# Low Cost, Effective Solution for Monitoring, Controlling and Tracking of Rented Vehicle Engaged in Vehicle Sharing

**Chithira Cyriac[1] Rijo Sebastian[2]**
[1]P.G Scholar [2]Associate Professor
[1]Department of computer science engineering
[1,2]Mangalam College of Engineering, Ettumanoor

*Abstract—* This paper proposes an efficient and low cost solution to monitor, control and track rented vehicles. This paper aims to avoid the problems due to traffic congestion, environmental pollution and global warming effect due to the vast number of vehicles through the concept of vehicle sharing. In vehicle sharing, vehicles can be booked in advance and charges levied on the basis of time and distance. The paper focuses on finding solutions for providing a sustainable model of mobility, by integrating various features like user authentication, theft detection, collision detection, distance travel per day analysis and functions control. The idea was experimentally implemented and the desired result was obtained successfully.
*Key words:* DIPTRACE, FDT, HEW, R5F21258SNFP

## I. INTRODUCTION

Provident Fund is the fund which is composed of the Nowadays, traffic and parking congestion are the major difficulties facing by the communities. An innovative solution is required to address these problems as well as to improve air quality. One way is to obtain alternatives to individual car ownership, which can achieve in vehicle sharing. Vehicle Sharing is the practice where a number of people share the use of one or more cars. A vehicle can be made available for rental through reservation by the clients when he/she does demand it. Fees are based on actual use as determined by time and/or mileage.

There are many risks associated with renting out a vehicle. Rented assets are often damaged, used outside of a permitted area, and even stolen with no way for the company to retrieve it. Rental companies always need a system that monitors their vehicle in case of theft, or met with an accident. A platform is required for ensuring the return of the vehicle, which can be made through the use of GPS (Global Positioning System).

Reserving, acquiring and releasing vehicle is done automatically through GSM (Global System for Mobile Communication). The GSM acts an intermediate to let the owner communicate with vehicles to manage the fleet. The same is used to send vehicle information such as GPS location, speed and accident detection to the proprietor. An owner can get an alert when the vehicle leaves designated area through GSM. GSM can also be configured to control implemented functions inside the vehicle e.g., dick and/or door. FDS (Face Detection System) is employed for theft detection. The master control technique is used to stop the vehicle when any misleading has been noticed by the owner. Vehicle Tracking, Vehicle Monitoring and Vehicle Controlling features allow to create a hassle free environment.

This report deals with the basic principles behind the vehicle sharing system. The first part explains the purpose of the proposed scheme. The second segment will present the detailed specs and a blueprint of the epitome. And the final segment will discuss around the performance and test results of the epitome.

## II. PROPOSED SYSTEM DESIGN

In this proposed system, a user interacts with an owner through his/her phone to reserve the vehicle. After completing the money transaction, the owner will provide a customer's number to the system and then the system will retrieve the following details: location, vehicle's number and password required to unlock a reserve vehicle, to the user. Then this password is entered by the user and enters into the following functions. The functions realized by the system can be divided into different categories: Authentication, Vehicle Tracking, Monitoring and Controlling. In case of a user who reserves the vehicle for the first time, then creating the database is only the process done in the authentication process. If the same user reserves this vehicle again, FDS (Face Detection System) is used to detect the face of the driver and compare it with predefined face. If this process is valid, then the vehicle is enabling for movement. Otherwise, it can call off the trip. While on a journey, the condition like any collision occurs, has been checked. In addition, the analysis of the distance travelled per day is also integrated. If any fake occurs, a master control is also incorporated. When the journey has been ended, he/she should park the vehicle in a particular parking area in that designated region. Before going to stop, the user has to press the park button so that the location of the parking area has been sent to an owner.

### A. User Authentication

This offer an advance security system, in which consists of a FDS. The FDS bases on PCA (Principal Component Analysis) algorithm and can detect faces in the cars. Web camera, which can be hidden easily in somewhere in the car, obtains the images and compares the obtained images with predefined images. The trip can call off, if it doesn't match. PCA algorithm is as follows:

Step 1: Get some data
Step 2: Subtract the mean
Step 3: calculate the covariance matrix
Step 4: Calculate the eigenvectors and eigen values of the covariance matrix.
Step 5: Choosing components and forming a feature vector.
Step6: Deriving the new data

### B. Accident Detection

A switch network is made for collision detection, which are placed inside the body of the vehicle. If a severe impact occurs, the network gets closed and a signal is brought forth to the microcontroller and an owner gets a message, indicating the vehicle's current location.

## C. Travel Distance Per Day Analysis

Reed switch and permanent magnet are used for this purpose. When they come into the same line a pulse is produced. The travelled distance is calculated by using these pulses. When the vehicles exceed a desired distance, a corresponding is brought forth to the microcontroller. Since the input is an analog in nature, an ADC (Analog to Digital Converter) is required to convert the value. An owner gets a message indicating that the distance travelled by the vehicle is exceeded; thereby an additional amount is drawn out.

