

Model Signal - Chennai City Traffic Police and Thozhan

Specification Document 1.0

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"Just added for some Visual Appeal, not a reference to our Model Signal"

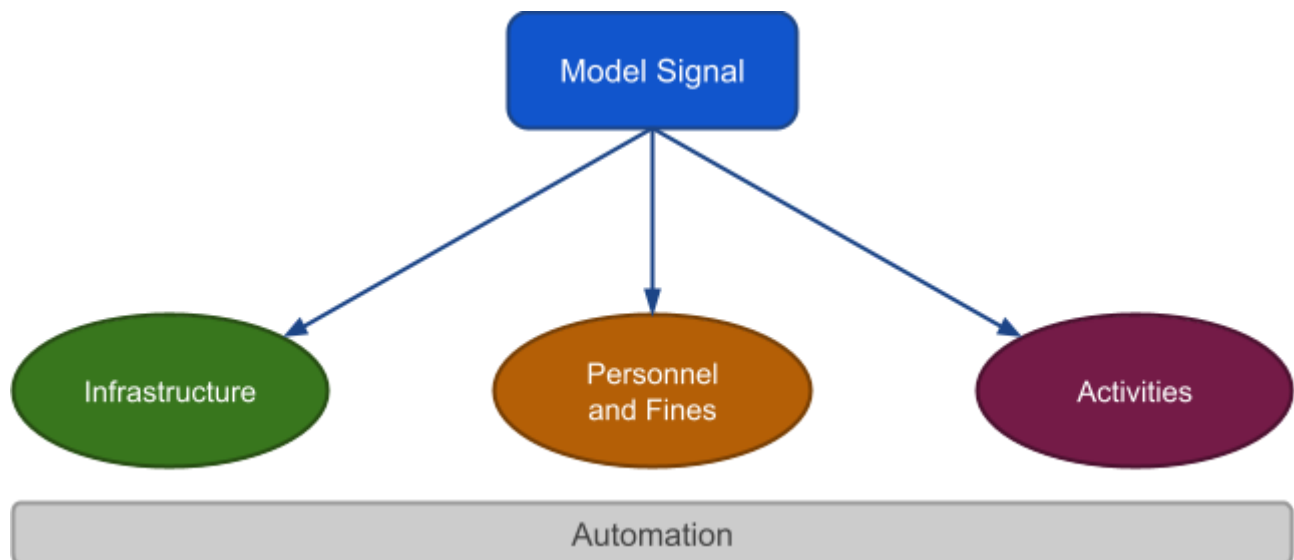
1 Purpose

Model Signal project is a major stepping stone in creating Accident Free Chennai. The primary goal of the model signal is safety and efficient road usage. The idea is to implement a signal where all existing rules and frameworks would be followed cent percent. All the functionalities in the signal would be completely automated, all violators be fined, thus effectively reducing the traffic violations and hence the traffic accidents.

Model Signal would be

1. 100% Safe
2. 100% Automated
3. 100% fine imposition on violations

Thus, paving the way to Accident Free traffic city.



The following sections details all the modules and workings of the model signal.

2 Infrastructure

2.1 Signal

1. A signal to be placed on each road connecting the junction, rather than a centralized Signal.
2. The signal to be mounted to the left side of the road.

3. All signals should have the Count down Timer.
4. Each signal should also have Pedestrian Crossing Signal.

2.1.1 Traffic Signal Density Controller System

In the current system, the signal switches between `green` and `red` at fixed time periods, say 30 seconds in green and 180 seconds in red. These timing can be manually controlled by the Traffic Police, when they are available.

Scenario: The traffic overflows in the **road (A)** that has 30 seconds green time and traffic is less in the **road (B)** that has 180 seconds green. The vehicles in the Road A would be made to wait more time though there is not much of traffic in the other perpendicular road, thus leading to inefficient usage of road bandwidth.

So we will have intelligent responsive signals that can sense the traffic flow in each road and open up the road where there is more traffic, effectively reducing the unnecessary wait time of the commuters and increasing the efficiency of road usage. But as always, the Traffic Police would be able to take manual control and `turn off the automation`, only as and when required.

Complete Technical specifications on the `**Traffic Signal Density Controller System` @ <https://drive.google.com/file/d/0B76vDSSLMZVuOWtKWWVJaHV6eFU/view?usp=sharing>.**

2.2 Road Lines

1. Proper Stop Lines on all Roads.
2. Zebra Crossing on all Roads.

2.3 Signboard

1. Proper Signboard to be placed at the Junction.
2. Signboards on all roads covering at least 1 km from the Junction.

2.4 Footpath

1. Proper footpath on all roads covering at least 100 meters from the Junction.
2. The footpaths should be properly fenced, so Pedestrians can get into road only at Zebra Crossings.

