Development Of Congestion Reduction System For Rail-Road Crossing Using Smart Sensor

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ABSTRACT

Congestion and delay are one of the most important factors affecting the transportation system. At level crossing this situation of congestion and delay become more immense. As the railway gate operation consumes a huge amount of time. Which causes long shockwaves and queue formation at the level crossing. Due to this ample amount of time is consumed and chances of accidents also increases gradually. To counter-act this problem. The operation which is carried out manually can be changed and the whole system can be made automatic. By using RF transmitter, receiver, GPS, microcontroller etc and, by implementing this model various problems can be counteracted easily and operation efficiency increases.

Keyword: - *Congestion, Queue Formation, Level Crossing, Sensors*.

1 Introduction

At places where there is heterogeneous traffic at level crossing the congestion rate increases gradually. As the gate closing and opening operation consumes a huge amount of time, which causes long queue formation, congestion, rate of accidents increases, delay in journey time. The whole operation Carried is manual based. The gate man/ operator get the instructions he makes the calls and closes the gate. But the amount of time for which gate is being closed is very high. To overcome this problems a model is being introduced in which smart sensor are used to overcome this problem.

Different sensors are open in the market which have top of the line capacities to perform different undertakings precisely and quick. For example, IR sensor, RF sensor, Xebee sensors and so forth according to the nees and prerequisite the RF sensor was the most reasonable sensor for performing out this specific undertaking. As it is a standout amongst the most possible trusted gadget, with low support and high precision rate. The GPS module has been wanted to find the continuous area of the railroad, which gives fundamental information of it nearness to the clients at the intersection by means of presentations, and the sirens have been utilized to alarm the vehicles at intersection.

1.1 Study Area

Samtha Nagar intersection is one of the busiest point, most extreme number of preparer's goes through this segment, which makes exceptionally burden the general population who are heading out from that point because of the gigantic time devoured to play out the opening and shutting operation. So the clients redirect their way and take a long course by means of Ring Street to go to their separate area.

Fig-1 Samtha Nagar Level Crossing, Udgir

2. Methodology

In this model, the RF sensor is used to detect the train arrival at a particular distance from the gate. The RF transmitter and GPS has been situated or installed on the train. As the train arrives at a given distance the RF receiver gets the signal and simultaneously siren goes on which warms the road traffic users about the incoming train and the current location of the train is been shown on the LCD which is installed at crossing via the GPS installed at the train, which alert the users and safety increases. As the train crosses the level crossing the second sensor situated at other end of the gate activities and the gate opens automatically. As this whole operation consumes a very less time so the congestion at the crossing automatically decreases as the queue formation is less. This causes in decrease in conflict point

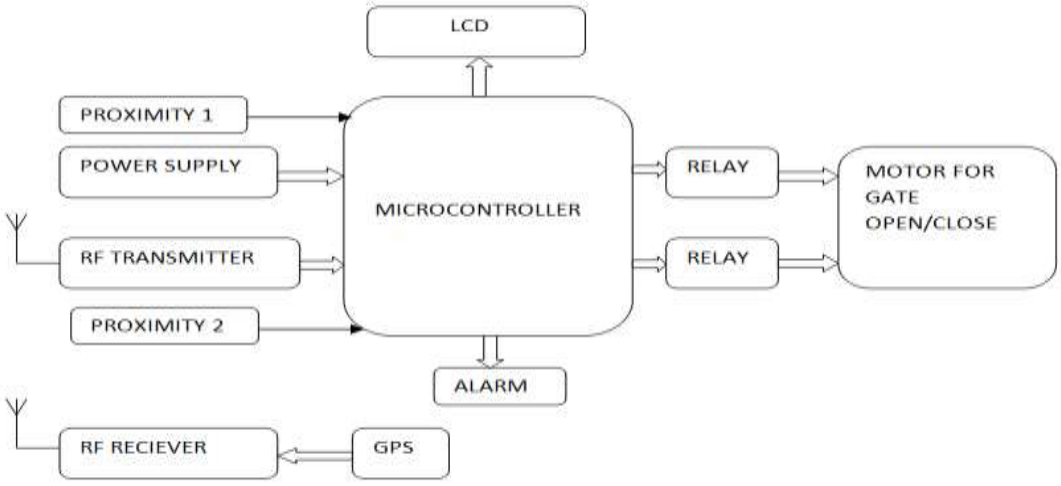

Fig -2 Block diagram

Fig-3 System Module

2.1 Data Collection

The data is collected by manually and by camcorder. The physical dimensions have been collected by normal methods. Then that data is been extracted as per requirement, the current situation analysis is done in the Vissim software, after that the model is prepared by using RF sensors, GPS modules and other equipment's. Then the results obtain from the model is noted down. And the compression has been determined between the two scenarios, and the effect of it on the traffic congestion, queue formation, delay, has been determined.

Table No-1 Level Crossing

Type of train	Time interval (min)	Type of vehicles						Queue length (m)
		Non-motorized		Motorized				
		Pedestrian	Bicycle	2 wheelers	3 wheelers	4 wheelers	HCV	
PASSENGER TRAIN	19	27	9	34	2	7	5	31
	18	19	12	29	3	12	9	47
	19	28	8	23	1	8	10	41
	22	35	16	16	3	15	7	48
Average	20	28	20	26	3	11	8	40
HIGH SPEED TRAIN	17	16	11	24	5	6	9	35
	18	26	17	19	2	10	6	35
	16	19	9	20	1	18	8	56
Average	17	21	13	21	2	12	8	42
FRIGHT TRAIN	15	27	11	22	2	9	10	43
	19	24	10	24	2	12	8	44
Average	17	26	11	23	2	11	9	44
Total	163	221	103	211	21	97	72	380

2.2 Data collection Analysis

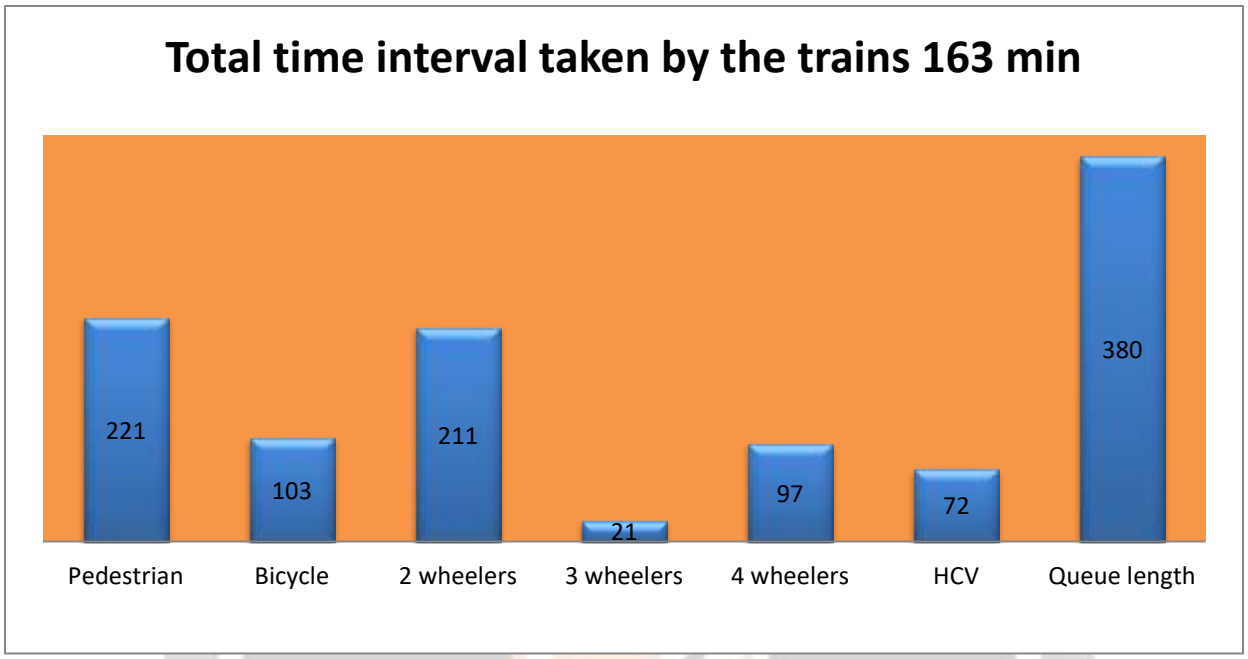

Fig-4 Total time interval taken by trains

3. System Analysis

After implementation of the smart system the various are counteracted very easily and the results are shown below

