ISSN: 0974-5823 Vol. 7 No. 6 June, 2022

International Journal of Mechanical Engineering

Vehicle Monitoring and Indicating System

R. Sarath Kumar [1]

[1] Assistant Professor, Department of ECE, Sri Krishna College of Engineering and Technology, Coimbatore, Tamil Nadu, India.

S. Arun Kumar [2]

[2] UG Student, Department of ECE, Sri Krishna College of Engineering and Technology, Coimbatore, Tamil Nadu, India.

R. Apoorva [3]

[3] UG Student, Department of ECE, Sri Krishna College of Engineering and Technology, Coimbatore, Tamil Nadu, India.

R.V. Arthi [4]

[4] UG Student, Department of ECE, Sri Krishna College of Engineering and Technology, Coimbatore, Tamil Nadu, India.

Abstract - The Internet of Things (IoT) is a technical paradigm of interconnected things that enables physical items or devices to connect, communicate, and share data with other items or objects. The major purpose of IoT is to automate activities as well as to develop communication between items or devices. IoT applications have influenced a wide range of fields, including home automation, health care, energy systems, smart cities, agriculture, and industries. As we all know, the automobile sector is one of the fastest expanding industries today. Every home has a vehicle, which is both required and desirable. The Vehicle Monitoring System (VMS) is intended to improve the safety of our ride. We employ a variety of sensors to gather information about the vehicle's actions. Due to the presence of sensors in the vehicle, it is difficult to predict any breakdown in advance. We will be able to detect any damage, as well as the amount of fuel in the tank, the engine temperature, the condition of the vehicle's tyres. This project's use of the Internet of Things (IoT) is impressive. The IoT is reshaping the technology landscape and allowing us to do more with less.

Keywords—*internet of things, vehicle monitoring system, temperature sensor, fuel level sensor, Wi-Fi, air pressure sensor*

INTRODUCTION

Wireless Sensor Network (WSN) technology's all- pervasive sensing has had a huge impact on many facets of modern life. It enables you to track, speculate on, and interpret environmental markers ranging from natural assets to urban settings. The proliferation of these devices in a communicating-actuating network gives rise to the Internet of Things (IoT), a network of sensors and actuators that surrounds us. The data is subsequently transmitted among devices, resulting in a entirely computerized environment. Nowadays, IoT supports a broad range of applications, the most important of which are home automation, health care, and social welfare.

This model describes a real-time technique for monitoring vehicle condition by evaluating multiple internal vehicle parameters such as engine temperature, fuel level, viscosity, and tyre pressure status, which are used for assessing the sensor flaws and actuator in the vehicles, which is vehicle health ailment. The system's goal is to inform users when the engine is overheating, when the fuel level is low, and when the tyre pressure is low. A temperature sensor is installed in the engine, which alerts the user when the engine overheats. A voltage divider is also utilized to detect the fuel level, and a pressure sensor is put in the tyre to determine the tyre pressure state. This aids in the correct monitoring and evaluation of the vehicle's performance [2]. The dependability of automobiles is improved when they are monitored.

As an outcome, security and stability, maintenance efficiency, and vehicle operations have all improved. Furthermore, the vehicle's operational and servicing costs have decreased, and troubleshooting is halved. This type may be used to clearly identify vehicle faults to an authorized service facility via wireless transmission, which is a remote diagnostics concept.

RELATED WORKS

IoT has revolutionised human living in comparison to the preceding decade. IoT has been hailed as one of the most significant breakthroughs in the internet portfolio of technologies [1]. The Internet of Things is a conglomeration of micro-electromechanical systems, wireless technology, micro services, and the internet. The Internet of Things (IoT) is an automated and embedded system made up of hardware, internet, software, and sensors that allow objects to communicate data and control items virtually.

A wireless sensor network (WSN) is a network of specialized transducers coupled along with a transmission mechanism that allows for virtual monitoring and data recording in several places. Climate, moisture, pressure, wind speed, noise, electricity, and levels of pollution are all often measured. Wireless sensor networks link things to the internet via a gateway that serves as an interface between the WSN and the internet. [2] To enable WSN incorporation in the IoT, two vital features must be included to the relevant protocols: First, the IPv6 over Low Power Wireless Personal Area Networks (6LoWPAN) protocol must be developed and implemented in Wireless Sensor Networks (WSNs), followed by the standardisation of M2M protocols [3].

Kunal Maurya et Al. developed a vehicle tracking electronic system, which allows the vehicle owner or any third person to track the location of the vehicle [4]. This proposed framework built based on embedded system tracks of the vehicle location using GPS and GSM technologies. Chen Peijiang et Al. designed the remote monitoring system, which is an integration of hardware and software [5]. GPS and GSM module are the hardware part of this system and the remote monitoring station is developed in Visual Basic can be considered as the software part of this system.

SYETEM ARCHITECTURE

The system's primary goal is to recognize or detect numerous factors linked with a conventional or electric car. Three critical parameters, namely engine temperature, fuel level, and tyre pressure, have been given extra attention in this system. The system will continue to monitor these characteristics and transfer the information to the web server through Wi-Fi connectivity, allowing different groups of individuals or users to access the data. This information is primarily needed by or valuable to vehicle users, the car industry, and government agencies such as the Metropolitan Traffic Office. The system's key goals or characteristics are microcontroller-based design for versatility and upgradeability. This system comes as a bundle that comprises both the hardware implementation and the system integration. The proposed system block diagram is presented in the Figure. 1.

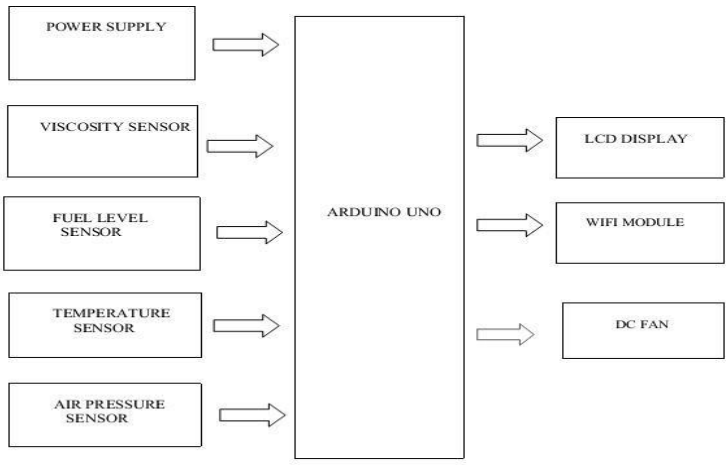

FIGURE 1. Proposed System Block Diagram

The proposed systems comprises of the following components:

1. Arduino UNO: An Arduino Uno microcontroller device that is free source, allows us to program digital devices through which it receives inputs from many sensors and controls the physical devices [19]. It has 32 KB of flash memory for storing the microcontroller programs. Arduino Uno is used to process the data received from sensors. Arduino UNO is shown in the Figure 2.

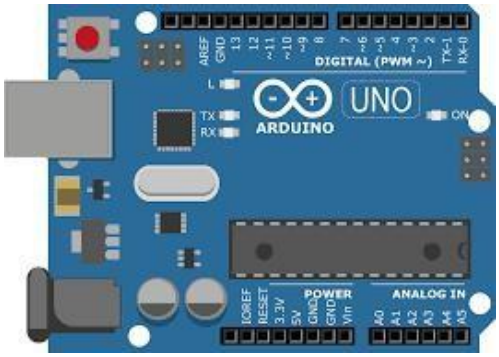

Figure 2. Arduino UNO

2. Fuel Level Sensor: It is used to measure the fuel level in the vehicle and the sensor is shown in Figure 3 [9].

Figure 3. Fuel Level Sensor

3. Temperature Sensor: It is used to measure the temperature of the vehicle engine and the sensor is shown in Figure 4 [7].

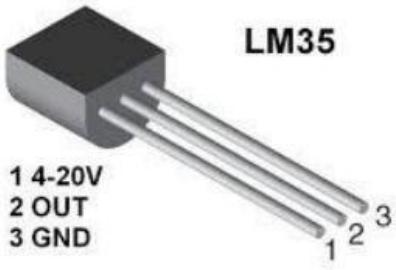

Figure 4. Temperature Sensor

4. Air Pressure Sensor: This sensor is responsible for measuring the air level in the tyre through monitoring the pressure in the tyre. The air pressure sensor is displayed in the Figure 5 [8].

Figure 5. Air Pressure Sensor

5. Viscosity Sensor: The Viscosity sensor monitors the viscosity, dielectric material number, and heat of bearing and hydraulic oils in real time to offer an accurate assessment of the oil's state. The sensor is shown in Figure 6 [10].

Figure 6. Viscosity Sensor

6. LCD Display: LCD display panel is an electronic display and the I2C 1602 LCD module is a 2 line by 16 character display directly connected to an I2C daughter board [11]. In this proposed system, it is used to display the parameters value to the users (shown in Figure 7).

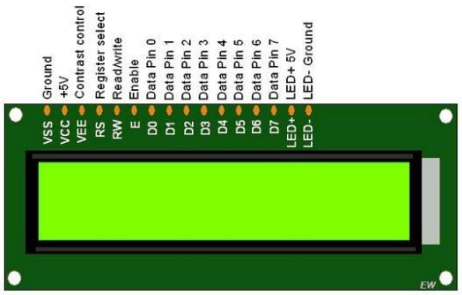

Figure 7. 16x2 LCD Display

7. Wi-Fi Module: This module enables the microcontroller to connect to the internet and through which the sensor data can be sent to cloud storage or web-based software for further inference [12, 13].

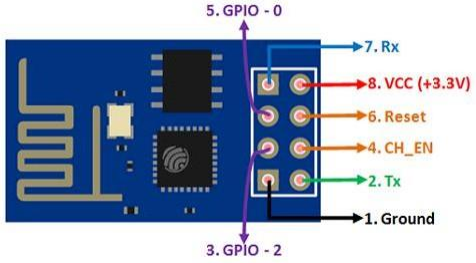

Figure 8. Wi-Fi Module

8. Power Supply Unit: This unit provides power supply to the microcontroller and sensor units.

A user interface web page is designed to receive requests from clients, i.e. the automobile user, in order to accomplish interaction between client and server. The user interface and web front end are linked to a database server on the backend. Clients can communicate and interact by sending messages to the server via the web page. The server receives the client's message and affirms the client over a gateway via a Wi-Fi

network. The data warehouse is the web server's primary storage, and great work is devoted in designing the database as a tightly unified framework to maintain the instructions received from the user via web page. The database, in essence, incorporates the framework for storing information from sensors connected to the circuit and collecting data from the web server. The microcontroller's programming is also developed in such a way that it can send data from the car to the database in real time. The sensors capture data, which is then communicated to the server through router over a Wi-Fi connection by a arduino microcontroller and stored in a database. At the same time, if a data exception occurs, the vehicle's owner will be notified.

RESULTS AND DISCUSSION

Several experimental discoveries were made throughout the system's execution, allowing users to access and assess the car's performance, as specified in the proposed system's purpose; the goal of this study is to observe various vehicle metrics. The system's final output can be shown utilizing graphical user interfaces offered on the host locally or remotely on the client end.

After connecting and switching all of the system components, the data generation process begins from the sensors in the vehicle to the repository through Wi-Fi connection via the microcontroller. The data is saved in the database in table format, along with various other columns and properties that will be analyzed. Figure 9 shows the prototype of the proposed system.

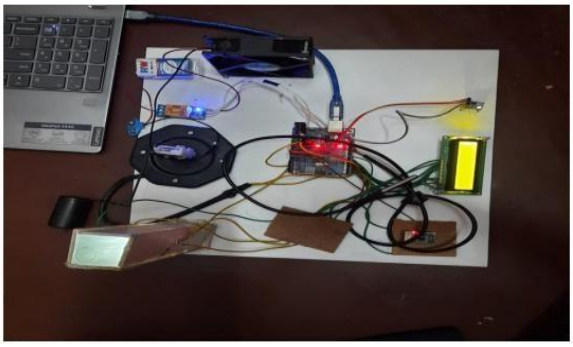

Figure 9. Prototype of the Proposed System

When power supply given to the vehicle system and turned on, the output will be shown on the LCD. The IoT app output will be shown even when the vehicle is turned off.

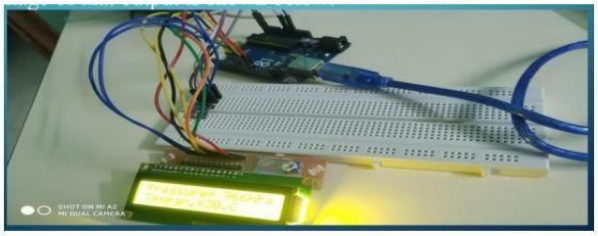

Figure 10. Pressure Level Indication

Figure 11. Fuel Level Indication

Figure 12. Oil Level Indication

Figure 13. IoT Web Page Display

REFERENCES

[1] Vangelis Gazis, KonstantinosSasloglou, NikolaosFrangiadakis and PanayotisKikiras, “Wireless Sensor Networking, Automation Technologies and Machine to Machine Developments on the Path to the Internet of Things,” 16thPanhellenic Conference on Informatics, 2012, pp. 276 – 282.

[2] Nacer Khalil , Mohamed Riduan Abid, Driss Benhaddou, Michael Gerndt, “Wireless Sensor Network for Internet of Things” arXiv:1606.08407v1 [cs.NI] 27 Jun 2016

[3] M. Yun and B. Yuxin, “Research on the architecture and key technology of internet of things (IoT) applied on smart grid,” in International Conference on Advances in Energy Engineering (ICAEE), 2010, pp. 69–72.

[4] 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.

[5] Chen Peijiang, Jiang Xuehua, “Design and Implementation of Remote monitoring system based on GSM,” vol.42, pp.167-175. 2008.

[6] D.B. Tushara and P. A. H. Vardhini, "Wireless vehicle alert and collision prevention system design using Atmel microcontroller," 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), Chennai, 2016, IEEE 978-1- 4673-9939,pp- 2784-2787.

[7] U. Jovanović, I. Jovanović and D. Mančić, "Overview of Temperature Sensors for Temperature Measurement of PV Modules," 2018 26th Telecommunications Forum (TELFOR), 2018, pp. 1-8, doi: 10.1109/TELFOR.2018 .8612096.

[8] H. Takahashi, K. Matsumoto and I. Shimoyama, "Air Pressure Sensor for an Insect Wing," 2009 IEEE 22nd International Conference on Micro Electro Mechanical Systems, 2009, pp. 825-828.

[9] A. Sequeira, N. Koul, A. Kumar, E. Wessely, G. George and P. Chakraborty, "Fuel Level Detector," 2019 IEEE International Conference on System, Computation, Automation and Networking (ICSCAN), 2019, pp. 1-5, doi: 10.1109/ICSCAN.2019.8878782.

[10] A. Ballato, "MEMS viscosity sensor," 2009 IEEE International Frequency Control Symposium Joint with the 22nd European Frequency and Time forum, 2009, pp. 784- 787, doi: 10.1109/FREQ.2009.5168292.

[11] S. S. Kanagond, S. S. Huddar, S. H. Hoolageri, V. Kapatakar, R. L. Itagi and S. Jolad, "Smart assistive device for senior citizens," 2020 IEEE International Conference on Distributed Computing, VLSI,

Electrical Circuits and Robotics (DISCOVER), 2020, pp. 42-46, doi: 10.1109/DISCOVER50404.2020.9278083.

[12] O. Andrei, S. Ungureanu, A. Miron and A. C. Cziker, "IoT power monitoring device using Wi-fi and Arduino," 2021 9th International Conference on Modern Power Systems (MPS), 2021, pp. 1-6, doi: 10.1109/MPS52805.2021.9492651.

[13] R R Veekshita, R Meghana, G Varsha Iyengar, B R Thejaswini and M Latha, "Smart Assistive Device for Physically Challenged People", Int. Jour. of Engineering Research & Technology, vol. 6, no. 13, 2018.