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Automation of Fuel Measurement and Air Pressure in the Wheel based on IoT Technology

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Abstract : In today rapid development era the motor vehicles display the amount of fuel in the fuel tank by means of some indication like bars running through the empty and full indicators and also not get an alert message about the condition of wheel were air is available in the wheel or not. Everyone of us might have experienced the problem with improper estimations of the current fuel level in the tank with the existing bars representation system and accident cause due to imbalance because of less amount of air in the wheel. At the time of manufacture they provides the specification that each bar maps to the corresponding liter of fuel approximately and air pressure in the wheel .Today in this digitalized world ,if the fuel indicator in the automobiles is also made digitalize and it will help to get the exact amount of fuel present in the tank and air in the wheel. In this paper have proposed a technique to make a Smart IoT based system to display the fuel and wheel pressure status on Android device and also get alert message in mobile through Bluetooth module. Also this application can predict and calculate how much distance that vehicle can travel in the amount of fuel present right now in the fuel tank by Arduino.
IndexTerms -Bluetooth, Android OS, Arduino, Ultrasonic sensor,Pressure sensor

I. INTRODUCTION

Now a days most of the accidents cause due to pressure variation in wheels. If the air in wheels is more than fix level it may damage the suspension, wheel alignment and balance when travelling through bad roads. Because of this fact we loose the control vehicle in some situations and the wheel has the chance to explode. If pressure is less than fixed level can also cause accident by loss of control. And another reason is pressure difference in each wheels also create accidents and another case some people stuck in between the highway due to less amount of fuel and this cases happen because of not getting an exact value of fuel level in the tank. All this problems are arising due not checking the pressure in wheel as well as fuel in the tank before entering in to vehicle . Hence the above furnished fact is considered in our project and we found out a proper solution for indicating the accurate availability of fuel in the tank digitally. We are introducing our paper (Automation of Fuel Measurement and air pressure in wheel based on IoT Technology).Hence we can get an exact amount of petrol in the fuel tank and air pressure in the wheel .The Ultrasonic sensor is fitted to tank to detect the fuel level and also pressure sensor is used to detect the air in the wheels. It also gives the prediction about how much distance vehicle can travel in the available amount of fuel in the tank and also can get an alert message through Bluetooth module to the android phone.These all attributes are verified by an Android app. It also helps the user to lookout all this parameters before moving in to vehicle this all information pass through an wireless system. If a family is going for a long trip then they can make a plan and take some precaustions according by getting all the information before entering into vehicle. In this paper, We mainly focus on reducing accidents, increasing vehicle life and making a safe journey.

II. LITERATURE SURVEY:

A. A Smart Monitoring System in Vehicles

Kavitha N(2018) has mainly focused on developing a smart monitoring system of vehicle. Sometimes due to low pressure in the wheel causes accident that's why they used pressure sensor to detect the air pressure status also Carbon dioxide (CO2) gas has been proven to be one of the most significant gases that will cause global warming. How to efficiently monitor CO2 concentration in a large field such as an urban area by CO2 sensors was an interesting research topic and also they used fuel detection sensor to check the fuel level in tank and get status to our phone by wireless networks.

In that developed system CO2 sensor was used to sense the carbondioxide gas concentration emitted from the vehicle. Ultrasonic sensor was used to sense the level of petrol in the vehicle. The arduino controller was built in the vehicle and the LCD display was placed in front of the driver near the steering and each and every sensors continuously sense the values and sent to the arduino controller. The arduino controller then compares the level of fuel, wheel pressure and CO concentration level with the threshold

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value set in the arduino. If the sensed value was greater than the threshold value then a message was sent to the owner of the vehicle. Owner will only allowed to turn up the engine. In future this systems would be highly cost and all this requirements would not possible to handle by the vehicles.

B. Modified Type Intelligent Digital Fuel Indicator System

Nitin Jade(2014) has mainly focused on to measured the exact amount of fuel level in the tank and also gave the chemical value to check the purity level of fuel and it was the first device which gave the accurate knowledge of fuel level in the tank and display it digitally and it also gave the idea of how much vehicle can run in available fuel in the tank & running capability of vehicle using loadsensor .All the sensors were situated on their particular separate place to perform their operation. In that system ECU(Electronic controlling unit) was used to control and gave power to the various sensor which was placed in the system. It collects data from sensor and then pass to ECU and then forward to CPU which perform calculation as per the programs done There are various sensor used in that system loadsensor was used to check the running capacity of the vehicle Speed sensors was used For control measurement systems this sensor provides speed and direction information. Between sensor face and a target, a target induce magnetic field was detected by rotational speed sensor. The operating temperature of the sensors was around 200C. The output voltage of the sensor was proportional to the target speed and air gap Acceleration sensors was used to measure the relative acceleration for linear and rotary drive and also analysis the behavior of drive system. Digital temperature sensors was too low power consumption to detect the temperature surround.

C. Embedded System Based Digital Fuel Gauge for Automobiles

K S Balasubramani(2016) has mainly focused on system which was to measure the exact amount of fuel level in the tank. Now a days the fuel fraud case are increasing the fuel in the tank has much less than displayed value. Hence to overcome that problem that system was proposed which shows the exact amount of fuel in tank digitally on the LCD screen which was fitted on the vehicle and also send the alert message to owner about the fuel status through WIFI and calculations was done through Microcontroller.

This system was establish to focus on the digitally display the exact amount of fuel and also cross check the quantity of fuel in tank and various sensors was also add in system to gives the various info to the driver like temperature sensor was used to detect the temperature and WIFI module was used to gave the alert message to the owner through SIM network and microcontroller was main part was to perform the various calculation and passing the results to devices. They used keypad to enter the fuel cost and value and passed to microcontroller for calculations and fuel level sensor was used to analysis the fuel level in the tank.

D. Petrol Detection Meter Using IoT

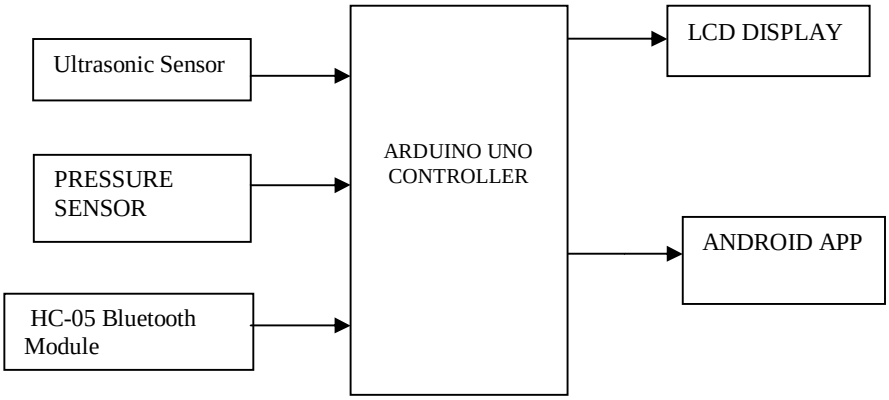
N. Murali Krwashna(2018) has mainly focused on to detect how much petrol has been falling into your petrol tank by showing you the exact point reading through LCD .Here they are implemented an IOT fuel monitoring and tracking system. Hence as soon as agent starts filling petrol in your vehicle, the flow sensor was activated. That flow sensor will be active till flow ends. Once flow ends it will calculate the amount of fuel filled and send information on your android device. Flow sensor was used to check the fuel filling in tank as it passes the flow ends than the calculation will start for exact amount of fuel. Microcontroller was used to check or calculating the mileage for the existing amount of fuel and also it will displayed the alert message for low fuel.RPS(Regulate Power Supply)was used to give the power supply to microcontroller. All this informations about fuel can able to stored in memory storage for future use through Wi-Fi module and that can see on android device anytime.

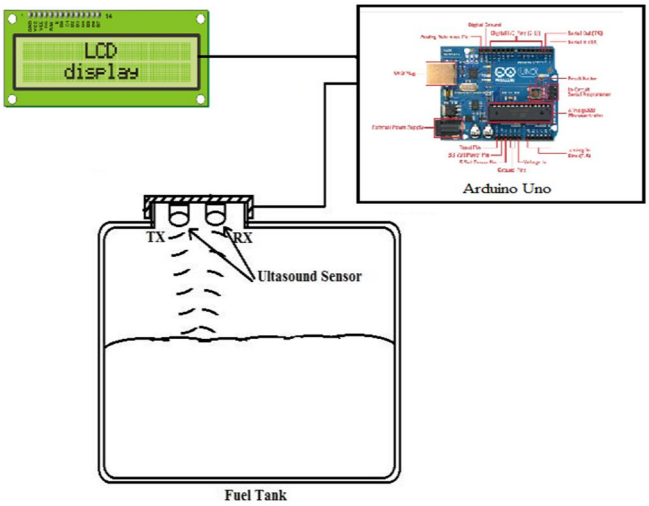
III. PROPOSED SYSTEM

This paper describes the method to facilitate an enhanced Automation of Fuel Measurement And Air Pressure In The Wheel based ,using Android application for displaying the status of fuel level in the tank and air pressure in the wheel.UltraSonic sensor is used to detect the fuel level inside the tank and pass the value to the Arduino and Arduino will calculate the value and send to the Bluetooth module and from Bluetooth module it will display on android phone and also Arduino will help to predict the mileage means how much km vehicle can run with in a present amount of fuel level in the tank.Pressure sensor is used to detect the amount of air pressure in the wheel and send to the Arduino and then it will display on phone in psi unit. Hence we combined both fuel level sensor and pressure sensor.

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IV. BLOCK DIAGRAM





V. WORKING

A. The flow chart to prepare a liquid level indicator; you can use power supply for input signal,micro-controller.There must be an inter-connection between all the modules, and the indicators must be connected with the arduino.

B. If the over load level occurs then the system gives alarm and sends alert message .The message will be transmitted to the owner through arduino processor and simultaneously the buzzer also sounds for alarm

VI. COMPONENTS DEATILS

A. Ultrasonic Sensor

Ultrasonic sensors are devices that use electrical–mechanical energy transformation to measure distance from the sensor to the target object. Ultrasonic waves are longitudinal mechanical waves which travel as a sequence of compressions and rarefactions along the direction of wave propagation through the medium. Apart from distance measurement, they are also used in ultrasonic material testing (to detect cracks, air bubbles, and other flaws in the products), Object detection, position detection, ultrasonic mouse, etc.

An ultrasonic sensor consists of a transmitter and receiver which are available as separate units or embedded together as single unit. The above image shows the ultrasonic transmitter and receive. Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function. The ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. I also Provide you complete Project code you can download it from the bottom of the page.

Now working of HC-SR04 as follow:

Send 10us HIGH pulse on TRIG pin of HC-SR04.

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The sensor sends out a “sonic burst” of 8 cycles. And detect whether there is a pulse signal back. If there is an obstacle in-front of the module, it will reflect the ultrasonic burst.

If the signal is back, ECHO output of the sensor will be in HIGH state (5V) for duration of time taken for sending and receiving ultrasonic burst. Pulse width ranges from about 150µS to 25mS and if no obstacle is detected, the echo pulse width will be about 38ms.

Pin out of HC-SR04:



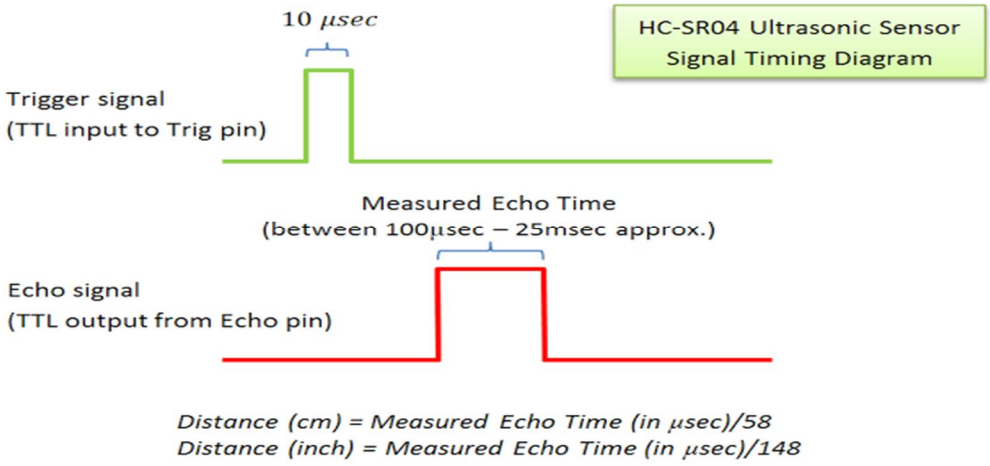
HC-SR04 Front view

VCC – 5V Power supply.

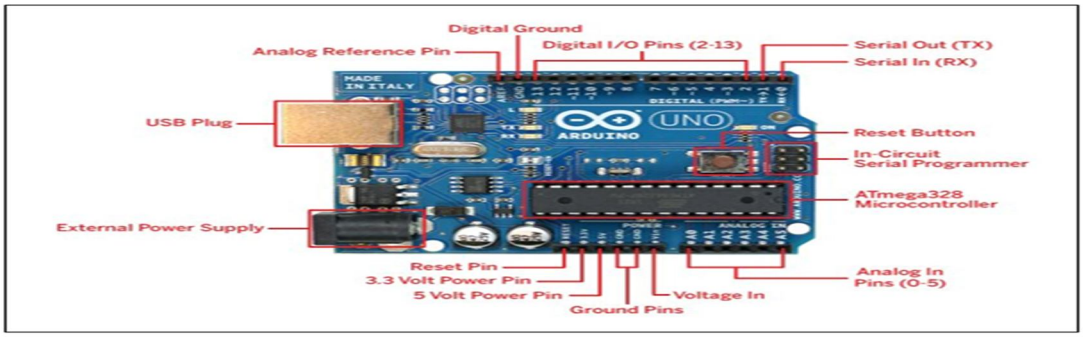
TRIG – Trigger Pin connect to the P1.1 of AT89S52.

ECHO – Echo Pin connect to the P1.0 of AT89S52.

GND – -0V Ground.



B. Arduino



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a

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reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter."Uno" means "One" in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.The power pins are as follows:

VIN.The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V.The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

3V3.A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GROUND. Ground pins.

C. Memory

The ATmega328 has 32 KB (with 0.5 KB utilized for the boot loader). It likewise has 2 KB of SRAM and 1 KB of EEPROM (which can be perused and composed with the EEPROM library).

D. Info and Output

Each of the 14 computerized sticks on the Uno can be utilized as an info or yield, utilizing pin Mode advanced Write, and computerized Read capacities. They work at 5 volts. Each stick can give or get a most extreme of 40 mA and has an inside draw up resistor (disengaged as a matter of course) of 20-50 ohms. Furthermore, a few pins have specific capacities:

1) *Serial:* 0 (RX) and 1 (TX). Used to get (RX) and transmit (TX) TTL serial information. These pins are associated with the comparing pins of the ATmega8U2 USB-to-TTL Serial chip.

2) *External Interrupts:* 2 and 3. These pins can be designed to trigger a hinder on a low esteem, a rising or falling edge, or an adjustment in esteem. See the connect Interrupt () work for subtle elements.
3) *PWM:* 3, 5, 6, 9, 10, and 11. Give 8-bit PWM yield with the simple Write () work.
4) *SPI:* 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins bolster SPI correspondence utilizing the SPI library.
5) *LED:* 13. There is an inherent LED associated with advanced stick 13. At the point when the stick is HIGH esteem, the LED is on, when the stick is LOW, it's off. The Uno has 6 simple data sources, marked A0 through A5, each of which give 10 bits of determination (i.e. 1024 distinct qualities). As a matter of course they measure from ground to 5 volts, however is it conceivable to change the upper end of their range utilizing the AREF stick and the simple Reference () work. Furthermore, a few pins have particular usefulness:
6) *I2C:* 4 (SDA) and 5 (SCL). Bolster I2C (TWI) correspondence utilizing the Wire library.

There are several different sticks on the board:

AREF. Reference voltage for the simple sources of info. Utilized with simple Reference.

Reset. Convey this line LOW to reset the microcontroller. Commonly used to add a reset catch to shields which obstruct the one on the board.

VII. OBJECTIVE

A. To reduce manual work.
B. The device has to be cost efficient without compromising on the accuracy of measurement.
C. Design and develop fuel indicator system.
D. Understand project planning and execution.
E. Understand the fabrication techniques in a mechanical workshop.
F. To study the controller model and observe its characteristics.

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VIII. ADVANTAGES

A. Easy installation.

B. Low maintenance.

C. Compact elegant design.

D. Can be able to operate using an external battery supply.

E. Saves man power.

F. Show exact indication of fuel levels

G. Easy to indicating to millage in two wheeler.

IX. APPLICATION

Used in 4 wheeler, 3wheeler.2 wheeler.

X. FUTURE SCOPE

In future the proposed technique can be improved by adding fuel cells at different places of fuel tank to measure exact fuel levels at different conditions like day/night for particular densities at different altitude conditions of vehicle and a buzzer to announce the user about the abnormal conditions like low level, half level and full levels of the fuel tank to refill or warn themselves. The accurate distance to zero can also be done by programming the microcontroller by taking the input of present mileage with respective speeds and tank levels

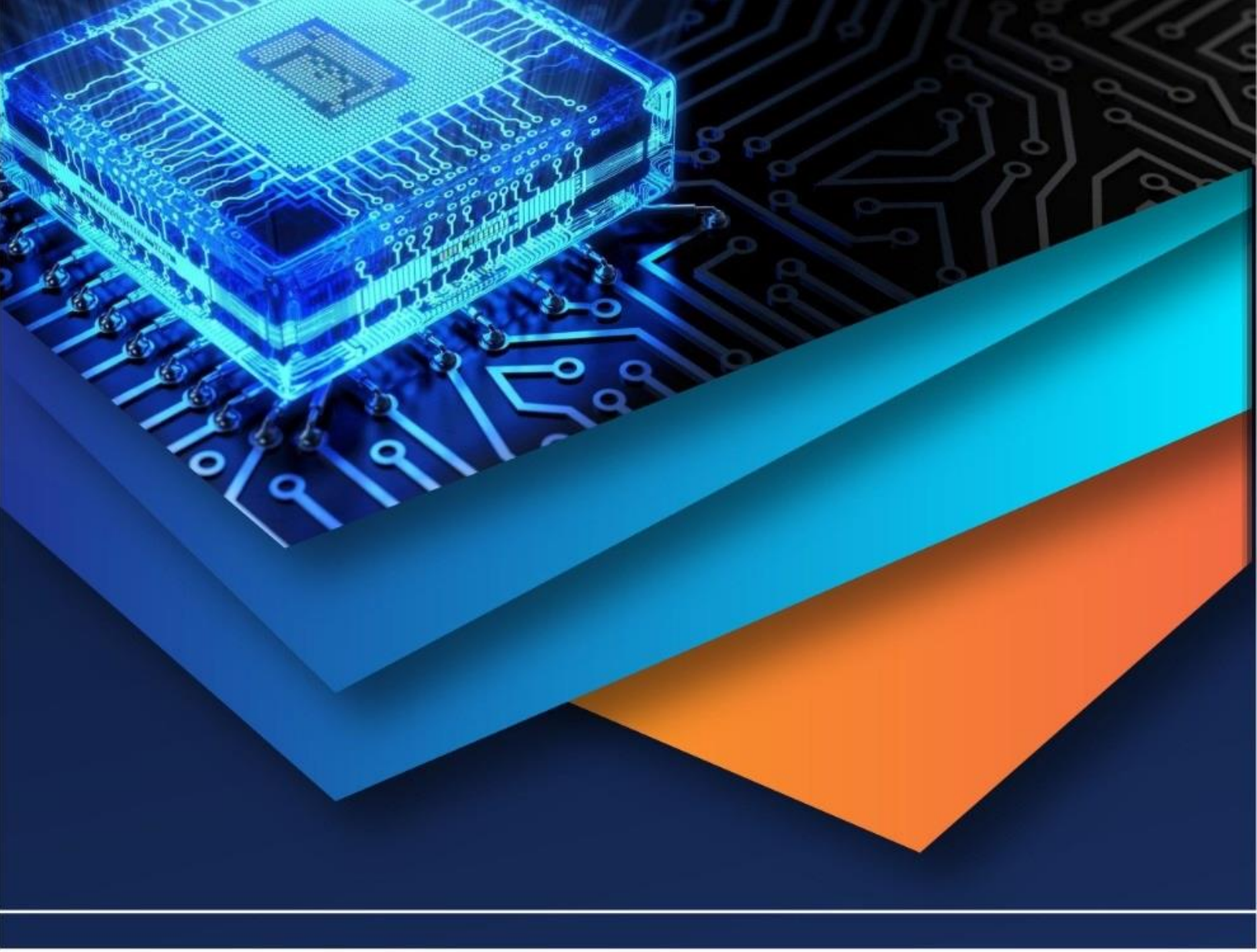
XI. CONCLUSION

Thus we have arrived at the concept of Automation of Fuel Measurement And Air Pressure In the Wheel, based on IoT Technology. It will sure the approx percentage of fuel in the thank and also check and the air in the wheel and also gives the prediction of a mileage as per that it will give the alert message and status will be shown on android device.

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