PEDESTRIAN CROSSING BEHAVIOUR ANALYSIS AT INTERSECTIONS

[1]Rakesh Kumar, [2]Esar Ahmad

[1]M.Tech, CIVIL TRANSPORTATION ENGG. Department, Mewar University Chittorgarh, Rajasthan, INDIA

[2]Asst.Professor   Mewar University Chittorgarh, Rajasthan,

I. ABSTRACT

Pedestrian movement study can be possible done by different approaches like Investigation of walker movement (field data collection), experimental observation, and conduction of controlled tests and also by creating pedestrian models. All these diverse sorts of studies are subject to develop fundamental diagrams. Movement of pedestrian along a line of the corridor under the closed boundary conditions is the simplest method to know how the effect of pedestrian characteristics like age, gender and that of carrying baggage and luggage as well as their crossing patterns were examined on pedestrian flow characteristics like crossing speed and waiting time. Pedestrian safety was also analyzed with respect to safety margins and gaps accepted by pedestrian in traffic stream. Crossing patterns were observed for different age group and gender.

Keywords: pedestrian crossing behavior, crossing pattern, waiting time, gaps accepted, safety margins

II. INTRODUCTION

Walking is perhaps the most useful, necessary and basic transportation system which is available to mankind and used by almost every person in the world. Walking is additionally included in many outings made by different modes. Whatever the fundamental method for travel, walking is normally the first and last mode utilized, giving an essential connection between area utilize and mechanized travel. It is additionally sound, economical and environmental friendly. As per DEMOGRAPHIC OF INDIA, WIKIPEDIA (2014), India is the second most crowded nation on the planet more than 1.27 billion people, more than a 6th of the world's populace. As of now contains 17.5% of the world's populace and India is anticipated to be the world's most crowded nation by 2015, surpassing china

so India should need a adequate pedestrian facilities to provide better design spaces for human circulation, to empower and energize walking for distinctive purpose, the physical facility must be available to backing the

physiological, psychological and social need of walkers and guarantee them against overexertion, interference by other person on foot and mischance. For this reason, exploration of walker movement streams has just been given constrained consideration amid the most recent decades. Since walking is a part of the transportation chain without which barely any

Traffic accidents involving pedestrians have become a major safety problem all over the world, particularly in developing countries, due to high population density, rapid urbanization, and lack of adherence to traffic regulations by both drivers and pedestrians. Lack of adherence to traffic regulations at pedestrian crossings particularly by drivers create a paradigm in which pedestrians may become bold and force approaching vehicles in the traffic stream to brake in order to gain priority at the pedestrian crossing. On the other hand, pedestrian crossings with heavy pedestrian flow are likely to cause unacceptable vehicular delay.

III.DATA COLLECTION

In the first place to gather the velocity-density information, a digital video camcorder ((Mode: HXR- NX30E/NX30P, Make: Sony), Frame rate (25 frames/s) with Resolution (640×480) is set as indicated in figures show 3.1,3.2 recorded the movement of people on foot. In the test two ranging bars are set independently to find the rectangular measured segment indicated in fig.

From the video data as indicated in fig, the snapshot of the observed section is found. To acquire the crossing time of the each person (say person p) from the rectangle area, passage time ($t_{p\ in}$) and way out time ($tp\ out$) are noted.

Speed and density of individual person are obtained from these data sets. By these information set, speed, density for the individual person on foot is found. After acquire the density information set, the distance headway is obtained by the reciprocal of the density. As the people on foot are moving so slowly, proper accuracy was taken at the time of information gathering
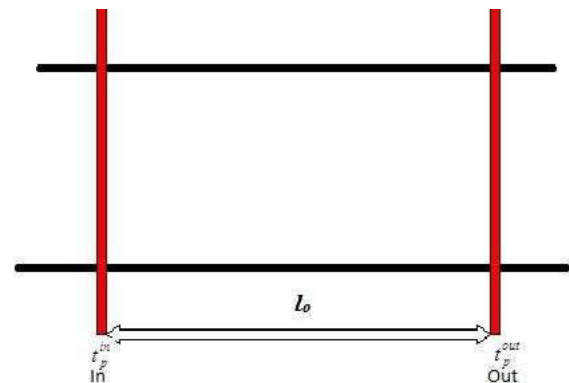

Figure 1: observed section for data collection

IV. ANALYSIS OF EMPIRICAL DATA AND RESULTS

These outcomes are divided into five sections. In the first and second part results represent the fundamental relation (speed-density, distance headway- speed relation) of pedestrian flow.

The third part represents the study on free flow speed of Indian pedestrian and fourth part

represents the statistical analysis by hypothesis testing. In the fifth part results represent the ANOVA test to demonstrate the overall distinction exists in five unique classifications of experiment set.
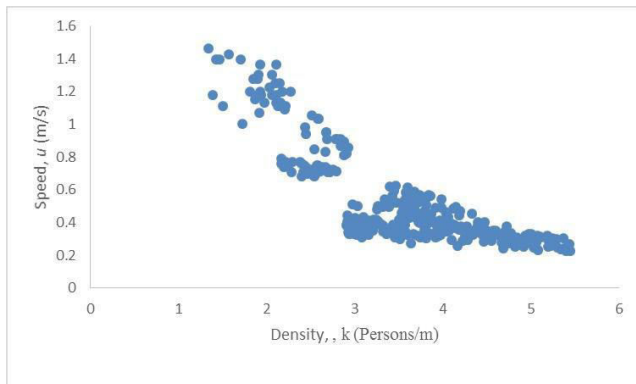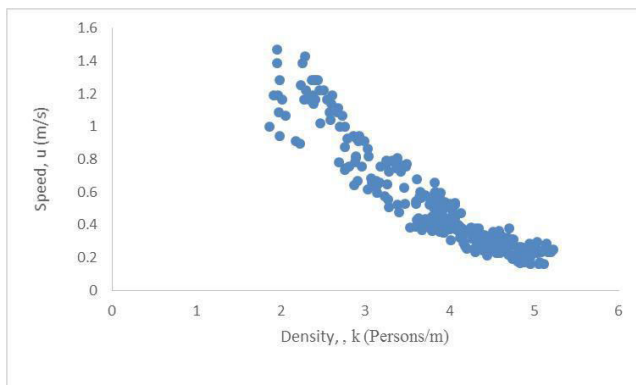

