

IoT System for Monitoring and Diagnostics of Engine

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Abstract - On-board diagnostics (OBD) is a simple vehicle self-diagnosing system and has reporting capability. OBD systems give the vehicle owner or repair technician access to the status of the variety of vehicle subsystems. The amount of diagnostic information available via OBD has varied broadly since its introduction in the early 1980s versions of on-board vehicle computers. With the help of OBD II engine parameters like engine oil temperature, engine RPM, throttle position, run time since engine start, engine coolant temperature etc are monitored.

With the help of OBD II and raspberry pi using IoT, we will access all information regarding engine from home so it is helpful for heavy duty machines like used in excavation on site so owner stay eyes on engine condition of machine from anywhere home also.

Key Words: OBD II, RASPBERRY PI 3, IOT, ECU, THINGSPEAK, PHP, APACHE, MYSQL

1. INTRODUCTION

The advancement in cloud computing along with internet of things (IOT) has given a promising opportunity to resolutely the challenges caused by the expanding transportation issues. It presents a novel multilayered vehicular data cloud platform by using cloud computing and IOT technologies. The two innovative vehicular data cloud services, an intelligent parking cloud service and a vehicular data excavation cloud service, for vehicle warranty analytic thinking in the IOT environment are also presented. The automotive engine contains different system of rules that operate to fulfill the continuous function of the combustion. To insure un-interrupted function and optimal performance, various types of condition monitoring technologies are being used with different advanced data processing techniques.

Developing an embedded system for detecting the vehicle condition by monitoring the internal parameters that are used in evaluating the vehicle's electric current health condition. Traveler information dramatically plays a critical role in supporting refuge, security, mobility, and in improving the reliability of travel. This traveler information can be a continuous data on performance of the vehicle and the position of its internal elements.

An in-vehicle embedded organization is being developed to generate a vehicle health report (VHR) whenever needed by the user. It also acts as an eco friendly vehicle by monitoring

the emissions from the car which in turn avail in regulating (by taking proper actions to reduce the emissions as per the issues shown within VHR) the environmental pollution. It predicts the future errors so that the driver can have an continuous travel and can avoid accident.

The data required for generating the health report consists of parameter values (outputs of in-built sensor) of different systems inside the vehicle. This data can be obtained using the OBD-II protocol which is followed by the vehicle manufactured after 1996. It uses Lab VIEW as platform that has automotive diagnostic command set tool kit which helps in building up the software required to communicate with the vehicle's ECU through OBD-II system. OBD-II technology has been created to diagnose Vehicle's condition. OBD-II scanner plugs to OBD-II port or usually called Data Link Connector (DLC), and after that it sends the diagnostics to Raspberry Pi. Compared from another Microcontrollers, Arduino, Raspberry Pi are chosen because it sustains the application to receive Real-time diagnostics, process the diagnostics and send command to automobiles at the same Time, rather than Arduino that must hold for another process finished to run another process.

2. LITERATURE REVIEW

Jose A. Afonso and Ruben A. Sousa et al. [1] this paper represents an IoT system applied to transportation designed to allow the monitoring and control of parameters of the users vehicles anywhere in the world through the Internet. The authors had used a vehicle diagnostic and tracking system where the on-board diagnostic (OBD) system is used to retrieve the vehicle's data. The main components of the proposed IoT system for vehicles are an intra-vehicular wireless sensor network (one per vehicle).

M. Jyothi kiran et al. [2] from this paper author proposed method of developing an embedded system for detecting the vehicle condition, by engine parameter monitoring and depending on that engines current health condition becomes evaluated. Various sensors are used to find out exact parameters such as coolant temperature fuel pressure, engine RPM etc. Depending on that vehicle health report built. Here author used lab VIEW as platform that is automotive diagnosis command set tool kit which helps in building the software required to communicate with the vehicle ECU through the OBD II system.

Myuresh Desai et al. [3] had proposed system which is used for monitoring of engine parameters and monitoring or tracking of vehicle location. System design was comprehensive for monitoring different parameters like location of vehicle speed, engine compartment temperature, fuel consumption, engine RPM. Proposed system mainly consists of a microcontroller and GPS + GPRS module. Vehicle parameters and location coordinates from GPS module are fed to the controller. Controller transfers this data to server with the help of GSM/GPRS technology

Dr. Shreenivas Jog et al. [4] author proposed a system depending on microcontroller, GPS and GSM. Here location of vehicle, speed of vehicle, fuel level, engine temperature of vehicle these parameters are monitored. The vehicle monitoring system using wireless communication for that GSM 900 module is used. Controller collects all data through sensors and send as sms to the receiver with the help of GSM module.

Gheorghe PANGA et al. [5] in this paper author proposed method of automotive diagnostics using Iot, with the help of MQTT Iot protocol. MQTT (messaging telemetry transport) is an ISO standard based messaging protocol. It work on top of TCP/IP protocol. In this method monitoring and control unit represent car mounted device that connect to the vehicle through OBD II port and is used for performing the actual diagnostics of vehicle.

Qinqin Wang, Zhiqi Lei, and Shaocheng Qu, "Design of Car Remote Monitoring System Based on Internet [6] introduced a design of car remote-monitoring system based on internet which can realize internet remote control, and draw the trajectories of the car through collecting the data by sensors. It has a good market prospect for the design of the monitoring objects. With the assistance of remote monitoring systems, they have not only overseen the movement of the car, but also intervened when necessary and controlled it in order to complete new tasks.

Dr.L.Jubair Ahamed, Asian Journal of Applied Science and Technology (AJAST) April-June 2018 [7] The IOT Enabled Smart vehicle implements an easy way to monitor an individual's vehicle's parameters such as fuel level, Engine oil level, Engine's temperature etc., using IOT Technology. The fuel level is measured using liquid level sensor which is commonly used nowadays. The sensor will get the level of the fuel present Digital Documents. The mobile application as word goes digital all of above aspects are integrated to mobile application the user can seamlessly view all the parameters as well as track vehicle using application.

Anujaraj V1, C B Bromy2, Johns Vinod3, Nithin Prakash4, Binsa Mathew5 [8] in this paper instead of CAN protocol for monitoring and communicating sensors inside the vehicle they uses OBD (on board diagnostic) device is used. It gives sensor values through OBD port which is used for vehicle

diagnostics. OBD port gives Vehicle speed, rpm and engine temperature sensor values and using required conversion values are obtained.

3. DISCUSSIONS

In this system, the main objective of the proposed work is to observe the parameters and location of engine and give feedback from cloud to engine for processing like to start or stop engine from owner's location.

The user should connect OBD II Bluetooth module to DLC port of engine & get parameters like engine oil temperature, coolant temperature, engine RPM, engine run time from engine using an OBD II. The user will communicate with Raspberry pi through Wi-Fi network or Internet. Then user will connect OBD II to Raspberry pi via MAC address of Bluetooth module. Machines geographical position can be detected using GPS module. User will access these parameters using python in raspberry pi and upload the data on cloud using IOT. For that Sign up on thingspeak server, create new channel and get API keys for that channel & upload the data using APIs. For engine start- stop generate command from cloud by sending feedback to engine from cloud.

User will get information of engine related to health and maintenance of engine by sending message.

Sr No.	Author s Name	ye ar	Type of methodol ogy	Advantag e	Disadvan tage
1	Jose A. Afonso and Ruben A. Sousa et al.	2017	IoT system using OBD II	IoT system applied to transportat ion designed to allow the monitoring and control of parameters of the user's vehicles anywhere in the world through the Internet. Vehicle diagnostic and tracking system	Authors implemen ted system only used for electric vehicle for battery monitorin g.

				where the on-board diagnostic (OBD) system is used to retrieve the vehicle's data.	
2	M. Jyothi kiran et al.	20 12	Vehicle health monitoring using OBD II	Embedded system for detecting the vehicle condition, by engine parameter monitoring and depending on that engines current health condition becomes evaluated. Depending on that vehicle health report built. lab VIEW as platform that used in automotive diagnosis command set tool kit which helps in building the software required to communicate with the vehicle ECU through the OBD II system.	In this paper, data display on vehicle touch panel computer . It accessible only for driver itself.
3	Myuresh Desai	20	Tracking system	System design was	This system
	et al.	17	with GPS & GPRS module	comprehensive for monitoring different parameters like location of vehicle speed, engine compartment temperature, fuel consumption, engine RPM. Proposed system mainly consists of a microcontroller and GPS + GPRS module.	uses Aurdino & Bluetooth port is not available for aurdino so extra HC-05 bluetooth module is required.
4	Dr. Shreenivas Jog et al.	20 16	System using microcontroller with GPS & GSM	System depending on microcontroller, GPS and GSM. Here location of vehicle, speed of vehicle, fuel level, engine temperature of vehicle these parameters are monitored. The vehicle monitoring system using wireless communication for that GSM 900 module is	This system is not useful for continuous real time data.

				used.	
5	Gheorge PANGA et al.	2016	IoT system using MQTT protocol	Automotive diagnostics using Iot, with the help of MQTT Iot protocol. MQTT (messaging telemetry transport) is an ISO standard based messaging protocol. It work on top of TCP/IP protocol.	This system sends data publicly so the all clients have that data by sending request to client.
6	Qinqin Wang, Zhiqui Lei, and Shaocheng Qu	2012	Remote monitoring system using IoT	Remote monitoring systems, they have not only overseen the movement of the car, but also intervened when necessary and controlled it in order to complete new tasks.	Author uses track driving algorithm so car only controlled on given track if track will changed the change in algorithm required.
7	Dr.L.Jubair Ahamed	2018	ARM processor with GPS & GSM	The IOT Enabled Smart vehicle implements an easy way to monitor an individual's vehicle's parameters such as fuel level,	System sends data through SMS to owner. Only two parameters over speed and vehicle location

				Engine oil level, Engine's temperature etc., using IOT Technology	monitored.
8	Anujaraj V1, CB Bromy 2, Johns Vinod3, Nithin Prakash4, Binsamathew5	2017	Using pico projector OBD parameter's display on windshield	Instead of CAN protocol for monitoring and communicating sensors inside the vehicle they uses OBD (on board diagnostic) device is used. It gives sensor values through OBD port which is used for vehicle diagnostics	This system uses wired method for displaying data on windshield.

4. CONCLUSION

Using OBD II module, we can communicate with various sensors of vehicle like engine rpm, speed, ignition voltage, and coolant temperature etc. It provides list of vehicle parameters to monitor along with how to encode the data for each. The monitoring and diagnostics of vehicle data can be done successfully using raspberry pi and internet source.

REFERENCES

- [1] Jose a. Afonso and ruben a. Sousa, joao c. Ferreira, vitor monteiro, delfim pedrosa and joao l. Afonso, "iot system for anytime/anywhere monitoring and control of vehicles' parameters", 978-1-5090-5847-1/17/\$31.00_2017 ieee.
- [2] M. Jyothi kiran, s.ravi teja, "vehicle health monitoring system", international journal of engineering research

- and applications (ijera) issn: 2248-9622 www.ijera.com vol. 2, issue 5, september- october 2012, pp.1162-1167.
- [3] Mayuresh desai, arati phadke, "internet of things based vehicle monitoring system", 978-1-5090-4884-7/17/\$31.00 ©2017 ieeec.
- [4] Dr. Shreenivas jog, saurabh deotale, shubham chaudhari, deepak singh, "monitoring parameters of vehicle using wireless communication", international research journal of engineering and technology (irjet) e-issn: 2395 -0056 volume: 03 issue: 05 | may-2016 www.irjet.net p-issn: 2395-0072.
- [5] Gheorghe panga, sorin zamfir, titus bălan, ovidiu popa, "iot diagnostics for connected cars", scientific research and education in the air force-afases 2016, doi: 10.19062/2247-3173.2016.18.1.39.
- [6] Qinqin wang, zhiqiu lei and shaocheng qu, "design of car remote monitoring system based on internet", proceedings of 2012 international conference on modelling, identification and control, wuhan, china, june 24-26, 2012.
- [7] Dr. L. Jubair ahamed, s. Rameshkumar, s. Sabari maheswaran, k. Sreenivasa perumal and s. Venkataraman, "vehicle parameter monitoring system", asian journal of applied science and technology (ajast) (open access quarterly international journal) volume 2, issue 2, pages 274-276, april-june 2018.
- [8] Anujaraj V1, C B Bromy2, Johns Vinod3, Nithin Prakash4, Binsa Mathew5 "An OBD Based Heads up Display for Automobiles" proceeding of 2017 International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering.