Emergency Traffic Lights Routing System - Claim

Henry V. Pham

The purpose of the '**Emergency Traffic Lights Routing System**' invention is to provide the local rescuer teams with the automatic system to find the shortest routes and set traffic lights on the route to green ahead with a predefined distance before rescue vehicles moving to rescue fires, rescue critical health condition people, and even rescue in disaster emergency situations. The local Traffic Control Offices would provide and maintain the Traffic Light Routing System, and the local Rescue Stations would use the system for rescuing. The traffic lights are in some geometry layout, and this invention applies the G-NETWORK layout and G-ROUTING algorithm to search for fastest routes and apply G-ROUTING protocol to transmit "forward-green" commands from one traffic light to another using Neighbor-to-Neighbors routing technology which was used in G-ROUTING ALGORITHM METHODOLOGY invention. This invention claim shows the overview figure of this invention which was submitted on 2022/12/23 with U.S. PCT/US22/82343 and International PCT/IB2022/000791 Patent Numbers, which can be used as the representing invention drawing to print on the patent frame and the following functions and features of this invention.

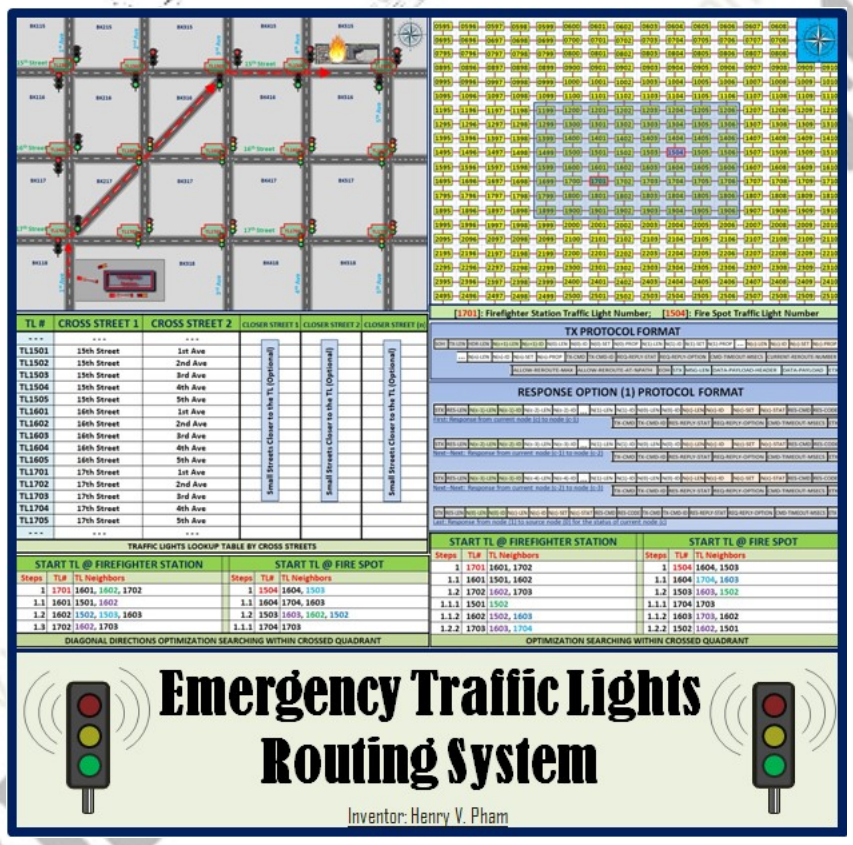

Figure-A: Emergency Traffic Lights Routing System -- Overview

1. The main apparatus for the Emergency Traffic Lights Routing System, comprising:

   The Emergency Traffic Lights Routing System would provide the local rescuer teams with the automatic system to find the shortest routes to the destination and set traffic lights on the route to green ahead with a predefined distance before rescue vehicles moving. Wherein, the traffic lights would be built or added with RF devices to transmit signals from one to another; the local Traffic Control Offices would handle the traffic lights database for the Emergency Traffic Lights Routing System applying the G-Routing Algorithm which was described in the 'G-ROUTING Algorithm Methodology' invention which was

HenryVPham@TheCloudOSCenter.com or henryvpham@gmail.com

submitted on 2022/12/23 with U.S. PCT/US22/82347 and International PCT/IB2022/000800 Patent Numbers, to search for the shortest routes by choosing the destination traffic light that closest to the destination address; the local Rescue Stations teams would trigger the start rescue function on the system, and the system would search and show the shortest routes for the rescue team to choose and the closest traffic light at the station would be triggered and send 'forward-green' commands propagating through other traffic lights all the way to the destination traffic light before the rescue vehicles running to clear and avoid traffic on both sides of the roads.

