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Controlling CO2 in an Ambiance by monitoring the CO2 emission in a vehicles using MG811 Sensor in an automatic RFID Tollways collection system

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ABSTRACT

The steep volume of CO2 emission into the ambience is very high predominately from the ambience of fossil. A well maintained vehicles are more fuel efficient engine, produces fewer greenhouse gas emission. In all over the world more than 60% of vehicles are not properly serviced because of servicing cost and also the poor knowledge in vehicle maintenance. So avoid this problem and also to reduce the greenhouse gas by monitoring vehicle. We are using MG811 CO2 sensor if the CO2 emission of vehicles will be higher than it will automatically detect the money in the toll way collection system

Keywords: MG811 sensor,tollway collection ,RFID based tollway collection,green house gases, co2 gas.

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INTRODUCTION

There are three modes of transportation present in this world, but Road transport is one of the major sources of pollution in the world, contributing to poor air quality, noise interruption, jamming and climate change of the 100 million vehicles on our road and 500 million are cars. So to control the pollution this paper will be very helpful for government.

Greenhouse gases significantly affect the temperature of the globe. Without them, plane temperatures would be on usual about 32.5°C colder than the present average of 14.4°C (57.9°F), creation of a life on Earth as we know it not possible. Greenhouse gases are not naturally a bad thing. But the growing absorption of greenhouse gases in the ambience has been raising usual temperatures around the world.

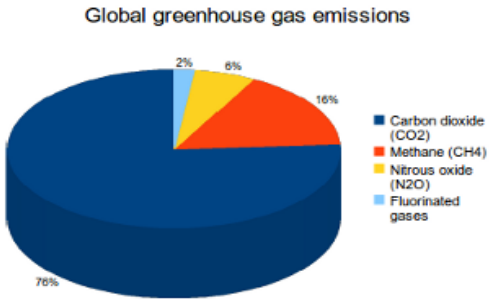

Figure: 1 Global Greenhouse gas emission

CO_2, CH_4 and N_2O are emitted to the ambience through natural processes as well as creature activities from the above figure 1 clearly know that the more greenhouse gas are produced by the Co2 (76%).In this the more Carbon Dioxide are produced by a road transport.

The rest of the paper is organized as follows non automatic/automatic tollway collection .1 MG811 sensor .2 Working principals of the proposed system.3 proposed system algorithm.4 result and conclusion.5

NON AUTOMATIC TOLLWAY COLLECTION/AUTOMATIC TOLLWAY COLLECTION USING RFID:

The model of non automatic tollway collection system is shown in below figure 2. In day to day life saving human energy and time they need transportation, but in olden people are mostly used government transportation so pollution are very low, but now day there are more vehicle present in this world so it's very difficult to screen all the vehicle pollution level.

Figure 2: Non-Automatic tollway collection

So by using this proposed system we can observe each and every automobile so from this we can avoid more Co2 Emission.

Most of the developing countries are using only non automatic tollway collection. In India most of the tollway collections are non-automatic tollway collection it's shown in above figure 2. So when the system is non automatic tollway collection system, then the proposed system needs human power to implement.

Three systems of toll roads exist: open, closed and open road only for electronic tollway collection at entrances and exits. Modern toll roads often, use a combination of the three, with various entry and exit tolls [1].

On an open toll system, all vehicles stop at various locations beside the highway to pay a toll. While this may save cash for the lack of need to construct toll booths at every exit, it can cause a traffic jam while traffic queues at the highway toll plazas. It is also possible for motorists to enter an open toll road after one toll barrier and exit before the next one, thus travelling on the toll road toll-free [2].

With a closed system, vehicles collect a ticket when entering the highway. In some cases, the ticket displays the toll to be paid on exit [1]. Upon exit, the driver must pay the amount listed for the given exit. Should the ticket be lost, a driver must typically pay the maximum amount possible to travel on that highway. Short toll roads with no intermediate entries or exits may have only one toll plaza at one end, with motorists travelling in either direction paying a flat fee either when they enter or when they exit the toll road. In a variant of the closed toll system, main line barriers are present at the two endpoints of the toll road, and each interchange has a ramp toll that is paid upon exit or entry [1]. In this case, a motorist pays a flat fee at the ramp toll and another flat fee at the end of the toll road; no ticket is necessary.

