Investigation on Pneumatic Traffic Reducing System

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Abstract:
In our project we reduce the traffic using pneumatic system. India has the second largest road network in the world. Traffic forecasting is the study and estimation of traffic volume and number of vehicles and number of people that will use a specific type of transportation facility in the future. Traffic congestions at intersections cause delay, which leads to economic losses in travel time, vehicle operating costs and environmental pollution from vehicular emissions. Vehicles moving through several traffic signal-controlled intersections mostly experience very high travel-times as they have to stop at almost every intersection on the path to destinations. This inefficient traffic flow is mainly caused by lack of coordination between adjacent traffic signal controls. Reducing the number of traffic accidents is a declared target of most governments. Since dependence on driver reaction is the main cause of road accidents, it would be advisable to replace the human factor in some driving-related tasks with automated solutions. For this purpose we use the pneumatic system for reducing the traffic. Here the footpath is used as a road for light load vehicles.

Key words: pneumatic, traffic volume, signal, footpath

I. INTRODUCTION

TRAFFIC DATA ANALYSIS
TRAFFIC data collection provides basic information required for planning, operation and management of roadway facility. Several techniques and methodologies have been used for this purpose, which may be broadly classified as manual methods and automatic detection techniques. Detection techniques are emerging techniques of traffic data collection and have been classified as intrusive and non-intrusive. The intrusive technologies include inductive loop detector and pneumatic tube detector and weigh-in motion systems, whereas non-intrusive technologies include infrared sensor, pulsed and active ultrasonic, microwave-doppler and radar, passive and active ultrasonic, passive acoustic array sensors and video image processing system (VIPS). VIPS has the ability to capture all desire traffic information, which includes some parameters that are not easily obtainable using other type of detectors. VIPS can collect and analyse microscopic as well as macroscopic and traditional traffic flow data; detect and verify incidents; classify vehicles; monitor intersections; read license plates, and perform image compression. The aforementioned ability makes it an emerging technology both in developing and developed countries.

TRAFFIC VOLUME STUDY:
Traffic movement 2 times for consecutive 7 days in accordance with IRC. The traffic in India is of Heterogenous in nature, therefore the equivalency factor as recommended by IRC is to be used for obtaining the desired PCU’s.

Duration of Traffic Census: The Traffic Census is to be carried out for 12 hours continuously at a stretch though with adequate time given to each Surveyor in rotation to have proper rest and food.

Abnormal Condition: Abnormal Traffic Condition if encountered at any instance during the survey, then survey should be immediately called off. Abnormal conditions may arrive due to Diversion from or to the control point, due to a state holiday or any other incident.

Recording of Data: A field data sheet as recommended by IRC should be prepared for recording of data in Hourly manner.

Compiling of Data: Data should be compiled immediately after the survey and care should be taken to minimise errors and Omissions.

II. METHODS OF TRAFFIC CENSUS

MANUAL METHOD:
Manual methods used field personal to count and classify traffic flowing past a fixed enumerators needed to count the vehicle depends upon the number of lanes in highway on which count is to be taken, type and accuracy of information desired. IRC recommends recording of data in each direction of travel separately and posting of observers for each direction. It is desirable to have literate enumerators with qualification preferably middle or matriculation. Accuracy and maintaining preci shifts, with adequate time given to each surveyor for rest as well as food and water.

AUTOMATIC METHOD:
Portable counters serve the same purpose as manual counts but with automatic counting equipment. The period of data collection using this method is usually longer than while using manual counts for 24 hours have to be used. Mechanism Automatic methods consist of equipment the purpose of traffic measurement in two steps:-

1. Detecting the passage or presence of a vehicle known as Detector or Sensor
2. Recording the count.

FOOTPATH
Footpath or footway is a path along the side of a road. A sidewalk may accommodate moderate changes in grade (height) and is normally separated from the vehicular section by a curb. There may also a median strip or road verge either between the sidewalk and the roadway or between the
sidewalk and the boundary. In some places, the same term may also be used for a paved path, trail or footpath that is next to a road, for example, a path through a park.

