

Impact Of Vehicle Pedestrian Interaction On Traffic Flow: Midblock And Intersections

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Abstract

Several studies are there to understand the pedestrian movement and all the studies are based on fundamental diagrams only. These studies construct a base to characterize pedestrian flow. Several experiments have conducted to understand the pedestrian flow, likewise some field observations have done to represent fundamental diagrams. Therefore, before going to analyze the data from the observation, it is necessary to note down the pedestrian flow parameters carefully. The aim of the paper is to build up the base to fundamental diagrams and for characterization of pedestrian. And derive the required flow diagrams and results from the field observations. Field survey is conducted to know the vehicle pedestrian interaction, and this field data with respect to pedestrian crossing at signalized, Unsignalized or at midblock sections is aimed to be observed. And the impact of vehicle pedestrian interaction at several intersections/midblock sections is to be studied.

To do this, several places are chosen from Tiruchirappalli. It is aimed to observing whether the pedestrian fundamental diagram is different in alternate locations or not. In this study it is found that fundamental diagrams are different in different locations of Tiruchirappalli.

Introduction

Walking has always been the primary means of human motion. And that's why we considered the pedestrians are the basic elements of transportation. In ancient ages there was a huge pedestrian walking take place and walking is the only mode of transportation. For every transport related to travel and journeys must begin and end in walking. This pedestrian walk is an effective mode of transportation for short trips. Walking is a major mode of transportation in Indian cities also.

In order to provide the best design spaces for human motion or circulation like at airport corridors, shopping malls, subways etc. for that pedestrian motion is studied empirically in all aspects. It is carried away by two levels. At macroscopic level one can analyze the basic flow parameters like speed, density of pedestrian motion and at microscopic level one may track the paths followed by individual

pedestrians while moving respectively. From this it is clear that the pedestrian may create own paths in their journey trip.

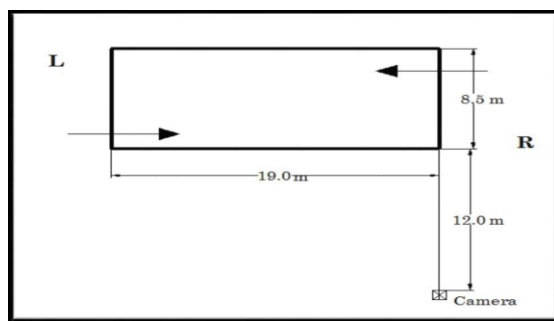
Coming to the pedestrian crosswalks there were several cross walks like zebra crossing are designed for a road, provide gainful work to assist the pedestrians to move from one side to the other side of road, and which plays a significant role in the mobility and safety mode of signalized intersections. In some other places like where the busy traffic takes place, pedestrian choose the mid blocks to cross the road. But there is no safety as compared to signalized intersections. Even many pedestrian crosswalks are taking place in these midblock sections.

Observation & Data Collection

Some facts that affect the pedestrian movement are the interactions of the other pedestrian motion, geometry of the road facilities, and alternate ways of the pedestrian

has to choose their trip in a multiple ways. The pedestrian flow may take place in a unidirectional, bidirectional, or multi-directional. They do not prefer travel in extreme clear path/lanes although they may do sometimes under heavy traffic. To do that recorded data or experimental/field data is to be taken to extract the pedestrian speed, density and several parameters which are very useful for the study.

There are several experiments were conducted at intersections and midblock. The first experiment was conducted at Mannarpuram; Trichy on disturbed pedestrian movement intended to study the impact of motorized vehicles on the pedestrian. From daily market undisturbed pedestrian movement was recorded to compare with the disturbed data set. The yield of this study is to show the fundamental difference between speed and density of the pedestrians.



Experimental road section

Results

The result shows the fundamental relation between the speed-density and speed-distance headway of pedestrian flow. As referring U Chattaraj et al. (2009) for comparison of fundamental diagrams across cultures. And the differences between the disturbed and undisturbed pedestrian flow is shown by hypothesis testing. Regression analysis has been conducted to get the statistical results. Simple linear regression analysis is well known statistical technique for fitting mathematical relationship between dependent and independent variables.

From the manual count method pedestrian flow is calculated for every 5 minutes. From this it is noted down that the pedestrian flow varies from section to section and from place to place. The size of the data collection depends on the length of the counting period, the type of count being performed, crosswalks being observed and the road conditions.

Conclusions

In this study, several experiments were conducted in different locations (Mannarpuram and daily market, Trichy) to compare the disturbed and undisturbed pedestrian movement, interaction of motorized vehicles with pedestrian and to establish the fundamental diagrams between speed-flow, speed-density and speed-distance headway.

The pedestrian crosswalk data were collected from different locations; entry time and exit time were recorded using the video camera to get the speed and flow of a particular pedestrian stream. Using the manual count method pedestrian flow was determined and this undisturbed data is very useful to compare with the disturbed data and how it is different from this undisturbed pedestrian flow. For that hypothesis test difference was determined.

In this thesis two types of experiments were collected from the field. The first one experiment intended to study the fundamental relationship between speed, flow and density. Distance headway speed was also observed in pedestrian motion. Second one is an approximate data set to know the direction of pedestrian movement and desired details of pedestrian volume count by the time.

For better and easy way for pedestrian crossing is by implementing pedestrian safety interventions for road geometry. Following are some key reasons give the brief about pedestrian safety interventions:

(i) Reduce pedestrian exposure to vehicular traffic

Examples of interventions like providing sidewalks install and upgrade traffic and pedestrian signals, constructing the pedestrian refuge islands, raised medians, enhanced marked crossings, overpasses/underpasses and improving the mass transit route design.

(ii) Reduce vehicle speed

Examples of interventions like reduce speed limit, implementing area wise lower speed limit, install speed management measures at intersections.

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