

Traffic Congestion Alert System using GSM

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Abstract: The increase in the number of vehicles has led to Traffic congestion. During the busy hours of the day, the traffic is at its peak and there are various problems related to traffic congestion. For the emergency conditions such as ambulance, fire engines to pass through, the congestion possesses a hindrance. To recover for the lost time spent in congestion people tend to hurry and disperse the congestion, causing accidents. The smoke released from the vehicles and the honking of the horns causes air and noise pollution. To overcome these problems, a system has to be designed which can alert for congestion. Traffic congestion alert system using GSM does the needful and thus helps in reducing the traffic congestion.

Keywords: Traffic Jam, Arduino, SMS, GSM modem, Photoelectric sensor.

1. Introduction

The vehicles are increasing day by day has led to traffic congestion. During the busy hours of a day, the traffic is at its peak and there are various problems related to traffic congestion. One such problem is fuel consumption [1]. This increases a heavy revenue loss to the country [2]. For emergency conditions such as ambulance, fire engines to pass through, the congestion poses a hindrance [3]. To recover for the lost time spend in congestion people tend to hurry and disperse the congestion causing accidents [4-6]. The smoke released form the vehicles and the honking of the horns causes air and noise pollution [7]. To overcome these problem, a system has to be designed which can alert for congestion [8].

Traffic congestion alert system using GSM alerts the traffic congestion or clogging condition. It can be implemented in the lanes and junctions which carry heavy traffic [9]. Sensors are placed on roads to monitor the traffic condition. In each junction a transmitter and receiver will be present along with a LCD screen for display of message. When congestion is reported an interrupt is sent to the controller and corresponding alert, LANE BUSY message is sent to the neighboring junctions. The GSM modem is used for transmitting and receiving message on GSM network. The alert message is received on the surrounding junction using GSM. This message will be display on the respective LCD screen [10]. Thus rider is alerted for the congestion condition beforehand. This facilitates the rider in taking an alternate congestion free route, avoiding being stuck in the traffic

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jam. After the particular lane clears, the LANE CLEAR message is also displayed. This helps in diverting the traffic and hence reducing congestion.

2. System Architecture

The block diagram of transmitter as shown in Fig.1, which gives an overall description of the project. Using GSM system the data is transferred from transmitter to receiver. This data will be displayed on both the LCD screens placed at transmitting and receiving side. The sensor are kept on lanes for traffic monitoring. The output of these sensor is given to the AT89C51 microcontroller. The controller process these outputs received and the corresponding busy lane is displayed BUSY on the LCD screen connected to microcontroller. The BUSY message is wirelessly transmitted to the receiving end using the GSM modem. It is processed in PIC microcontroller.

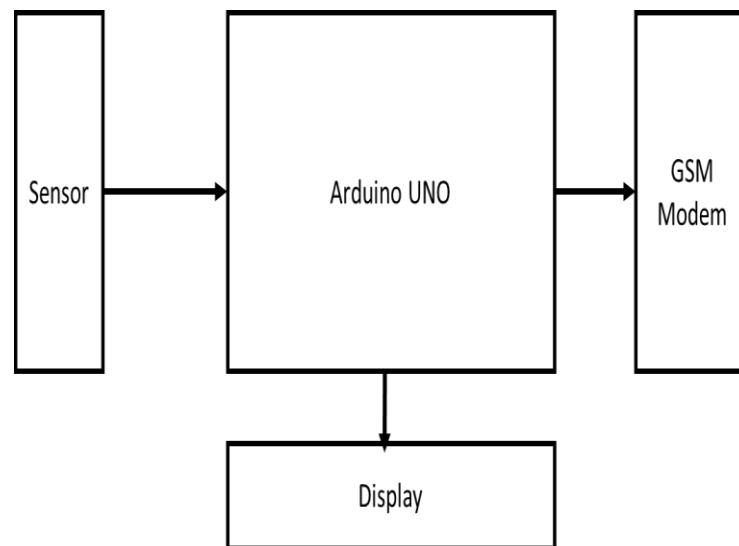


Fig.1 – Block diagram

3. Project Hardware

The hardware includes microcontroller, photoelectric sensor, seven segment display, GSM modem. ATMEL 89C51: Microcontroller 89C51 has 40 pins, 32 pins for parallel port. One port includes 8 pins, so 32 pins formed 4 parallel ports each of them is recognized as port0, port1, port2 and port3. It has 4KB of flash programmable and erasable read only memory and 128 bytes of RAM. It can be erased and program to a maximum of 1000 times.

