Wireless Traffic Light Controller

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Abstract

We propose a new system for wireless traffic light controller, it makes a traffic policeman easily and effective control a road junction with a wireless remote control. The system has two modes, Manual and Automatic. Manual mode provide the control of traffic light to change manually by the traffic policeman, by just press the button related to the direction of the street to make a green light signal. The remote will respond by checking the bearing of the pressed button on the remote using Hall effects sensor regarding to the position and direction of the remote. Then send the control signal to the traffic light controller board. In automatic mode, the traffic light controller board will change the light sequence according to the preset patterns and time delay, the traffic policeman be able to change the pattern at any time using the remote. The propose system help the policeman to control the junction by himself and be able to change conditions of the traffic flow dynamically.

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Keywords: Wireless control, Traffic light controller, Hall Effect, Remote control, RF transmission

1. Introduction

Transportation is the most important thing for city life. It serves the need of population to move themselves to desired places. One of the most popular transportation is car transportation. There increase in both speed and density. However, mismatch on increasing number of vehicle to road surface make a serious problem to every city, traffic jam. The regular method to handle this problem is using automatic traffic light control. However, automatic traffic light control rarely to adapt their time sequence properly to number of cars on the street in every period, so traffic police need to handle this in rush hours. The normal operation of traffic police needs two officers, where one in the street and other in the booth to control traffic light. Worse case, they turn off the system and control the terrible traffic by themselves. It cost them their health with air pollution, stress and time consuming. It also cost the police department with too much officer on street during rush hours.

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In this research, we use the Hall effects sensor [1] for a junction [2, 3] (4 possible ways) to demonstrate how the system works as shown in Fig. 1. It helps police officer to control traffic problem with ease and need only 1 office to do the task.

2. System Diagram

Fig. 2. The block diagram of the system
The block diagram of the system is shown in Fig. 2. The system consists of three main parts. First, four of the light control towers. Each of the traffic light control towers has MCS-51 as a main control unit which controls the four lights and 3 digits 7-segments. There are four possible lights: red, yellow, go-through green, and turn-right green. The 3 digits 7-segments are used to count down the time before changing to the next pattern. All of the towers can communicate via the bus using RS-485 protocol for a long distance. Secondly, the main control and receiver, its function is to control the pattern of all towers according to the mode setting. Finally, the transmitter, it is the main interface between the system and the traffic officer. It receives mode and specific pattern from the officer and sending to main control via RF.

3. Remote Control

Remote control uses to send the command from operate officer to main control. There are two modes possible, manual and automatic modes. In manual mode, there are three possible patterns occur as shown in Fig 3. First, only go-through green is on. Second, only turn-right green is on. Finally, both go-through and turn-right green are on. Anyway, there are four junction (road) can be selected. Police officer just points the remote control to the direction of desire road according to its compass. The remote control has Hall Effect sensor to sense the world’s magnetic pole and send the command according to the real compass of pointing direction to the main control. It helps police office to ease and comfort for changing the desire junction’s condition with themselves.

In automatic mode, all of 7 patterns will change periodically as preset time interval. Which mean, user has to set up the time before system change the pattern when the time reach. In case of office want to change the pattern prior to the time counting, just press one of the 7-patterns and the system reset and start counting all over again. 7-patterns are all list in Fig 5. Firstly, way number 2 and 4 are go-through. Secondly, way number 1 and 3 are go-through. Thirdly, way number 2 can turn right to way number 1 and way number 4 can turn right to way number 3. Then, way number 2 can go pass through way number 4 and also turn right to way number 1. After that, way number 4 can get to way number 2 and 3. Then, way number 3 go with way number 1 and 2. Finally, way number 1 can go to way number 4 and 3.
Fig. 4. The remote control and its block diagram.
Nevertheless, there is one more mode, Natural mode. If officer want to cancel the all the operation of the system, just press the N or cancel button to let the original traffic control system in the office booth to control the towers instead of this system.

4. Conclusion

We have show the operation of the traffic control system, which has two main modes, Manual and automatic modes. In manual mode, user has to change the pattern themselves by point the remote to the desire tower. The main control will send the command to change the light on specific tower. In automatic mode, the system will change to pattern periodically according to preset time interval. If the office wants to change pattern instantly, just press one of 7-patterns button. This system provides ease ability yet full control function to an officer to manage the terrible traffic problem. Give them comfort and reduce the cost on extra office on the street.

References