The toll is calculated by the distance travelled on the toll road or the specific exit chosen. In the United States, for instance, the Kansas Turnpike, Ohio Turnpike, Pennsylvania Turnpike, New Jersey Turnpike, most of the Indiana Toll Road, and portions of the Massachusetts Turnpike, New York Thruway, and Florida's Turnpike currently implement closed systems. The Union Toll Plaza on the Garden State Parkway was the first ever to use an automated toll collection machine [3].

The first major deployment of an RFID electronic toll collection system in the United States was on the Dallas North Tollway in 1989 is shown in below figure 3. Highway 407 in the province of Ontario, Canada has no toll booths, and instead reads a transponder mounted on the windshields of each vehicle using the road in the rear license plates of vehicles lacking a transponder are photographed when they enter and exit the highway. This made the highway the first all-automated toll highway in the world. A bill is mailed monthly for usage of the 407. Lower charges are levied on frequent 407 users who carry electronic transponders in their vehicle [4].

The systems use a small radio transponder mounted in or on a customer's vehicle to deduct toll fares from a pre-paid account as the vehicle passes through the toll barrier. This reduces manpower at toll booths and increases traffic flow and fuel efficiency by reducing the need for complete stops to pay tolls at these locations.

Figure 3: Automatioc tollway collection

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There are two types of RFID tag:
1) Active RFID Tag
2) Passive RFID tag

Active tag has battery or power and periodically transmit it's ID signal.
Passive tag has small battery and is activated when the presence of an RFID reader.

In proposing system, it consists of passive RFID reader why because its very cheaper and also its consume low power and it's also available in read and write. The passive tag is shown in below figure4. Signaling between the reader and tag is achieved by several ways, depending on the frequency band used by the tag. Tag operate in both LF and HF band

Figher4: RFID passive tag

By designing a tollgate specifically for electronic collection, it is possible to carry out open-road tolling, where the customer does not need to slow at all when passing through the tollgate. The U.S. state of Texas is testing a system on a stretch of Texas 121 that has no toll booths. Drivers without a TollTag have their license plate photographed automatically and the registered owner will receive a monthly bill, at a higher rate than those vehicles with TollTags.[4]

MG811 SENSOR

Figure : 5 MG811 sensor

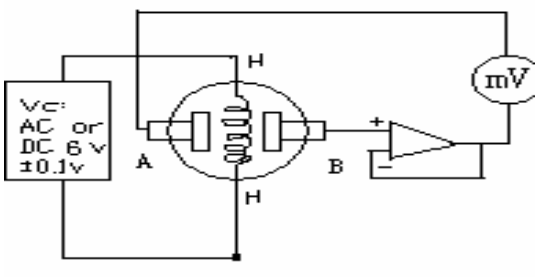

Figure6: Circute diagram of MG811 sensor

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Sensor accepts solid electrolyte cell law, It is composed by the following solid cells: Air, Au|NASICON|| carbonate|Au, air, CO2.When the sensor senses CO2, the following electrodes reaction occurs:

Cathodic reaction: 2Li + + CO2 + 1/2O2 + 2e - = Li2CO3

Anodic reaction: 2Na+ + 1/2O2 + 2e- = Na2O

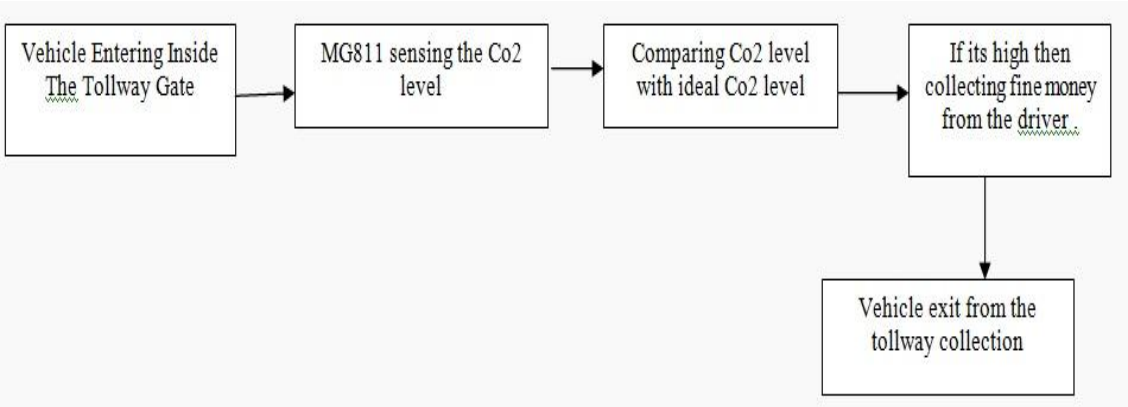

Figure 7: Block diagram of non automatic tollway collection with Co2 sensor

Overall chemical reaction:

Li2CO3 + 2Na + = Na2O + 2Li + + CO2

The Electromotive force (EMF) result from the above electrode reaction, accord with according to the Nernst's equation:

EMF = Ec - (R x T) / (2F) ln (P(CO2))

P(CO2)--CO2--- partial Pressure Ec—Constant Volume R—Gas Constant volume

T— Absolute Temperature (K) F—Faraday constant

From Figure 6, Sensor Heating voltage supplied from another circuit , When its surface temperature is high enough ,the sensor equals to a cell, its two sides would output voltage signal ,and its result accord with a Nernst's equation. In sensor testing, the impedance of the amplifier should be within 100—1000GΩ, Its testing current should be control below
1pA.
Output=350—10000PPMCO2

WORKING PRINCIPAL OF PROPOSED SYSTEM:

In non automatic tollway collection when the vehicle enters inside the tollplasa at the initial stage itself the Co2 level will be measured from the outlet of silencer by using MG188 sensor. The model diagram of non automatic toll gate using MG811 sensor is shown in below figure8. From the sensor the information will pass to the computer which is present inside the money collecting booth now the money collector will check the sensor output with the preloaded threshold level .If the measured sensor output is higher than the preloaded level, then the person should pay the fine depend on the amount of Co2 level higher than the preloaded level and also the money collector will intimate that to the driver. The block diagram is shown in below figure7. If its repeat more than 3 times, then his license will cancel.

In case if the system will be Passive RFID based automatic tollway collection shown in below figure 10, The vehicle information will be present in RFID tag which is pasted on the vehicle so from that we can

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collect the information about the vehicle and below figure 9 automatic tollway collection working model is shown and in

