Design of Vehicle Health and Position Telemetry System for Management

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Abstract—To manage and monitor a machinery especially vehicles using manual processes is very difficult. Especially the enterprises comprising of large fleet of vehicles face the tasks of prime management. To deal with such proble, a telemetry system is needed to envision the optimal management by monitoring the condition and position of the vehicles by real time monitoring.

This paper has been focused on the development of the hardware (main part) and software platform for the extraction, logging, recording and analyzing the vehicle condition and position. The vehicles health data is attained through On-Board Diagnostic & Engine Control Unit.

In this work a system is proposed which is capable of communicating with all kinds of cars for the diagnosis of the faults. The proposed system is capable of collecting the data and send it throgh Bluetooth to the concerned organization to initiate the remedial measures. The suggested system is compatable with all kinds of vehicles, which is a drawback of the existing system.

Keywords— OBD, ECU, EMC etc

I. INTRODUCTION

In vehicle telemetry system data from the measurement and collected parameters are made remotely or at inaccessible point, then trasmissted to maintenance department for monitoring. It is an automatic communication process.

Present day, every system is being switched to automatic system as the technology progresses, hence it becomes easy to control and manage the machinery and other vehicles. Modern enterprises face challenges of optimal management of large fleet of vehicles. As a result, the real time monitoring of machinery health and positing through optimal management is achieved with the implementation of telemetry system.

To implement the system, extracting, logging, reporting and analysis of vehicle health and other data is required, for which hardware and software plateforms are needed. The required vehicle data is learnt through Engine Control Unit (ECU) and On-Board Diagnostic (OBD).

The OBD System has made it easy to extract data from the engine with the latest technology being OBD-II. Practically all cars being manufactured after the year 1996 had a built-in 16-pin OBD-II connector. With this connecter an OBD scanner device can easily be connected and can manipulate the engine related data and other parameters via the ECU.

To get data from the OBD scanner, an android application, Torque, a reliable available software, or a desktop application connected to it through Bluetooth or wifi is used. The data extracted from the OBD-II scanner through these applications are send to an open source ERP system where it is evaluated.

A number of sensors are present in the vehicle which are connected directly to the ECU. The OBD-II port can be used to communicate with the Electroinc Control Unit of the vehicle. Hence to get the information and performance of the vehicle through its fuel consumptioin, mileage, air/fuel ratio, error codes, mpg, timing and other such sensors dependant paremeters are obtained with the help of this process. The OBD-II needs a buffer for this whole process,

which is achieved by OBD-II Scan tool which also provides readouts to the user. This tool can read the data and show the error code that is being provided by the OBD-II port. Android device or desktop application connected through a Bluetooth unit are one of the many ways to read the data of the vehicle.

In addition to read out the date the user will also be able to save the data into the log files on the android device or desktop which has been read from the OBD-II port.

The distant server located at the repair and maintenance department such as OpenERP System can receive the log files saved on the android or desktop applications after being transferred. At the repair and maintenance department, the data can be used to:

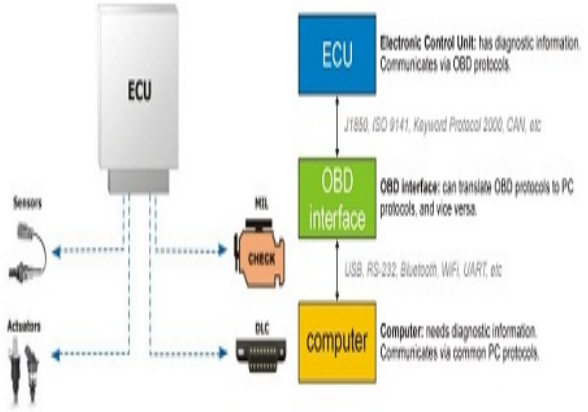
1. Detection of errors that may occur in the future.
2. Identificatio of faults in the vehicle.

The information will be send by the maintenance department back to the vehicle driver with the diagnoses.

The Enterprise Resource Planning (ERP) is a platform used for business management which is an integrated application used by an organization for the storage and management of data. The ERP system is responsible for a real-time view of the fundamental business processes by using the common database.

1) ECU

Controlling of one or more electrical system or subsystem witht the help of emebeded system is done through ECU. The types of ECU includes Powertrain Control Module (PCM), Electronic/engine Control Module (ECM), Transmission Control Module (TCM), General Electronic Module (GEM), Brake Control Module (BCM/ EBCM), Suspension Control Module (SCM), Central Control Module (CCM) and Body Control Module (BCM). The combination of all these systems is known as car computer.

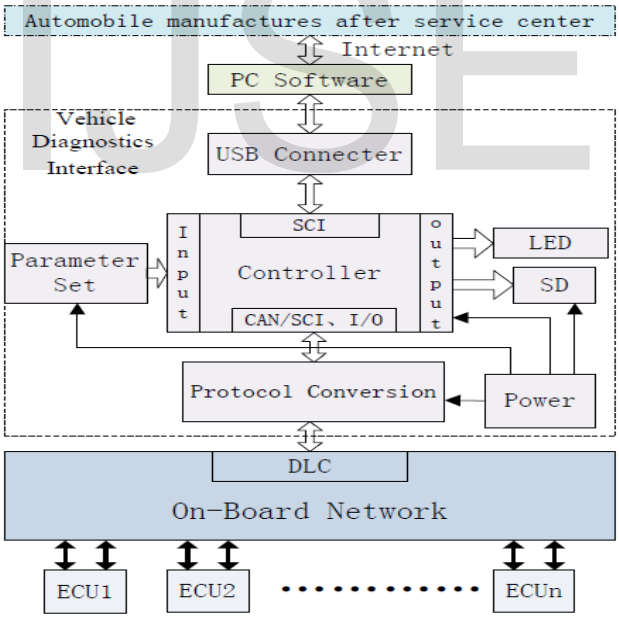


During an internal fault inside a vehicle, various data from ECU is retrieved by the OBD-II which is a valuable source of information. For requesting numerous diagnostic data, a method is described by the standard SAE J1979, which also states a list of standard parameter's to be attained from the ECU. "Parameter Identification Numbers" are explained by the same standard, which are available parameters (Appendix A).

The PMC and EMC constantly monitors the standard Parameter ID (PID) codes. In case of any potential problem in the engine detected by the EMC and PMC, a warning light call Malfunction Indicator Light (MIL) lits up to alert the driver.

To acquire the information from the ECU a combination of software and hardware tool is needed. The hardware tool, OBD-II scan tool acts as a cable between the diagnostic connector and the device that runs software for reading codes and data. The hardware tool offers ways to read the codes and all kinds of information such as test result, live data and ECU information. Apart from this, it also stores any trouble code in case of fault and can visualize it to the user. With these provided information the user is able to know about the problem.

Due to the benefits of the federal legislations linked with the automobile functionality industry and the development in the innovative automobile techniques has outmoded the the traditional analyse tools. The operative common public will be provoked by some sort of drop with auto support great quality united with increasingly increasing support charges. This paper has been aimed to discuss the modern procedure used for automobile industry, Automotive analysis program – Auto sensor. The program was developed to help in the diagnoses of the modern day automobiles. With the personal testing the machine can work with ease, and consequently be utilize where the



In the current auto support marketplace, the traditional schemes for the diagnosis of automobile medil difficulty are turning into unproductive. Due to the increase in the complexness associated with the automobiles the people having the practical knowledge are loosing their worth. motion is used an application, otherwise the auto mechanica can be called immediately for the diagnoses of the specific automobile problem [1].

In the system a stand-alone microcomputer, Motorola 6801/68701 makes up a channel, along with the data storage

for memory. A signal conditioner is used for automatic calibration and zero offsets, piezo resistive transducers and programmable gain amplifier.

A multifunction screen and manage program (MFDCS) can be made for design and style notion in association of the Orbiter spacecraft having the following attributes:

1. automation associated with team procedures
2. wrong doing prioritization
3. incorporation associated with checklists and procedures into the screen
4. manage program and program freedom with respond to objective variant
5. greater encounter and advancing screen and manage engineering.

The program consists of the following components:

1. a multifunction key pad applying programmable icon switches
2. some sort of channel size toned screen pertaining to presentation associated with alphanumeric info as well as a colouring CRT with the screen associated with schematic diagrams.

The adopted schematic in addition to the multifunction screen and program manager conserves the solitary function ability from the existing couple of devoted switches even though the same delivering pertaining to automation linked with several of the checklists and techniques. The fundamental design and style attribute of the program has the ability to change this at relatively higher level of automation and team interaction without making acny changes to the hardware system or the operating-system [3].

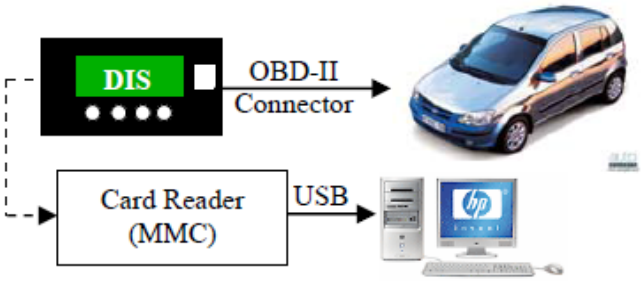
After sought, the digital generation possesses the information and ingenious programs in the automobile. Moreover, this information is not just limited to inside of the automobile but beyond it. The traditional automobile information programs do not deal with utmost of these make newfangled measurements also they are not able for the encouragement of the specifications. To deal with this need the development of a standardised operating system is needed, which is featured with the scalable integration of the programs which are inside of the autombile and also permit a seamless transmission of the information to the outer digital programs [4].

Due to severe development within vehicle electronic devices most of the mechanical controlled devices such as an self handle has been transformed into an automated method such that more precise method to handle the machine with much less expense have been developed. With the utilization of more and more digital controlled devices the execution has eased. Also, more and more facts might be accomplished in utmost of the devices, in addition to this a substantial gain in using the data is achieved with the converting place. At the moment the vehicle circle can actively play a vital role within vehicle electronic devices. For the real time communication the Controller Area Network (CAN) has emerged as the most popular candidate between the devices [5].

This research work has been focused on the concept of actual Controller Area Network (CAN) component which is intended to set the microcontrollers to focus on the programs installed in vehicle. At the moment, the concept is being used as one of the most widespread handle circle devices. A method has been referred in this work which takes care of a real lot of facts while taking into the consideration of the lowest CPU price in order to have a business for the supply of the prime whole performance on the COMPUTER. The fact has been proven while having a simulation result, contrary to the new CAN component beside the regular one, along a case with a point for the exhibition of an efficient app such as Adaptive Cruise trip Control (ACC) method. In addition to this specific new CAN component which has the ability for the consumer to directly communicate while using the most current requirements on the CAN [5].

The OBD II has been installed inside the ECU which is known as the power train control (PTC) module of the vehicle. Useful information regarding the vehicle is scanned by the OBD-II tool. OBD-II san tool devices are available in the market upto some extent such as:

1. Personal digital assistant Dyno/OBD-II scan tool
2. Car Chip fleet
3. Driver Right 600
4. Scan Gauge



Other than the advantages there are few limitations in the device. In order to supports all the features, a universal OBD-II scan tool is needed. Also the OB-II is standardized under ISO and SAE standards. To get data from the OBD-II, five protocols are used for the communications, which are:

1. SAE J1850 (PWM)
2. SAE J1850 (VPW)
3. ISO 9141-2
4. ISO 14230-4 (KWP 2000)
5. ISO 15765-4 (CAN)

The Driver Information System (DIS) is used to display the obtained data from OBD-II via OBD connector. Besides, data collecting it has feature of data logging with the aid of multimedia card attached in USB slot of PC [6].

As the technology in the field of electronics advances the design of the automotive electronic control system is being complicated day by day which also makes the tracing the cause and position of faults in the vehicles complicated. A vehicle comprises of ECU which have different sensors. The ECU starts it operation of monitoring as the vehicle starts up, and keeps monitoring the information of attached sensors. During the occurance of the fauld, it detects it and will blink the MIL, fault indicator in addition to storing the fault information in the shape of diagnostic codes. Also it can recover the sotred information from the memory.

Different kind of diagnostic protocols used on the OBD diagnostic system could also be analyzed by the OBD system, which is also dubbed as the most advance diagnostic system now a days. With the help of VCI system the diagnostic systems used in vehicles can be connected to the PC diagnostic software, which is used for transmission of data and also for converting protocols sandwiched between network and computer [7]. Three submodule VCI systems are used:

- Protocol conversion function module, which works for transmission between computer and vehicles protocol.
- Host microcontroller module, which is aimed for the analysis of on board data in addition to sending and receivnign the messages to the computer which is known as the Host.
- USB bridge module, having the applications of transferring serial data to USB alongwith communicating between the Host and the microcontroller.

In order to understand various complex problems arising in the vehicle the need of multiple ECUs are needed, which brings the requirement of a sophisticated on-board diagnostic strategies as a result increase in the amount of computer hardware and software implementations has been observed. This paper offers improved vehicle stage method for problem processes strategies, whereby any consolidated bright Entry Module will be suggested within the vehicle circle structure which is likely to the problem processes from the finish vehicle inside a sequential run. This precise Entry Module will thus have the likelihood in order to collect any bunch comprising faults raised by unique ECUs in addition to connect these entities meaningfully to steer the user in the direction of real cause of the problem. The work will offer how this kind of brilliant entry component will seizure, classify it as well to correlate the problem facts in the spread circle structure, eventually causing real filtering linking main defects from the vehicle [8].

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