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Arduino Powered Vehicle Guardian for Real-Time Fuel Monitoring and Emergency Alert System

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ABSTRACT:

This paper presents the design and implementation of an Arduino-based vehicle monitoring system that enables real-time fuel level detection and emergency alert functionalities. Addressing issues of fuel theft and vehicle accidents, the system utilizes a GSM-GPS module for sending SMS alerts and an accelerometer to detect sudden angular deviations. Fuel level is measured using a capacitive sensor, and output is displayed on an LCD. In the event of an emergency or suspicious activity, alert notifications with location details are immediately transmitted to designated recipients. This integrated solution ensures enhanced vehicular safety, real-time monitoring, and system reliability.

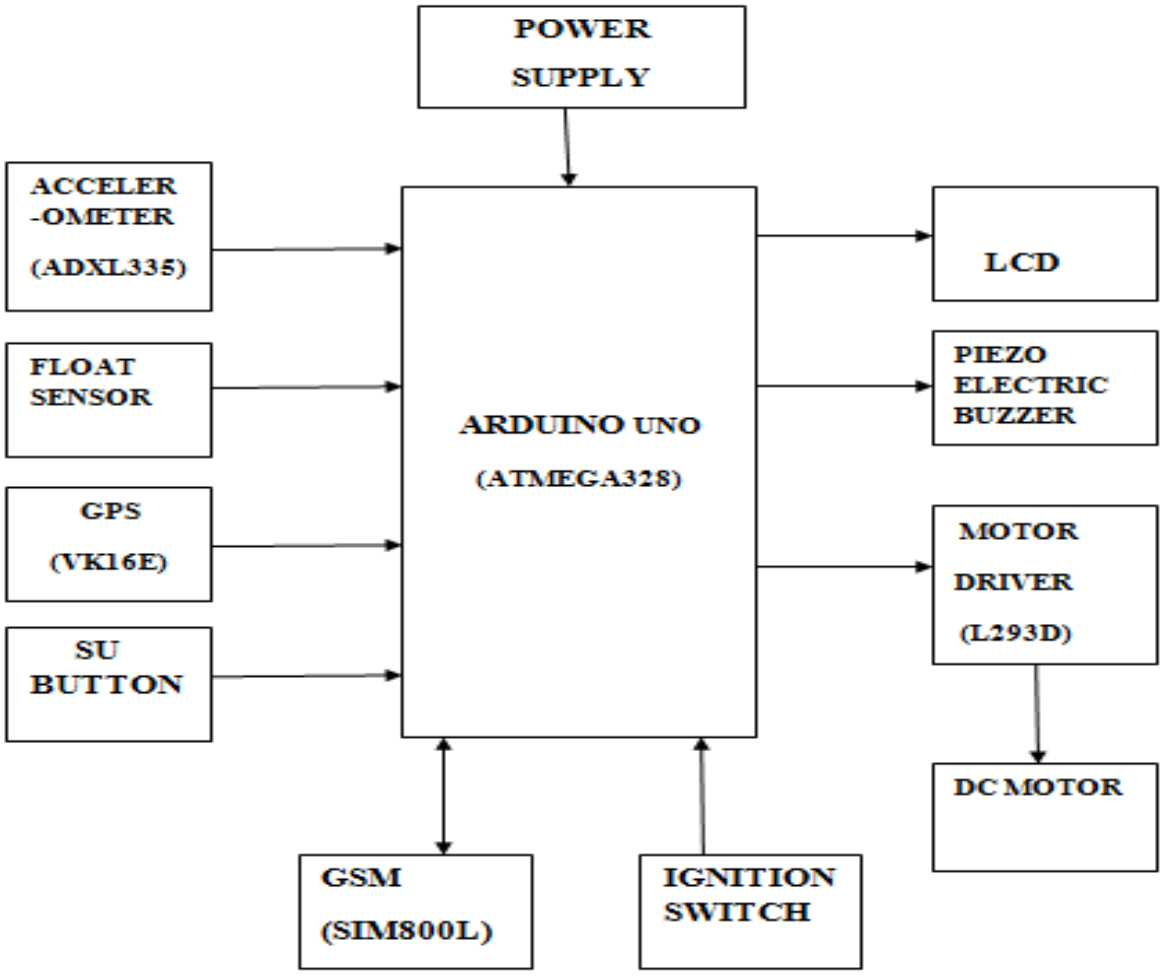
INTRODUCTION:

Fuel level Indicator are designed by using MULTILAYER PHOTONIC STRUCTURE .The multilayer photonic
structure consists of different layers. The different layers are occupied with a air layers, this can be filled with
the fuel in which the air layer is inversed to the fuel level indicator. Thus these photonic structure can efficiently
indicate fuel levels in the vehicle tank. An ultrasonic sensor is also used to detect any fuel thefts from vehicles.
The measured fuel data is sent to a mobile app and cloud database in real-time. If a theft or fraudulent dispensing
is detected, an alert is sent to the owner. The proposed technology of this project is “Accident Alert”. 3-axis
accelerometer sensor detect the vehicle accident using three coordinates. It is an electromechanical device used to calculate acceleration forces, either static or dynamic forces of acceleration.

In recent day’s world has become digitized, if we make fuel meter in the vehicle also digital it will help to know
exact amount of fuel present in fuel tank. In our Project we have made digital fuel meter. Here, we are indicating
amount of fuel present in tank digitally. That value is in numerical digits (ex: 1lit, 1.5 lit, 2lit etc).Fuel thefting
is also measure problem all over the world. In our project whenever there is fuel thefting, due to the noise of burglar
alarm people are aware of the fuel thefting and also during fuel thefting a text message delivered on

mobile to the
owner of the bike. This is real time occurring process. Nowadays everything is digital in all over field. Digital fuel
meter is also implemented in two wheeler, but they do not shows the exact fuel level which is present in the tank i.e.
they shows the amount of fuel in terms of bars and not in numbers or digits like liter or milliliter. That's why we do
not get proper idea about fuel present in our tank. We get only approximate level of fuel. So this problem is taken
into consideration for our project work of developing the Digital (numeric) fuel indicator system for two wheelers
which shows exact amount of fuel in terms of liter or milliliter. This value in liters will be in numerical digits
(ex: 1.2 lit, 1.3 lit, 1.4 lit). This project mainly concentrates about the indication of fuel level in two-wheeler tanks.
Various other features like the distance can be travelled to the corresponding fuel, is added with this arrangement which
will explain the clear performance of the vehicle to the corresponding fuel. In the recent times we are constantly hearing
about petrol thefting. Fuel Thefting There is major problem of fuel thefting all over the world. Thefting is malpractice
which includes removal of the fuel pipe in the absence of owner and misusing the fuel from the bike. The owner of the
bike unaware of fuel theft and he will come to know about it only when he wants to ride his bike on the next time.
Previously due to absence of any burglar alarm or buzzer the system, the people were not aware about fuel thefting.
To overcome this problem we have put this idea of digital fuel meter and fuel thefting, using Arduino UNO board.
In our project whenever there is fuel thefting, a text message delivered on mobile to the owner of the bike. This is real time
occurring process. Recently the lock system for the pipe ensured least amount of fuel thefting but it lasted only for small
duration of time. The disadvantages of this lock system are thief can break the system by using duplicate key and removal
of fuel from bike. Today's world is facing with traffic issues, accidents are causing on large scale due to transportation
so in this system detection of accident can be possible by using accelerometer.

This accelerometer will sense different angles as per the position of two wheeler vehicle on the road. These angles can
be used for detecting accident. If the accident is occurred and it is detected, then SMS will be sending to their relatives
as well as hospital areas. Due to this SMS, people may come to know about accident has been occurred or not.
This SMS is send with the help of GSM module.



METHODOLOGY:

The methodology of the project is to provide fuel level indication digitally without errors by continuous monitoring with
Of float sensor, fuel theft indication by basing on a mechanism i.e. whenever the vehicle is in rest condition the level of
the fuel is stored in micro controller, if the level decreases beyond the stored fuel level when the vehicle is still in rest
condition then the system will get aware that fuel theft is occurring and will send an SMS to owner of the bike through
GSM, Accident alert system based on angle of inclination of accelerometer, This accelerometer will sense different angles
as per the position of two wheeler vehicle on the road. These angles can be used for detecting accident. If the accident is
occurred and it is detected, then SMS will be sending to their relatives as well as hospital areas.

TECHNIQUES APPLIED:

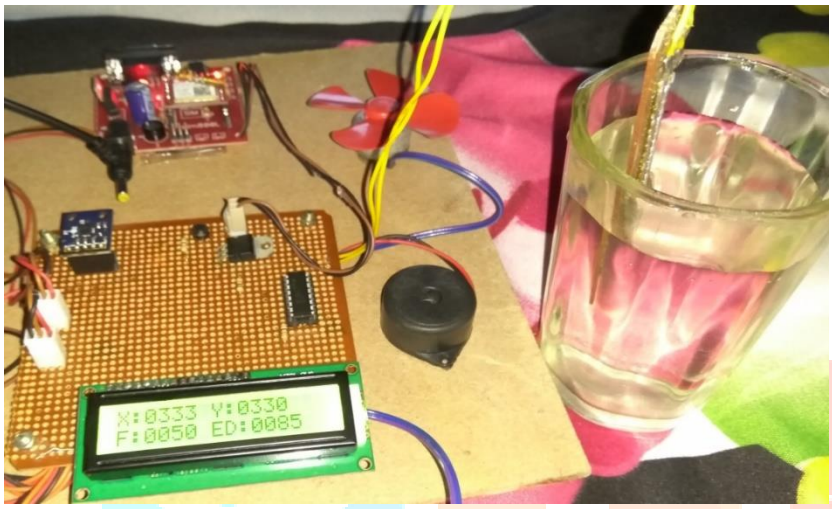
The Arduino Uno microcontroller board and various components used in this project.Its control over other components.

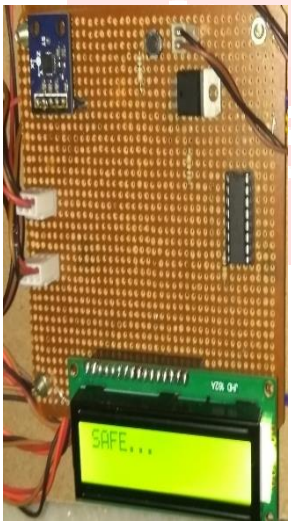
We also discuss about functioning of different components used and their interfacing with the ARDUINO.

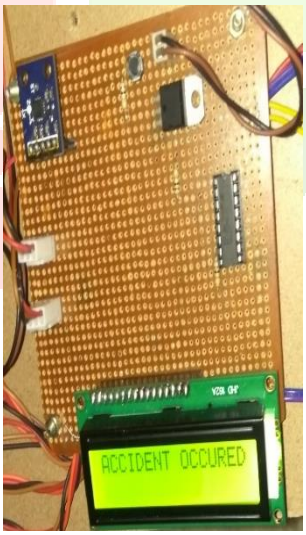
RESULTS:

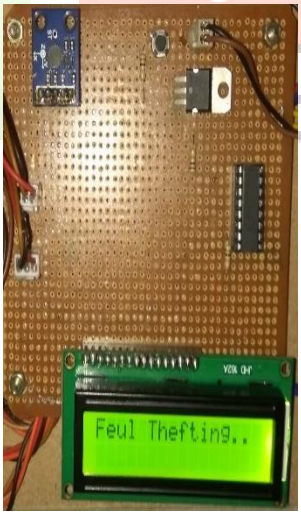
Incase if the vehicle did not met with an accident but it falls down by mistake from the user, then we can stop sending
the accident occurred message by clicking on the status update button then it indicates that user is safe and no accident has happened to the vehicle.

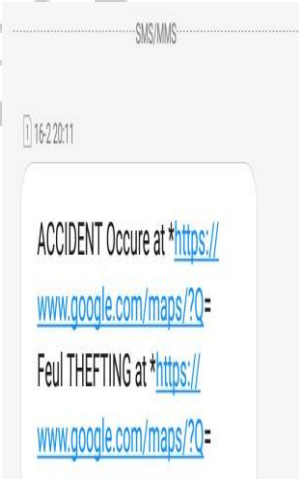
Indicating the level decrease when Ignition Switch is in off condition



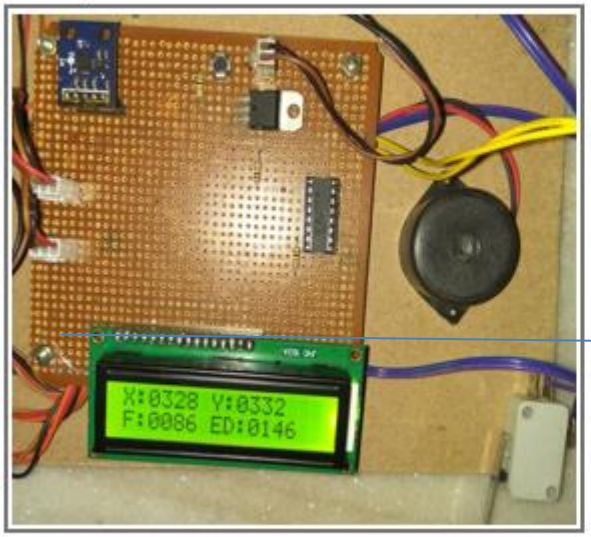




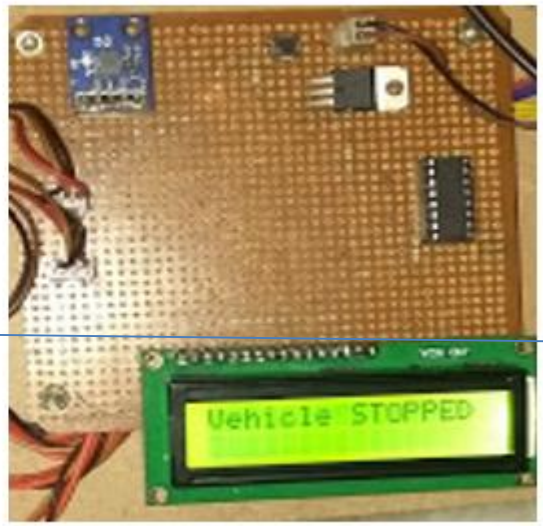




Displaying fuel level and expected distance



While stopping



CONCLUSION:

The design model is easy to implement and very customizable according to the user requirement. In this proposed system, thefting of fuel is avoided and the thefting of fuel from petrol pump will come to an end, which will decrease the corruption. Due to this, system will be more reliable .This system will obtain the accurate readings of fuel in digital format, and also this system can be able to detect the accidents occurred. The project provides the user friendly interface that creates interest among users to use it which in turn leads to use easily. Moreover, the present project can also decrease the problem of fuel theft when the vehicle is parked at some place, besides the system is very useful for emergency situations i.e. Accident happened to the vehicle.

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