

Dynamic Traffic Management System using Infrared and Internet of Things

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Abstract: With the rise in population of humans in cities & thus number of units, traffic control signals have really been playing major role in controlling flow of traffic in cities. It offers protection & comfort to both drivers & pedestrians. Modern traffic control signals, however, collapse in time management due to the fact that it allocates equal time slots to each street it controls. This cause's needless waiting for motorists, which in any case, as on time, could not be enduring, is vital to all. A density dependent traffic control signal system with emergency override dependent on IoT technology is proposed in this project. The design proposed assigns different time slots to each road depending on the density of the vehicle; thus, ensuring time management. The project integrates top concern-based control of traffic signals for high density lanes & emergency vehicles. An additional, safer option is given for pedestrians crossing the road; whereby the traffic signal is red based on priority, while pedestrians are requesting to cross the road.

Keywords: IoT, IR sensor, Raspberry Pi, Web camera, Safety.

1. Introduction

Transportation has been essential in the economic growth since the earliest human-known civilizations & successful traffic management has a significant effect on the economy of the world [1]. With several challenges we need to face one of which is that congestion is getting more severe every day. The high vehicle number, insufficient infrastructure and unreasonable growth distribution are said to be the key reasons for rising traffic jams [2]. The key factor that contributes to congestion is the large number of vehicles that induced by population and land growth [3]. Traffic congestion is a phenomenon that exists on roads as demand grows, and is defined by lower speeds, prolonged trip times & increased vehicle queuing. The most prominent example of this is vehicle physical use of highways [4]. When traffic demand is high enough to limit the pace of the flow stream through the contact between vehicles, this results in some traffic [5].

In this article, we provide customers with infrared (IR) and Internet of Things (IoT) dynamic visitor control devices that can be used to successfully eliminate street traffic congestion. Section

2 of this paper includes the literature survey; section 3 has the proposed methodology followed in section 4 by the Results & discussion. Section 5 presents the conclusion of the paper.

2. Literature Survey

Traffic signal is an important component for the control of the transport system. A variety of models for signal control built over the course of the history [6]. Implementation of complex approaches like machine learning & fuzzy logic has become a major theory research at the moment [7]. Whereas more theoretical work on dynamic signal processing ignored. In the above article traffic light optimum control for an intersection with two-way streets studied [8]. First, an estimated framework established which illustrates the progression of the que lengths by which the traffic signal flipping system achieved based on certain analytical functions such as minimum wait time & average queue length [9]. The method then extended to the group relation with a research study discussed in the last section of the paper [10].

Manipulating the site visitor indicator is an easily accessible and flexible approach for working with street site visitors within city street network [11]. Site visitors using the drift style have additional variance over long periods of time while signing up for the first manipulations made by site visitors, especially in a very short time and at a completely short scale as a way to stop crashes and minimize visitor delays at junctions [12].



Figure 1: Normal traffic systems used in the streets

Figure 1 shows the Normal traffic systems used in the streets. Under pressure the traditional way of posting visitor alerts assumes a waffle style, even though the spec used a persistent display setting to highlight the structure [13]. This is not always completely satisfactory in the general case where visitors are drifting and the signage settings clearly depend on it [14].

3. Proposed System

In order to solve the traffic jam on roads in the metropolitan area, it is important to accumulate all statistics, methodologies [15], and research on vehicles to manage the problems of road visitors and apply the excellent era to seek the possibility of immediate answers.

