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Smart Digital fuel level indicator by use of Arduino Microcontroller

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Abstract: ***The precision is always being whole heartedly welcomed by the people all over the world. It has an important application in the field of automobiles to measure and verify the fuel present in the vehicle with high degree of precision. The previous techniques use analog strip or capacitive sensor which is either inefficient to measure or too costly to install. In the proposed method, two Flow sensors are placed linearly, one sensor to measure the amount of fuel entering the tank and another sensor to measure the amount of fuel leaving the tank to the carburettor. The difference between the above measures gives us the amount of fuel present in the tank and it is stored in the arduino Uno microcontroller. It actively keeps the record of the fuel entering the tank and the fuel present in the tank at any given time in the dynamic memory of the arduino and is displayed using LCD display. If the fuel is low, the system suggests the commuter to refuel as soon as possible. If the fuel gets critically low, the system alarms the commuter to refuel immediately. The system has a solenoid valve which replicates the working of a carburettor of the automobile. This proposed method can identify petrol theft and is useful to people who opt for long rides. This system is designed to cut down the cost and increase the level of accuracy.***

I.INTRODUCTION

TheFuelquantity is one of the undetermined factors in two wheelers. As far as now fuel level in two wheelers are indicated through analog gauge. Analog gauge cannot provide accurate value of the fuel in the tank. It highly affects the driver who is 24VDC power), black (ground) and yellow (Hall Effect pulse output). By counting the pulses from the output of the sensor, you can easily calculate water flow. Each pulse is approximately 2.25 millilitres. going on a long drives. Normally finding fuel station in a highway is difficult. During such cases withoutknowing the fuel level it will be difficult for the driver to travel with an assumption about the fuel present inside the tank. Another drawback is that there are possibilities for petrol theft in the petrol bunks which is highly difficult to measure without proper instruments. There is a model proposed to find out the amount of petrol injected into the tank with a digital meter using float sensors but float sensors cannot produce accurate values when there is wobbling. And there is another proposed method that is used to find fuel level in aeroplanes using capacitance-level sensor which produces values with high accuracy. The main drawback of capacitance level sensor is its high cost which is not efficient when used in the two-wheeler users. The device has to be cost efficient without compromising on the accuracy of measurement. The sensor fitted has to be chemical resistant, should not vary with physical orientation, independent of shape and size of the tank. Basic methodological errors of liquid level measurement are caused by changes in physical orientation and mechanical forces, when liquid level does not correspond to fuel volume. Additional methodological errors are mainly caused by temperature influence on measured fuel.

II.EXISTING SYSTEMS

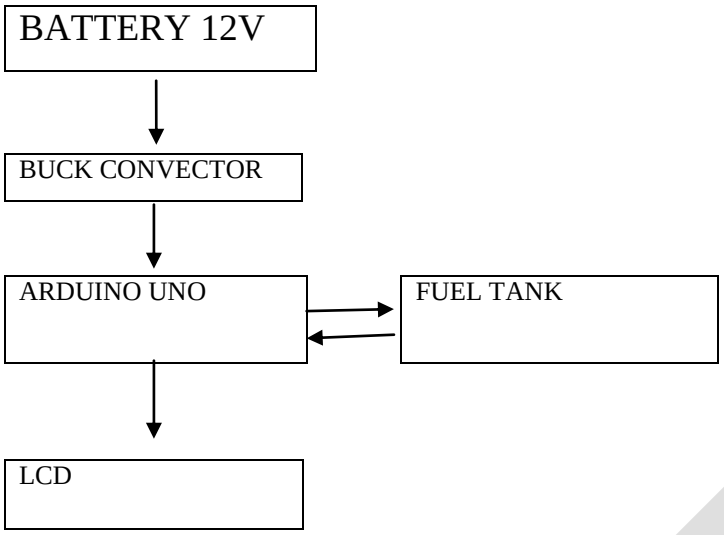
- At present most of the vehicles are having analog fuel meters. This meter indicates only three states of fuel levels that are full, half and empty
- Digital fuel indicator The amount of fuel is indicating by using digital circuit so user or owner can know the right amount of the added fuel from
- the petrol bunk. This calculation must be used to calculate the mileage of the vehicles.
- To design digital fuel level indicator and battery life
- indicator with the help of non contact type fuel level sensor
- The reading which shows on LCD display in terms of liter and percentage

III.PROPOSED SYSTEM

The petrol tank with float sensor is connected to an Arduino UNO. The float sensor provides analog value to the Microcontroller ATmega328P which converts analog value

to digital value which is further read by the microcontroller (which is flash programmable and erasable ROM). At last, the microcontroller gives the result of the amount of fuel in the tank which is displayed on a LCD screen. The system as a whole is Connected To A Battery

IV.BLOCK DIAGRAM



The main objective of this project by using Arduino Microcontroller to Monitor the fuel level in the tank and also gives the indication the amount of fuel left in the tank digitally (numerically). This project helps to avoid a lot of the problems like fuel bunks at fuel Stations, fuel theft andprevents us from getting into situations where we have to push our vehicles due toassumption of the level of fuel.The objective is to design digital fuel level and battery life indicator which would the following.
Selecting appropriate automotive application (motor bike/car)for carrying out this study to indicate fuel level and battery health.