2.5 Median

1. Definite medians should run through the middle of the road, at least for 100 meters from the Junction.
2. Medians can be filled with sand and be planted.
3. Small banners can be placed in the medians in the half a kilometre stretch about the significance of the Model Signal. So even new commuters get the whole point. It also has Contact Number / Online Form URL to give their feedback on the Project, grievances, etc.
4. Small Banners depicting the Importance of following Traffic Rules can also be placed.

2.6 Lanes

1. For 25 meters from the stopline, the road should be divided into 3 lanes: left, straight and right.
2. All the lanes have an arrow marker depicting which vehicle should take which lane, depending on what turn they are going to make.
3. Left lane have a left arrow mark. All vehicles that are to take left turn should switch to this lane. Same is the case with middle and right lanes for straight and right movements.
4. Left lane is also reserved for Ambulances. When an ambulance is about to reach the signal, the left lane is cleared and given way.

2.7 Camera

1. A High Res Camera be installed in each road.

2. It should be installed in the Median 10 meters away from the Stopline,
3. It should be facing the Stopline.
4. It should be recording all activities in that stopline.

2.7.1 Traffic Violation Portal

The Video stream captured by the Cameras are fed into the `Traffic Violation Portal` system, which will have a horde of Online Volunteers who will analyze the videos and find the details of violators who are missed by the Police personnel. This data is again given to the Department, so they can follow up on the violators and issue fine to them.

Complete Technical specifications on the `Traffic Violation Portal` @

https://docs.google.com/document/d/1jhuSz9_ntiTih6WMx2neTtxKYGWk2-wOLegT334wCys/edit?usp=s haring

With the help of [ANPR Module](#) in TVP, all the vehicles moving through the road are tracked and their count are stored time wise. Since this is done 24x7, it will give interesting and useful patterns on traffic flows and over a long duration, the increase in traffic flow can be found and projections on growth of traffic flow can be done.

2.8 Miscellaneous

1. 2 LED Board Installed at the Junction, displayed number of Violators caught, fine amount imposed the previous day. This LED Board should one day display 0, 0 for all. That day, we all shall `Rest in Peace` :P

3 Personnel and Fines

1. One S.I. be present in the signal, accompanied by 2 Constables, at minimum, from 7 AM to 11 PM.
2. The idea is to impose fine on maximum number of Violators at the capacity of 3 Personnels in each road.
3. Cameras installed in the Medians will be capturing all the activities. Hence, violators who were missed by the Personnels will be identified later via recorded Video Stream and Chelan be sent to their home.
4. All details of the Personnel (Their Name, Work Time), number of violators caught, fines imposed will be feed into a System at the end of the day and will posted online public preview.
 - a. We need to connect to the Traffic Police DB that stores the data, received from the `Fine Imposing Device` held by S.I.
5. At peak hours, there should be 2 Beat police officers. They should follow up and catch the violators who don't stop for the Police signal and are aggressive.

4 Activities

4.1 Physical Tests for Drunk and Drive

The Police are heavily re-using the mouthpieces in the Breathalysers, that they use to confirm If a motorist is drunk or not. It's possibly because of lack of funds to buy more breathalysers.

To reduce the use of breathalyzers, we shall have a round of simple physical tests to assess the motorists. Most drunk motorists can't possibly clear these simple tests and non drunk motorists can be sent without testing with a Breathalyser. The tests are:

1. Place feet together, arms at sides, tilt head back, close eyes, and count to 30, then open eyes and drop head back down.
2. Stand and listen to instructions, then walk in a straight line, turn around, and walk back towards the officer.

Those who fail the above tests, can be tested with breathalyzer to confirm their blood alcohol content.

4.2 Collecting Feedback

1. A Feedback from Traffic Personnel - Design a Form to get weekly feedback from the Personnel who worked there. The feedback should include their experience, best moments, worst moments, their suggestions, and areas of improvement.
2. Feedback from Public. Public can give their views / post their opinion via
 - a. SMS to a specific Number.
 - b. Online Form

4.3 Regular Traffic Awareness Campaigns (TAC)

1. TACs conducted regularly at the signal.
2. Involve RSP Students from nearby Colleges, Schools in conducting regular TACs.
3. TAC 2.0, where the volunteers assist the SI, in catching violators and impose fines.

4.4 Ambulance Routing

There is a special protocol to be followed by the traffic authorities when ambulance arrives. The traffic authority will have a special control that when activated stops all signals and paves way for the ambulance. Once the ambulance crosses the junction, the authority calls up the authority in next signal and informs of the arrival of the ambulance.

Once all the signals are digitized, this process will be completely automated. With the model signals, we would be seeing lesser ambulances and those ambulances won't get stuck in traffic.

This completes the modules / working of Model Signal. The following sections details the implementation plan.

