Road Safety System

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***Abstract*— As we are slowly reaching the age of electric vehicles, there has also been a lot of development in the field of road safety and ways to reduce accidents and crashes due to driver negligence. Driving without a valid license is one of the major causes of road accidents. Along with this we also face a major issue behind the mass use of electric vehicles which is the battery charging time and lack of charging stations. So here we propose a regenerative braking system with power monitor. This system allows a vehicle to generate energy each time brakes are applied as well as track the amount of power generated. As soon as brakes are applied, the friction lining touches the drum from inside and moves the motors connected to lining in same direction, thus generating electricity using motors as dynamo. Also we will use a circuitry to track the battery voltage generated with each press along with the count of brake press. Thus this system allows for charging security system battery each time brakes are applied. For the security system, our aim is to develop a system that verifies the details of the driver, and classifies him/her to be safe to drive the vehicle. The security system will limit the vehicles operation on the basic of 3 parameters. The basis of Acceptance or rejection will mainly be on 3 main factors namely, expiry date, vehicle ownership and category of the vehicle for which the driving license is issued. Verification of smart driving license card would enhance the road safety and vehicle security. The security system will use a microcontroller which is interfaced with RAM and ROM of the sensor. Along with this aim we would also like to advance the safety of the vehicles, in terms of security, its ownership and theft protection. The system will increase road safety and reduce vehicle theft. The Setup could be made more advanced and feature rich with the help of a pinhole camera and GPS tracking device. The image captured by the camera and GPS data may be send to owner's mobile phone and the data can help identify the thief and retrace. The system can also be integrated with other safety and crash prediction systems.**

PROBLEM DEFINITION

We seem to be facing a major issue behind the mass use of electric vehicles is the battery charging time and lack of charging stations. So here we propose a regenerative braking system. This system allows a vehicle to generate energy each time brakes are applied. The stronger the brakes, the more power is generated. We use friction lining arrangement in a brake drum. As a drum rotates the friction lining does not touch the drum. As soon as brakes are applied, the friction lining touches the drum from inside and moves the motors connected to lining in same direction, thus generating electricity using motors as dynamo. In general, RBS is a
system can recuperate mechanical energy to electrical energy during braking action. This system allows the vehicle kinetic energy to be converted into electrical energy and can be stored in the battery. This saved energy will be used again to move the vehicle. Thus this system allows for charging a battery each time brakes are applied, thus providing a regenerative braking system. It moves us another step ahead towards a pollution free transportation system. There has been a lot of development in the field of road safety and ways to reduce accidents and crashes due to driver negligence. Driving without a valid license is one of the major cause of road accidents. The system will limit the vehicle operation on the basic of 3 parameters. Verification of smart driving license card would enhance the road safety and vehicle security. The right equipment consists of various hardware and software systems to develop this system. The Licentronic system uses a microcontroller which is interfaced with RAM and ROM of the sensor.

COMPONENTS

In Regenerative Braking System

DRUM WHEEL

SUPPORT FRAME

SHORT ARM

MOTOR WITH LONG ARM

In Security System

RFID SCANNER

RFID CHIPS

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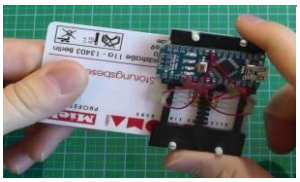
CARD READER