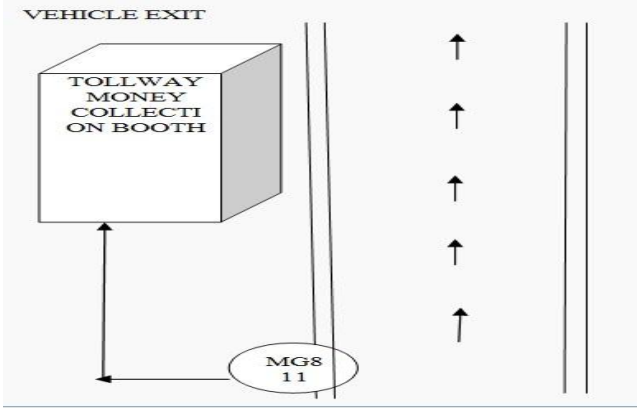

FIGURE 8: Non Automatic tollway collection with Co2 Sensor model

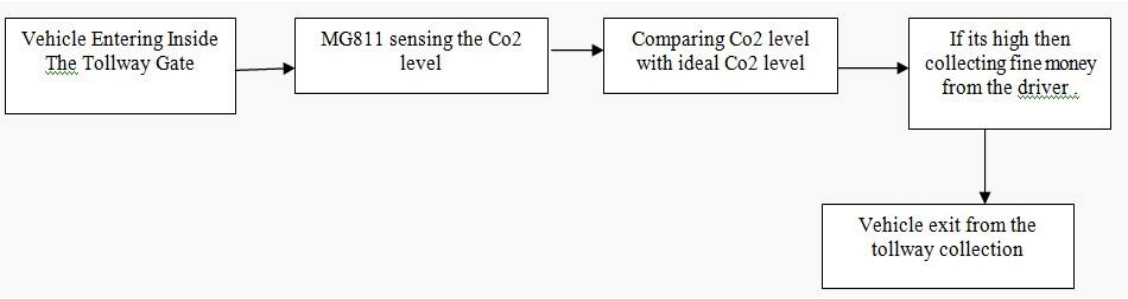

FIGURE 9: Block diagram of Automatic tollway collection with Co2 Sensor

This case when the car enter inside the tollplasa fist RFID tag will read the information and that information will pass to the system which present inside the tollway office, then the MG811 sensor will sense the information and that will also given to the same system now the system will compare threshold level with the sensed output state if it's more than the threshold level for first 3 time it will display the Co2 level high level in LCD display if then also Co2 level will be above the threshold level at the fourth time while its entering than the system automatically detect the fine amount from the card and that will displayed in LCD display board then it also transmit that information to pollution control office.

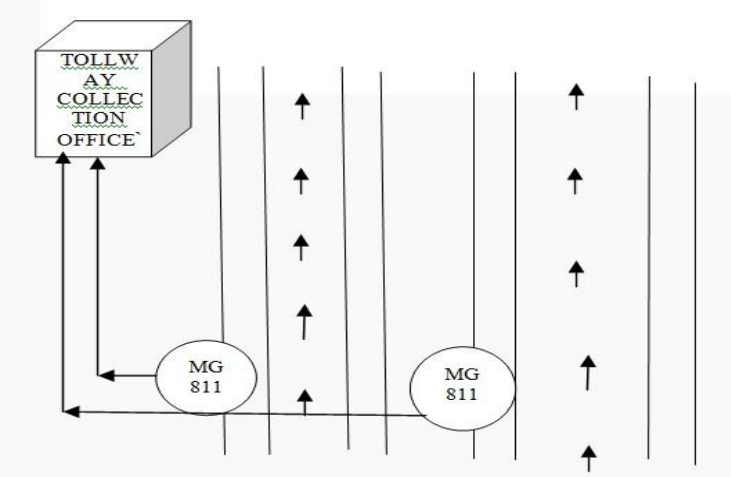

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FIGURE 10: Automatic tollway collection with Co2 Sensor model

PROPOSED SYSTEM ALGORITHM:

1)NON AUTOMATIC TOLLWAY COLLECTION ALGORITHM

STEP 1:The Vehicle enters inside the tollway collection.

STEP2:GM811 sense the Co2 Level.

STEP3: The output of MG811inforamtion sends to the computer which inside the toll booth.

STEP4: The sensor output is compared with a threshold value.

Step5: If it's equal or below, then vehicle needs to pay only tollway chare and they can leave.

STEP6: If co2 level above the threshold level .Fine amount will be collected and the information will also pass to the pollution control office.

Step7: Now vehicle can leave the tollway.

