

# Effect of Signal Countdown Timer on Performance of Signalized Intersection

Nawal Kishor Singh<sup>1</sup>, Arpan Mehar<sup>2</sup>,

<sup>1</sup> M-Tech Student, Transportation Division, Department of Civil Engineering, National Institute of Technology, Warangal, India

<sup>2</sup> Assistant Professor, Transportation Division, Department of Civil Engineering, National Institute of Technology, Warangal, India

E-mail: [om7659132@gmail.com](mailto:om7659132@gmail.com)

## Introduction

Signalized intersections are introduced to increase efficiency and reduce traffic accidents. Various measures are being taken to increase the safety and efficiency of signalized intersections. Countdown timers are a technical measure and are becoming increasingly popular in many countries, including India. However, scientific studies in this field under Indian conditions are very limited and those available in the literature have compared different intersections with and without timers' studies in other countries in this area show mixed results. Furthermore, as driver behavior differs significantly from country to country, it is necessary to carry out separate studies from different geographical areas. Since Indian traffic is heterogeneous and undisciplined, special care has been taken to include these characteristics in the analysis. Based on previous results, it is clear that signal countdown timers (SCTs) are associated with a reduction in startup lost time, dilemma zone and red light violations (RLVs), according to some studies. There are other studies that contradict these findings. The main reason for these contradictory results could be the different traffic situation and the different driver behavior between the countries, even from one city to another. Studies in developing countries (China, Bangkok, Malaysia, India and Taiwan) have shown that the presence of green signal countdown timer (GSCT) and red signal countdown timer (RSCT) influences traffic patterns and driving behavior as well as efficiency and safety in different ways at signalized intersections. Caution should be taken when installing the signal countdown timers (SCTs) at urban intersections. It is interesting to note that in India, no technical study has been conducted to evaluate the effects on the efficiency and safety of intersections before installing this timer.

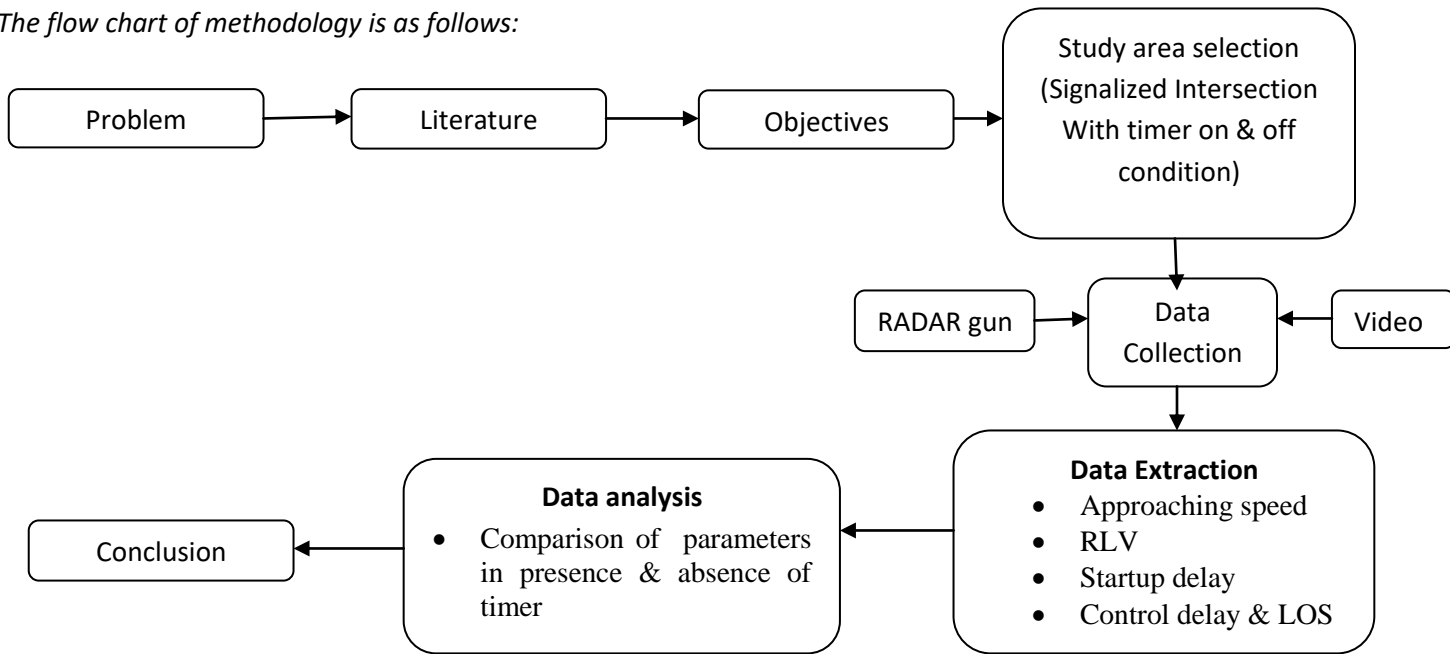
This study was conducted to investigate the impact of countdowns on various traffic characteristics and driver behavior, taking into account several measures of effectiveness (ME). The following goals are defined for this study.