The aim of our project ids to monitor the level of the fuel in the vehicle fuel tank and to automatically indicate the level information digitally, numerical value through LCD.To the contrary every one of us might have experienced the problem with improper estimations of the current fuel indicating system .Thus, digital (numeric) fuel indicator system will help us exterminate common problems like.

1.Misinterpretation of the amount of fuel left by the drivers,
2.petrol pumps theft cases,
Also, it will help us to know the current mileage of the vehicle.

V.COMPONENTS ANDTECHNOLOGIES

LEAD ACID BATTERY

- The **lead–acid battery** was invented in 1859 by French physicist Gaston Planté and is the earliest type of rechargeable battery. Despite having a very low energy-to-weight ratio and a low energy-to-volume ratio, its ability to supply high surge currents means that the cells have a relatively large power-to-weight ratio. These features, along with their low cost, make them attractive for use in motor vehicles to provide the high current required by starter motors. As they are inexpensive compared to newer technologies, lead–acid batteries are widely used even when surge current is not important and other designs could provide higher energy densities. In 1999 lead–acid battery sales accounted for 40–45% of the value from batteries sold worldwide (excluding China and Russia), equivalent to a manufacturing market value of about $15 billion.[8] Large-format lead–acid designs are widely used for storage in backup power supplies in cell phone towers, high-availability settings like hospitals, and stand-alone power systems. For these roles, modified versions of the standard cell may be used to improve storage times and reduce maintenance requirements. Gel-cells and absorbed glass-mat batteries are common in these roles, collectively known as VRLA (valve-regulated lead–acid) batteries.

In the charged state, the chemical energy of the battery is stored in the potential difference between the pure lead at the negative side and the PbO_2 on the positive side, plus the aqueous sulphuric acid. The electrical energy produced by a discharging lead–acid battery can be attributed to the energy released when the strong chemical bonds of water (H_2O) molecules are formed from H^+ ions of the acid and O^{2-} ions of PbO_2.[9] Conversely, during charging, the battery acts as a water-splitting device.

Buckconverter (stepdownconverter)

A buck converter (step-down converter) is a DC-to-DC power converter which steps down voltage (while drawing less average current) from its input (supply) to its output (load). It is a class of switched-mode power supply (SMPS) typically containing at least two semiconductors (a diode and a transistor, although modern buck converters frequently replace the diode with a second transistor used for synchronous rectification) and at least one energy storage element, a capacitor, inductor, or the two in combination. To reduce voltage ripple, filters made of capacitors (sometimes in combination with inductors) are normally added to such a converter's output (load-side filter) and input (supply-side filter).[1]Switching converters (such as buck converters) provide much greater power efficiency as DC-to-DC converters than linear regulators, which are simpler circuits that lower voltages by dissipating power as heat, but do not step up output

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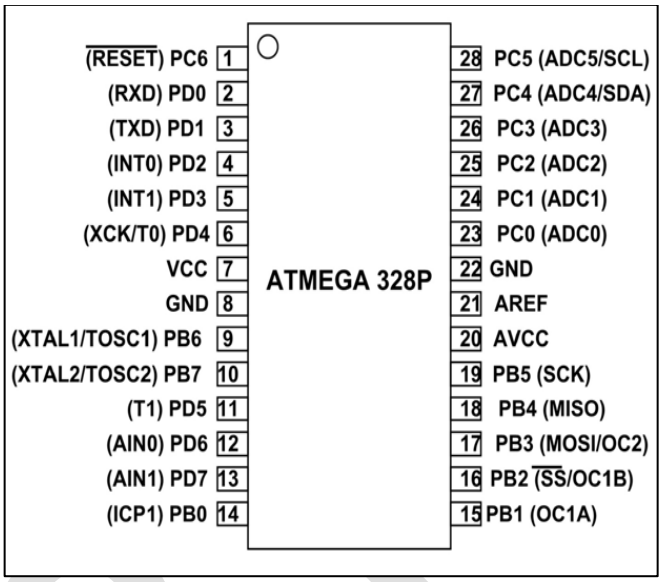
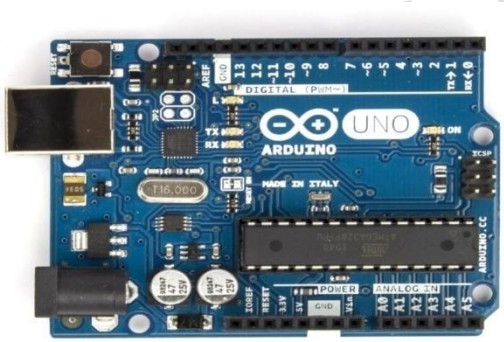
current.[2]Buck converters can be highly efficient (often higher than 90%), making them useful for tasks such as converting a computer's main (bulk) supply voltage (often 12 V) down to lower voltages needed by USB, DRAM and the CPU



