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Automatic Insurance Telematics For four Wheelers

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Abstract - In automobile engineering for insurance assignment the company can't judge the driver and not be sure about his driving. This unit is used to judge the driving of the driver and the proper monitoring can be done. The system is proposed to make vehicles Insurance more transparent. For that purpose we are implementing a system with the latest technology. The proposed system consists of Microcontroller, LCD display, RPM sensor, CO sensor, Alcohol sensor, Accelerometer, seat belt analyzer switch and WiFi module for acquiring wireless communication.

Key Words: Telematic data, Wi-Fi module.

1. INTRODUCTION

Smartphone-based insurance telematics or usage based insurance is a disruptive technology which relies on insurance premiums that reflect the risk profile of the driver; measured via smart phones with appropriate installed software. Plurality of figure of merits are described, analyzed and categorized, including events and properties like harsh braking, speeding, and location. The categorization of the forms in terms of observability, Driver influence, and Actuarial relevance are tools for robust risk profiling of the driver and the trip. Proper driver feedback is briefly discussed, and rule-of-thumbs for feedback design are included. A framework is presented to deploy a smartphone-Based measurement system for road vehicle traffic monitoring and usage-based insurance (UBI). Through the aid of a hierarchical model to modularize the description, the functionality is described as spanning from sensor-level functionality and technical specification to the topmost business model. The designer of a complex measurement system has to consider the full picture from low-level sensing, actuating, and wireless data transfer to the topmost level, including enticements for the individual smartphone owners, i.e., the end users who are the actual measurement probes. The former activity has a clear value for a society and its inhabitants, as it may reduce congestion and environmental impacts. The latter data stream drives the business model and parts of the revenue streams, which ensure the funding of the total measurement system and create value for the end users, the service provider, and the insurance company. In addition to the presented framework, outcome from a measurement campaign is presented, including road vehicle traffic monitoring (primary data stream) and a commercial pilot of UBI based on the driver profiles (secondary data stream). The measurement system is believed to be sustainable due to the incitements offered to the individual end users, in terms of favorable pricing for the insurance premium.

2. LITERATURE SURVEY

2.1 Lu Zhou, Qingrong Chen, Zutian Luo, Haojin Zhu1, Cailian Chen in their paper "Speed-based Location Tracking in Usage-based Automotive Insurance" explains that,Usage-based Insurance (UBI) is regarded as a promising way to offer more accurate insurance premium by profiling driving behaviors. Compared with traditional insurance which considers drivers' history of accidents, traffic violations and etc, UBI focuses on driving data and can give a more reasonable insurance premium based on the current driving behaviors. Insurers use sensors in smartphone or vehicle to collect driving data (e.g. mileage, speed, hark braking) and compute a risk score based on these data to recalculate insurance premium.

2.2 HyunSuk Kim, DaeSub Yoon, HyunSoon Shin in their paper "Driving Characteristics Analysis of Young and Middle-aged Drivers" explains that, From the statistics about rental car accidents, traffic accident death by drunken driving, speeding, and centreline invasion occurs frequently to the twenties drivers compared with the other age groups. Specially, speeding is a dangerous driving behavior. In this paper, we analyzed driving haracteristics of young and middle-aged drivers using FOT (Field of Test) data which was collected on the real urban, local road and highway.

2.3 Peter Händel, Jens Ohlsson, Martin Ohlsson,Isaac Skog and Elin Nygren in their paper "Smartphone-Based Measurement Systems for Road Vehicle Traffic Monitor Usage-Based Insurance", elaborates that The Number of cellular phones in the world steadily grows each year, with almost seven billion mobile subscriptions at the end of 2012, corresponding to some 96% of the world population. Cellular phones are often referred to as feature phones and smartphones, where the former provide basic telephony, and the latter provide flexibility by the use of software applications known as —apps.

3. HARDWARE MODULE

In this project we have used some hardware modules such as Wi-Fi module(ESP8266 MOD)for transmission and reception, microcontroller(LPC2138).LCD screen for display, power supply, alcohol Sensor(MQ3), CO sensor(MQ7),RPM sensor(A1101 hall effect),accelerometer(ADXL335) sensor.

3.1 Wi-Fi MODULE(ESP8266 MOD)

ESP8266 ESP-01 Serial WIFI Transceiver Module is a cheap and easy way to connect any small microcontroller platform, like Arduino, wirelessly to Internet. ESP8266 has powerful on-board processing and storage capabilities that allow it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.

