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# Anti-Theft and Odd/Even Pollution Control Challan System

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## ABSTRACT-

*This Project is a critically thought, genuine idea to combat the rising problem of pollution in Delhi due to vehicular emissions from private vehicles, especially cars. We came up with this idea after the declaration of odd-even scheme for private vehicles by the Delhi Government under the directive of Delhi High Court. In this system we identify even and odd vehicles automatically which are displayed in LCD. The system automatically checks the status and sends the information to the traffic control police and cuts the challan. In message we send vehicle id, user identity. The system identifies whether the vehicle is valid or not. The RC chip installed in the vehicle is checked and using it the system determines if it has been registered in the police database to be stolen or invalid due to any reason. If so the vehicle can be seized and notification sent to the owner thus ensuring the safe return of the vehicle to its owner. Hence this system provides perfect solution of antitheft security system.*

*When applied on a large scale this system will not only control the pollution levels due to automated regulation of odd and even numbered car but will also provide additional anti-theft measures.*

**Keywords:** RFID module; GSM module; RFID tag; pollution sensor.

## 1. INTRODUCTION

Roadspace rationing is a method of decreasing traffic congestion in a city by limiting the amount of vehicles allowed in a certain area based on license plate numbers. This method is usually exercised during peak periods in heavily congested city. The objective is to reduce vehicles in order to reduce traffic jams and air pollution.

The practical implementation of this traffic restraint policy is common in Latin America, and in many cases, the road rationing has as a main goal the reduction of air pollution, such as the cases of México City, and Santiago, Chile. São Paulo, with a fleet of 6 million vehicles in 2007, is the largest metropolis in the world with such a travel restriction, implemented first in 1996 as measured to mitigate air pollution, and thereafter made permanent in 1997 to relieve traffic congestion. More recent implementations was in Beijing during summer Olympics 2008 and now in Capital of India, Delhi.

Leading the way was the Delhi government, with the controversial odd-even formula for vehicle usage, and then the NGT order followed, restricting sale of diesel vehicles in the state. With media reports questioning the effectiveness of such bans, citing examples of cities like Beijing which have tried to combat in its implementation, it really gives rise to a question, if the hastily proposed changes will actually have the desired effect or not.

## 2. ANALYSIS

The objective of this project is to reduce the human power and chaos created at the roads

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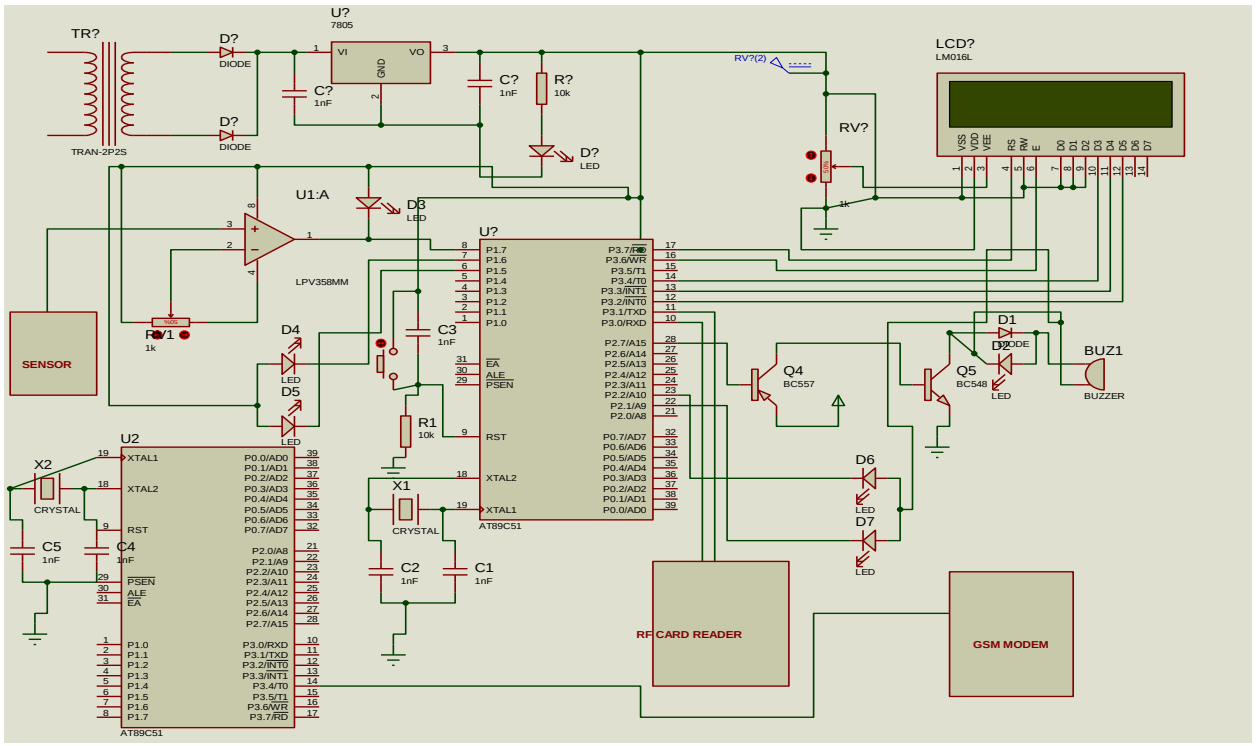