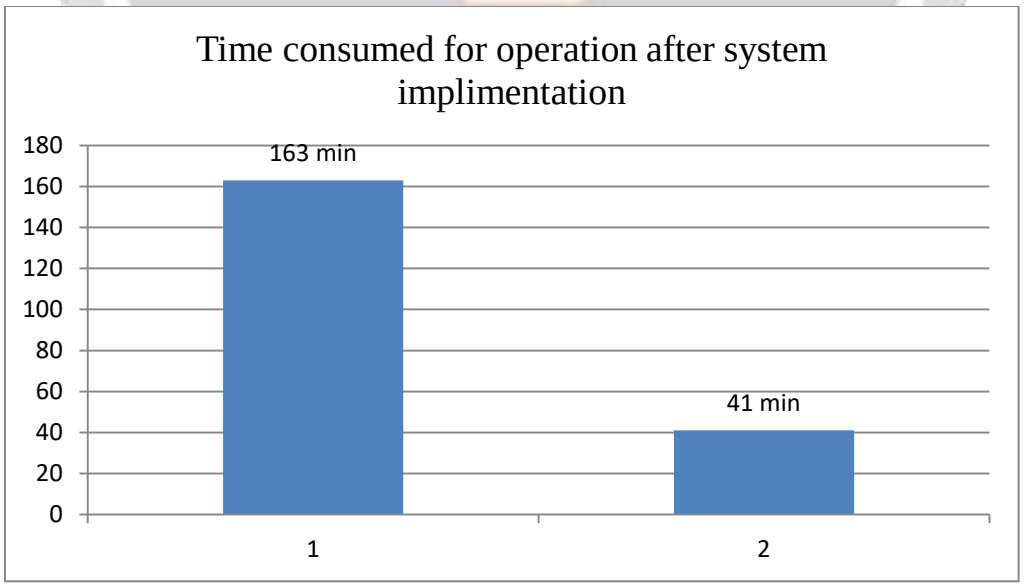

Fig-5 Time consumed for operation after system implimentation

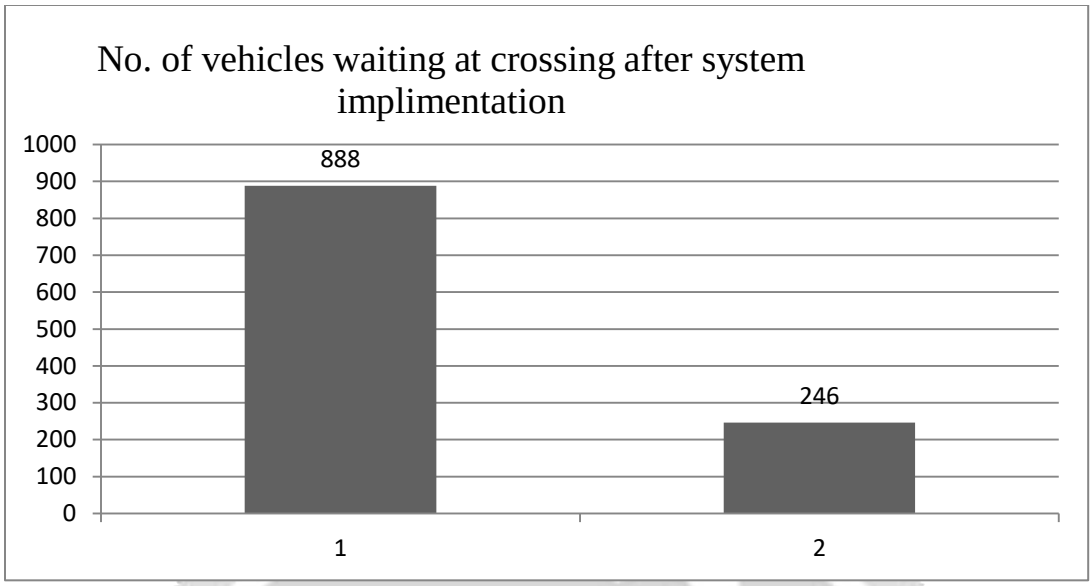

Fig-6 No. of vehicles waiting at crossing after system implimentation

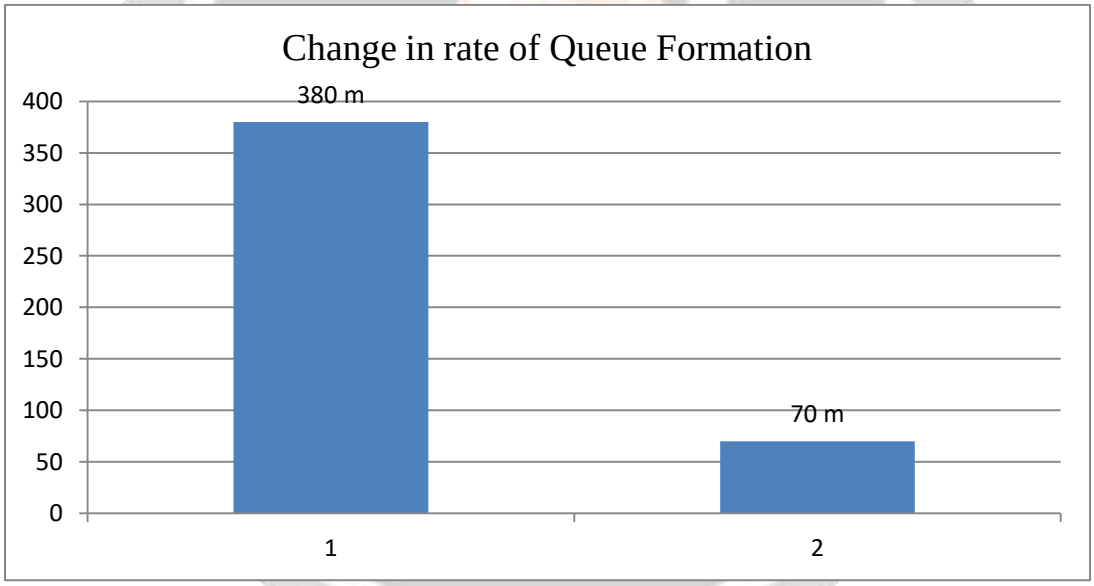

Fig-7 Change in rate of queue formation

3.1 Results

As the user has to wait for a minimum amount of time, the module decreases the time interval from 20 min to 5 min. this causes in reducing 15 min of journey time and the queue length is decreased about 60%. The delay in the journey time minimizes and fuel consumptions also decrease. The safety increases, as the installation cost of this model is very less, so it is very economical and it has a high accuracy rate. The wheatear conditions do not affect the model. So it has low maintenance.

4. CONCLUSIONS

The model gives us a very convenient and satisfactory solution over the rising congestion, queue formation and delay. The model if implemented gives us immense results as shown. It increases efficiency and decreases the rate of queue formation and other problems arrived because of it. And also gives the supervision and control framework give the intend to continuous examination audit and information gathering fo the reason for support on the mobile and settled offices for the certification of operation wellbeing and upkeep proficiency and in addition the security

evaluation basic leadership framework in view of the share of security information. The colossal accomplishment of present day innovations in each pertinent field and the mechanical improvement of the railroad business itself have given rail line plausibility to win higher administration quality and quicker speed.

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