

# SERVEY ON POLLUTION SENSING TRAFFIC CONTROL

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## Abstract –

Nowadays many studies are being led to develop resolutions for improving the performance of city traffic networks. In this work an algorithm for accepting control of urban subsystems is proposed to provide a solution for mobility problems in cities. Here there are numerous of process for supposition of pollution placed at the traffic signal. The interrelated system positioned at traffic signal which senses and measure of their respective properties. The presence of air pollution in cities is not only caused by road traffic but there are other pollution reasons that contribute to increase or decrease the pollution level. Due to the distributed and diverse nature of the different components involved, a system of systems engineering approach is applied to design a consent-based control algorithm. Their are three method which are like using IoT, using MATLAB & using TLC and simulate it at traffic signals.

## Keywords:

*Air Pollution, sensors, IoT, MATLAB, TLC.*

## Introduction:

Day by day the number of vehicles are growing very fast. In major cities like Delhi, Mumbai and Pune number of vehicles is remote. Due to imperfect burning in the vehicle engine the pollution through vehicle increases. Increasing number of vehicles lean towards to increase in co2 absorption in the atmosphere. The system is provided with the sensors, data from the sensors is used to make tartan the pollution level and accordingly the control action is carried out to control the speed of the system. MATLAB is the apparatus used here. The system is organized with Hardware design and procedure, project overview, imitation of motor using PID and PWM; Results are tabulated and discussed followed by conclusion [1].

In general, these impressions can be divided under four broad headings: local air value, climate change, noise and watercourse pollution, while the clean air is important to human health. By considering all these questions and facts we will going to design a system which will help to solve these issues. The system is all about detecting the air pollution, generating alert for authority via SMS or email and monitoring the traffic density which is measure root for an air pollution also managing the traffic signal timing energetically. This system is designed based on IOT. Internet of Things (IoT) is a recent communication pattern that predicts a near future, in which the objects of everyday life will be armed with microcontrollers, transceivers for digital communication, and suitable protocol stacks that will make them capable to connect with one another and with the users, becoming a important part of the Internet. The IoT concept, hence, goals at making the Internet even more immersive and universal. Also, by enabling easy access and interaction with a wide variety of devices such as, for instance, home appliances, tailing cameras, monitoring sensors, actuators, displays, vehicles, and so on[2].

In this work, the System-of-Systems (SoS) engineering paradigm sets the foundation for developing a cooperative control strategy applied to an urban situation. For this purpose, the air-pollution information service and the traffic device subsystem are put together, and the control system makes use of available information to alter or adjust traffic-light cycles at intersections[3].

## Literature Survey:

### A) Hardware design

The components used in this system are simple, cost efficient and the system is most indeed system, which is added as a part to the vehicle ( Arduino Uno board, Sensors- MQ-7, RF Transmitter and Receiver, Timer, DC motor , LCD display , GSM )[4]

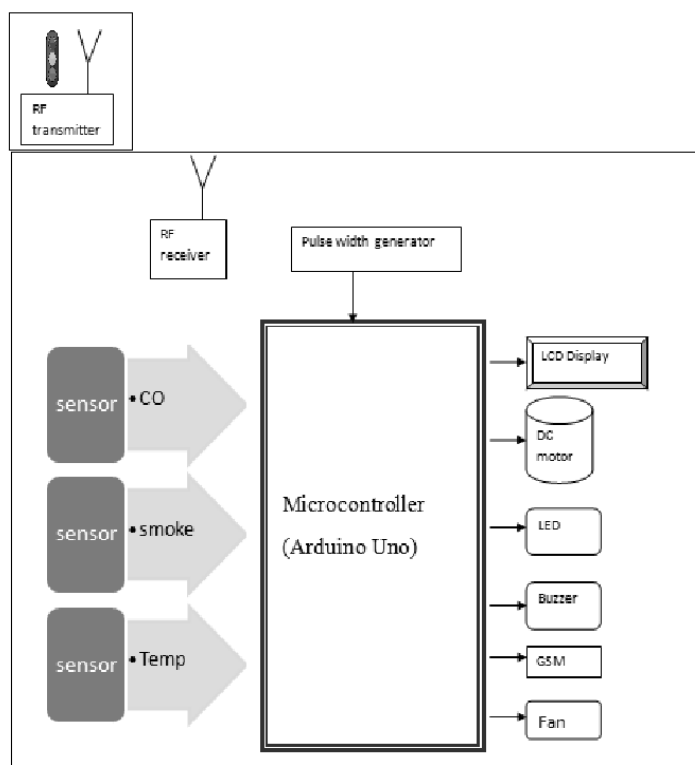


Fig 1. Schematic diagram of pollution monitoring system

Once the vehicle enters the range of traffic signal the sensors get triggered and checks for the pollution level using the gas sensors and temperature sensor in the vehicle.

### B) Methodology

The governor algorithm used here is PWM and ON-OFF control.