III. TRAFFIC AREAS IN CHENNAI:

TIDEL PARK SIGNAL:
First off, the whole of OMR is a clogged up sewer (metaphor). But TIDEL Park signal is the epitome of it all. This signal can stack up traffic until a kilometre away. If you are driving near SRP tools towards Adyar and you see traffic there, it is most probably because the TIDEL park signal is jammed. Sometimes, you might have to stand in the traffic for eons near NIFT and the signal turn from red to green three times. But all the three times, you will still be stuck in the traffic, moving only by inches and yet would not be free to go. I would hardly be surprised if you say it took you half-an-hour to cross the whole signal. The four-way junction near Ascendas is the worst ever! Especially on a weekday, all the vehicles from the SRP tools side and Ascendas side will want to take the pavement near TIDEL park, as the main road is always jammed. This would further choke up the pavement. As a result, a huge bottleneck would occur which would add like a million times to the jam. So, the pavement is subject to torment. If you are coming from within the city, you will have comparatively fewer hurdles to jump over. But good luck if you are taking a U-turn there by any chance. It would take you as long for dinosaurs to bid goodbye to Earth. On the whole, this signal would give a single shot of what the rest of the signals combined would be like.

IV. ROAD NETWORK IN CHENNAI:

Four (4) National Highways which are NH4, NH5, NH45 and NH205 radiate towards Kolkata, Bengaluru, Tiruchirappalli and Madanapalli from Chennai. Three (3) semi-circle ring roads which are Inner Ring Road, Chennai Bypass Road and Outer Ring Road connect the four radial NHs. Section-1 of Outer Ring Road is opened and the section-2 is under construction. Chennai Peripheral Ring Road is planned to be build outside the Outer Ring Road. It starts from the Ennore Port at north end and links to major radial roads such as NH5, NH205, NH4, NH45 and SH49 at the south end, with a total length of 133.65 km. It is expected that the connectivity to the Chennai Port and tEnnore Port from the industrial hubs such as ORAGADAM around Chennai will be improved by the completion of the Chennai Peripheral Ring Road.

WORKING PRINCIPLE OF PNEUMATIC CYLINDER

Pneumatic cylinder guides the piston in a cylindrical metal piece that moves in a straight line in the cylinder. The air is converted into mechanical energy by expansion in the engine cylinder. The gas is compressed in the cylinder of the compressor to increase the pressure. Pneumatic cylinder is composed of cylinder, end cover, piston, piston rod and seal. The piston is lubricated by the oil mist in the compressed air when the cylinder works. There are also small parts of the lubricating cylinder.
DIRECTIONAL CONTROL VALVES (DCVs): They determine the path through which a fluid transverses a given circuit. Pressure control valves protect the system against the overpressure, which may occur due a sudden surge as valves open or close due to an increase in fluid demand. A valve is a device that receives an external signal to release, stop or redirect the fluid that flows through it. The function of DCVs is to control the direction of fluid flow in any hydraulic system. A DCVs does this by changing the position of internal movable parts.

To be more specific, a DCVs is mainly required for the following purposes:

- To start, stop, accelerate, decelerate and change the direction of motion of a hydraulic actuator.
- To permit the free flow from the pump to the reservoir at low pressure when the pump’s delivery is not needed into the system.
- To vent the relief valve by either electrical or mechanical control.
- To isolate certain branch of a circuit. Any valve contains ports that are external openings which a fluid can enter and exit via connecting pipelines. The number ports on a DCVs is identified using the term “way”. Thus, a valve with four ports is a four-way valve. A DCVs consists a valve body or valve housing and a valve mechanism usually mounted on a sub-plate. The ports of a sub-plate are threaded to hold tube fittings directs the fluid to selected output ports or stops the fluid from passing through the valve. DCVs can be classified based on fluid path, design characteristics, control methods and construction.

V. CONCLUSION:

The traffic issue is obviously a critical problem that worries citizens and governments. The influence of low efficient conventional traffic system affects the economic, health, financial and environmental domains. The transportation system trouble and the bad monitoring may cause car accidents, traffic jam and roads congestion that put heavy loads on businesses and works. This proposed smart traffic system consists of a pneumatic footpath that manages the traffic in a junction of mono directional roads. Based on this information, the time dedicated for the traffic jam, or reduced to prevent unnecessary waiting time of the Ambulance. The system is complemented by portable controller for the emergency vehicles stuck in the traffic.

VI. REFERENCE: