International Journal of Research in Advent Technology, Vol.2, No.4, April 2014
E-ISSN: 2321-9637

Development and Fabrication of Alphanumeric Fuel Level Indicator for Two Wheelers

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Abstract- Digital fuel indicator is the fuel gauge in modern trends. As in the existing fuel indicator system although they are digital but the value of amount of fuel available in tank of vehicle cannot be shows correctly(exact value of the fuel amount).The digital(numeric) indicator will be used for the indication of the amount of fuel in terms of numeric value i.e. in terms of digits or number. In this project we are going to study the existing setup of the fuel indication system and fuel tanks that used and by redesigning the fuel tank we are keen to establish the modern fuel indicator system that give us the exact suitable value of the fuel amount present in the tank. The design software like CATIA, Solid edge, PRO-E for the redesigning of fuel tank and electronics kit consisting microcontroller, ADC, LCD display for calibration of fuel amount in terms of numeric value we are going to be used.

Index Terms- Digital fuel indicator, microcontroller, ADC, fuel tank.

1. INTRODUCTION

Nowadays the fuel indicator system for the two wheelers are digital but they do not shows the exact fuel amount 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. 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. In this project at firstly we surveyed the existing fuel indicator system and fuel tanks of different bikes and scooters. But during this survey we examined that the design (shape and size) fuel tanks are in irregular fashion. But due to irregular shape of the tanks there were much complexities arises for the installation of the electronics kit and level sensor which are used for the calibration of fuel level/amount. So we redesign a tank as a conceptual model in a regular shape like rectangular by using design software like PRO-E. Hence due to this regular design the installation of electronics kit would became easier also this whole system will gives us the fuel amount in terms of liter or milliliter, for example 1L, 2L, 1.2L,500mL, 800mL.

2. HYPOTHESIS

While the vehicle is moving the fuel in the tank fluctuates continuously, as this is our first attempt to solve such a problem we made the assumption that the vehicle is in a stable position for the indication of the exact fuel amount in tank.

3. DESIGN AND FABRICATION

We have study and survey the different tanks of bikes as well as scooters. Our electronics kit only work in a regular shape like square, rectangles, circle etc. Hence we design the tank in the rectangular shape. We design the fuel tank by using the cad cam software like Pro-E because now a day this software is more using in the designing field. And the software is easy to design and can be understand easily. Our main design of fuel tank is shown in the figure below.

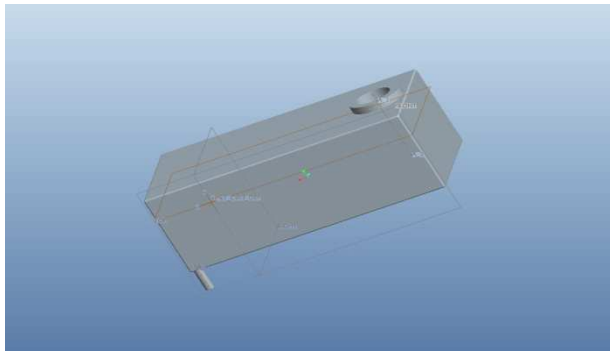

Fig 1: Conceptual design of fuel tank

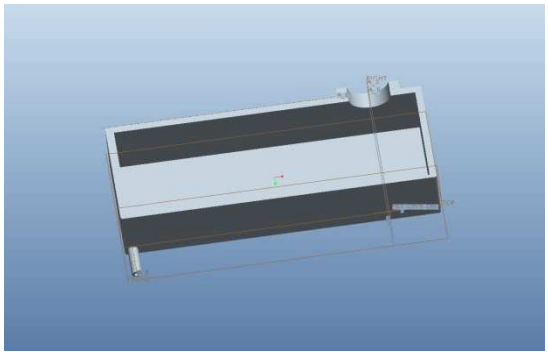

Fig 2: Vertical cut sectional view of tank

4. ELECTRONICS COMPONENTS

POWER supply: -For our all IC we require 5 v d.c. Supply, which can be generated by step down transformer, full wave bridge rectifier, and filter condenser and voltage regulator IC 7805.