Figure 1(a). Odd Even Challan Circuit

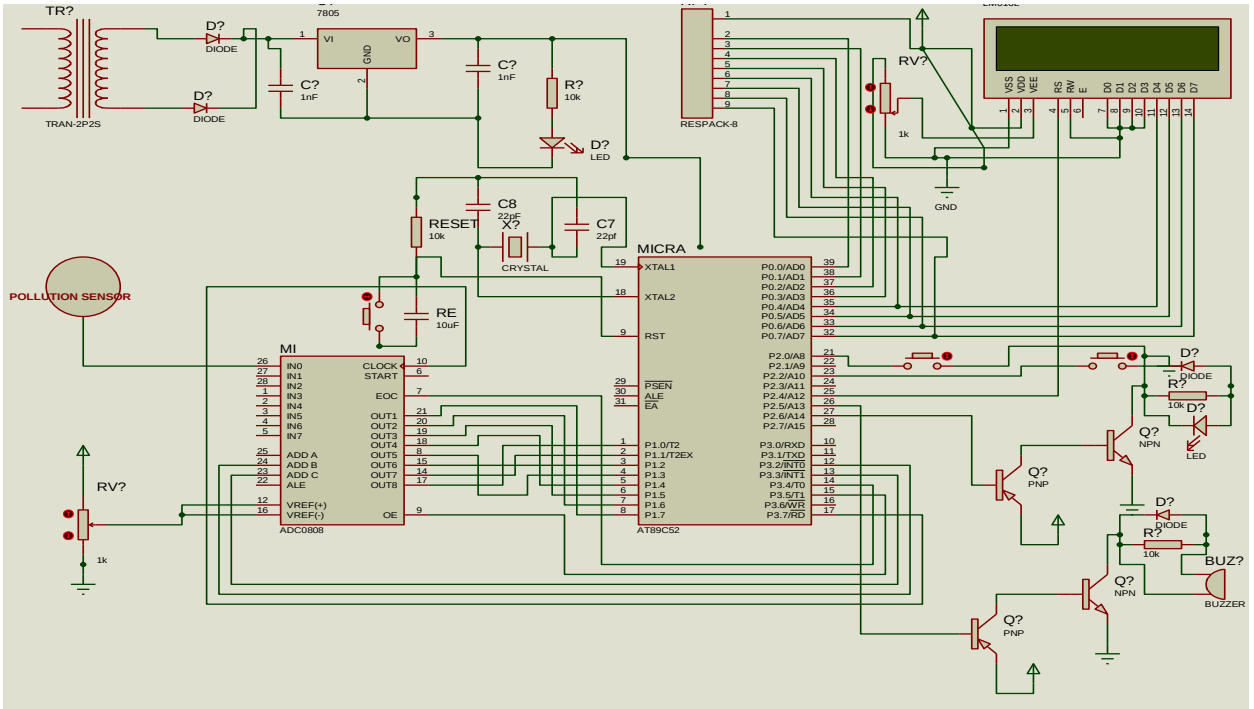


Figure 1(b). Pollution Control Circuit

when violating the traffic rules. Emphasis is done on the RFID module and the GSM module and how best it can be used so that the challan gets issued automatically and the record is sent to the base station. In this the RFID module is used on the engine and the sensor senses the unique identity code of that vehicle. It can also be used as an antitheft measurement where the last location of the vehicle can be traced using the sensor that senses the unique code of the RFID module.

In this project the vehicle having the RFID module passes through the sensors on the road and as soon as it is sensed, it checks the unique code and from the data base it gets the number plate and if the vehicle number is violating the date, an automatic challan is cut and sent through the GSM module to the traffic police and the owner of the car.

The other part of the project deals with the pollution level checking. A threshold level of the pollution is already set and as soon the level of pollution increases the threshold value, the warning sign is displayed on the LCD screen and buzzer produces the sound, indicating the owner that the vehicle is violating the allowed pollution level.

