

VOICE OPERATED FUEL INJECTOR USING BLUETOOTH MODULE

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Abstract: Petrol and diesel are the non-renewable resources. It is obtained from crude oil. Nowadays, petrol and diesel prices are increasing day by day. In the present day, a human source is needed to inject petrol or diesel into vehicles. During injecting, small or large amounts of petrol are wasted. In order avoid this, we proposed a new system named as voice-operated fuel injector. In this system, petrol or diesel is injected through the voice. This system consists of a microcontroller, Bluetooth module, and solenoid for processing. By using this, human effort is not needed because fuel is injected through voice.

Keywords: Microcontroller, Bluetooth module, Solenoid.

1. INTRODUCTION:

Petrol or diesel is the non-renewable source of energy, that is found under the ground. The word petroleum refers to "oil from the earth". Petrol or diesel that are created by older plants and animals that are lived long years ago. Petroleum, also known as fossil fuel, was created million years ago. Petrol or diesel energy is mainly used to power the vehicle and mechanical equipment. In the present days, petrol or diesel are injected into vehicle by human support. By using this present technique, human enter the rate of petrol in petrol bunk as required, then the petrol is injected into vehicle's fuel tank of the vehicle, by using this techniques effort of human need is greater. So in order to conquer this problem, we proposed a new system for fuel injection. By this system petrol or diesel is injected by voice signal. This system uses microcontroller; Bluetooth module, solenoid for process. In this system we use microphone, so need of petrol or diesel is fed through microphone. LCD display is used to display the amount of fuel required. The project voice-operated fuel injector is introduced for injecting fuel to the user through a voice signal. The output of fuel depends upon input voice signal. By using this loss of petrol and diesel reduced, and human effort will also be reduced.

2. METHODOLOGY:

In this design, we proposed a new system named as voice operated fuel injector. This system consists of microcontroller; Bluetooth module, relay, solenoid for process. Whenever the power supply gets ON, the fuel injector gets ready to inject the fuel. When the user conveys a requirement of fuel for his vehicle through Bluetooth-interfaced microphone, then the voice signal is converted

into a proper electrical signal, then that electrical signal triggers the relay, then the relay triggers the solenoid valve, which then injects the fuel into tank until the user's requirement. After the completion of this process, the solenoid operation gets stopped which stops the fuel injection and it gets ready for the next command. By using this system loss of fuel is low, and human effort is fully reduced.

3. OBJECTIVES OF THE PROPOSED SYSTEM:

- It is used for improving the engine performance.
- It is easy to control.
- By using this system, emissions will be reduced.
- This system improves fuel economy.
- It prevents carbon deposits.
- Injection of fuel is not wasted.

4. BLOCK DIAGRAM:

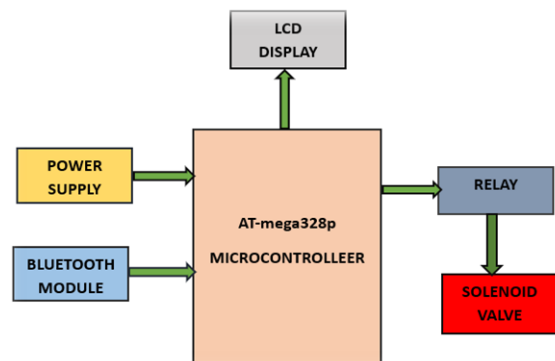


Figure-1: Block diagram

Block diagram contains,

- ✓ AT-mega 328p microcontroller
- ✓ Power supply
- ✓ Bluetooth module
- ✓ Relay
- ✓ Solenoid valve
- ✓ LCD display

5. HARDWARE DESCRIPTION:

Hardware description specifies that the layout and component used in the design. In this system microcontroller, Bluetooth, solenoid valve, relay and LCD is used for this process.

5.1. At-mega328p microcontroller:



Figure-2: At-mega 328p microcontroller

AT-mega contains 1KB of EEPROM and 2KB of SRAM. It is the brain of the Arduino board. It consists of 28 pins, DIP packaging. It is already pre-programmed with boot loader that allows the user to directly upload the program to Arduino by USB without need of any external programmer.

5.2. Relay:



Figure-3: Relay

Relay works in the principle of electromagnetic induction. It consists of 5 pins that are NC, NO, common, DC+, DC-. NC, and NO used for controlling the output load. DC+, DC- is used on the input side. Relay is used to control the output devices with respect to the input signal. It is mainly used to isolate low voltage DC supply and high voltage AC supply.

5.3. Solenoid valve:



Figure-4: Solenoid valve

It works in the principle of electromagnetism. It uses DC supply for processing. When the DC supply fed as input, the coil gets energized by DC supply, and then the valve gets open or close depending upon the input. Inside it consists of plunger; it is used for controlling the valve. Solenoid is mostly used for controlling liquid flow and gas. Applications of solenoid are that it is used in the mechanical and automobile industries.

5.4. LCD Display:



Figure-5: LCD Display

LCD display is used to convey the output in the display form. It is made up of crystal material. Inside the LCD, it contains LEDs, LEDs are used to convert the electrical energy into light energy. It is used in medical devices, industrial equipments, etc.

5.5. Bluetooth module:

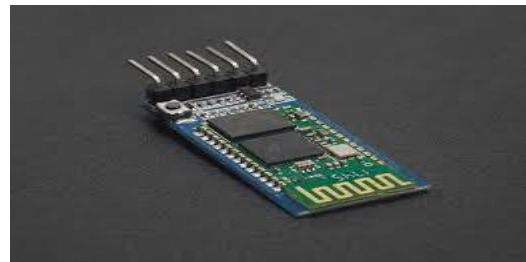


Figure-6: Bluetooth module

The HC-05 is one type of Bluetooth module that is used to transfer the data wirelessly to user by UART system. It can be used in master slave system. Its frequency band is 2.4GHZ. Its range is up to 10 meters. It is used for controlling the output devices through phone when Bluetooth system is enabled. Its operating voltage is between 3.6v to 6v. It is used in robotics, home automation, embedded system, etc.

5.5.1. Bluetooth Technology:

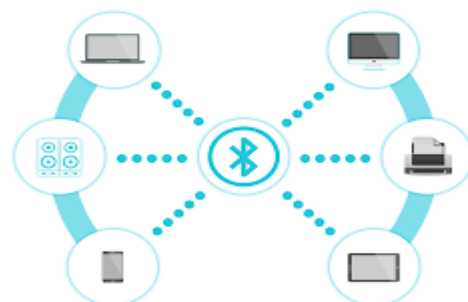


Figure-7: Bluetooth network

Bluetooth is a wireless communication standard. It is used to send the data serially by means of Bluetooth network to users. It was introduced in 1994. Its frequency band is 2.4GHZ. It is very suitable for short range up to 10 meters. Bluetooth network is also called as piconet network. Up to 8 devices can be connected to Bluetooth network at a time.

I) Connection process of Bluetooth:

1) Inquiry:

Before the connection, two devices don't know about each other. During connection, device1 sends request to device2. This process is known as inquiry.

2) Paging:

Paging is the process of connection between two devices. Before the paging process, each device knows about each other.

3) Connection:

After the paging process is completed. It enters into connection state. During connections, there are 4 modes.

a) Active mode:

In this mode the device is transferring or receiving the data actively.

b) Hold mode:

This mode is also known as temporary power saving mode. In this mode, the device sleeps for some time and return back to active mode.

c) Sniff mode:

It is one type of power saving mode. By this mode device will sleep and only listen for transmission process by interval of time.

d) Park mode:

This mode is also known as the deepest sleeping mode. The master commands the slave to wake up. Before the command the slave is in inactive mode.

5.5.2. Advantages of Bluetooth technology:

- ✓ It can be used everywhere in this world
- ✓ It is very easy to use
- ✓ It consumes low power
- ✓ Cost effective
- ✓ User friendly

6. CIRCUIT DIAGRAM:

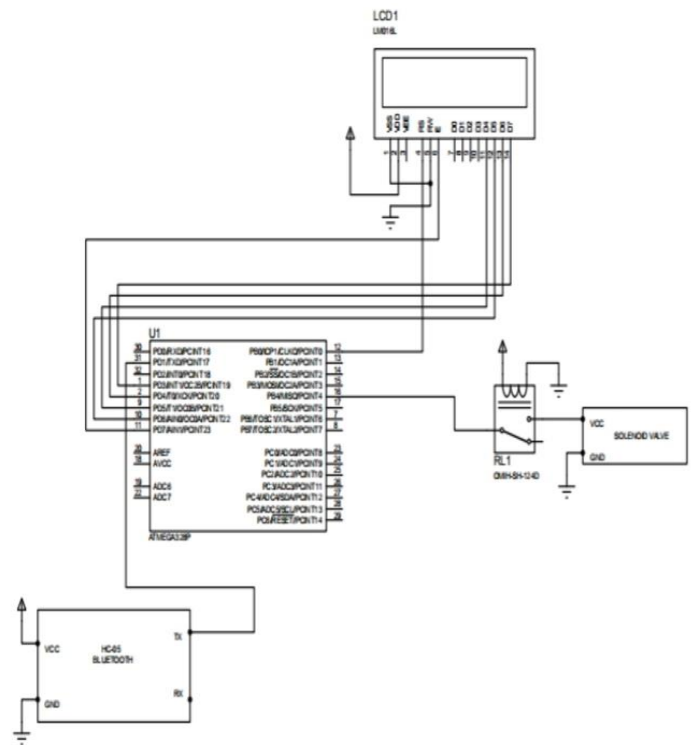


Figure-8: Circuit diagram

7. RESULTS AND DISCUSSION:

Whenever the power supply gets on, the microcontroller gets active. When the user tells his fuel requirement to the microcontroller through a Bluetooth-enabled microphone. The incoming sound energy is converted into electrical energy by using a microphone, then the voice signal is processed by a signal processing circuit, and then the electrically converted voice signal is fed to a microcontroller. Depends upon the source program and input signal, then the valve gets opened. A voice signal is used to control the liquid flow. The requirement of fuel told by user is displayed on the LCD display. LCD display is controlled by microcontroller. Fuel output is also displayed in LCD display.

