

EASY PAY - Automated Toll and Fine Collection System

Adarsh R¹, Adithyan D², Akshay Kumar R³, Jithin B⁴, Baby V⁵

^{1,2,3,4}Student, Dept. of Computer Science Engineering, Nehru College of Engineering and Research Centre, Kerala, India

⁵Lecturer, Dept. of Computer Science Engineering, Nehru College of Engineering and Research Centre, Kerala, India

Abstract - Road safety focus on the safety of all the living organisms. So in order to ensure the safety, every individual should follow some rules. In this rapid world, day by day the no of vehicles are increasing. So it is very much difficult to monitor each and every vehicle manually that they don't break any of the road safety rules. One of the major rule broken by the people is the traffic signal violation. Also manual toll collection is something that makes the road travelling more harder and time consuming. So in order to solve these problem both the traffic signal violation fine collection and the toll collection can be made automatic. Easy pay provides unique Rfid tags for every vehicle. By using a Rfid reader it is easy to identify every vehicle since every tag is unique. By using this tag user can easily pass through the automatic toll gates. To make automatic payment an android application is provided where the user must create their account and should maintain a minimum balance in their wallet. In case of traffic signal violation if a user try to pass through during the red signal, then the rfid reader at the signal lights will identify the vehicle and the fine amount will be automatically deducted from the user wallet.

Key Words: RFID Tag, RFID Reader, Arduino UNO, Arduino NANO.

1. INTRODUCTION

Automation has made its way into everyone's lives and is slowly seeping to everyone's lifestyle. There is a wide spectra of places where this can be used for the betterment of the society. The number of vehicles on the road are increasing at an alarming rate because of which the condition of the roads is worsening quickly. Not only the condition of the road but also the travelling of each individual is getting worse day by day. Along with this one of the major crime done by the people is the breaking of traffic rules, which makes the travelling and safety of each individual more worser[1]. People have no fear to break the traffic signals or traffic rules since there is no proper system to manage and monitor each individual vehicle. Currently used system is done manually by the police and road transport department. Since it is done manually it is hard to monitor each and every vehicle. So by using an automated method this problem can be easily solved. But no vehicle owners will not simply place an unique identification key in their vehicle so as to pay fine for breaking the traffic rules unless it is made compulsory by the respective authority[2].

But the problem which occurs here is that by making it compulsory the people will place the key in their vehicles, but if the use of the key is only for identifying the rule breakers then the people may start using many counter measures so as to escape from paying the fine. So the solution for this problem can be found by using easy pay. Easy pay system provides an automated tax toll collection system along with an automatic signal break fine collection system which will help to avoid traffic congestion as well as to reduce the number of no of road accidents caused due to the breaking of signal lights[3]. Automatic toll collection system allows to reduce the traffic congestion causing at the toll centers. It also help to reduce the amount of vehicle pollution and as well as fuel consumption since the need for acceleration and deceleration is reduced to a greater extend.

2. OBJECTIVES

The main goal of Easy pay is to increase the safety of the each individual travelling through the road. Majority of these accidents are due to the breaking of traffic rules. Many life's are lost since the ambulances are not able to reach the destinations on time due to traffic blocks. Easy pay is a system is designed in such a way that it increases the safety of the people and also increases the revenue of the government by collecting the fine amount instantly[4]. There are many situations such as other state vehicles will not respond to the summons sent by the higher authorities, which create a high revenue loss to the government. So Easy pay focus to increase the safety of the people along with a digital toll collection system which will be less time consuming and automated.

3. PROPOSED SYSTEM

Easy pay is a system is designed in such a way that it increases the safety of the people and also increases the revenue of the government by collecting the fine amount instantly. There are many situations such as other state vehicles will not respond to the summons sent by the higher authorities, which create a high revenue loss to the government. So Easy pay focus to increase the safety of the people along with a digital toll collection system which will be less time consuming and automated. Automation has made its way into everyone's lives and is slowly seeping to everyone's lifestyle. There is a wide spectra of places where this can be used for the betterment of the society. The number of vehicles on the road are increasing at an alarming rate because of which the condition of the roads is worsening quickly. Not only the condition of the the road but

also the travelling of each individual is getting worse day by day. Along with this one of the major crime done by the people is the breaking of traffic rules, which makes the travelling and safety of each individual more worsen.

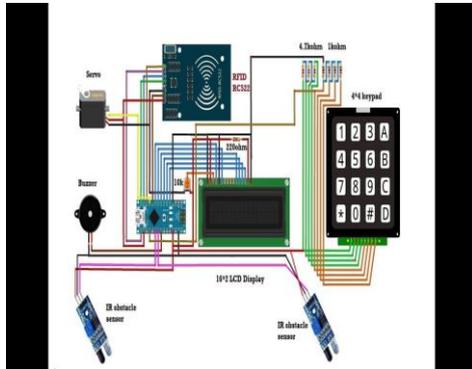


Fig 1:- Toll circuit diagram

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notification to process the recharge. If the user has the required balance in his account then the toll amount will be deducted from his account and the servo motor gets initiated by the arduino to open the toll gate.