- To analyze safety measure like approaching speed and red light violations (RLVs) at signalized intersections under Indian traffic conditions due to the presence of signal countdown timer.
- To analyze the changes in efficiency measures like start-up lost time and control delay at signalized intersections under Indian traffic conditions due to presence of signal countdown timer.

## Materials and Methods

To analyze the influence of different components of signal countdown timers on intersection efficiency and safety, two signalized intersections, Chengicherla X Road and Suchitra junction is chosen from Hyderabad city, India. At both signalized intersections traffic signals are installed with countdown timer already. Both intersections is four legged junction with two major roads and two minor roads. To keep the geometric and traffic characteristics similar, data is collected with timer on and timer off condition at same intersection.

The flow chart of methodology is as follows:



## Results and Concluding Remarks

With respect to objectives of present study, following points may be concluded as-

1. There is significant increase in approaching speed during last 15 Sec. of green phase due to presence of signal countdown timer at both signalized intersections. In the presence of signal countdown timer, driver aware about the time of initiation of red phase, so they accelerate their vehicle in last few seconds of green phase in presence of timer so that they can cross the intersection within the remaining green time. Increase in approaching speed in presence of signal countdown timer cause speed limit violations which results reduction in traffic safety while crossing the intersection.
2. Average red light violations (RLVs) per cycle decreases at signalized intersections in presence of countdown timer. It suggest that there is decrease in red crossing of vehicle in timer on condition which can reduce the right angled crashes at intersections and helps to enhance the intersection safety.
3. After discharge headway and startup lost time (SULT) analysis it has been observed that there is significant decrease in SULT due to presence of countdown timer. In the absence of timer drivers waiting for green phase at front of queue takes more time to start and move as compared to timer on condition. Since driver in front of queue are aware about green phase initiation in timer on condition so they already prepare to cross the intersection which cause reduction in startup lost time.
4. Average control delay of signalized intersections decreases in presence of timer which results in increase of level of service (LOS) from F to E. So it can be concluded from above findings that signal countdown time helps to increase the efficiency of signalized intersections.
5. From the results of present study it can be concluded that there is effect of countdown timer on driver maneuvering behavior at signalized intersection.

## References

- Devalla, J., Biswas, S., and Ghosh, I. (2015). "The effect of countdown timer on the approach speed at signalised intersection". *Procedia Computer Science* 52, 920-925.
- Fujita, M., Suzuki, K., and Yilmaz, C. (2007). "Behavior and Consciousness Analyzes on Effect of Traffic Signals Including Countdown Device". *Journal of the Eastern Asia Society for Transportation Studies*, 6, 2289–2304.
- Harshitha, M. S., Agarwal, S., and Vanajakshi, L. (2012). "Headway Analysis at Signalised Intersections with and without Countdown Timer". *Highway Research Journal*, January, 33–40.