LIVE DIGITAL TRAFFIC MANAGEMENT SYSTEM

INTRODUCTION

Over the last decade, the adoption and use of technologies like Mobility, Cloud and Social Platforms has made it possible for common, middle class users to use small, focused applications for making their life easier and comfortable. Whether it is simply paying your utility bills using mobile banking or getting that favourite movie ticket by just clicking couple of buttons, use of technology has really changed the way we live, play and work. Though we have been referring to Smart Cities and communities for some time now, let us look at how use of Information and data available to us can be used to really create some smart services, which in a true sense provide us with better living. We shall look at a key case, which impacts us almost daily: traffic management. Use of technology and real time analysis can actually lead to a smooth traffic management. The common reason for traffic congestion is due to poor traffic prioritization, where there are such situations some lane has less traffic than the other. Vehicular congestion is increasing at an exponential rate. Let us take the case study of Chandigarh, one of the Union Territories of India. Chandigarh has the largest number of vehicles per capita in India. According to Chandigarh Transport Undertaking, more than 45,000 vehicles were registered this year in Chandigarh making the total count of more than 8 lakhs vehicles on the road. While the number of vehicles are increasing at a fast pace, the infrastructure in the city is not being able to match this growth. Traffic jams during rush hours are becoming a routine affair, especially in the internal sectors where long queues of vehicles can be seen stranded. Therefore, we have tried to address the problem with the help of our project wherein the focus would be to minimize the vehicular congestion. We have achieved this with the help of image processing that can be obtained from surveillance cameras and eventually to deploy a feedback mechanism in the working of the traffic lights where the density of the traffic would also be factored in the decision making process.

OBJECTIVE

We propose a technique that can be used for traffic control using image processing. In which we present the method to use live images feed from the cameras at traffic junctions for real time traffic density calculation, Deciding priorities when emergency vehicles, Traffic violation detection, Ability to read vehicle number using image processing. It also focuses on the algorithm for switching the traffic lights according to vehicle density on road, thereby aiming at reducing the traffic congestion on roads which will help lower the number of accidents. In turn it

will provide safe transit to people and reduce fuel consumption and waiting time. In further stages multiple traffic lights can be synchronized with each other with an aim of even less traffic congestion and free flow of traffic. The vehicles are detected by the system through images instead of using electronic sensors embedded in the pavement.

METHODOLOGY

To achieve the desired system the following hardware components and softwares will be required:

HARDWARE COMPONENTS:

- Raspberry Pi Model 3
- Web Cameras
- LEDs for signals

SOFTWARES USED:

- Raspbian Jessie OS
- Python
- Open CV
- MySQL

The Raspberry is the primary controller of the entire system. It makes use of a python service that runs on startup automatically to control the lights. Four cameras, one for each direction will be used to capture images, which are then to raspberry Pi as inputs. These images are processing using OpenCV to detect the number of vehicles in each lane and sets the timer based on the vehicle density in each direction. Initially timer for each direction will be set to 30 seconds, which will change depending on the traffic in each direction i.e if direction-1 has high traffic while direction-3 has very low traffic, then it will set the timer in direction-1 for 60 seconds and in direction-3 for just 15 seconds. Also using live images feed from cameras we will detect emergency vehicles in the lanes and give them priorities at the traffic signals. This system can also be further extended for traffic violation detection and vehicle number identification to keep track of vehicle passing through the signal.

WORK PLAN

The project needs to solve the current problem of traffic congestion and static timing in traffic signals even during uneven distribution of traffic at traffic signals. To counter this after a brainstorming session in the initial stage the designing part will begin.

The designing will consist of the hardware and software requirements with their consolidation and the way way in which each and every component would work together.

Once the designing is over, the project will move on to Implementation and execution phase. For this a small model for demonstration will be made where all the testing will take place. The model will demonstrate a junction of roads from 4 directions and variable traffic densities.With the help of physical cameras, images will be captured and will be sent to a processor where openCV will be used to process the footage and detect cars and other vehicles to ultimately find the traffic density. Based on the result, traffic lights timer will be dynamically controlled to manage the traffic in the most efficient manner. This will be achieved by Using Raspberry Pi which would control the traffic lights installed at the junction.

Once the model is completed and is working then it will be tested with different real world scenarios and changes will be made to achieve best possible results.

BUDGET

Serial No.	Component	Cost in Rupees
01.	Raspberry Pi 3	6,000
02.	Cameras -4 (one for each direction)	2,000
03.	LEDs, Wires and other electronic components	400
04.	Miscellaneous cost for model	600
	TOTAL:	**9,000**

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