



MODERN MILEAGE INDICATOR

A.Nandha Kumar¹, M.Natramil², G.Andiappan³, M.Gowtham⁴

¹EEE Department, Dr.MCET College

²EEE Department, Dr.MCET College

³EEE Department, Dr.MCET College

⁴Assistant Professor, Mechatronics, Dr.MCET College

Abstract — *Efficient mileage indicator is a microcontroller based system which displays various parameters like future distance can be covered with the fuel available in the vehicle with respect to the region of travelling and what is the most economy speed to reach maximum travel distance. All the necessary data for the calculation of the above mentioned parameters will be taken from the last few rides of the vehicle. This system will help to know the performance of the vehicle. With our proposed system, the maximum travel distance and the most efficient speed of driving can be indicated to the rider. Hence this system will be helpful for increasing the efficiency of the vehicle. This system also includes battery monitoring unit for electric and hybrid vehicles.*

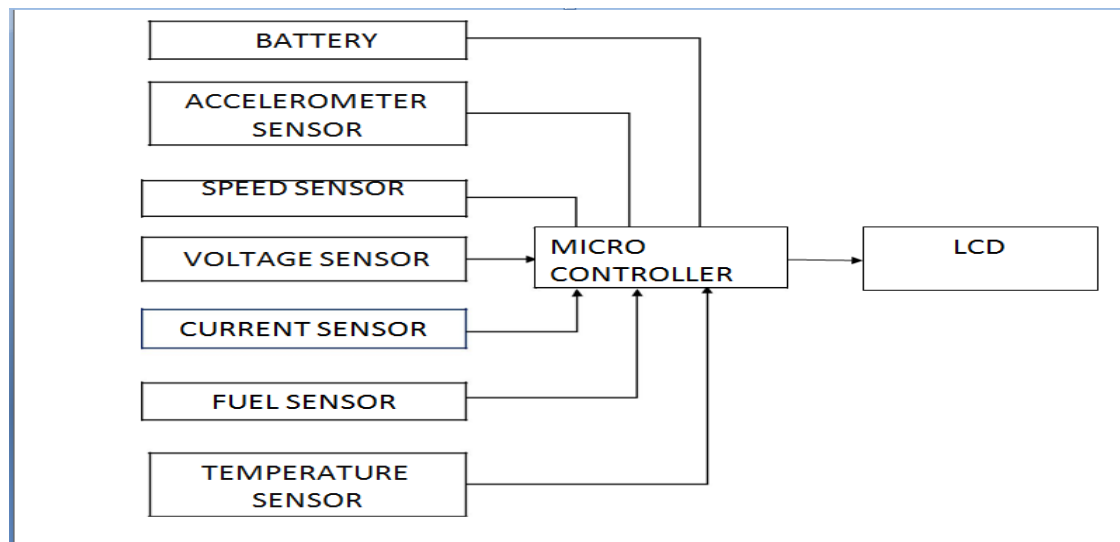
I. INTRODUCTION

Efficient mileage indicator is a microcontroller based system which displays various parameters like future distance can be covered with the fuel available in the vehicle with respect to the region of travelling and what is the most economy speed to reach maximum travel distance. All the necessary data for the calculation of the above mentioned parameters will be taken from the last few rides of the vehicle. This system will help to know the performance of the vehicle. With our proposed system, the maximum travel distance and the most efficient speed of driving can be indicated to the rider. Hence this system will be helpful for increasing the efficiency of the vehicle. This system also includes battery monitoring unit for electric and hybrid vehicles.

