lane by turning its signal green while turning all other signals red. This ensures smooth passage for the ambulance, reducing potential delays and improving emergency response times.

## 2. System Overview

The system uses wireless communication between an ambulance and the traffic signal through sensors or transmitters. The moment an ambulance approaches a traffic light within a set range, the sensor detects the vehicle and checks if the ambulance is in emergency mode. If it is, the system sends a signal to change the traffic light for the ambulance's lane to green and the rest to red. This green light stays active for 10 seconds to avoid confusion and ensures the ambulance passes without interference.

## 3. Components and Technologies

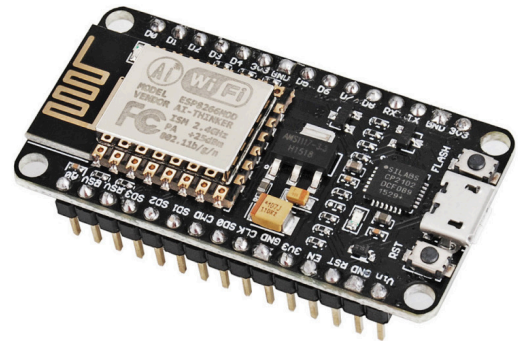
- The following components are essential for the system:
- **Wireless Communication (LoRa/Wi-Fi):** The ambulance is equipped with a transmitter that communicates with the sensor at the traffic light.



**LORA** (reciver)

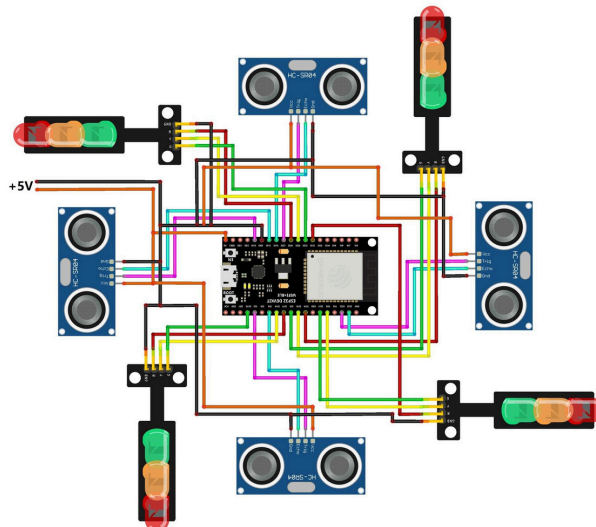


**LORA** (transmitior)



**ESP8266**

- **Traffic Light Control Unit:**  
A controller changes the light based on the sensor data



#### • **4. System Workflow**

- **Ambulance Detection:** The ambulance is equipped with a transmitter, which communicates with a receiver at the traffic signal. When within a 50-meter range, the ambulance sends an emergency signal to the traffic light sensor.
- **Light Adjustment:** Upon receiving the signal, the system checks if the ambulance is in emergency mode. If confirmed, the system changes the light in the ambulance's lane to green and all other lanes to red. The green signal stays active for a duration of 10 seconds, providing ample time for the ambulance to cross the intersection without confusion.
- **Light Reset:** After the ambulance passes, the traffic light reverts to its normal cycle to ensure smooth traffic flow for the rest of the vehicles.

#### **5. Benefits**

- **Improved Response Time:** The system significantly reduces delays for ambulances, enabling faster arrival at the hospital during emergencies.
- **Automated and Reliable:** The system works automatically without requiring human intervention, ensuring quick and reliable action when an ambulance is detected.
- **Reduced Traffic Confusion:** By maintaining a standard green light duration of 10 seconds for the ambulance lane, the system prevents confusion among drivers and ensures smooth traffic flow after the ambulance has passed.
- **Scalability:** The system can be easily implemented at multiple intersections, creating a city-wide network for emergency vehicle management.

#### **7. Conclusion**

**The smart traffic light system provides a reliable solution to reduce delays for ambulances in urban areas. Through wireless communication and automated traffic light adjustments, emergency vehicles can pass through intersections without delay, ultimately saving lives by reducing response times. This system is scalable and can be applied to multiple intersections in a city, making it a valuable tool for urban traffic management.**