## 3. PROPOSED APPROACH & EXPERIMENTAL SET-UP

In this project there are two circuits, one is for the odd/even challan system and the other one is for pollution detector. The challan system circuit consists of the GSM module and the RFID module and the other circuit consists of the smoke sensor, LCD screen and the buzzer.

We have completed this project in 7 modes. After completing all the desired modes and taking various precautions we achieved this project. In the first mode we designed an overall frame script which included the idea of project, components and the circuit diagram. After doing with the first mode, we proceeded with the second mode and we got a rough estimate about the price of components and then we went to the shop to purchase all the components. In the third mode we have designed the circuit on proteus software and simulation is done on that software.

After completing the initial 3 modes we moved to the fourth mode where we did the coding and used the keil software. In the fifth mode we developed the circuit on the board and did all the soldering work with all the precautions. Finally all the detailed work was done now, it was time for the sixth mode where we burnt the code on the controller IC. Finally the last mode was to check the circuit and to rectify it if there was a fault.

## 4. COMPONENTS USED

| Components | Type | Quantity |
|---|---|---|
| Transformer | - | 1 |
| Capacitor | 1000uf,10uf,27uf | 5 |
| Resistor | 1k,22k,56k,10k | |
| LCD | - | 2 |
| Inductor | 3-5 mh | 5 |
| Switch | - | 5 |
| Transistor | NPN & PNP | 5 |
| Microcontroller | At89s52 | 3 |
| ADC | 0809 | 1 |
| LED | - | 5 |
| RFID Card | - | 3 |
| RFID Tag | - | 1 |
| Pollution Sensor | Mq4 | 1 |
| Crystal Oscillator | - | 4 |

**Table No.1**

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## 4.1. SENSING DEVICE

## (1) GSM MODULE

GSM stands for Global System for Mobile Communications. It is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones.

Figure 2. GSM Module

A GSM module is a specialized type of module or 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 modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

The protocol used by GSM modems for setup and control is based on the Hayes ATCommand set. The GSM modem specific commands are adapted to the services offered by a GSM modem such as: text messaging, calling a given Phone number, deleting memory locations etc. Since the main objective for this application note is to show how to send and receive text messages, only a subset of the AT-Command set needs to be implemented. Setup modem for new message indication.

1) Send SMS messages containing user-defined text.
2) Mechanism for identification of new message received.
3) Read SMS message from a given memory location.

## (2) RFID MODULE

RFID stands for Radio-frequency identification which uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. RFID uses a semiconductor (micro-chip) in a tag or label to transmit stored data when the tag or label is exposed to radio waves of the correct frequency. RFID is only one of numerous technologies grouped under the term Automatic Identification (Auto ID), such as barcode, magnetic inks, optical character recognition, voice recognition, touch memory, smart cards, biometrics etc. Auto ID technologies are a new way of controlling information and material flow, especially suitable for large production networks. The RFID technology is a means of gathering data about a certain item without the need of touching or seeing the data carrier, through the use of inductive coupling or electromagnetic waves.There are three types of tags passive, active and semi-passive. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and they can operate at hundreds of meters from the RFID reader. Semi-Passive uses abattery to maintain memory in the tag or power the electronics that enable the tag to modulate the reflected signal.

A. RFID System Components RFID is a generic term for technologies that use radio waves to automatically identify people or objects. There are several methods of identification, the most common of which is to associate the RFID tag

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unique identifier with an object or person. RFID system (as shown in Fig1) will typically comprise the following:

1) RFID tag
2) RFID reader with an antenna and transceiver
3) A host system or connection to an enterprise system.

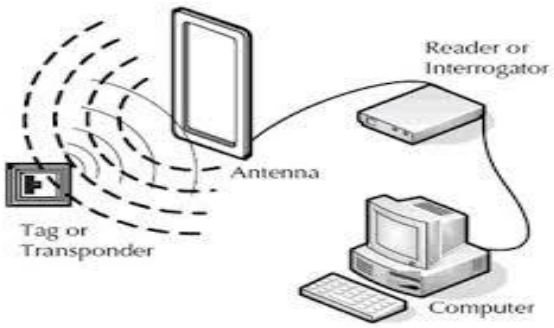
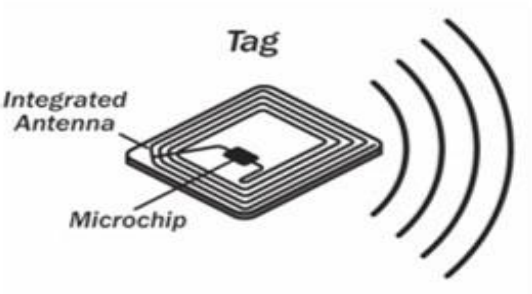



Figure 3. Components of RFID System

**A. RFID Tags**

The tag, also known as the transponder (derived from the terms transmitter and responder), holds the data that is transmitted to the reader when the tag is interrogated by the reader. The most common tags today consist of an Integrated Circuit (IC) with memory, essentially a microprocessor chip, see Fig.4.




