Novel Technical Design Of An Early Protection System For An Electronic Fuel Injection System

1st Dr. Abdullah J. H. Al Gizi[1], 2nd Msc . Saadi faisal radhi[2] and 3rd Msc. Yaerobe Mohammed Mthbob[3]
{abdullal.algizi@stu.edu.iq ,ss2014ra@gmail.com, Yaareb.m.m@stu.edu.iq}
Thi-Qar technical collage Electromechanical Engineering ,Southern Technical University, Iraq[1], Shatrah Insitutes, Agrculter Mechine Southern Technical University, Iraq[2] , Electrical Networks Engineering Department, Southern Technical University, Iraq[3]

Abstract. The system of sensors was designed and controlled for early warning that the fuel sprayer will stop working and be controlled. When the fuel sprayer stops working, the electronic-control-unit (ECU) or computer gets electrical signals from (current, voltage) various sensors, but there are no sensors, which may result in fuel waste and engine combustion, posing a risk to passengers. Electric motors drive the fuel injection pump, the pressure control valve is set to 100 bars, and the standardising fluid is injected through the nozzle in the computing cylinder. This proposed system consists of sensors and signal processor that control, giving an early warning about the state of the sprinkler through a screen and after that turning off the engine when it does not respond to the warning and treatment. This technique was utilised to examine a 40[MP]capable conventional Gide inwardly-opening multi-hole fuel inoculation scheme using new fuel system mechanisms, injector dynamics, spray characteristics, and a single cylinder engine burning evaluation.. It also appears that the system provides a significant savings in fuel consumption and reduced material losses that result from engine damage and biography and maintain the vehicle users 'modesty and improve the quality of the protection and warning system and intelligent treatment of vehicles. The achieved system is demonstrated to be efficient and robust in improving fuel sprayer control system and capacity.

Keywords: ECU,Early Warning, Sprayer,Sensors,Protection.

1 Introduction

The Electronic-Fuel-Injection scheme can be separated into three: elementary sub-system. These are the the electronic control system and fuel delivery system, air induction system,.

This implies the progress of optical sensors with suitable organization software for online discernment.The conservative example for vehicle security has been an ***self-governing*** method to include a large amount of sensors in each automobile so that adequate attention can be providing to classify adjacent objects that could cause chances and keep the passengers and vehicle driver safety.

To this end, a spray boom postponement must be intended to absorb tractor of the most new horizontal strips of pixels from the optical sensor delivers information J.De Baerdemaeker [1]. J.De Baerdemaeker [1]A practical review on steering schemes of agrarian independent off-road vehicles.[2] Proposed the Investigational data were verified with essential sensors (encoders ultrasonic sensors, etc.). [3] examines the processes of a 40 [MPA] accomplished conservative GDI inwardly-opening multi-hole fuel inoculation method, as well as injector nuances, spray features, and a single cylinder engine burning investigation. Change

