AUTOMATIC TOLL PAYMENT, ALCOHOL DETECTION, LOAD AND VEHICLE INFORMATION USING INTERNET OF THINGS & MAILING SYSTEM

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Abstract— **Present days, the technology has emerged in such a way that it can provide solutions to any real life problems. One such solution to the problem of collecting toll payments efficiently is RFID. When a vehicle passes through the toll gate, by using RFID the vehicle can be detected easily and the amount will be deducted from the user's prepaid account automatically. In order to detect the drunken drivers, Alcohol sensor(MQ135) is fixed near the driver steering. If the alcohol consumed by the driver exceeds the limit detected by sensors automatically accelerometer reduces the speed. The load detector fixed at the toll gates checks the load of heavy vehicles if load exceeds the limit, the barrier remains closed and the camera captures a snap of the vehicle. And also the notification will be sent to the consignment officer for registering complaint against the vehicle and also penalty amount will be deducted from the owner's account.**

Keywords— RFID Tags, Alcohol sensor, IR sensor and load cell, Email Notification.

I. INTRODUCTION

These days, people face traffic near toll gates during the payment. To overcome this issue, this paper provides the solution by an automatic toll e-ticketing system. It would help to detect the vehicle's information when getting through the toll gates. The technology uses IR sensors to detect the details of the vehicle. RFID uses electromagnetic fields to automatically identify and track tags attached to objects. Existing methods uses technologies such as Ultrasonic Sensors, Vision Sensors etc., which are highly impractical, non-commercial and non-comparable to RFID technology. When it comes to practical implementation and usage, We reduce the restriction by introducing a RFID based localization system that unequivocally and instantly decides the places of versatile articles. RFID is the unique solution for object identification because current strategy used cannot be changed in further process. RFID tags which contains information of particular vehicle can be used to deduct the amount from user prepaid account which reduces the time and manual power.

We know, accident rates got increased these days due to overspeed and drunken driving. To minimize this, Alcohol Detectors will be installed in vehicles. MQ135 alcoholic sensor is used which would sense the alcoholic driver and automatically decelerates and helps to avoid accidents. Load checkers are installed at the toll gates to weigh the motor vehicles. If the weight exceeds the permissible limit, then the penalty will be charged for the exceeded limit from user's prepaid account and also an e-mail alert will be sent to the consignment officer concerning the vehicle.

II. LITERATURE SURVEY

[1] Proposed NFC(Near Field Communication) reader method which is placed at certain distance before the tollgate, this reader collects the identification number of the car and send the data to the tollgate system. Then system sends a query to the main office for the data and will retrieve back the data and valuable documents belonging to the car. If no error found than barrier will open otherwise barrier remains closed. [2] In this system, it consists of RFID tags, RFID reader and a user interface. RFID tags attached with many different objects and RFID reader will track the respective object accordingly. [3]Proposed the accessibility of an organized objects is achieved on condition that the self localization of object is secured with a decent accuracy.[4] developed a scalable and reliable RFID-based localisation framework which accurately and rapidly determines the positions of stationary and mobile objects.[5] put forward the GPS system that detect the exact location of vehicle with corresponding longitude and latitude and than GSM will send messages to relatives of the driver. Here they used ultrasonic sensor which sensing the limited distance from other vehicles, and than sensor will be activated and send location info messages to relatives of the vehicle.[6] This paper describes the preliminary efforts towards a system which uses a smartphone-based wireless body area network with specific applications in psychophysiological assessment and more general applications in context-aware computing and emotion-oriented computing.[7] In this paper, a program installed on the mobile phone computes accelerations based on sensor readings, and compares them with typical drunk driving patterns extracted from real driving tests. [8] In this paper, used Water clustering detection (WCD) method to detect the alcoholic drunken driver by positive or negative charged water clusters in breath. [9]suggested the testing of alcohol by moving the car in a zig-zag manner is obtained