5 Signal Selection Criteria

1. It should be a Signal with neither low traffic nor heavy traffic.
2. OMR, Main roads connecting to CMBT are excluded.
3. There should be plenty of room next to road for Traffic Police to drag in Violators and impose fine without distracting Regular Traffic.
4. Signal Suggestions:
 - a. Vani Mahal
 - b. Keelkattalai Signal

6 Inventory

1. will be updated once got approval from CTP.

7 Expenditure and Cost Management

1. will be updated once Inventory is freezed.

8 Modules

The implementation would be split into following modules.

8.1 Preparation Module

1. 3D Video that features the 'Model Signal'.
2. Posters / Pamphlets with Condensed high level overview of 'Model Signal' to approach Sponsors.

8.2 Core Module

1. This module is of the highest priority of Implementation.
2. This module covers setting up the following infrastructures:
 - a. Signal, Road Lines, Sign Board, Median (for 10 meters) and Camera.
3. Digital Logging System.

8.3 Secondary Module

1. This module doesn't affect the core functioning of Model Signal.
2. Hence implementation of this module is done as per the availability of funds.
3. We might try `Crowd Funding` for this module.
4. This module covers setting up the following infrastructures:
 - a. Proper Footpath for 100 meters.
 - b. Proper Median for 100 meters.
 - c. `Model Signal` Web site.

9 Timeline Estimation

9.1 Completing Documentation

~ December, 2014

9.2 Project Approval from Department

~ March, 2014

9.3 Infrastructure Preparation

1. Setting up Systems and running Pilots

~ April, 2015 to September, 2015

9.4 Awareness Campaign among locals

~ September, 2015

9.5 Model Signal Launch - Phase 1

~ October 1, 2015

9.6 Three Month Pilot

~ October 1, 2015 to December 30, 2015

9.7 Review Feedback and Evolve

~ December 30, 2015

9.8 Model Signal - Phase 2

~ January 1, 2016

9.9 Six Month Pilot

~ January 1, 2016 to June, 2016

9.10 Review Feedback and Evolve

~ June, 2016

9.11 Replicate the Idea to other Signals

9.12 Replicate the Model of Accident Free Chennai to other Cities

10 Data Logging

All Operations should be logged in the System. The log data should include:

1. The Personnels details who worked in the model signal each day.
2. All violations, fine imposed, types of vehicles with timestamps are tracked. [So we can analyze later, which vehicle is causing major issues, at what time of day, etc.,]
3. Installation / Maintenance Expense.
4. Income via Fine Imposition.
5. Number of accidents around the signal every day. (however small, like 2 bikes hitting)
6. Feedback from Personnel.
7. Feedback from Public.
8. Number of Vehicles moving through the junction. Detected through effective ANPR system.

10.1 Model Signal Web Site

All the above data are made public through a dedicated Web site for Model Signal. The data is anonymized before posted online.

10.2 Preview Clips

From the videos that are recorded, specific clips are extracted out for public preview, which are hosted online. The clips include accidents, close calls and such. We can identify repetitive offenders, impose fines and then make a clip of them. This may help them realize their mistake.

There will be a measure on the number of critical clips per month. It should reduce as months progress and ideally reach 0.

11 References

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4. <http://www.quora.com/Why-does-Kerala-have-a-high-crime-rate-even-though-most-of-the-population-is-well-educated>
5. <http://expertbeacon.com/tests-used-determine-if-you-are-driving-drunk/> - Drunk and Drive Tests

12 Version History

Version	Date	Author	Description
0.1	15.10.2014	saiy2k	Initial Draft
0.2	1.11.2014	saiy2k, Yokesh, Priya, Rajesh Kanna	1.1.2 Intelligent Responsive Signal [New] 1.6.1 Traffic Violation Portal [New] 1.1 Signal Maintenance Board [Update]
0.3	24.11.2014	saiy2k, Hitesh, Pravin Mariappan	Lanes to Roads [Update] 1.6.1 ANPR [New] 1.7 Lane Idea [Drop] 3.1 Test for Drunk and Drive [New] 7 Modules [New] 8 Data Logging [Update] 8.1 Web Site [New]
0.4	24.12.2014	saiy2k, Sabari, Bharath, Mohan, Vignesh Palani, Praveen Koya,	2 Personnel count [Update] 2.5 Beat Police [New] 1.6 Lanes [New] 1.1.5 Board that displays maintenance Info [Drop]

		Viswaakshan	
0.5	7.1.2015	saiy2k, Ashok, Yokesh, Sabari, Mohan, Bharath, Sathyanarayanan,	1.1.2 Traffic Signal Density Controller System [Update] 'mbulance Routing [New] 5 Inventory [Update] 6 Cost management [Update] 7 Timeline [Update] 8.2 Critical Clips [New]
1.0	9.1.2015	Kanchan, sai2k, Radhakrishnan, Nakkeeran, Karthik Pandy, Dinesh Raja,	1 Purpose [Proof reading]