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of a piezoelectric energy garnering scheme for applying wireless devices on the tires.[4] Proposed the Demonstrating and imitation of rain for the examination of automotive sensor schemes. Advance of a sensor-based precision herbicide appeal system [5]. Application and description of a keen space system founded on 3-axis magnetic devices are proposed by [6]. Proposed by[7] Railroad bridge nursing using wireless smart sensors. Smart Self-governing Movement Light Changing by Movement Density Amount finished Sensors[8]. [9] Devices and actuators are used, often schmoozed in a dispersed regulator scheme, in a number of uses changing from manufacturing automation to ecological condition nursing regulator, to brainy transportation schemes or to fatherland defense. Low cost unmanned aerial automobile intensive care using smart phone skill[10]. The effects of straight water inoculation (WI) on burning and release physiognomies for a hydrogen (H2)-fueled stimulus explosion (SI) engine were investigated experimentally in this paper[11]. With experimental fuel split inoculation, dual-fuel combustion using diesel and high-octane quantity (ON) biofuel of n-butanol blends to ignite battered normal gas (CNG) was investigated[12]. A novel combustion mode, intelligent charge compression ignition (ICCI), was developed in the future to be predictable for ultra-high competence and low emissions at the same time [13]. The burning physiognomies for n-butanol and petrol were investigated in this work on a four-cylinder spark explosion petrol engine with self-governing port fuel inoculation and straight inoculation systems in various operating conditions[14]. Spread Generation (DG)[15] is a unique idea in electric power schemes, primarily in delivery systems, as a result of this miracle. The goal of this study is to look at a problem that comes from the cumulative spread of distributed energy capitals in control schemes: the design and testing of defensive devices with more complex topologies and power flow patterns[16]. The effects of adding PODE3-4 to diesel on macroscopic spray physiognomies were studied in a continuous volume spray chamber with varying injection pressures[17]. Straight hydrogen fuel cell electric automobiles (FCEVs) produce just water as a byproduct, eliminating tailpipe carbon and standard air pollutant emissions associated with internal combustion engines (ICEVs)[18]. Fuel cells (FCs) are well-organized energy conversion devices that can be employed for both energy conversion and storage[19]. 3-phase four-wire delivery methods are utilised to house single- and three-phase customer loads as well as renewable energy sources (RES) in numerous housing and profitable low voltage (LV) networks[20].. Characteristically, fuel Cell Hybrid Electric Vehicle (FCHEV) contains of fuel cell, cordless and/or ultracapacitor (UC) as the power sources[21]. An automatically activated fuel inoculation valve and a example electronic control system are industrialized [22]. [23] discusses the future of the automative electronic schemes. A regulatory model for the cooling scheme of an train was industrialized in order to decrease fuel ingesting and engine releases through the use of manageable engine cooling mechanisms counting an electrical water pump, an electrical fan, and a heated regulator[24]. [25] increases the amount of energy consumed in the gasoline manufacturing process, raises the cost of fuel, and produces undesired by-products. The main weakness of such an style is the in height cost of the scheme as a consequence of the large amount of sensors .Current advances of communiqué and interrelating skills have allowable a new obliging model for vehicle safety schemes, in which, via conventional vehicle-to-vehicle communiqué links, vehicles not only share info everywhere their . The electronic controller unit (ECU) or the computer accepts electrical signals (current ,voltage) from different sensors, but there are no sensors when the fuel sprayer stops working, which may cause waste of fuel and the burning of the engine and thus a risk to passengers, This paper presents system consists of sensors and signal processor that control giving early warning about the state of the sprinkler through a screen and after that turning off the engine when it does not respond to the warning and treatment.

2 System of Early Warning of the Fuel Sprayer

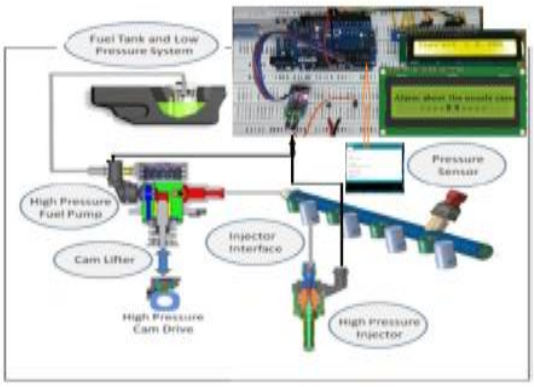

Fig. 1. GDi (Gross domestic income) Fuel System and Components

Make connections as shown above in Fig.1.The Major advantage of utilizing the Acs712 hall effect sensor interfacing with Arduino is that helpful to the cheap. This technique recovers overall accuracy, efficiency, and real-time alarm sign competence. Each gadget has the ability to detect current density and process the information using a microprocessor. Each sensor is placed in the line at various calculated nozzle and fuel-pump locations. These sensors are connected to the microcontroller via electrical connections.
A magnetic field is created when AC or DC current passes over a copper transmission route. The room effect sensor interacts with this electro-magnetic field. Depending on the input current variety, the room effect circuit converts this electro-magnetic field into relative voltage, either AC or DC. With the help of Arduino or any other microcontroller, this output voltage is measured..