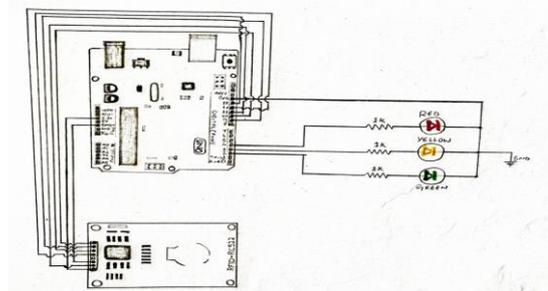


Fig 2:- Signal circuit diagram

After the payment user gets the complete information in his easy pay application such as the deducted toll amount, the account balance so that there will be no confusion in the future. Also there will be no issues of over toll taking or no wastage of time in changing the money. The passenger also need not to worry for the receipt since everything is up to date in the application. Since everything is done automatically there is no chance for any illegal entries and also the government will not have any loss in its revenue. In case of signal light fine collection, the same system in the toll centers are used with some changes. The signal light fine deduction system is designed in such a way that the RFID reader gets on the part where the signal light red is currently on. There will be fine marking line for every signal light such that if a vehicle pass this line during the red signal light, then the fine amount fixed by the government will get deducted from his easy pay account. If the vehicle does no have the required balance in his account then his easy pay wallet balance will be made to a negative value by subtracting the fine amount. So when a vehicle passes the fine marking line during the red signal light, then the RFID reader detects the RFID tag[7]. The collected information is then passed to the arduino board. The arduino board passes the information to the python program through its port. The python program deducts the amount from the user easy pay wallet.

Using the admin login, the authorities can monitor each and every vehicle. By using this they can easily identify the vehicle which breaks the traffic rules many times and take necessary actions.

4. SYSTEM DESCRIPTION

4.1 RFID Tag

RFID is a wireless data collection technology that uses electronic tags that contain an integrated circuit chip to store data. The method of identifying objects and of transferring information about the objects' status via radio frequency waves to a host system. The case of passive RFID tags contain no power source of their own, such as a battery. Tags

are energized by the reader device's transmitted radio frequency energy, then use that harvested radio frequency energy to transmit return signals, which the reader device can interpret.

4.2 RFID Reader

Radio frequency identification systems can be classified by the type of tag and reader. The Passive Reader Active Tag system has a passive reader which only receives radio signals from active tags battery operated, transmit only. The range of a PRAT system reader can be adjusted from 1–2,000 feet, allowing flexibility in applications such as asset protection and supervision.

4.3 Arduino UNO

Arduino Uno is a microcontroller board. It is an open-source electronics platform mainly based on AVR microcontroller Atmega328. Arduino Uno comes with USB interface, it has 6 analog input pins, 14 I/O digital ports which are used to connect with external electronic circuits. From 14 I/O ports, 6 pins can be used for PWM output.

4.4 Arduino NANO

Arduino Nano is a small, compatible, flexible microcontroller board, based on ATmega328p (Arduino Nano V3.x) / Atmega168 (Arduino Nano V3.x). It comes with exactly the same functionality when compared to Arduino UNO but quite in small size. It has an operating voltage of 5V and the input voltage can vary from 7 to 12V. The Arduino Nano Pinout contains 14 digital pins which includes 8 analog Pins, 2 Reset Pins & 6 Power Pins. All these Digital & Analog Pins are assigned with multiple functions but their main function is to be configured as input or output.

4.5 IR Obstacle Sensor

IR technology addresses a wide variety of wireless applications. The main areas of IR technology is sensing and remote controls. In the electromagnetic spectrum infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region.

4.6 Servomotor

The servomotor is a closed-loop servomechanism which uses position feedback to control its motion and final position. Its input control is a signal (either analogue or digital) representing the position command for the output shaft. Its Motor is paired with some type of position encoder to provide position and speed feedback.

5. RESULT AND DISCUSSIONS

The EASY PAY application focus to reduce the manual work and to bring a full automatic system. EASY PAY merges both toll collection and traffic signal violation fine collection into a single system. EASY PAY system focus to increase the road safety of each passengers, increase the revenue of the government by collecting each and every payment and penalty amount without any loss. It also helps to reduce the

fuel consumption, congestion in the toll plaza and to reduce the amount of air pollution. So EASY PAY focus on overall welfare of the people, government and country. EASY PAY is low cost application with multiple functioning feature. No other existing system provide these features in a single application. It will help to reduce traffic signal violation, reduces the block at the toll booths. Hence the proposed project will be the future of toll tax collection and fine collection system.



Fig 3:- Easy pay App

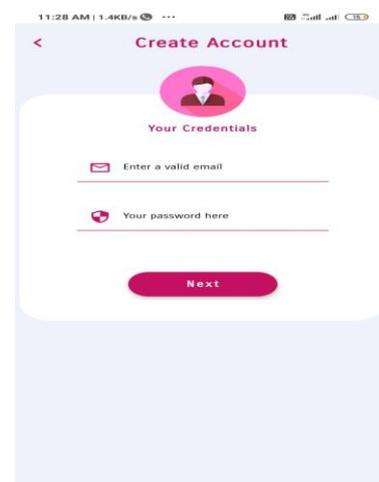


Fig 4:- Create Account



Fig 5:- Home Page

6. CONCLUSIONS

After doing the project it is found that introduction of EASY PAY system can be beneficial for the country and its people. The main benefits are less time consuming, fuel savings and traffic reducing. It has the best benefit that the government is not losing any revenue from toll collection. Moreover the extra option of signal violation identification reduces the traffic rule violations. People will also get lots of benefits among them the main benefit is fractional part of toll charge will deduct as fraction value. So no chances of people paying a round figure amount for fraction value. The EASY PAY application aims to change the current toll tax collection systems. Apart from the toll tax collection it also include fine collection from the vehicles that breaks the traffic signal. Presently the current system for traffic signal violation is manual. So to make all these process much comfortable and efficient EASY PAY can be a good solution. Apart from the current system EASY PAY is multiple functioning application. EASY PAY is low cost application with multiple functioning feature. No other existing system provide these features in a single application. It will help to reduce traffic signal violation, reduces the block at the toll booths. Hence the proposed project will be the future of toll tax collection and fine collection system in our country.

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