II. PROPOSED SYSTEM

Our proposed system of modern mileage indicator will indicate the performance of the IC engine mode of travel and electric mode of travel of a hybrid vehicle. Because, hybrid vehicles are the short term solution to control the air pollution and improve the vehicle efficiency. In IC engine fossil fuels like petrol or diesel is the fuel. Hence the vehicle performance parameters like future distance can be covered by the vehicle with the present available fuel, and the most economic speed to reach maximum distance with respect to the fossil fuels will be indicated in the display. In electric mode of travelling where power for propulsion is provided by the motor which gets power from the battery, our proposed system will indicate the future distance covering, most economic speed to reach the maximum distance and battery monitoring unit. Future distance covering will be a great future of a electric vehicle because short distance transmission is one of disadvantage of electric vehicle. With our system the rider could know the distance he can travel with the fuel available in the battery. Battery monitoring system is also a very important future of electric vehicles.

III.BLOCK DIAGRAM



3.1 BLOCK DIAGRAM DESCRIPTION

3.1.1. BATTERY: Battery is the source of energy in our system. Every electrical and electronic circuit need a power source for its operation. Hence in a vehicle battery will be available for the electrical operation of the vehicle. Hence the power for the operation of the microcontroller and other sensors will be taken from the battery.

3.1.1. ACCELEROMETER SENSOR: Accelerometer gyroscopic sensor is a device that detects the position of an object according to the gravitation force. The sensor detects the position of the vehicle in triple axis. Hence the output from the sensor which carries the information about the position of the vehicle in the triple axis. This information from the sensor is used to find the nature of the travelling road (i.e., whether the vehicle is travelling in plain road or uphill or downhill). This is also an important parameter because uphill motion requires more fuel than plain surface travel whereas a downhill travel requires less fuel than plain surface travel. Once the microcontroller confirms the mode of travelling then the process of finding the future distance travel prediction with respect to the particular mode of travel will be displayed in the display.

3.1.3. SPEED SENSOR: Sensor is one which convert any of the physical quantity into electrical quantity. Output from the speed sensor is a digital pulse. The digital pulse from the sensor is feed to the counter of the microcontroller which gives the speed with respect to particular interval of time. The speed is measured in rotations per minute, these can be converted in Km per hour by the microcontroller. Hence the speed of the vehicle is calculated by the microcontroller and estimated distance of travel with respect to the fuel in the vehicle will be displayed.

3.1.4. VOLTAGE SENSOR: Voltage sensor is a potential divider network which gives information of voltage available at the battery as a analog value. Analog voltage will be converted into digital by the ADC of the microcontroller. This voltage will be used for calculation of the power available and power drawn from the battery.

3.1.5. CURRENT SENSOR: Current sensor is connected in series with the battery and motor. This current sensor will give information about the load current. Load current will be used to calculate the power drawn from the battery for the operation of the vehicle.

3.1.6. MICROCONTROLLER: Microcontroller is the heart the control system used. All the information from the sensors will be stored by the microcontroller and used for the calculation of the output based on the predefined algorithm which is programmed in it. The microcontroller will use the data from the sensors and process it for the calculation of future travel distance prediction with respect to the fuel available in the battery, the most economy speed to reach the maximum distance with minimum amount of fuel. Once the values are processed, it will be displayed in the LCD display. The microcontroller will also incorporate an additional algorithm for battery monitoring unit.

3.1.7. LCD DISPLAY: A Liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary

images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and 7-segment displays, as in a digital clock. The output will be displayed in the Microcontroller.

IV. HARDWARE DESCRIPTION

4.1 CURRENT SENSOR:

A current sensor is a device that detects electric current (AC or DC) in a wire, and generates a signal proportional to that current. The generated signal could be analog voltage or current or even a digital output. The generated signal can be then used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control.



Figure 4.1 Current Sensor

The sensed current and the output signal can be alternating current input, analog output, which duplicates the wave shape of the sensed current. Bipolar output, which duplicates the wave shape of the sensed current. unipolar output, which is proportional to the average or RMS value of the sensed current. Direct current input, with a unipolar output, which duplicates the wave shape of the sensed current digital output, which switches when the sensed current exceeds a certain threshold.