Figure : Speed-density plot for all boys

Figure 2 : Speed-density plot for two boys and one girl alternatively
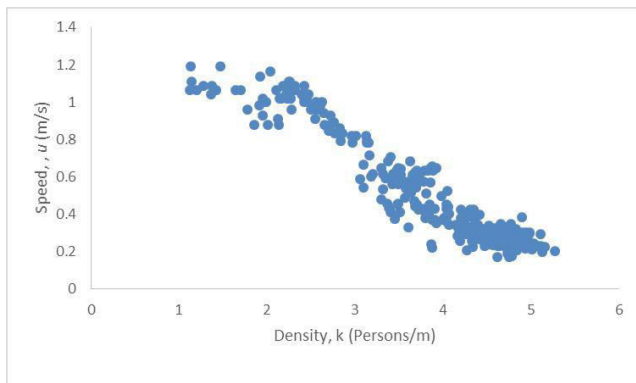

Figure 3: Speed-density for all girls

STATISTICAL ANALYSIS BY HYPOTHESIS TESTING

A Z-test is a statistical test for which the distribution of the test statistic under the null hypothesis can be approximated by a normal distribution. Because of the central limit theorem, many test statistics are approximately normally distributed for large samples. For each significance level, the Z-test has a single critical value which makes it more convenient than the Student's t-test which has separate critical values for each sample size. Therefore, many statistical tests can be conveniently performed as approximate Z-tests if the sample size is large or the population variance known. Hypothesis test was done to show the statistical analysis.

CONCLUSION

In this thesis, the experiments on pedestrian motion under closed boundary condition using the single file pedestrian motion are conducted to observe the impacts of gender and gender mix condition on fundamental diagram. The objective of this study to show the impacts of gender effect on pedestrian fundamental diagram using different hypothesis test. The results were compared statistically using z-test and ANOVA test. The following observation is found from this study: The Mean free flow speed is 1.27ms −1 for male pedestrian and it is1.24ms −1 for female pedestrians. While walking females are

more conscious about their private space than the males. Security distance is introduced to explain the private space concept. From this experiment it appears that the male group of test persons are less concerned about their personal space and thus the security distance is smaller compared to the female group. It is clearly notice that the impacts of gender is existed in pedestrian crowd flow and mostly gender condition affects the space between the pedestrians present in mix pedestrian traffic.

REFERENCES

[1] U. Chattraj and P. Chakraborty "Comparision of pedestrian fundamental diagram across culture", *Advances in complex system*, vol. 12, pp. 393–405, 2009.

[2] W. Hankin. B.D, "passenger flow in subways", *operational research Quarterly*, vol. 9(2), pp. 81–88, 1958.

[3] O. D, "Verkehrsbelastung und dimensionierung von gehwegen undanderen anla- gen des fubgangerverkehrs tech rep forschungsbericht 22",*Technische Hochschule braunschweig*, 1963.

[4] O. S.J, "Movement of pedestrian on footways in shopping streets", *Trafficngineer- ing and control*, vol. 10(4), pp. 160–163, 1968.

[5] L. Hoel, "Pedestrian Travel Rates in Central Business Districts", *Traffic engineering*, vol. 38, pp. 30–33, 1968.

[6] N. F.P.D and W. R.J, "Pedestrian flow characterstics", *Traffic engineering*, vol. 39(9), pp. 30–36, 1969.

[7] J. J. Fruin, "Pedestrian Planning And Design", 1971.

[8] L. Polus. A, Joseph. J and U. A, "Pedestrian flow and level of service", *journal of transportation engineering, ASCE*, vol. 109(1), pp. 46–56, 1983. [9] Y. Tanaboriboon, "Pedestrian Characteristics Study in Singapore", *Journalof trans- port engineering*, vol. 112, pp. 228–235, 1986.

[10] M. M and T. H, "A ne wmethod for evaluation of level of serviece in pedestrian fa- cilities", *Transport research part A*, vol. 21(3), pp. 223–234, 1987.

[11] S. P. Morrall. J.F, Ratnayake. L.L, "Comparision of CBD pedestrian characteristic in canada and sri lanka transportation research record",*Transportation research board, National research counsil, Washington DC,USA*, vol. 1294, pp. 57–61, 1991.

[12] Y. Tanaboriboon and J. A. Guyano, "Analysis Of Pedestrian Movements In Bangkok",*Transport research record*, vol. 1294, 1991.

[13] A. Mintz and J. Abnorm, "Non-adaptive group behavior", *Social physcology*, vol. 46, pp. 150–159, 1951.

[14] H. S.P and D. W, "Pedestrian behavior at bottlenecks", *Transportation science*, vol. 39(2), pp. 147–159, 2005.

[15] A. T. Isobe. M and N. T, "Experiments and simulation of pedestrian counter flow", *Physica A*, vol. 336(3-4), pp. 638–650, 2004.