2.1 Basic Block Diagram

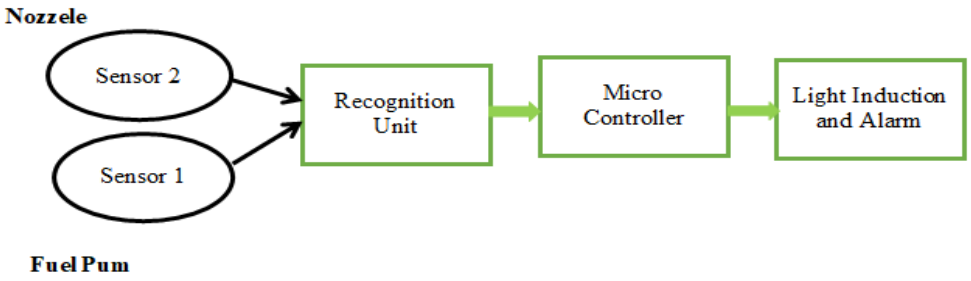

Fig. 2. Block Diagram Of early warning of the fuel sprayer

The block plan shown in Fig.2 contains of numerous sub-systems like recognition unit, micro-controller and indicated light unit. Discovery unit has a number of ACS- 712 current-sensors for fuel pump and nozzele associated. A low power micro-controller is devoted to the Light Indication scheme and alarm. Each scheme applied in the fuel sprayer scheme has the

same sub-systems of Fig. 2..

3 Recognition And Early Warning Of The Fuel Sprayer System

3.1 Detection Unit

Fig. 3. Hall sensor (ACS- 712) for fuel pump

The discovery unit has acs712 sensors on each lane, as illustrated in Fig.3, that detect the current AC or DC of the nozzle and fuel pump on that lane and provides the data to the microcontroller for processing. Every line is equipped with a number of sensors that are dependent on the current on a certain cct. These sensors are placed at a specific current level to detect precise nozzle and fuel pump current consumers. The current cumulative or decreasing gives as the induction, which causes problems nozzle or a fuel pump and challenges in most cars of modern models . The implementation of this system overcomes the events that lead to accidents of cars burn engine and overall the car with the user.

3.2 Working of ACS712 current sensor

A lined room result circuit and a copper transmission pathway are included in the ACS712 sensor. The copper transmission path wraps around the die's surface. A magnetic field is created when ac or dc electricity passes over a copper transmission route. This electro-magnetic field interacts with the sensor that detects the room effect. The room effect circuit converts this electro-magnetic field into relative voltage, depending on whether the input current is ac or dc. With the help of an arduino or any other microcontroller, the output voltage is measured. After you've calculated this voltage, you'll need to convert it to current using sensitivity equations, which I'll explain below. When the current flowing through the sensor is zero, the output voltage is calculated as Vcc / 2. If the voltage supply to the ACS712 is 5 volts, the current sensor's Vout will be 2.5 volts and the current ACS712=0 will pass through the sensor. The sensor's offset voltage, also known as the base voltage, is 2.5 volts and must be deducted from the measured value. When current becomes transitory across the sensor, Vout decreases. As a result, using the procedures below, you can determine I dc: Voltage = (adcvalue / 1024.0) * 5000; Adcvalue = analogRead(A0);
The amount of current by the preceding three lines of Arduino code is current = ((Voltage – voltage offset) / mVperAmp). In the first line, the Arduino analogue Read function is used to calculate the output voltage of the hall effect present sensor. 'The calculated digital value is saved in the mutable 'Adcvalue' variable. In the second line, convert the digital value of voltage back to equivalent voltage in mili ampere by raising it with the resolving factor and dividing it by 1000. Slow voltage is subtracted from offset voltage and alienated by the compassion factor

to obtain current from slow voltage in the third line. I hope that this explanation clarifies how this code works and how you may calculate dc current using the acs712 hall result current sensor.