**B. RFID Reader**

Reader, as a scanning device, detects the tags that attached to or embedded in the selected items. It varies in size, weight and may be stationary or mobile. Reader communicates with the tag through the reader antenna, which broadcasting radio waves and receiving the tags response signals within its reading area. After the signals from tags are detected, reader decodes them and passes the information to middleware. The reader for a read/write tag is often called an interrogator. Unlike the reader for a read- only tag, the interrogator uses command pulses to communicate with a tag for reading and writing data [3]. RFID reader sends a pulse of radio energy to the tag and listens for the tags response. The tag detects this energy and sends back a response that contains the tags serial number and possibly other information as well. Historically, RFID readers were designed to read only a particular kind of tag, but so-called multimode readers that can read many different kinds of tags are becoming increasingly popular. Like the tags themselves, RFID readers come in many sizes. The largest readers might consist of a desktop personal computer with a special card and multiple antennas connected to the card through shielded cable. Such a reader would typically have a network connection as well so that it could report tags that it reads to other computers. The smallest readers are the size of a postage stamp and are designed to be embedded in mobile telephones.

**C. RFID Antenna**

The reader antenna establishes a connection between the reader electronics and the electromagnetic wave in the space. In the HF range, the reader antenna is a coil (like the tag antenna), designed to produce as strong a coupling as possible with the tag antenna. In the UHF range, reader antennas (like tag antennas) come in a variety of designs. Highly directional, high-gain antennas are used for large read distances [3]. Antenna design and placement plays a significant factor in determining the coverage zone, range and accuracy of communication. Physical interdependencies mean that the antenna gain is linked to the antenna size.

## 4.2 BUZZER

A buzzer is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a pre-set time has lapsed, and

usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound.

## 5. ADVANTAGES AND MITATIONS OF THE TECHNOLOGY

### 5.1 Advantages

Though RFID is not likely to entirely replace commonly used barcodes in the near future, the following advantages suggest to additionally applying RFID for added value of identification:

1) Tag detection not requiring human intervention reduces employment costs and eliminates human errors from data collection,

2) As no line-of-sight is required, tag placement is less constrained,

3) RFID tags have a longer read range than, e. g., barcodes.

4) Tags can have read/write memory capability, while barcodes do not.

5) An RFID tag can store large amounts of data additionally to a unique identifier,

### 5.2 Current issues of concern, limitations

Although many RFID implementation cases have been reported, the widespread diffusion of the technology and the maximum exploitation of its potential still requires technical, process and security issues to be solved ahead of time. Today's limitations of the technology are foreseen to be overcome and specialists are already working on several of these issues.

1) Collision

Attempting to read several tags at a time may result in signal collision and ultimately to data loss. To prevent this, anti-collision algorithms (most of them are patented or patent pending) can be applied at an extra cost. The development of these methods, aimed at reducing overall read time and maximizing the number of tags simultaneously read, still goes on.

2) Standardization

Though the characteristics of the application and the environment of use determine the appropriate tag, the sparse standards still leave much freedom in the choice of communication protocols and the format and amount of information stored in the tag. Companies transcending a closed- loop solution and wishing to share their application with others may encounter conflicts as cooperating partners need to agree in standards concerning communication protocols, signal modulation types, data transmission rates, data encoding and frames, and collision handling algorithms.

## 6. APPLICATIONS AND FUTURE RESEARCH DIRECTIONS

1. An automated odd even checker, thus reducing the burden of manual work on the already limited traffic police force.
2. Additional Anti-Theft measures using RC chips and RF ID thus ensuring the stolen vehicles don't enter or leave a desired perimeter without a proper check.
3. Thus ensuring safe return of vehicles to the owners or at least tracking to the latest area where it was last seen.

Some of the Future Research Works of this project work are as follows:

1. We can use a better pollution sensor that can detect various gases that are responsible for bad air condition in the city.
2. RFID module should be enhanced which can read from various vehicles at a single time, thereby giving more accurate results.

## 7. CONCLUSION

In conclusion this implementation is our way of bridging the gap between the idea and real life implementation of the odd even system. With the ever increasing load on roads with traffic congestion, this automated system definitely reduces the workload on the limited manpower

that any country might have in the form of traffic policemen. Additionally the reduction of vehicles on road has its on merits and will definitely help in the problem of global warming, though slightly but it will help.

Hence we propose a model that is not only applicable but is also feasible and can surely be implemented easily throughout any city

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