ARDUINO UNO



The major components of Arduino UNO board are as follows:

- USB connector.
- Power port.
- Microcontroller.
- Analog input pins.
- Digital pins.
- Reset switch.
- Crystal oscillator.
- USB interface chip

AT MEGA 328P MICROCONTROLLER

The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core

FEATURES

- High performance design
- Low power consumption
- Total number of Analog Input pins are 6
- Contains 32 kilobytes of flash memory
- Contains 2 kilobytes of SRAM
- Contains 1 kilobytes of EEPROM
- 16 megahertz clock speed
- Minimum & maximum temperature -40 degree centigrade to 105 degree centigrade

APPLICATIONS

- Industrial machinery controlling systems
- Solar powered machinery and applications
- IOT based applications

LCD DISPLAY

A liquid crystal display or LCD draws its definition from its name itself. It is a combination of two states of

matter, the solid and the liquid. LCD uses a liquidcrystal to produce a visible image. Liquid crystal displays are super-thin technology display screens that are generally used in laptop computer screens, TVs, cell phones, and portable video games. LCD's technologies allow displays to be much thinner when compared to a cathode ray tube (CRT) technology.

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly .Here, in this able we're going to use a monochromatic 20x4 alphanumeric LCD. 20x4 means that 20 characters can be displayed in each of the 4 rows of the 20x4 LCD, thus a total of 80 characters can be displayed at any instance of time.

- The LCDs are commonly used in all the digital wrist watches for displaying time.
- The LCD (liquid crystal display) is used in aircraft cockpit displays.
- It is used for displaying images used in digital cameras.
- It is used in instruments panel where all the lab instruments use LCD screens

- The television is main applications of LCD.
- Mostly the computer monitor is made up of LCDs.
- The LCDs are used in mobile screens.

It is also used in video players..

FLOAT LEVEL SENSOR

- Fuel level sensors, also known as fuel gauges, allow drivers to monitor fuel consumption and help them to determine when to refill the tank. They consist of two main components: the sensing system itself (also known as the sender) and the indicator (also commonly referred to as the gauge).
- Fuel gauges work by measuring the voltage across a variable resistor within the sensing system, to determine the level of fuel; which is then relayed to the driver via the indicating system. Several components work within the sensing system, enabling it to detect how much fuel is in a tank, including the float switch, a variable resistor, and a wiper. The sensor system is relatively simple compared to other sensors currently produced, although newer sensor systems can also utilize microprocessors for faster and more accurate measurements.
- The sensing system is located in the fuel tank and consists of a float—usually made of foam and connected to an actuating metal rod—attached to a variable resistor. The variable resistors used in fuel levels sensors are often composed of a resistive material, where one end is attached to the ground, with a wiper (much like a very small windscreen wiper) that moves over the resistive material as the float moves. When the float moves due to changing fuel levels, the wiper moves across the resistor, causing a change in voltage. The orientation of the wiper means that the highest resistance is experienced across the resistor when the tank is empty. At this point, the wiper is also as far away as possible from the ground end of the resistor. The change in current is then passed on to the indicator which in turn changes the reading.
- However, fuel level sensors in automobiles can often be inaccurate, especially when driving with a full tank. In this scenario, the float will rise to the top of the tank, with the wiper returning to the ground end of the resistor, resulting in a small resistance and a high current passingthrough the sensor. As the float drops in height, the resistance changes; but the gauge will often remain on 'full' for some time. This is because when the fuel tank is full, the float cannot position itself on top of the fuel, as it is blocked by the tank or is limited by the reach of the actuating rod attached to it; meaning that the float becomes submerged when the tank is full. This leads to inaccurate readings until the fuel drops to a level where the float can sit on top, allowing the resistance to change.
- Similarly, when fuel is low, the rod often does not extend to the end of the tank, causing the gauge to indicate an empty tank when actually some fuel remains.

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VI APPLICATION

- To produce a numeric readout of the amount of fuel left in the tank.
- Capable of being in the dash of the vehicle, thus needed to minimum modifications.
- This project is adaptable to all types of vehicles, to indicate the amount of fuel in fuel tank
- This project all type of vechicles chemical tank ,water tank to indicator amount of liquid in the tank with small modification of sensor

VII.CONCLUSION

Thus This paper is very useful for a common man as it avoids him by getting cheated. This measuring unit should be fixed to the entire vehicle so that we can get an exact quantity of fuel to measure the inflow. Float level sensor is used to measure level of the tanks. This paper presents the study of effect of inclination of tank on the amount of fuel available in the tank.

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