## D. Vehicle Tracking

In this system, while allowing rented out a vehicle, several damages are happened to be occurring. The vehicle has to be monitored by every time such that an owner can keep eyes on the vehicle. GPS is only the platform provided for that. There is no other way does exist. If owner requests, then the location will be displayed for his/her mobile phone a SMS (Short Message Service) text message.

## E. Theft Detection System

FDS as well as GPS subsystem employs a theft detection system. In this system, if the user is an unauthorized person then the engine will not start. Thus, it doesn't allow the vehicle's movement, thereby preventing the vehicle from the hands of the intruder. In case an intruder attacks the vehicle GPS platform is used to trace the location of the vehicle.

## F. Master Control

If above all cases failed and an owner has some hesitation then master control technique has been used. That means, any trip can be cancelled out through a simple text message which is being sent to the system. A notification has been given to the driver, so that the vehicle cannot be stopped in the mid of the road.

## G. Functions Control

The implemented functions in the vehicle can be controlled through SMS by an owner, according to the user's requirements. For example, suppose dick has to be open then the dick can open through the message which is being sent to the system. Thus an owner allows knowing what all functions are used by the user.
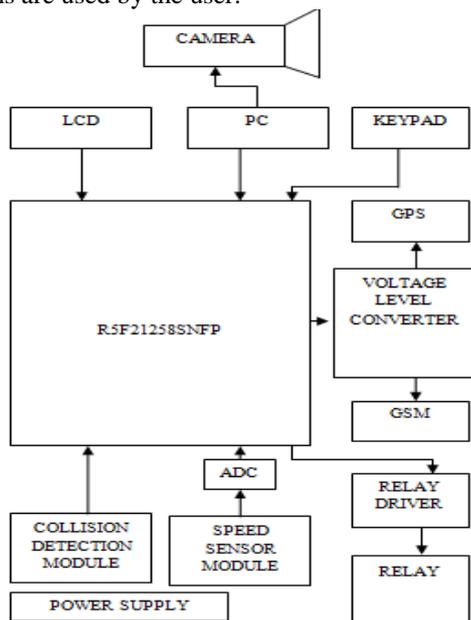


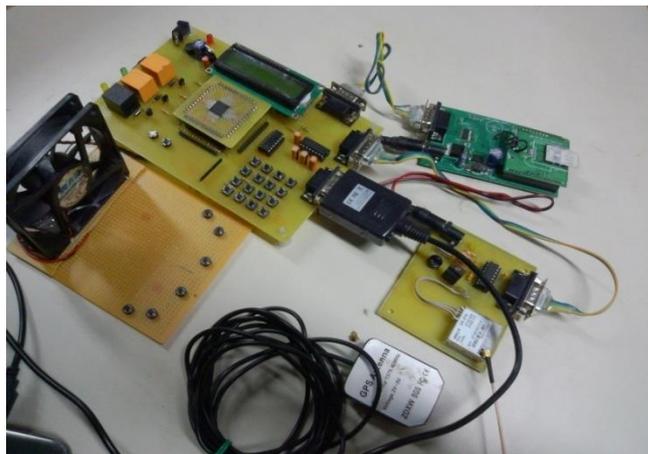Fig.1: Block Diagram

## III. PROTOTYPE



Fig. 2: Hardware Implementation

This system prototype is built on the base of one embedded platform in which R5F21258SNFP controls all the process. The device features a maximum operating frequency of 20 MHz and supports operating voltages from 2.2 to 5.5 V. The embedded board is composed of GSM module, GPS module, voltage level converter, web cam, switch network, speed sensor module, LCD (Liquid Crystal Display), relay, keypad and power supply. A keypad is provided for the user to input the password, which is exchanged between the user and the owner to open the vehicle doors. A camera is employed to catch the picture of the driver. A collision detection module is used for accident detection, comprises of a switch network. Reed switch and a permanent magnet are employed to get the number of pulses, which is being sent to the controller. Relay circuitry enables an owner to control different parts like dashboard, dick, etc., in the vehicle. This control platform consists of a transistor, relay, resistor and LED (Light Emitting Diode). The GSM module transmits the necessary information to both user and owner and help to keep eyes on the car all the time. Also the position of the vehicle can be caused from the GPS receiver and wanted messages are indicated along the LCD module. The software used is HEW (High Performance Embedded Workshop). The tool used to program the Renesas microcontroller is the FDT (Flash Development Toolkit). Face recognition was done in MATLAB. PCB (Printed Circuit Board) layout tool is DIPTRACE.
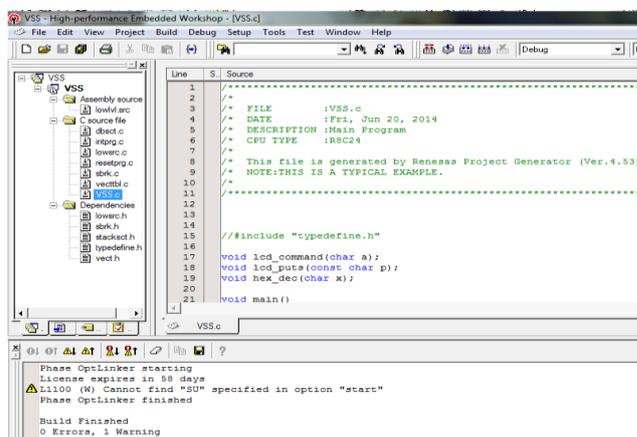


Fig. 3: HEW Environment

This project strictly follows an algorithm and software flowchart is shown below.
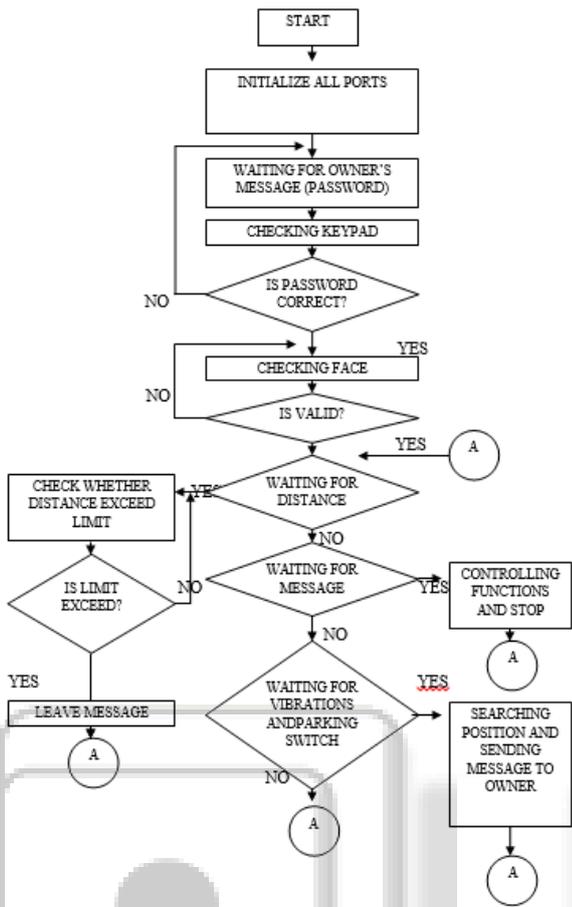


Fig. 4: Flow Chart

## IV. PROTOTYPE PERFORMANCE

The prototype realized almost all the properties of the proposed system. This system has anti-fraud face recognition system, collision detection capability, distance travelled per day analysis, vehicle tracking capability and controlling options. An integration of GPS technology and GSM offer a comprehensive and rigorous vehicle sharing system with mobile phone and GPS tracking capability to vehicle rented businesses.

## V. CONCLUSION

The vehicle sharing system finds very useful application in present day life. There are several opportunities for future enhancements and architecture of vehicle sharing system can be successfully designed to provide the flexibility that is necessary to manage fleets of vehicles.

## REFERENCES

[1] A. Kalogeras, P. Foundas, M. Georgoudakis, K. Charatsis, and P. Konstantinopoulos, "Integrated system for smart transport services, " in *Proc. IEEE Conf. Emerg. Technol. Factory Autom.*, 2009, pp-1-6.

[2] G.Alli et al., "Green move: Towards next generation sustainable smart-phone-based vehicle sharing,"in *Proc. SustainIT*, 2012.

[3] A. A.Pentland, T.Choudhury, " Face recognition for smart environments, " computer, vol. 33 Issue: 2, Feb.2000, pp-50-55.

[4] M.A. Turk, A.Pentland, " Face recognition using eigenfaces",in *Proc. IEEE Conf. Comp. Vision and Pattern recognition*, 1991, pp-586-591.

[5] Kunal Maurya , Mandeep Singh, Neelu Jain, "Real Time Vehicle Tracking System using GSM and GPS Technology- An Anti-theft Tracking System," *International Journal of Electronics and Computer Science Engineering*. ISSN 2277-1956/V1N3-1103-1107.

[6] Charles M Farmer, Bevan B Kirley and Anne T McCartt, "Effects of In-Vehicle Monitoring on the Driving Behaviour of Teenagers", Journal of Safety Research 41, 2010.

[7] William J Horrey at al, "On-Board Safety Monitoring Systems for Driving: Review, Knowledge Gaps and Framework", Journal of Safety Research 43, 2012