1. **PWM for motor speed control**[5] : PWM is a method for The PWM assembly on the Arduino can be varied by varying the duty cycle from “0” to “255”. Thus the speed can be mixed. Also timer can be used to produce pwm signal in the system.



$$V_{\text{eff}} = V_s \frac{\tau_0}{\tau_c}$$

2. **ON-OFF control**: An on-off controller is one of the methods for temperature regulator of a device. An on-off regulator will switch the output only when the temperature crosses the set point.

### C) Project Review

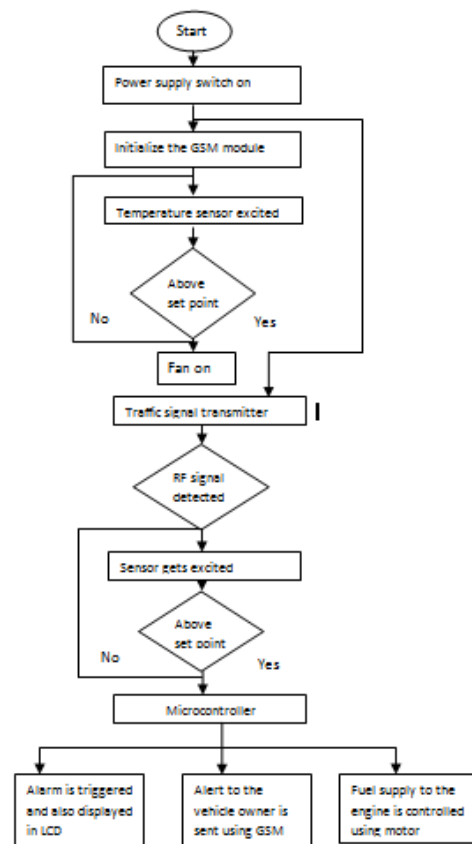


Fig 2. Flow chart of the system

### D) Simulation of DC Motor For Speed Control

Matlab simulink is the device used here to control the speed of a dc motor. PID controller and PWM system is used to control the speed of a DC motor. The control algorithm carried out to regulate the speed, current flow of the system is used is PID.

PID (Proportional Integral Derivative): The most providing the electrical power to a load having slow retort. resourceful controller type provides proportional with integral and derived control i.e PID. This controller chains comparative control with two additional adjustments, which helps the unit mechanically pay for changes in the system. These changes, integral and derivative, are expressed in time-based units.

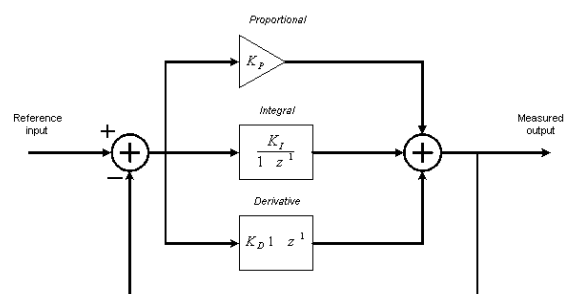


Fig 3. General Block diagram of PID controller

The system based on the micro-controller placed on the board in which comprise display unit. The traffic signal changes on the board. This system is use fix time of intermission for each signal. They is no distantly services delivered to the user only provided to that location. It uses predefined hardware and functionality according to program. Dynamic change of

state using background differentiating process was successfully in solving of fixed timing of controller in control traffic and minimizes jamming. Real time data obtained by image processing work as input to traffic manager. Twitter is used to extent the news of traffic condition of particular location. Anyone user can be tweet the current traffic circumstance of any location. In that System NLP used for removing the information of traffic signal from twitted.

In this system, we are using Infra-red Sensors (Vehicle count) and Gas Sensors (air quality and gives the absorption of different gases.) for sensing the surrounding atmosphere.

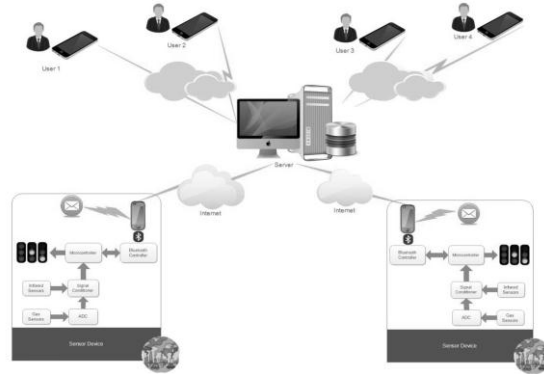


Fig 4 : System Architecture

## Algorithms

### 1. K-Means

The K-means algorithm for separating where each cluster's middle represented by mean value of the objects in the bunch.