2. The main functions operating apparatus for the Emergency Traffic Lights Routing System, comprising:

   The Emergency Traffic Lights Routing System would come with the traffic lights database with the maps and traffic lights maps with users interactive functions provided which would be managed by the local Traffic Control Offices and operated by the local Rescue Stations. Wherein, the system at local Rescue Stations when received rescue order, will look into the database for the destination traffic light ID and search for a fastest route starts from the rescue station; the Rescue Stations can trigger a rescue route and send the "Forward-green" commands to a list of routing traffic lights. The routing traffic lights will take turns to turn green light for a given initial distance and keep green the traffic lights ahead with a maximum velocity of the rescue vehicle. The rescue vehicle would be equipped with an RF device carrying in the last rescue vehicle to notify the traffic light back to normal traffic condition, to end the route when the rescue vehicles passed by.

3. The Traffic Lights database storing and configuring apparatus of claim 1, further comprising:

   The Traffic Lights database which contains properties of all the local traffic lights is important for the routing algorithm to search. Wherein, the traffic lights would have their unique IDs, and each traffic light in the database would contain its neighbor traffic lights with their properties such as direction and distance to that traffic light. The distances between each traffic lights can be used the LPS devices which was described in the 'LPS – Local Positioning System' invention which was submitted on 2021/11/23 with U.S. PCT/US21/72562 and International PCT/IB2021/000949 Patent Numbers, to determine the distances automatically since the traffic lights are installed on their fixed locations. The G-ROUTING Algorithm would lookup the database based on the directions and distances of the traffic lights to determine the shortest routes for the rescuer team to choose before running to rescue. Note that the G-ROUTING Algorithm can provide more than 1 shortest route for more shortest routes to choose for convenient routes or for shortest in distance or fastest in time, after found the first shortest one.

4. The Rescue Stations equipping and functioning apparatus of claim 1 & 2, further comprising:

   The Rescue Stations would have functions to control and operate Traffic Lights Routing System with GUI application and have the rescue vehicles equipped with the system that provide Traffic Lights maps and the RF devices to send the notify the traffic lights to normal mode. The GUI application can draw the local network traffic lights layout and show the routes to the destination traffic light so the ambulance or firefighter rescuer team can follow the direction on the GUI application. Wherein, the system would provide address lookup that connecting with the real maps for locating the destination address with the destination traffic light; the rescue vehicles would have the RF devices or the RF devices can be separated

so the rescuer team can use on the rescue vehicles to signal the traffic lights back to normal mode when the last rescue vehicle passed by.

5. The Traffic Lights Routing Algorithm functioning apparatus of claim 1, further comprising:

   The G-ROUTING algorithm can use optimization method since traffic lights layout are in common square layout to search for the shortest route along the crossed quadrant for the 1st traffic light at the rescue station to the destination traffic light by starting with clockwise in outward direction with 90° turns at 12 O' clock with given the neighbors' North, East, and South then West directions and distances for both rescue station traffic light and the destination traffic light until found shared traffic lights. Emergency Traffic Lights Routing System will be triggered to search for fastest route and starts sending TX command message to the closest traffic light with a series of routing traffic lights nodes, then one forwards to the next routing traffic light until reached the final traffic light. Wherein, the Emergency Traffic Lights Routing System needs a database that has mapping the crossed streets names for lookup the closest traffic light of a destination address. The operational protocol for TX message forwarding to each routing traffic light with initial required green distance and time delay from each traffic light to keep the desired green distance ahead of the emergency vehicle.

6. The Routing Protocol format apparatus for the Emergency Traffic Lights Routing System, comprising:

   The Traffic Light routing protocol would be based on the protocol for simple or dummy nodes in the 'G-ROUTING Algorithm' invention. Wherein, the TX Protocol Format and RX Response Format as shown in Reference-1 and Reference-2 in the original invention document; Reference-1 shows the TX Protocol Format when a route is defined with the series of routing nodes 'N(0)...N(c)...N(n)'; where N(0) is the original source node or Traffic Light, N(c) is the current node or Traffic Light, and N(n) is the destination node or Traffic Light. Reference-2 shows the response with the requirement of every receiving node must replies to the system or the source node when received the data package as an acknowledgement of receiving data package and confirmed transmitting to the next node.

7. The Maintenance and Testing functioning apparatus of claim 1, 3 & 5, further comprising:

   The Emergency Traffic Lights Routing System would come with the Testing Protocol for repair and maintenance to ensure the traffic lights around the cities functioning properly with RF signal coverage though from one traffic light to another. Wherein, the Testing Protocol and function commands would send to each traffic light without controlling the traffic light turn green or red; the Testing Protocol would only test the RF signal for each traffic light and send back the Acknowledge Receive Command for each traffic light when the signal reached the traffic light. The Testing Function would be controlled and managed by the local Traffic Control Offices.

Inventor name: Henry Viet Pham
Email Address: HenryVPham@Gmail.com
Business Website: www.TheCloudOSCenter.com
Phone Number: 714-686-0927