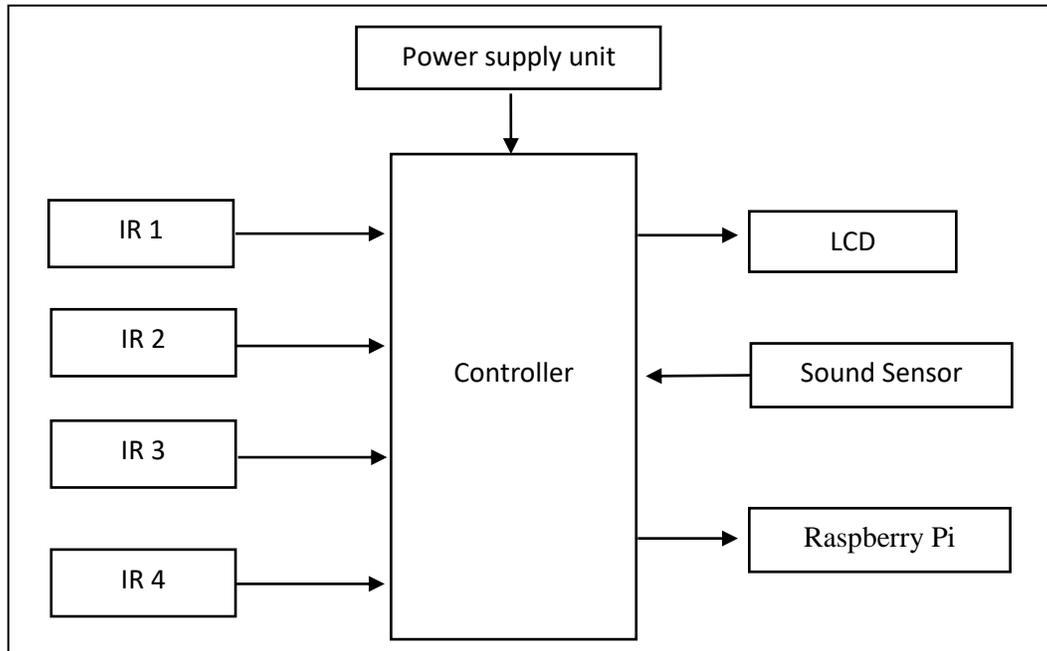


Figure 2: Block diagram of the Density detecting unit

Above Figure 2 shows the block diagram of the Density detecting unit in which IR sensors are used to detect the density of traffic in a particular lane. LCD is just to display the time frame for the lane users. Sound sensors are used to detect the ambulance in the lane so that it can be coded in such a way that to turn green. Raspberry pi is also interfaced with the above unit. These warnings, marked with a congestion symbol, suggest a processor plugged inside the symbol. The processor instructs the site visitor controller to issue appropriate alerts based primarily on the density of site visitors. Data a mark is given to the visitors of the site light.

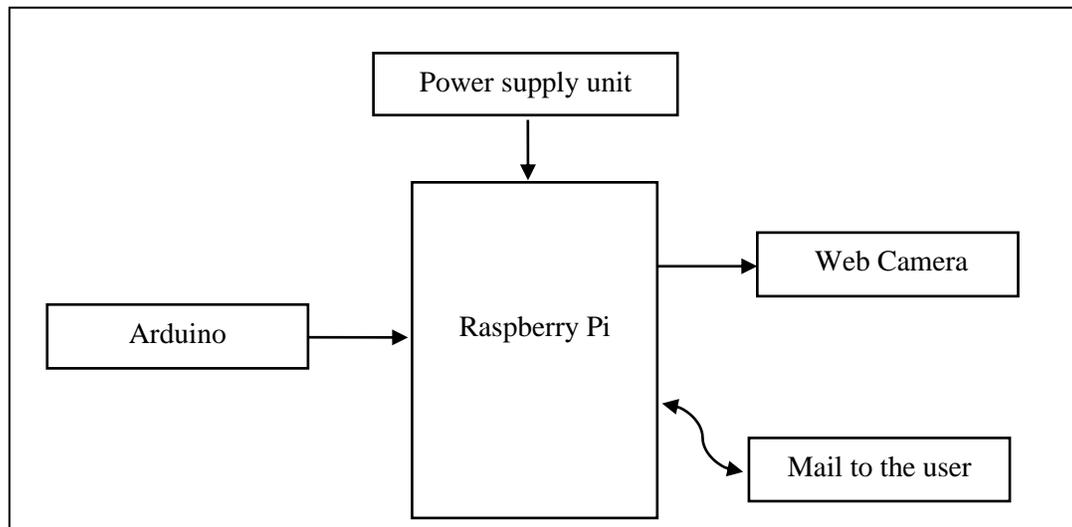


Figure 3: Block diagram of the Density Capturing unit

Above Figure 3 shows the block diagram of the Density capturing unit in which Arduino input is the main thing based on which camera capturing takes place in the raspberry pi. After capturing process, captured image is sent to the concerned authority. In proposed system, image is captured at lane where the traffic is found to be abnormal.

