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Intelligent Traffic Control System Using Centralized System For Emergency Vehicles

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Abstract - *In today's world where increase in population has led to massive increase in number of vehicles on road. As the number of vehicles on road has increased it leads to massive roadblocks even when traffic signals are installed at that junction. Due to these traffic jams the emergency vehicles like ambulance which carries critical patients with them are stuck in these traffic jams and are delayed reaching their destinations or hospitals. In this proposed system the focus is on clearing all roadblocks at the signals in advance before the ambulance reach any signal on its path by using centralized controlled system monitoring all the signals on its path.*

Key Words: **Android application, GPS, Traffic Signal, Transmitter, Receiver.**

INTRODUCTION

The modern world is evolving at great speed, this has given rise to the term called comfort. Everyone in this world has inclined towards the comfort for his needs, these needs include comfort of having personal cars for travelling which is at any time convenient for him. This mode of comfort has given rise to the traffic problems as everyone has his own vehicles. These many number of vehicles on road sometimes lead to traffic jams. Most of the cities have implemented traffic signals at major junctions to tackle this problem, yet they fail many times due to ever increasing traffic. As a result, there are long lanes of vehicles. In such situations emergency vehicles like ambulances face major problems as these are the vehicles which have the priority to reach the destination on time or within short amount of time, but due to such long traffic jams or road blocks they take long time to pass the traffic signals in short time. The latest report from National Institute of Emergency Medicine (NIEM) shows that 20% of patient lost life because of the ambulance delays and major factors in delays of these vehicles is traffic jams, heavy traffic or long signal timings.

Hence to tackle such important issue in this proposed system states that the use and implementation of the latest technology such as smart traffic signals, centralized cloud-based system and mobile application to make sure that ambulance reaches the targeted destination within time without getting stuck in the jams.

2. COMPONENTS

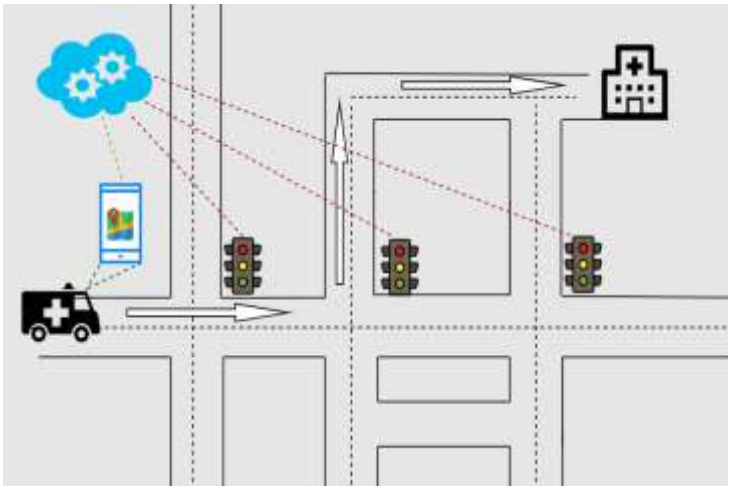

Fig -1: Overview of Proposed Design

2.1 SMART TRAFFIC SIGNAL

The smart traffic signal in this system plays an important role in the whole system as it will act as normal signal with usual stop and go timings, but it will change its functionality when it will get notification or alert about the incoming ambulance on its way. Signal will act as per the instructions given by the centralized system where all the signals will be connected to make system more practical and effective.

2.2 CLOUD BASED CENTRALIZED SYSTEM

The Cloud based centralized system will act as the backbone to the whole system, where it will govern the whole system. This will have the task to coordinate all the signals with each other, by this all the signals will act in synchronization. This cloud-based application will take the input from the mobile application and give output to the signals which will be part of route in that respected travel. The mobile application will first set the shortest route to reach the destination and will forward that route to this system, where this system will take that as an input and will map all the signals on that route. After getting all signals on that route it will count the distance of each signals from the destination, this way it will plot the rankings for each signal and it will determine the priority of each signal. After setting priority for each signal this system will give command to each signal on basis of its priority.

This way it will instruct the signals on the way when to go green/free. The timing for signal to set free/green will mostly depend on the time required for the ambulance to reach at each signal.

2.3 MOBILE APPLICATION

An android based mobile application will act as an input provider to whole system where user will have all the rights (this application should be installed in the mobile phone of the driver or it should be integrated to the ambulance itself). This application will have the input field in which user needs to set the destination, using this as an input system it will locate the destination on map and will try to find the shortest route to reach that destination. In this way the application will find the shortest route to reach the destination. After finding the shortest route it will track the vehicle and with the help of the GPS tracker it will track the vehicle, and on the basis of that it will decide if the ambulance is following the track or not. On the basis of all these it will locate all the possible signals on the way and the cloud-based system will set free the signals when ambulance is not far away or just five minutes away from the signal.
The mobile application is restricted to only authorized person. The authorized person should pre-register to the application.

3. WORKING

The working of the model is an integration of all the components working on parallel.