4.2. VOLTAGE SENSOR:

A voltage sensor is going to be able to determine and even monitor and measure the voltage supply. It is then able to take those measurements and turn them into a signal that one will then be able to read. The signal will often go into a specialized electronic device for recording, but sometimes, an observer will be present to manually read the sensor output.



Figure 4.2. Voltage sensor

The voltage sensor is able to measure the presence of a voltage without making metal contact i.e. on insulated wires. A voltage sensor consists of a resistive voltage divider. The integrated resistors, embedded in a casted resin (for voltages between 1-72kV), have a low value inductance. The arrangement, mostly in a zigzag arrangement, together with the resin permittivity, results to a capacitance. This capacitance is more than any capacitance straying to the ground.

4.3. FUEL SENSOR:

The sensing unit usually uses a float connected to a potentiometer, typically printed ink design in a modern automobile. As the tank empties, the float drops and slides a moving contact along the resistor, increasing its resistance. In addition, when the resistance is at a certain point, it will also turn on a "low fuel" light on some vehicles.



Figure 4.3 Fuel sensor

The system can be fail-safe. If an electrical fault opens, the electrical circuit causes the indicator to show the tank as being empty (theoretically provoking the driver to refill the tank) rather than full (which would allow the driver to run out of fuel with no prior notification). Corrosion or wear of the potentiometer will provide erroneous readings of fuel level. However, this system has a potential risk associated with it. An electric current is sent through the variable resistor to which a float is connected, so that the value of resistance depends on the fuel level. In most automotive fuel gauges such resistors are on the inward side of the gauge, i.e., inside the fuel tank. Sending current through such a resistor has a fire hazard and an explosion risk associated with it. These resistance sensors are also showing an increased failure rate with the incremental additions of alcohol in automotive gasoline fuel. Alcohol increases the corrosion rate at the potentiometer, as it is capable of carrying current like water. Potentiometer applications for alcohol fuel use a pulse-and-hold methodology, with a periodic signal being sent to determine fuel level decreasing the corrosion potential. Therefore, demand for another safer, non-contact method for fuel level is desired.

4.4. ACCELEROMETER SENSOR:

An accelerometer is also an electromechanical device, including holes, cavities, springs, and channels, that is machined using micro-fabrication technology. Accelerometers are fabricated in a multilayer wafer process, measuring acceleration forces by detecting the displacement of the mass relative to fixed electrodes.



Figure.4.4 Accelerometer Sensor

A common sensing approach used in accelerometers is capacitance sensing in which acceleration is related to change in the capacitance of a moving mass. This sensing technique is known for its high accuracy, stability, low power dissipation, and simple structure to build. It is not prone to noise and variation with temperature. Bandwidth for a capacitive accelerometer is only a few hundred Hertz because of their physical geometry (spring) and the air trapped inside the IC that acts as a damper.

4.5. MICROCONTROLLER BOARD:

PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially

referred to Peripheral Interface Controller. The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems.



Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types. The manufacturer supplies computer software for development known as MPLAB X, assemblers and C/C++ compilers, and programmer/debugger hardware under the MPLAB and PIC Kit series. Third party and some open-source tools are also available. Some parts have in-circuit programming capability; low-cost development programmers are available as well as high-production programmers. PIC devices are popular with both industrial developers and hobbyists due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, serial programming, and re-programmable Flash-memory capability.

V.OUTPUT



The above diagram shows the final hardware output. It shows the single module output of voltage and current of a dc load in a machines laboratory.

VI. FUTURE WORK

By means of this method as a framework, the system is expanded embrace varied different choices that might include home security feature like capturing the picture of an individual roving the house and storing it in the cloud. This can cut back the info storage than mistreatment the CCTV camera which can record all the time and stores it. The system is expanded for energy observance or weather stations. This type of a system with individual changes is enforced within the hospitals for disabling folks or in industries wherever human invasion is not possible or dangerous, and it also can be enforced for the environmental observance.