4. Results and Discussions

In proposed system each lane has an IR sensor which is placed from a distance of hundred metres from the traffic signal light. So, whenever the IR is faced by an obstacle which means congestion in the lane is too high (i.e.) Queue is formed in the particular lane due to traffic congestion.

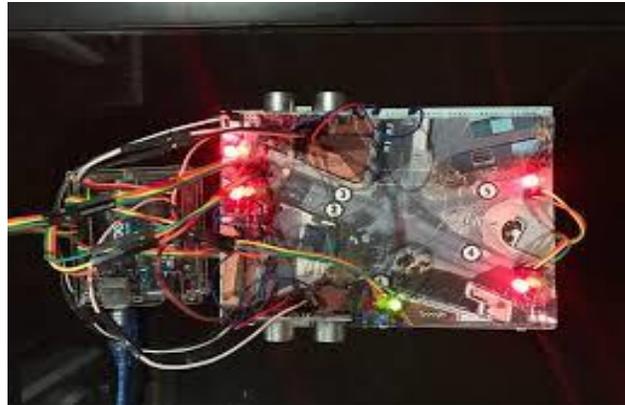


Figure 4: Hardware Implementation of the proposed system

Figure 4 illustrates the Hardware Implementation of the proposed system. Whichever IR is detected proposed system is coded in such a way that the signal time would be extended for the particular lane. Also, an image would be captured and mailed to the concerned authority or traffic regulating authority. And presence of sound sensor in each lane will wait for a high pitch of sound (i.e.) whenever an ambulance crosses the lane the traffic signal light would be automatically bypassed to green signal. Thus, by making the traffic system a smart and intelligent one.

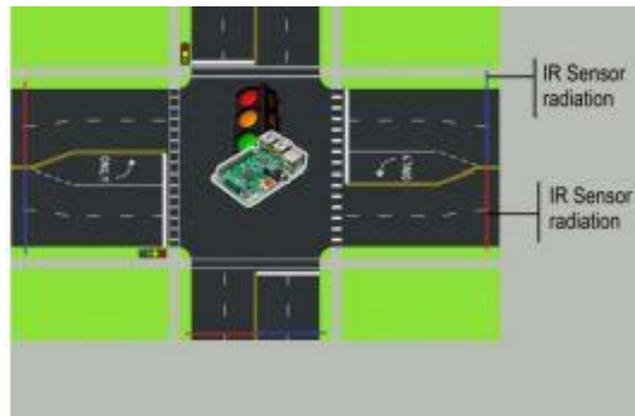


Figure 5: Installation of IR sensor

Figure 5 shows the installation of an infrared sensor inside a road. A rule set called the history subtraction rule set is used internally in image processing to design a block using an internal IR sensor, and the block is referenced in the processing block. The timer is reset as soon as the blockage is cleared and the machine's normal operation returns to its pre-configuration.

5. Conclusion

The Findings in section 4 showed that the collective control of traffic signals & route advice has major advantages over the control of traffic signals. Positioning systems for the discerning visitor must play an important role in ensuring the fate of mobility in the face of increasing economic, environmental and social pressures, and these devices can play an important role. Guidelines for congestion prevention and control, including actions including obtaining administrative access and imposing tolls, may be given higher priority. The paper blends Raspberry pi & Wireless Sensor Networks (WSN). This is because traffic congestion results in significant losses in productivity and cost savings, as well as significant environmental impact. There are several gift parameters to celebrate the manageability of the site's street visitors and the performance of city roads. Based on the Internet of Things, suboptimal speed limiting is optimized to avoid site visitors. This can cause relationships to be more complex, thus win at real value. This approach is ideal in the event of emergency traffic congestion.

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