The driver of an ambulance first needs to launch the application installed in his phone. Next step is to type the destination, while picking up the destination the application will pick the GPS location of device to set it as a source of location. After taking input of destination and setting source location the application will search for the fastest route with minimum signals in path. Then it will look for the traffic on those particular tracks which is selected by the application. It will use google API's for searching for route and for traffic data.

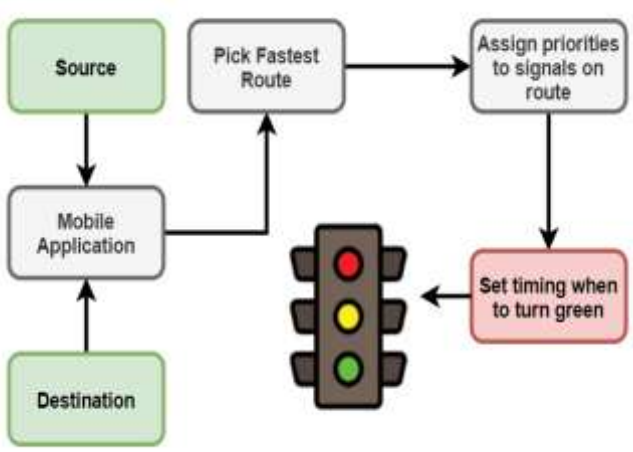

Fig -2: Flow of System

After getting fastest route for the destination the app will plot or identify all the signals on the route, after that it will set the priority for each signal as per its distance from the source. The nearby ones will have the highest priority whereas the farthest will have the lowest priority. These priorities will decide at what time which signal to set free. This information about the priority of each signal will be sent to the centralized system where all the signals are connected and it will have the right to change functioning of any signal on its way for time being. The centralized system will count the time for ambulance to reach every signal and it will set free signal when ambulance is five minutes away from the destination. In this way, ambulance will have the steady flow of traffic and it will not be caught in any roadblocks.

4. IMPLEMENTATION

This proposed system consists of number of latest technologies for its implementation which involves smart signals, centralized system, and android based mobile application. All these technologies are a sort of huge implementation of their own viz smart signals. The smart signal should be installed at every road junction, the android app must be pre-installed in the phone of authorized person. The centralized system should have the whole control over the traffic signal for controlling the timing whenever needed. For the purpose of sending and receiving the alert or notification transmitters and receivers will play crucial role. The mobile application send all required information to centralized system via wireless network, the centralized system will have set of transmitters and receivers installed which will receive and pass the signal to traffic signals.

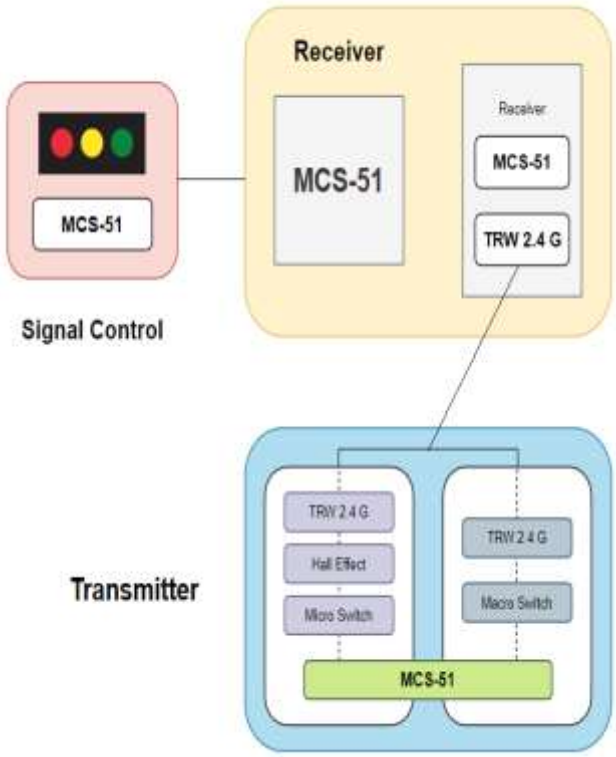

Fig -3: Implementation

The receiver block of centralized system will have MCS-51 and TRW 2.4 and main controller will have only single MCS-51. The traffic signal will have single MCS-51 installed in each one of them.

5. LIMITATIONS

Even if this proposed system has scope it has its own limitations as well. Major problem with the system is implementation of smart signal. As of today, there are no smart signals implemented anywhere, hence these signals should be implemented throughout the city for better and proper implementation of system. Another major problem is people inside the cars, these people will not cooperate willingly as most of the people consider their own comfort as priority than helping someone in need. The major complications can be occurred at the road junctions where hospital is located, here it can be possible that more than one ambulance can arrive at the signal at a same time in such cases the system cannot decide which signal to set free/green. The one-way solution for such complications is to set a priority index in the android application, hence by considering the severity priority can be assigned.

6. CONCLUSION

This way proposed system will try to ease the traffic flow and will help the ambulance and patients to reach the destination as early as possible by not getting stuck at road blocks. This will surely help many ambulances which get stuck in between traffic and which is risky for patient. Hence this will save many lives which are lost just because of ambulance delays.

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