by steering performance and detects the reaction time which results in detecting alcoholic consumption. [10]Alcohol consumption is detected by using an optical fiber tip.This directly detects the alcohol by calculating the refractive index in quality of alcohol. [11]studied on hyperbolic postioning location using RFID tags.Tagged location is obtained when the target is in hyperbolic lines. [12] clone detection verified the information has written into tags in order that set of all information data in the collected tag events forms a statistics sequence. Real tags are often differentiated from clone tags as a result of the discrepancy which are constructed as products in their verification sequences flow on the available chain. flow along the supply chain. The verification sequence together with the business sequence actions developed during the RFID supply chains yield two tracks which may be assessed to detect the presence of clone tags. [13] supported RFID application and multi-Agent simulation, an information tracking and supply mechanism for ready made supply chain is planned. The analysis builds the data connections on the complete provide chain using RFID and creates the likelihood of zero inventory of prefabricated components on the available chain.[14] used Elliptical Curve Cryptography(ECC) for describing an efficient and lightweight authentication protocol. It becomes safe because of mutual authentication between the server and tags during protecting against replay, eavesdropping, tracking and cloning risks.[15] The proposed tag, features a compact size (radius 20 mm, height 5 mm) and a decent performance with a simulated most reading vary of 9.7 m (4.0 W EIRP) within the RFID FCC band (902-928 MHz). Furthermore, the fabrication time and cost has consequently reduced by the 3D printing technology.

III. PROPOSED SYSTEM

In fig 1. When the vehicle passes through the toll on highways, toll tax is being collected manually which is a time consuming activity. To facilitate with ease, the proposed system aims to employ automatic toll payment Radio frequency identification(RFID), which is fixed at the toll in order to obtain the unique identity number of the vehicle which is approaching the toll. Another security added to the system is MQ135 which is designed to detect the level of alcohol consumption of the driver. The sensor device is fixed on the steering.Once it detects that driver has consumed alcohol, it automatically decelerates. Load checker sensor square measure is fixed at the toll gate to figure out the load. The senors square measure accustomed check load, monitor and the amount is charged as penalty for the additional load within the vehicle. If the load level exceeds quite a particular limit, then the complaint will be registered automatically. The camera captures a snap of the vehicle and it is transferred to the costumer and corresponding officer via e-mail.
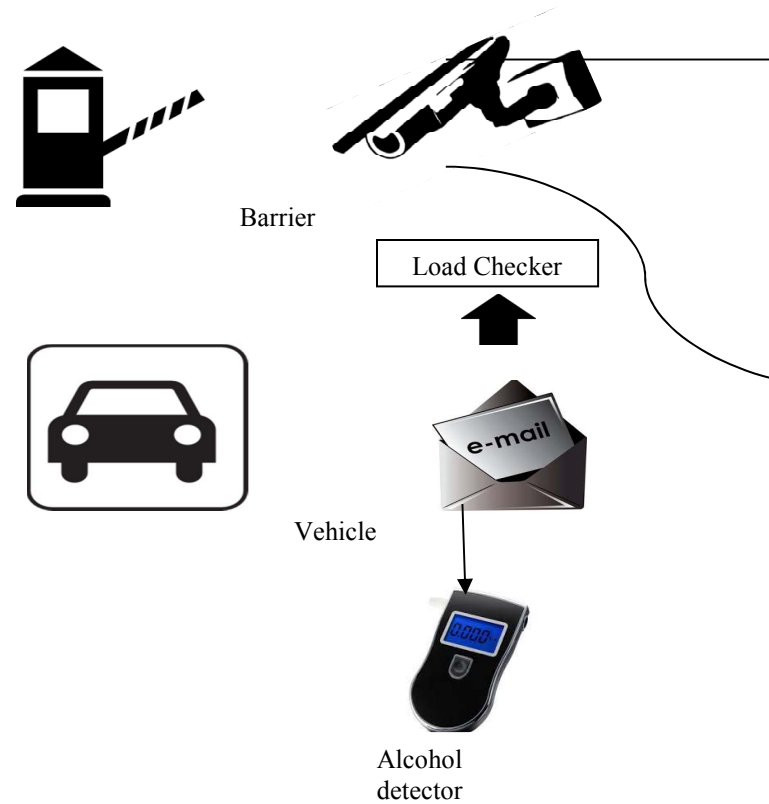

Figure 1. Automatic toll payment, load & vehicle info monitoring using IoT & mailing system.

IV. Implementation

A. Board

Fig 2. Shows The system uses MSP 430 Launch pad microcontroller. It has on-board emulation for programming and debugging and features a 14/20 DIP soket,on-board buttons LED's & Booster pack plug-in module pin outs that supports a wide range of modules for added functionality such as wireless and displays.
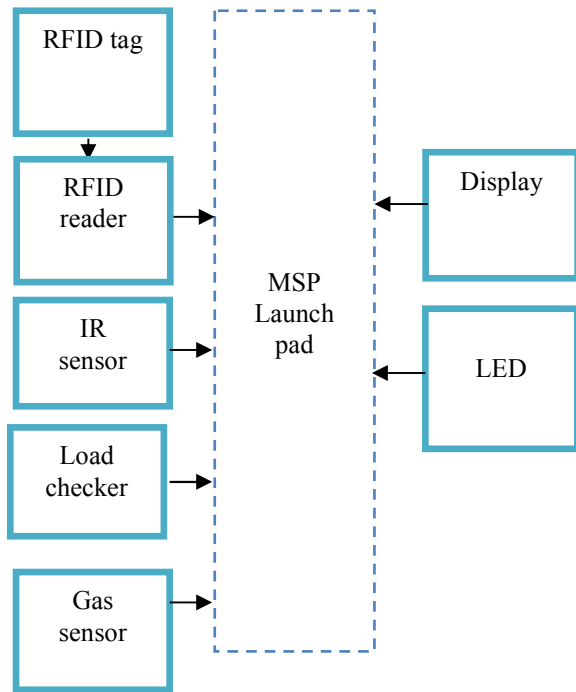
Figure 2 Block diagram of MSP launch pad microconroller board

B. RFID

Fig 3.Shows RFID is a technology used widely for tracking a particular object. There are 3 kinds of RFID tags active, passive and battery assisted tags. In our system we are using RFID tags for reading each vehicle information with the help of RFID reader. It has the unique identification number which detects the vehicle. The RF signals then are received by an RF receiver at the toll plaza, which send the data to the computer's parallel port. A software program would be running on the computer which retrieves the vehicle details from the vehicle registeration database. Synchronized information will help to approximate toll tax and then the amount deducted from the pre-paid account of the vehicle's owner.
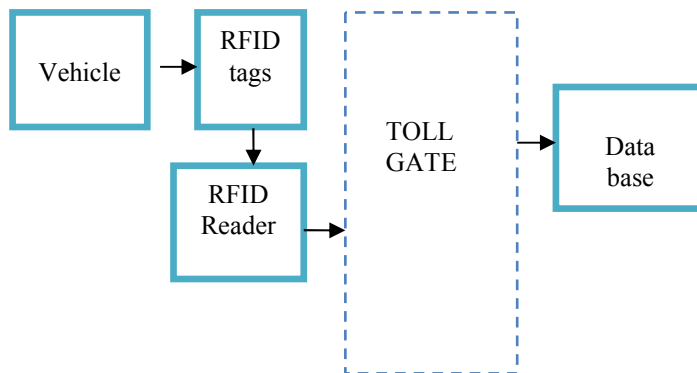

Figure 3 RFID

A. IR Sensor

In Figure 4 . IR Sensor is used to detect object which is near, by emitting infrared raditions. This sensor has LED flash, when it detects the object which results in glow of LED. In this project we are using Infrared Rays to detect the vehicle which is coming near the toll. When a vehicle approaches the toll IR sensor detects the vehicle and barrier is closed automatically if the load exceeds the limit.
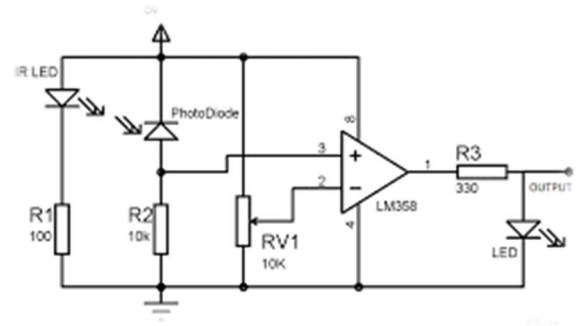

Figure 4 . IR sensor detects the vehicle

B. Alcohol detector:

Figure 5.Says about Alcohol detector. Alcohol detector is used to detect the drunken driver. This system is developed wih the help of an embedded kit which will be placed in the vehicle. If the driver is drunk, the car speed will be automatically reduced, and will be under the control of the hardware used in the kit.