4 Experimental Setup

One goal of Gdi (gross domestic income) schemes is to recoup the low cost of gasoline for gasoline-powered cars. The entire fuel system, from the gasoline tank to the injector, must be thoroughly examined and optimised. The fuel pump transports fuel from the fuel tank to the GDi high-weight pump's inlet. The fuel enters the high-pressure pump by the damper body, goes through the input metering valve, gets hassled by the plunger, and finally exits the high-weight side of the fuel scheme via the outlet check valve. A fuel line connects the pump opening to the high-pressure (common) rail, which distributes the fuel to the individual injectors. The fuel pressure sensor is usually installed on the fuel rail to allow for exact dimensioning and regulation. The ECU is in charge of the actuator that injects the fuel into the engine (electronic control unit). Fig. 4 showed the experimental set up the proposed system. Our systems consist of fuel pump electrical control unit with current sensor acs712 with Arduino Uno The Arduino Uno, a DC power supply (UNI-T UTP3315TFL 0-30V/ 0-5A), a digital oscilloscope (GDS-3252 GW INSTEK,Oscilloscope), and a nozzle were all used.

Fig. 4. The Components OF experimental testing Fuel System

5 Results and Discussion

In many cases, the nozzle is damaged or undergoes from a leak in the fuel extrusion or open and it is not possible to control the fuel extrusion, as the fuel continues to flow in the cabin, which leads to the leak of fuel outside the engine, which causes the vehicle to burn at any spark and at the same time it causes Consuming large quantities of fuel, and since there is no early warning about a nozzle malfunction, this proposed off spring will give an early warning of a nozzle malfunction, i.e. if this malfunction, whether it is a leak, a blockage, or the flow of fuel will pass through the nozzle inspection system that consists of an electrical control unit and sensors Current and voltages .

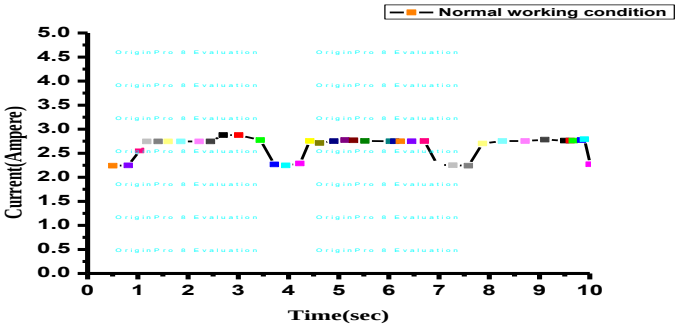

Fig. 5. The nozzle open and close induction depends on the current of the fuel pump under the normal operation condition

The cases of study state operation of the nozzles when the nozzle currents is in the range dependents on the types cares and the model , the new models of cares the system of control and units of ECU developed by the early alarm for nozzle defected needed more interesting for protection the cares and the user. In normal operation condition, the nozzle the current consumed by the fuel pump, is 2.24 amps to open and 2.78 amps to close. The working condition, periodic (2.245 A and 2.78 A) of the nozzle open and close induction depends on the current of the fuel pump under the normal operation condition as shown in Fig.5.