7.1. Hardware diagram:

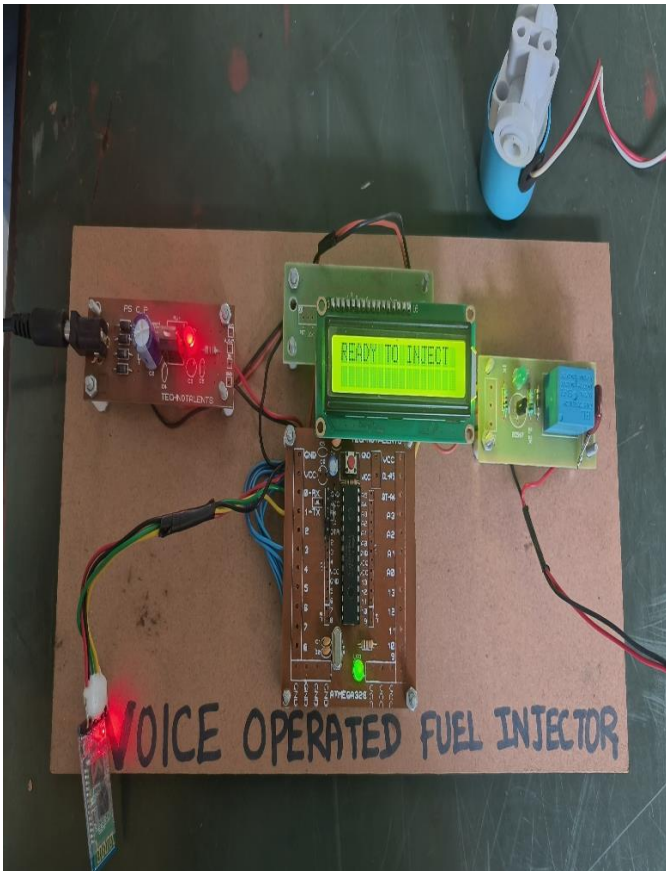


Figure-9: Hardware diagram

7.2. During process:

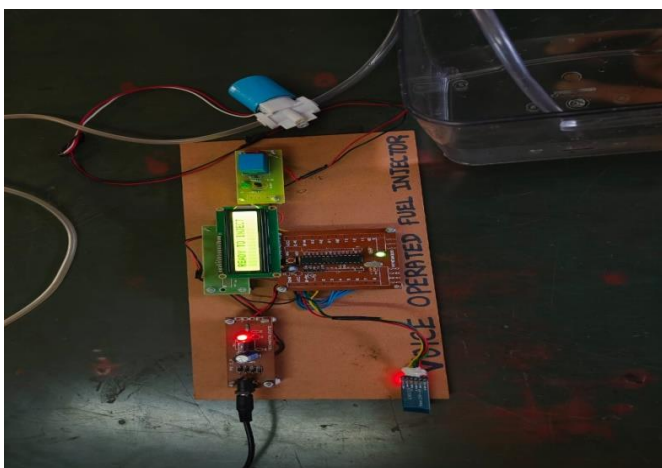


Figure-10: During execution

7.3. Advantages of this system:

- It is controlled electrically
- It simplifies the fuel injection system
- Cost will be reduced

- It improves the reliability
- Human effort is reduced
- Fuel distribution is better

7.4. Applications of this system:

- ✓ It is used in mechanical system
- ✓ It is used for injecting fuel into vehicles

8. CONCLUSION:

In present days, saving the petrol is very important for the future. In the world, the petrol ratio is decreasing day by day. To save the petrol with no loss, we proposed this system. Here Bluetooth system plays an important role in this design; here Bluetooth technology is used to transmit the data for a particular distance. Here, fuel injection is fully based on voice signal. Depends upon the voice signal, the amount of fuel is determined. By using this technology, a solenoid valve is used for controlling the liquid flow. Human effort will be reduced by using system. Day by day new technologies are introduced. New technologies reduce the human need and also reduce the cost also. In upcoming days our country fully based on advanced technologies so all students do useful things for our country to reduce loss in such things.

9. REFERENCES:

[1] Shreyansi Gupta, Anuj Patidar, " A Review on Fuel Injection System", International Research Journal of Engineering and Technology (IRJET), Volume 7, Issue 08, Aug 2020, e- ISSN: 2395-0056, p- ISSN: 2395- 0072.

[2] Mohammed Ahteshamuddin, Palavalsa Kiran, A Rohit Kumar, Mohammad Amaan Ali Siddiqui, " Design and Development of Smart Fuel Management System", International Research Journal of Engineering and Technology (IRJET), Volume 08, Issue 07, July 2021, e- ISSN: 2395-0056, p- ISSN: 2395- 0072

[3] Dharmendra Singh, " Electronic fuel injection system", International Journal of Advanced Research in Engineering and Technology(IJARET), Volume 11, Issue 11, November 2020, pp. 2035-2040, ISSN Print: 0976-6480 and ISSN Online: 0976-6499

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