Chapter 11
Intelligent Traffic Monitoring System through Auto and Manual Controlling using PC and Android Application

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ABSTRACT
Traffic congestion in cities is a major problem mainly in developing countries. In order to counter this, many models of traffic systems have been proposed by different scholars. Different ways have been proposed to make the traffic system smarter, reliable and robust. A model is proposed to develop an Intelligent Traffic Monitoring System (ITMS) which uses infrared proximity sensors and a centrally placed microcontroller and uses vehicular length along a lane to implement auto controlling of the traffic. The model also provides means to control the traffic manually through a PC software and an Android application.

INTRODUCTION
Road network is the lifeline in all cities. Nowadays, traffic jam becomes a daily life problem in any metropolitan city. It is a circumstance on roads where lots of vehicles are stuck, thus they are either moving very slowly or unable to make further movement for few minutes or may be hours. Underlying reasons of such traffic are due to the exponential rate increase in the number of vehicles, poor traffic manage-
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ment, etc., whereas roads do not expand proportionally with the increased number of cars. Governments and corporations try to work on the threats of traffic congestion. However, many obstacles including poor public transport (i.e., absence of enough number of buses, trains, trams, etc., which leads to the necessity of traveling by individuals own cars. Also, numbers of unlicensed or fake licensed drivers are increasing daily. They know a little about traffic rules. Therefore, the tendency of overtaking and parking anywhere makes the situation of traffic a disaster. As a result, it is impossible for people to reach their destinations in time as well as leads to increase the number of accidents. Cities become inappropriate for people to live because of the increasing rate of pollution. Therefore, solving such problems requires monitoring the road network resources.

Most of the existing systems follow simple round robin algorithm to assign traffic lights on the lanes which is based on a fixed time quantum. Therefore, all the lanes in a junction are treated with equal priority irrespective of the number of vehicles present in each lane. Consequently, lanes with less or more traffic have to wait for the same time span. This useless waiting destroys ones valuable time. In order to control the lanes manually, it is necessary for the traffic police to have the entire view of the junction. However, it is quite difficult for the police who are standing in the middle of the junction. So, achieving the real time view is unfeasible in the existing systems. Additionally, due to the absence of traffic police at night it is impossible to supervise roads manually.

Currently, in order to improve this scenario many researches are interested to develop an Intelligent Traffic System (ITS) that involved in a much closer interaction with all the components of a traffic including vehicles, drivers and even pedestrian. It provides safety at intersections, and prevents traffic jam as well as manages the traffic as a whole.

Consequently, the proposed model follows an algorithm based on the length of traffic on each lane. Since, the length of traffic on the other lanes affects the time allotted to the current lane. Therefore, in the current work, proximity sensors are used instead of the wireless area network (WAN). These sensors are used to determine the length of the traffic. The proposed system can reduce the traffic in all lanes proportionately. In addition, the proposed system is quite cheap with respect to the systems used in developed countries where video recorders such as the closed-circuit television (CCTVs) that installed to monitor the lanes. Once the proposed system is implemented, it does not require any human assistance. However, the system can also be controlled manually in two ways:

1. By traffic police in the traffic control room by going through the sensor values in the computer and therefore gives the control to the respective lanes as required, or by
2. Controlling the system by using android application, which is loaded on the phone of the traffic police. All the communications is done via Bluetooth connection.

The operator first sets up the connection with the microcontroller by authenticating himself, then he can manually control the system. There are some cases when manual control is required like road constructions, and arrival of any minister’s convoy that the proposed system can manage.

RELATED WORK

Developed countries have already implemented traffic systems on their roads and still many researches are going on to make traffic systems more advanced and suitable. Traffic systems are being researched