TRANSFORMER:-We have used Step down transformer as we have to generate 5 volts and 12 volts DC supply from the 230 volts input AC supply so we have used 15 volts / 500 mA transformers which mean its output will be 15 volts AC with current rating of 500 mA.

RECTIFIER:-Rectifiers used to rectify the negative half cycles of the output signal of the secondary of the transformer. So at the input of the rectifier We have AC signal with both positive and negative cycles and at the output of the rectifier.

FILTER CAPACITOR:-Filter capacitor to remove the AC signal from the output of rectifier. Filter capacitor is used in order to remove ripples from the pulsating DC and convert it to unregulated DC.

VOLTAGE REGULATOR:-Two separate voltage regulators are used after the filter capacitor so as to generate constant DC voltage supply of 5 volts and 12 volts. We have used 7805 and 7812 as a voltage regulator.

MICROCONTROLLER:-

Design specification of Microcontroller 89S51

Features

- Compatible with MCS-51 (8051 series microcontroller) products.
- 4k bytes of I system reprogrammable flash memory.
- Endurance: 1000 write/erase cycles.
- Fully static operation: 0Hz to 24 MHz.
- Three level program memory lock.
- 128*8 bit internal ram.
- 32 programmable I/O lines.
- Two 16 bit timers/counters.
- Six interrupt sources.
- Programmable serial channel.
- Low power idle and power down modes.

Description:-

The AT89s52 is a low power, high performance CMOS 8 bit microcomputer with 4k bytes of flash programmable and erasable read only memory (EEPROM). The device is manufactured using Atmel's high density non volatile memory technology and is compatible with the industry standard MCS-51 instruction set and pin out. The on chip flash allows program memory to be reprogrammed in system or by a conventional non volatile memory programmer.

By combining a versatile 8 bit CPU with flash on a monolithic chip, the Atmel AT89S51 is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications.

The AT89S52 provides the following standard feature: 4k bytes of flash, 128 bytes of ram, 32 I/O lines, two 16 bit timers/counters, five vector two-level interrupt architecture, a full duplex serial port, and on-chip oscillator and clock circuitry. In addition the AT89S52 is designed with a static logic for operation down to zero frequency and supports two selectable power saving modes. The IDLE mode stops the CPU while allowing the ram, timer/counter, serial port and interrupts system to continue functioning. The power down mode saves the ram contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

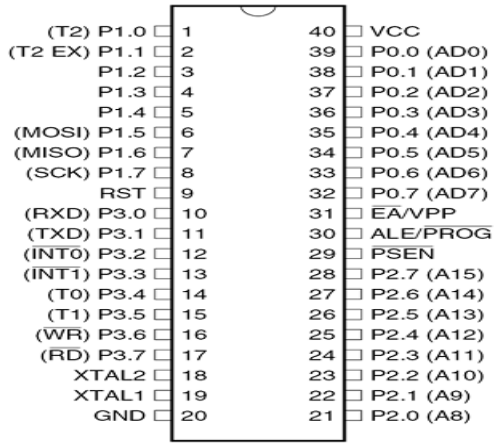

Fig 3: PIN CONFIGURATION 40-lead PDIP

Pin description

1) VCC : Supply voltage : Pin no 40
2) GND : Ground : Pin no 20
3) XTAL1: Crystal terminal 1 : Pin no 18
4) XTAL2: Crystal terminal 2 : Pin no 19
5) RST : Reset Pin : Pin no 9

LCD interface to microcontroller:-

Liquid Crystal Display which is commonly known as LCD is an Alphanumeric Display it means that it can display Alphabets, Numbers as well as special symbols thus LCD is a user friendly Display device which can be used for displaying various messages unlike seven segment display which can display only numbers and some of the alphabets. The only disadvantage of LCD over seven segment is that

seven segment is robust display and be visualized from a longer distance as compared to LCD. Here we have used 16 x 2 Alphanumeric Display which means on this display we can display two lines with maximum of 16 characters in one line.