**Input:** K: the number of bunch, D: a data set containing n objects

**Output:** K bunches their Centroids

#### Method:

1. Randomly choose k objects from D as initial bunch centres (centroids)
2. Repeat
3. (re) assign each object to bunch to which object is most similar based on mean value of the objects in cluster.
4. Update the bunch means i.e. calculate the mean value for each bunch
5. Till no change (the centroids do not change or no object moves)

### 2. Effective Green Time Signal Algorithm

**Input:** Centroid, Constants: min\_veh\_count, min\_time\_threshold, max\_time\_threshold

**Output:** Calculated Effective Green Time

#### Method:

1. Start
2. Effective Green Time =  $(\text{centroid} / \text{min\_veh\_count} * 100) + \text{min\_time\_threshold}$
3. If (Effective Green Time > max\_time\_threshold) then  
Effective Green Time < -max\_time\_threshold
4. Stop

### 3. Traffic Signal Adjustment Algorithm

**Input:** Initial Signal

**Output:** Adjusted Traffic Signal Lights & Completes Traffic Signal Cycle

#### Method:

1. If (Current signal)
2. Calculate Operational Green Time
3. Apply the time on signal lights
4. Make current signal 'Green' and all other signals 'Red'
5. If (current time == Orange\_light\_time)
6. off green light for present signal
7. Glow 'Orange' light
8. If (current time == 0)
9. Reset IR count to zero
10. Present signal = next signal

Repeat step 1 to 10 till fatal error comes out or externally stops.

The Traffic Signal time is lively, due to this according to traffic density the Traffic Signal cycle is completed in less time as equate to our regular Traffic Signal System. Due to this it reduces the pointless waiting time of vehicles, also it helps in reducing air pollution.

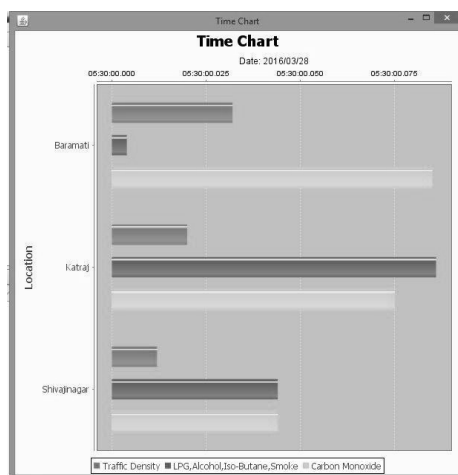


Fig 5. Time Chart

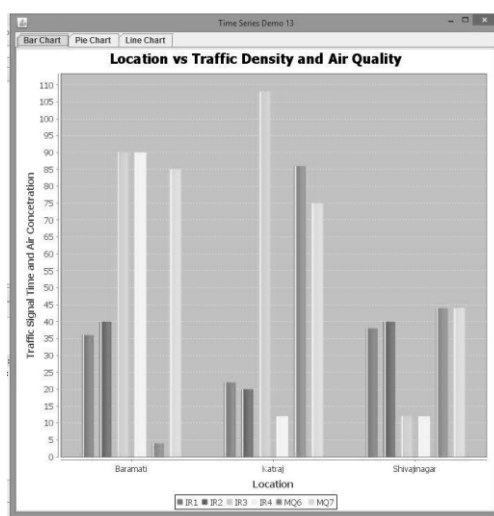


Fig 6. Density and Air Quality Chart

## conclusion

There is an rise in the level of Pollution over the last couple of decades, leading to several severe Environmental problems and health issues. Due to busy life an robotic system is needed to take the action against pollution control. This paper can be prolonged by adding GPS device and conserving the data base and sending a message to the user about the details of the adjoining service station, a system in which Traffic Signal Time will be attuned dynamically, due to which Air Pollution will get reduced and also designed Gas Monitoring System for insanitary Gases. It also produces an Aware for Insanitary Gases if they hits their safe limit. There is two type of data is collected gas data and vehicle data. On the vehicle data collecting is applied to forecast whether Traffic is more or not. If the Traffic is greater then instruction is passed to manager to bend the timing of traffic signal. This manages traffic & avoiding overcrowding. Mobile users having internet can repossess real time information for their use. End user or client can demand to server via Android Application for knowing the actual time situation about traffic & air quality of distant location. One of the machineries that gives accurate reading for the approximation of vehicle count Ultrasonic waves sensors are little bit expensive and robust for any intermediate through which waves can passed. For the additional extension for more precision, there will be use of ultrasonic wave's sensors. As the RFID tag and Reader more dependable for the use of measuring vehicle density. In the smart city each vehicle having RFID tag and at the Traffic Signal reader would be more communicative in nature for exchanging their messages. On the

basis of data for Vehicle density and air quality, there could be prediction for future using Various Predication Algorithm. That would be beneficial in taking upcoming decision for reducing many problems.

### References:

- [1]. Chaitanya H P<sub>1</sub>, H. Prasanna Kumar<sub>2</sub> “Automated System for Air Pollution Detection And Control Of Speed In Vehicles”
- [2]. Sonal Deshmukh, Aditya Jagtap, Sameer Inamdar, Ganesh Mahadik, “Real Time Traffic Management and Air Quality Monitoring System Using IoT “
- [3]. Antonio Artuñedo \*, Raúl M. del Toro and Rodolfo E. Haber, “Consensus-Based Cooperative Control Based on Pollution Sensing and Traffic Information for Urban Traffic Networks”
- [4]. Anita kulkarni<sub>1</sub>, T. Ravi Teja ”Automated System for Air Pollution Detection and Control in Vehicles ” /ijareeie.2014.0309061
- [5]. Poonam M Baikar , “Design of PID Controller Based Information Collecting Robot in Agricultural Field”-IJAR,EEIE volume8-2014