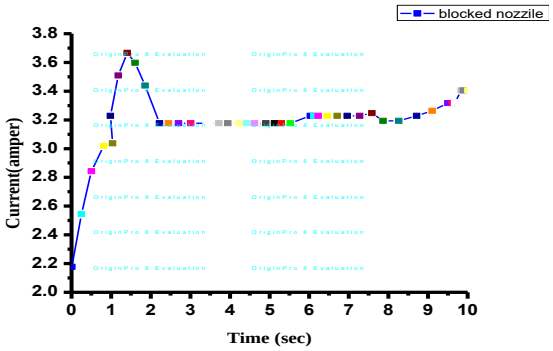

Fig. 6. The nozzle is blocked periodic

Our technique is dependents up on the electrical control unit and the currents that needs to nozzle operation .Where the current is induction for the operation conduction open and close of the nozzles depends on the current of the fuel pump. On the other hand in case the nozzle is blocked periodic as shown in Fig.6 the current consumed by the fuel pump is increasing from 2.80 A until 3.67 A. The clogging of nozzle lead to the increasing pressures for fuel pump and also increasing the current of fuel pump may damage the coil that control of nozzle fuel gate. The leakage state in the fuel, leads to decreasing the nozzle current from 3.5A to 2.6 A and decreasing pressure on the fuel pump so that have two types of leakage the fuel the fuel leakage from piping system as shown in Fig.7 and the current of nozzle pump between (2.54A and 2.8A) and the nozzle as in Fig.8

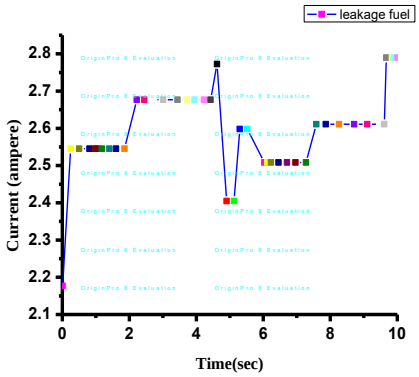

Fig. 7. Leakage the fuel the fuel leakage from piping system that between the pump and nozzle

The leakages fuel from the nozzle because of the damage the nozzle gates that lead to the continuous the flow of fuel without control, in this case the current of nozzle pump between (2.54A and 3.28A) as shown in Fig.8. Continuous the flow of fuel without control leaded to full the combustion chamber and flow outside it. That may be causes of burning the internal combustion and the overall the car.

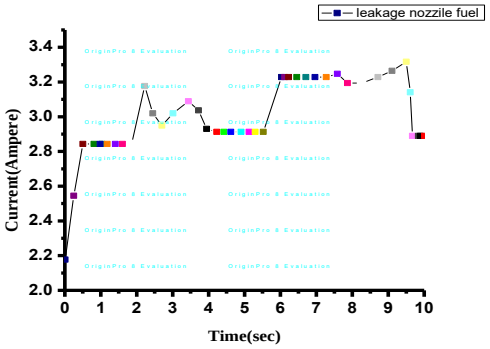

Fig. 8. The leakages fuel from the nozzle because of the damage the nozzle

Based on the findings of this research, control and alarm indication based on the present sensor's result appears to be the most promising option due to its simplicity and flexibility in including new factors into the control. However, based on the findings presented in the literature to far, it is possible to determine which method is the best to use as an early warning for nozzle pump work. Thus, the proposed technique procedure is efficient under dissimilar values the presentation of the proposed methods when compared with all cases established.

6 Conclusions

The proposed technique following system is projected and applied to improve the achievement of control system. This research described a low-cost real-time recognition and early warning system for the fuel sprayer system that uses sensors to prevent a collision between a burning car engine and the body. Also save the lives of drivers and passengers

to reducing the losses economic and human. The prototype was simply used to confirm the design, with the trials demonstrating an increased ability for control and warning indication based on the results obtained from the current sensor. With enough financing, this idea can be developed on a wide scale to produce an even better Early Warning Of The Fuel Sprayer System to compete with the existing ones on the market. The Early Warning Of The Fuel Sprayer System is tested and measured using a current sensor, which is then relayed to a microcontroller for automatic control. The system can able to save the lives of drivers and passengers to reducing the economic and human losses and preventing these accidents in vehicles. The achievement system is demonstrated to be efficient and robust in improving the fuel sprayer control system and capacity. Experimental results demonstrated the improvement in attaining to the desired control system using the proposed technique of control to provide good control performance in difference operating conditions.

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