3.2 MICROCONTROLLER(LPC 2138)

A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, these microcontrollers are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale.

3.3 ALCOHOL SENSOR(MQ3)

MQ3 GAS Sensor is a very easy to use and very handy sensor. It is suitable for sensing Alcohol gas concentration. MQ3 Alcohol GAS Sensor can detect Alcohol gas concentrations anywhere from 200 to 10000 ppm. The MQ3 GAS sensor has a very height sensitivity to Alcohol gas. The sensitive material of MQ3 Sensor is SnO2,which has lower conductivity in clean air. When the target alcohol gas exist, the sensor‘s conductivity is higher along with the gas concentration rising. MQ3 GAS sensor has high sensitivity to Alcohol, and good resistance to disturb of gasoline, smoke and vapor. The sensor could be used to detect alcohol with different concentration; it is with low cost and suitable for different application.

3.4 CO SENSOR(MQ7)

This sensor has a high sensitivity and fast response time. The sensor‘s output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.Sensitive material of MQ-7 gas sensor is SnO2, which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO at low temperature(heated by 1.5V).The sensor‘s conductivity gets higher along with the CO gas concentration rising. At high temperature (heated by 5.0V),it cleans the other gases adsorbed at low temperature. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit.

3.5 RPM SENSOR(A1101 HALL EFFECT SENSOR)

Inductive and Hall Effect RPM sensors in today's vehicles, mainly are used for measuring the rpm and determining the position of crankshaft or camshaft at engine management systems, as well as measuring the speed (rpm) of the wheels at ABS systems,ESP systems, etc The Hall Effect is the most common method of measuring magnetic field and the Hall Effect sensors are very popular and have many contemporary applications.

3.6 ACCELEROMETER(ADXL335)

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum fullscale range of ±3 *g*. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins.

4. SOFTWARE USED

4.1 Eagle6.1.0 (for circuit design and PCB)

EAGLE (for: Easily Applicable Graphical Layout Editor, German: Einfach anzuwendender grafischer Layout-Editor) by CadSoft Computer is a flexible, expandable and scriptable EDA application with schematic capture editor, PCB layout editor, auto-router and CAM and BOM tools developed by CadSoft Computer GmbH, Germany, since 1988. EAGLE is popular among smaller design houses and in academia for its favourable licensing terms and rich availability of component libraries on the web. Hobbyists are attracted by the availability of freeware licenses.

4.2 KEIL U- VISION 4 (LPC2138)

KEILS uVision Simulator: uVision is an IDE (Integrated Development Environment) that helps you write, compile, and debug embedded programs. This simulator tool is used for programming the microcontroller for the require specification of the system. It helps us to perform the simulation of This software is used to burn the internal ROM of the microcontroller. The Assembly Language Programming simulated in the KEIL Simulator is than loaded into the internal of microcontroller ROM . Flash is very compatible to be used with 89C51 & LPC2138.

4.3 PROTEUS 8

Proteus 8 software is used for simulation purpose. Proteus developed by lab center electronics. Microcontroller simulation in Proteus works by applying either hex or debug file to the microcontroller part on schematic. Sample

paragraph Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

5. BLOCK DIAGRAM

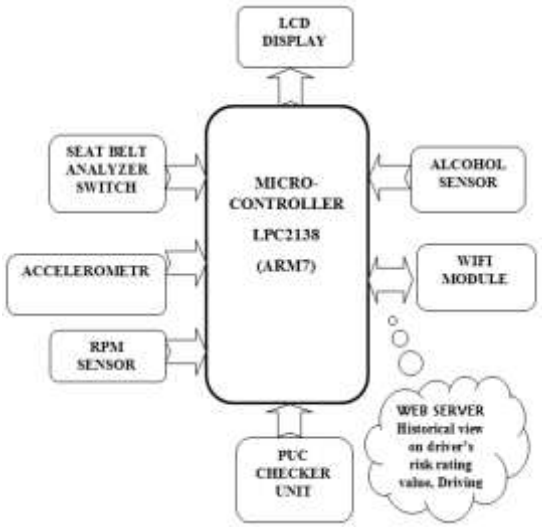


Fig. 1 Block Diagram of automatic insurance telematics for four wheelers.

6. WORKING

Data analysis-Whenever vehicle having proposed system installed on it, and is running on road the important parameters which are always needed to be monitored like Pollution causing agents, Speed of vehicle, Alcohol consumption done by the driver, Travelling path are monitored with the help of respective sensors. All the sensor values received from respective sensors are sent to the web server we are going to design for our system via Wi-fi connectivity. So that Insurance company admin is able to see the contents of particular driver from the web server. With the additional feature of pollution monitoring unit, system will continuously monitor the CO (Carbon monoxide) gas emission done by the vehicle and upload this data on web server. The rash driving of driver is monitored with the help of proposed system where RPM sensor interfaced will continuously monitor the speed of vehicle and this sensor information is also continuously updated on web server. So that Insurance assignment for that particular vehicle is done after intelligent monitoring of that particular vehicle and it's driver details by accessing previous data record from web server. Accelerometer will be useful for tracking the type of route where driver used to travel usually; whether it is smooth path or having various disturbing factors along the path.

Profile Rating- At the server side the respective driver's profile will be created by the machine itself with respect to the various differentiating parameters received from the vehicle unit.

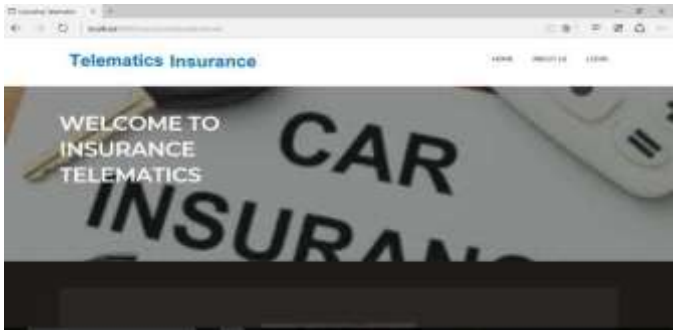
Flow of operation-

1. Start
2. Initialize all devices like LCD display, sensors and Wi-Fi module
3. Check if input received from respective sensors interfaced for monitoring certain
   vehicle parameters

If Yes,
I. Display all the parameters on LCD display
II. Check if Request received from server side
III. end all the sensor's data to the server via wifi connectivity
If NO,
I. Display all the parameters on LCD display
II. Wait for request from server side.
4. Repeat step no. 3

7. RESULTS

Once the hardware is run and establish connection with Wi-Fi module. Then welcome page is displayed first through which admin and user can navigate the services.

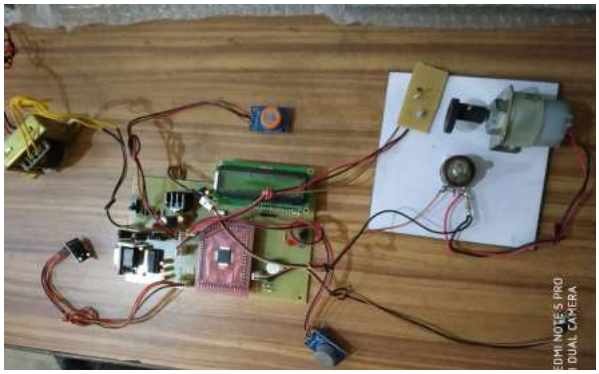


Admin and user can login to view details

User database i.e. sensor values collected from hardware.

Ratings provided to user according to collected data.

This is hardware of the proposed system consisting sensors interfaced to the microcontroller to monitor various attributes related to automobile and driver.



7. ADVANTAGES

1. Highest incentives to change driving pattern
2. Rating encourages good driver behavior by comparing with other drivers.
3. Potential cost saving for responsible customers.
4. Safe drivers get extra benefits
5. Beneficial for user as well as insurance companies
6. No need to keep records of all vehicle parameters manually.

8. APPLICATIONS

1. Transportation Services
2. Vehicle maintenance
3. Vehicle insurance companies
4. Drivers analysis

9. CONCLUSION

This system works successfully to monitor the different vehicle parameters like RPM, CO value exertion, alcohol consumption by the user, path followed by the driver while driving, seat belt wearing analysis with the help of respective sensors interfaced to the microcontroller unit. And are successfully sent to the web server designed for our project. At the server side all values are maintained in the database and are used for profile creation of the driver. That profile will be then used by the insurance companies to assign an insurance amount for particular owner of that vehicle.

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