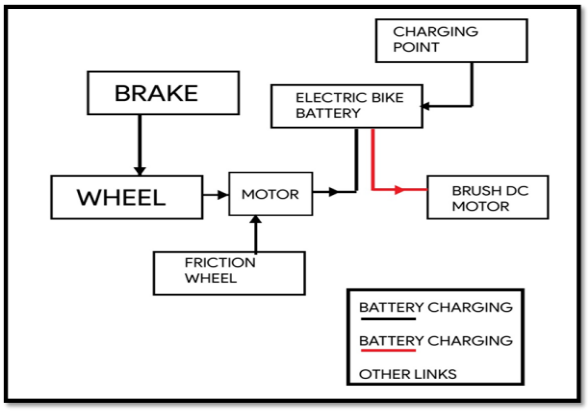


ARDUINO WITH GPS

WORKING

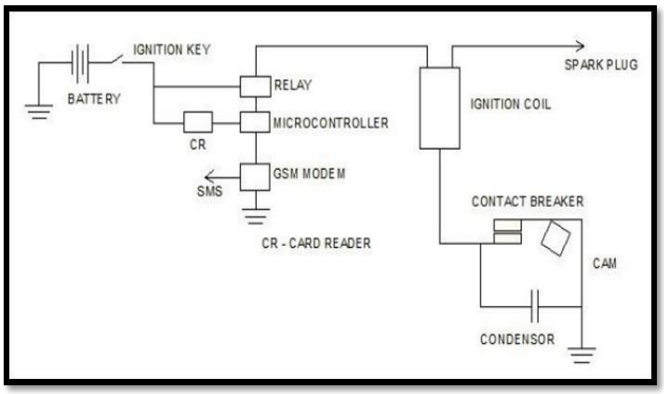
Regenerative braking is used in vehicles that make use of electric motors, primarily fully electric vehicles and hybrid electric vehicles. One of the more interesting properties of an electric motor is that, when it's run in one direction, it converts electrical energy into mechanical energy that can be used to perform work (such as turning the wheels of a car), but when the motor is run in the opposite direction, a properly designed motor becomes an electric generator, converting mechanical energy into electrical energy. This electrical energy can then be fed into a charging system for the car's batteries.

Paper Title

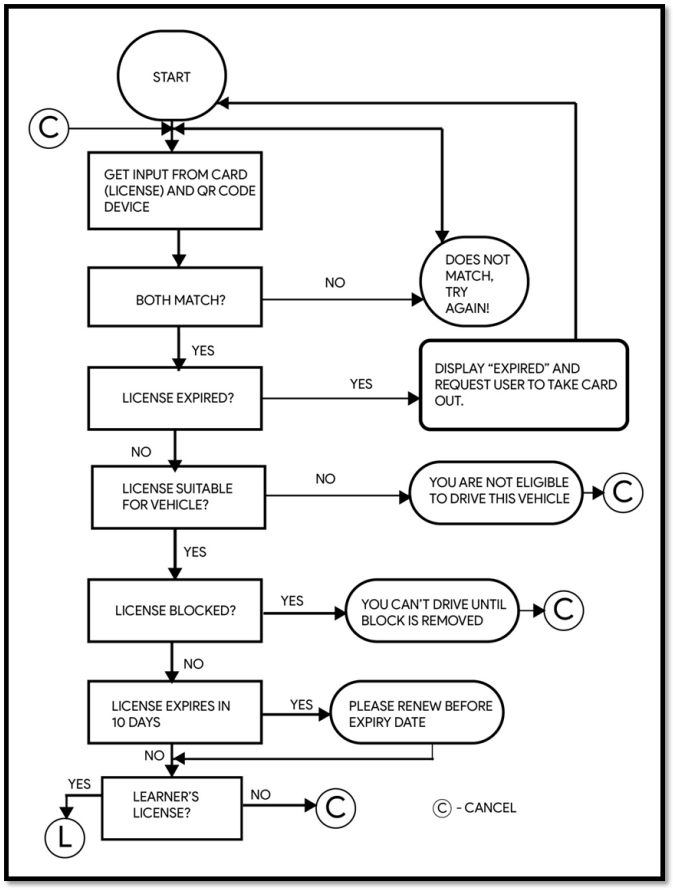


REGENERATIVE BRAKING SYSTEM

To develop a system that verifies the details of the driver, and classifies him/her to be safe to drive the vehicle. The basis of Acceptance or rejection will mainly be on 3 main factors namely, expiry date, vehicle ownership and category of the vehicle for which the driving license is issued. Along with this aim we would also like to improve the safety of the vehicles, in terms of security, its ownership and theft protection. The main aim is to develop a system which permits or deny permission to operate a vehicle, on the basis of driving license and vehicle ownership. Setup consists of microcontroller, GSM modem, Card reader units, and various other common peripherals of the vehicle. The card reader prepares to scan authentication card and smart driving license card. If both cards are valid the microprocessor switches on the ignition system. Even if one or both the cards are invalid, the microprocessor sends the details of the invalid card to a pre-registered mobile number simultaneously the vehicle doesn't start.



SECURITY SYSTEM

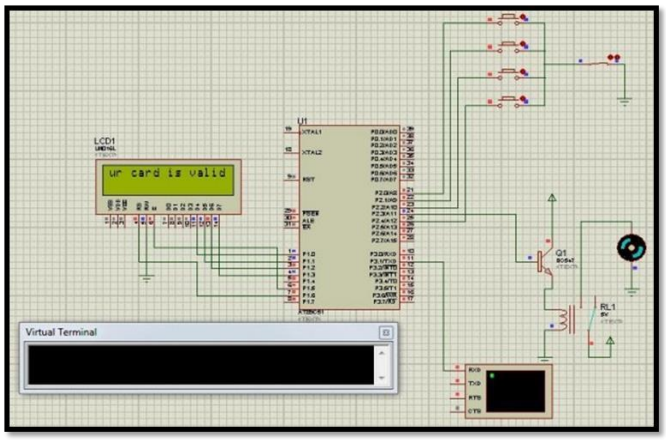


FLOW CHART OF SECURITY SYSTEM

SIMULATION WORK

In the block diagram given below, each switch represents different cases.

The "Case 1" represents a valid driving license card. All that the registered owner has to do, to drive his vehicle, is to get his driving license validated by the system. It allows the driver to run the vehicle if it is valid.



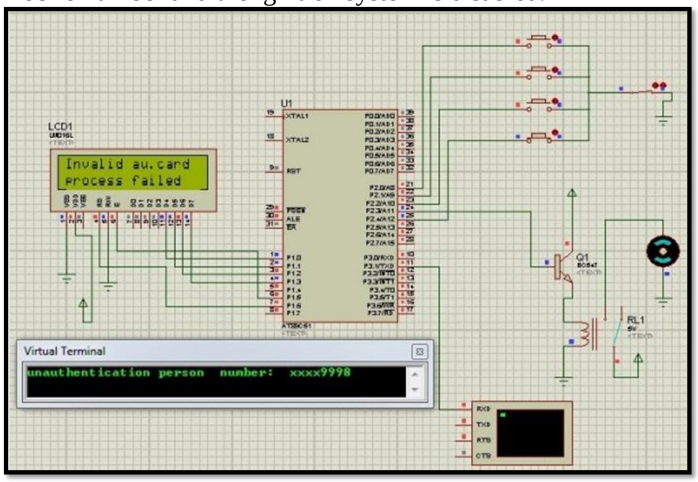
The Case 2 represents usage of an expired driving license card. It does not allow the owner to run the vehicle until the driving license is renewed. If the driving license has expired, it informs the owner to renew the license and the ignition system is disabled.

The Case 3 represents an attempt to use the vehicle by someone who is not the registered owner. When the unauthorized person tries to access the vehicle, the security system alerts the owner by sending a SMS to the preregistered mobile number and the ignition system is disabled.

The Case 4 represents an attempt to use the vehicle by someone who is not the registered owner and in possession of the unique authorization card of the vehicle. When the person tries to validate the unique authorization card, he will be allowed to use the vehicle provided his driving license is valid by all means. To keep the owner informed, the system sends a SMS to the pre-registered mobile number.

The Case 5 represents an attempt to use the vehicle by someone who is not licensed to drive the particular category of vehicle, as in the case of a two wheeler driving license holder trying to drive a passenger car. In this case, the display shows „YOU ARE NOT ALLOWED TO DRIVE THIS CATEGORY OF VEHICLE".

The Case 6 represents an attempt to use the vehicle by someone who is holding an authentication card which is not unique to the particular vehicle. In this case also the security system alerts the owner by sending a SMS to the preregistered mobile number and the ignition system is disabled.



Simulation for Authentication card

The registered owner can by-pass the security system one step by using a unique alpha-numeric code keyed into the key pad of the security system. In case of emergency, the owner can allow anyone to use this provision and the secret code can be changed by the registered owner.

Simulation for Valid license

RESULT

SR NO	EXPECTED VEHICAL SPEED(RPM)	VOLTAGE OUTPUT
1	150	9.34
2	175	11.88
3	200	12.81
4	225	13.91
5	250	14.49
6	300	14.49

SPEED vs VOLTAGE

It can be seen from the result tables that the efficiency of the regenerative braking systems using BLDC Motors increases as the angular velocity of the motor increases and hence the regenerative braking systems are more efficient as higher angular velocities and the recoverable energy increases with increase in the motor speed

CONCLUSION

In this project Regenerative Braking system, the regenerative brake captures about half of the energy wasted and is utilized by the engine whereas in conventional brakes, 80% energy is wasted. Hence fuel consumption is reduced by 10 to 25 percent in regenerative braking. Not only this, speed of the vehicle is also greatly enhanced by this mechanism of braking. The system will increase road safety and reduce vehicle theft. The Setup could be made more powerful with the help of a pinhole camera and GPS tracking device. The image captured by the camera and GPS data may be send to owner's mobile phone and the data can help identify the thief and retrace the vehicle. The system can also be integrated with other safety and crash prediction systems.

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