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Figure 5 Gas Sensor

C. Load Checker

In Figure 6. Load checking is another important module of this project. Recent days, many vehicles are loaded with weights exceeding its limit. The load checker fixed at toll gates helps to stop the vehicle which exceeding the load limit. Load cells placed near toll barrier, checks simultaneously with toll payment system. When limit is over the permitted allowance the respective amount will be deducted and sent copy of complaint to consginment officer via E-mail.

Figure 6. Load checker

V. TRANSMISSION OF DATA

Data transmission occurs through RFID tags.When RFID tag is read by RFID reader the Vehicle code is generated, in main data base a communication between vehicle and toll plaza occurs. An RFID device transmits electromagnetic waves between the objects. In this part RC522 Passive RFID card is being used. It has capability of receiving and sending the data within the range of 10m, The vehicle number is transmitted to the data base and with that details of vehicle respective amount is deducted from his/her prepaid account.

In Fig 7. RFID reader has the frequency from 125 kHz, Operating at a supply of 5V. This type of cards are called passive tags because they are active only at time when it arrives near the RFID reader. With a wide range of frequency supply, active RFID sends the information and operates in a wider range. To handle the RFID, the code is embedded in MSP launch microcontroller board using assembly language.

Figure 7. RFID tag and Reader

Results and Discussions
a. Sending E-mail

In Fig 8.The Mail will be sent to the person who have registered their details with respect to the RFID tags. Mail will be sent with the details of amount deducted and the reason for decuction. Primarily it gives the details of toll payment deduction and location further it checks the load, if load is exceeding weight then amount deduction for exceeding the permitted limit is also sent with that mail. In this system, we are adding the amount deducted for druken driving, with total sum deduction and area of toll together which will be sent via E-mail to respective authorized RFID tag.
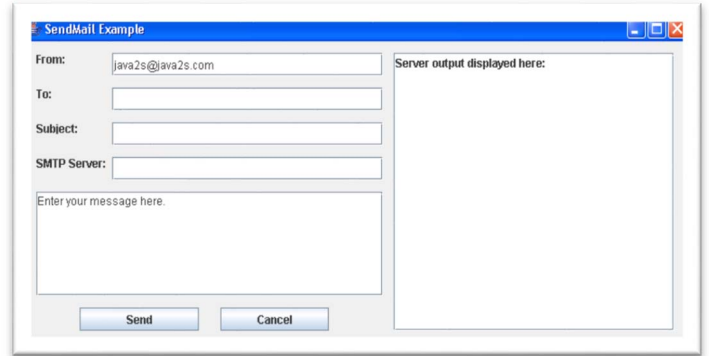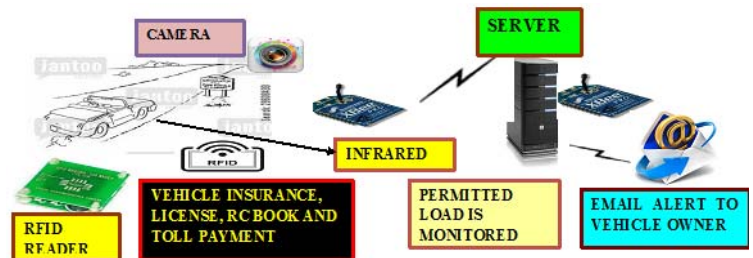

Figure 8. Sending mail

Fig 9. Architecture diagram

VI. CONCLUSION

In this paper, the system have proposed the automatic toll collections by using the Micro controller, RFID tags and IR sensors. When a vehicle reaches near the toll gate the fee will be automatically deducted from user account. MQ135 sensors attached inside the vehicle near the steering to check for the alcohol consumption of the driver. By implementing this system in the vehicle, a safe journey is possible, which would decrease the accidents and also reduces the accident rate by reducing the speed of the vehicle automatically, if the sensor detects the drunken driver. The load checker checks the load of the heavy vehicle, if the load exceeds the limit then the penalty amount will be deducted for the exceeded limit and the camera captures a snap of the vehicle and also automatically an e-mail alert will be sent to the consignment

officer regarding the vehicle. As future enhancement this RFID tag can be used to store more information about the vehicle and it can be used for investigation to catch the thief in case if the vehicle is stolen. And can also be extended to find the location of the vehicle by collecting the information from the toll gates.

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