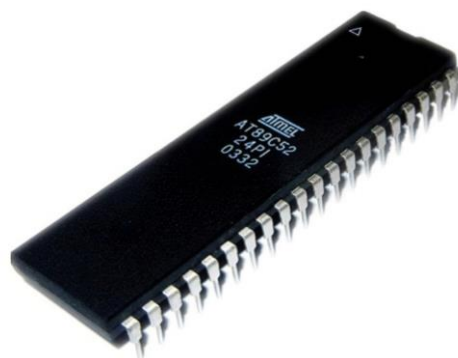


Fig. 2 – ATMEL 89C51

Seven Segment Display: A seven segment display is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot-matrix displays. Seven segment displays are widely used in digital clocks, electronic meters and other electronic devices for displaying numerical information.



Fig. 3 – Seven Segment Display

GSM MODEM: A GSM modem is a specialized type of modem which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM model looks just like a mobile phone. It is used to send and receive SMS.



Fig. 4 – GSM Modem

Photoelectric Sensor: Sensor is a device that measures the physical quantity and converts it into a signal which can be read by an instrument. Photoelectric sensor detect any objects by the light quantities reflected and received.



Fig. 5 –Photoelectric Sensor

4. Result And Discussions

The developed system is efficient to avoid the traffic jam situation with good accuracy. It alerts the rider for the congestion condition beforehand and avoids further deterioration of traffic. This system can be deployed on the already existing GSM network. Message are transferred wirelessly. The maintenance cost of GSM is less. The air and noise pollution can be reduced.

5. CONCLUSION

The traditional methods for controlling the traffic jam don not prevent the vehicle from getting into the jam. Using the developed system gives status of forthcoming lanes and alerts the rider by displaying the busy message if any of lanes is found congested. Hence the vehicle can be prevented form getting caught up in traffic jam. By diverting the traffic away from the congested lane the congestion can be cleared much faster.

6. Future Recommendation

The system can be further improved by creating a website that gives the status of each lane. With the aid of GSM network the traffic status of any remote lane can be monitored and viewed on website from any location. The LCD screen can be setup at the junction to display congestion status more clearly.

7. References

- [1] Chowdhury, T. U., Raihan, S. M., Fahim, A., & Bhuiyan, M. A. (2016, April). A case study on reduction of traffic congestion of Dhaka City: Banani Intersection. In International Conference on Agricultural, Civil and Environmental Engineering (ACEE-16) (pp. 61-65).
- [2] Qian, J., & Eglese, R. (2016). Fuel emissions optimization in vehicle routing problems with time-varying speeds. *European Journal of Operational Research*, 248(3), 840-848.
- [3] Bharadwaj, S., Ballare, S., & Chandel, M. K. (2017). Impact of congestion on greenhouse gas emissions for road transport in Mumbai metropolitan region. *Transportation Research Procedia*, 25, 3538-3551.
- [4] Rhodes, C., & Djahel, S. (2017, September). Trader: traffic light phases aware driving for reduced traffic congestion in smart cities. In 2017 International Smart Cities Conference (ISC2) (pp. 1-8). IEEE.
- [5] El-Seoud, S. A., El-Sofany, H., & Taj-Eddine, I. (2016, October). Towards the development of smart parking system using mobile and web technologies. In 2016 International Conference on Interactive Mobile Communication, Technologies and Learning (IMCL) (pp. 10-16). IEEE.
- [6] El-Seoud, S. A., El-Sofany, H., & Taj-Eddine, I. (2016, October). Towards the development of smart parking system using mobile and web technologies. In 2016 International Conference on Interactive Mobile Communication, Technologies and Learning (IMCL) (pp. 10-16). IEEE.
- [7] Stewart, J., McManus, F., Rodgers, N., Weedon, V., & Bronzaft, A. (2016). *Why noise matters: A worldwide perspective on the problems, policies and solutions*. Routledge.
- [8] Al Najada, H., & Mahgoub, I. (2016, December). Anticipation and alert system of congestion and accidents in VANET using Big Data analysis for Intelligent Transportation Systems. In 2016 IEEE Symposium Series on Computational Intelligence (SSCI) (pp. 1-8). IEEE.
- [9] Sandhya, K. S., & Karthikeyan, B. (2017, March). Automatic traffic diversion system using traffic signals. In 2017 International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2) (pp. 131-136). IEEE.
- [10] KUMAR, A. A., SHENWAI, G., & SRINIVASULU, D. (2016). A Novel System for Traffic Control Based on Emergency Vehicle Clearance, Congestion Control and Anti-Theft Assistance.