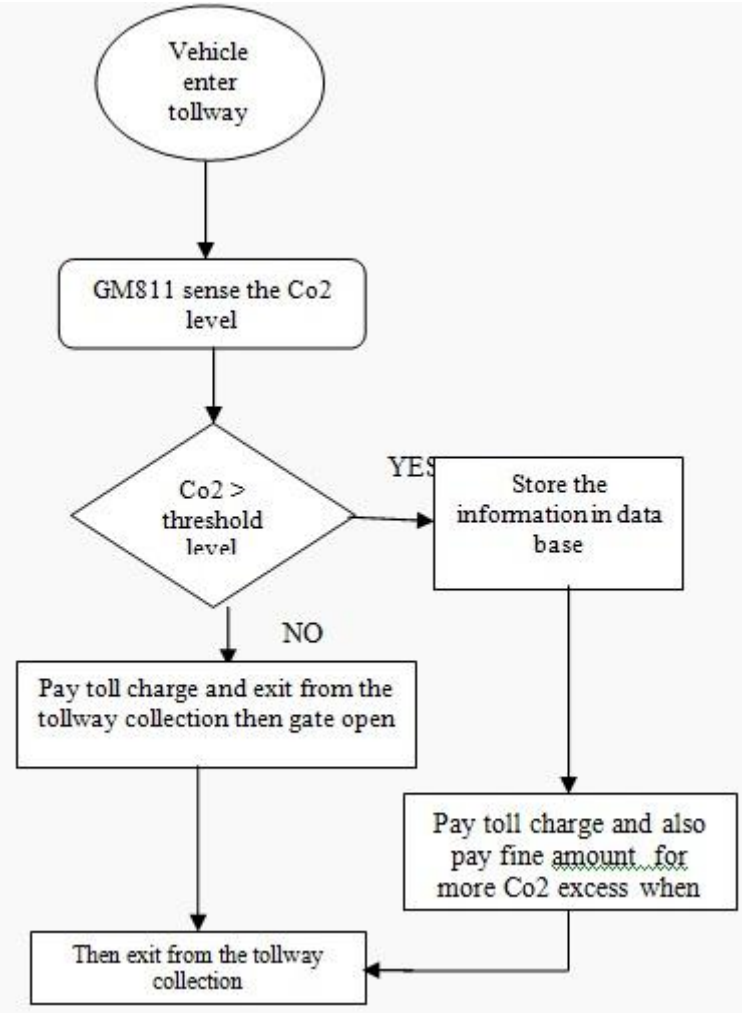

Figure 11: Algorithm for Non-Automatic tollway collection with Co2 Sensor

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AUTOMATIC TOLLWAY COLLECTION ALGORITHM

Step1: The Vehicle enters inside tollway collection.

Step2: GM811 sense the Co2 Level.

STEP3: Compare Co2 level with a threshold value

Step4: If Co2 < threshold value

Step5: The gate opened.

Step6:If Co2 > threshold value

Step7: store information in the database for the first 2 time display the warning message in LCD Display

Step8: The gate opened.

Step9: If Co2 >threshold value more than 3 times.

Step10: With the toll charge, detecting the fine amount and display the information on the LCD Display

Step11: Send the information about the vehicle to pollution control officer.

Step12: The gate opened.

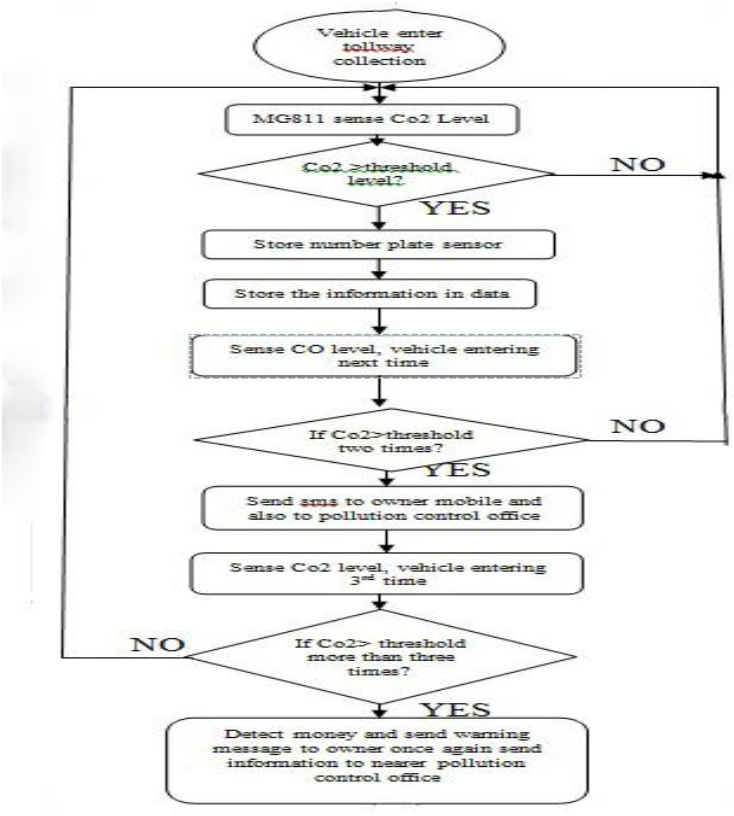

Figure 12: Algorithm for Automatic tollway collection with Co2 Sensor

CONCLUSIONS

The future highway system will be digital and some developers and poor country will be non automatic tollgate. So in this case the proposed system will be very helpful for controlling pollution caused by vehicle. So by using proposed system 20% pollution may controlled. Here in this project, it mainly described around only a Co2 gas control. In future may use more sensor for finding a CO, CIF and other greenhouse gas that produced by the vehicle.

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