This interface diagram shows us the connection of an LCD to microcontroller.LCD consists of 8 data lines which can be either a command or a data. An entire port is used for sending data to the LCD by microcontroller. 3 other pins are also used for handshaking purposes.

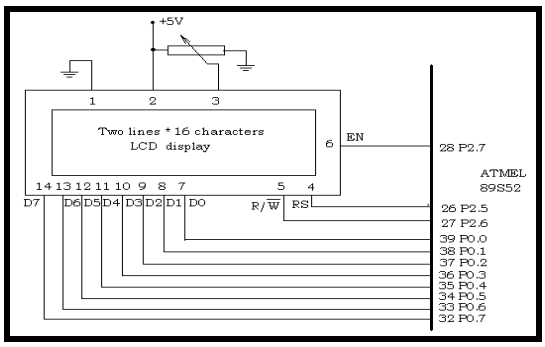

Fig 4: LCD Interfacing

KEIL Microcontroller Programming Software:-

Keil has compiler designed specifically for the 8051 microcontroller. Keil provides a broad range of development tools like IDE (Integrated Development environment), Project Manager, Simulator, Debugger, C Cross Compiler.

Compilers are programs used to convert a High Level Language source code (written in assembly language or C language) into its object code. Then a linker is used to create an absolute object module suitable for your circuit.

8051 project development cycle: - these are the steps to develop 8051 project using keil

- Create source files in C or assembly.
- Compile or assemble source files.
- Correct errors in source files.
- Link object files from compiler and assembler.
- Test linked application.

5. MICROCONTROLLER PROGRAMMER

This Microcontroller Programmer we are using for our project. This simple Microcontroller Programmer will allow you to painlessly transfer hex programs to most ATMEL Microcontroller microcontrollers without sacrificing your budget and time. It is more reliable than most other simple Microcontroller programmers available out there and can be built in very short amount of time.

Microcontroller programmer consists of in-circuit serial programmer (dongle) and small PCB with a DIP socket where you can fit your microcontroller and have it quickly programmed.

You may also use this programmer as a standalone in-circuit serial programmer that can be used to conveniently program Microcontroller microcontrollers without removing them from the target circuit.

Entire Microcontroller programmer has been build with using common parts and fits in the case of the serial connector. The socket PCB has been created to fit a 40-DIP Microcontroller 89s51 microcontroller, but you can build a socket PCB for any other Microcontroller out there. This Microcontroller programmer is compatible with popular PonyProg software that shows you a status bar of the programming progress.

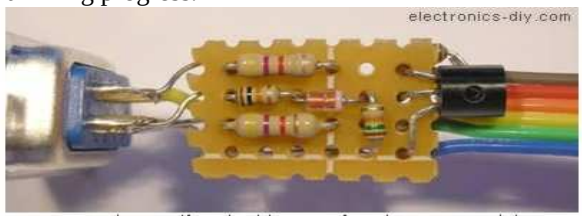

Fig 5: Serial connector

6. CONSTRUCTIO AND WORKING

Fuel indicator system consist of float with variable resistance, ADC, uC, LCD display and buzzer.All this components performe together to indicate the amount of fuel in tank. A float with variable resistance is installed in the tank at the base. Initially with no fuel in tank the float is at its lowest position. 5V supply from transformer is given to float rheostat.

When float is at its lowest position , rheostat offers maximum resistance and no current passes. As we start filling fuel in tank float starts rising up. Float is attached to a vertical column with fulcrum and supports rheostat. One end of the float is attached to the rheostat, as float rises up results in varying resistance, as resistance decreases flow of current increases. The output current from the rheostat is anolog signal which is feed to the anolog to digital converter i.e. ADC.

ADC processes these anolog signal into digital pulses. Output from ADC send to the microcontroller, uC further processes digital signals and send to the LCD display in the form of voltage . This output voltage is calibrated in terms of volume of petrol filled in tank in terms of liter or millileter.

Buzzer is also provided with system, this buzzer is activated when fuel in the tank reaches reserve level i.e. 0.5 L or 500 mL.After every 100 mL reduction in fuel quantity periodic buzzer activates up to zero position.

7. CONCLUSION:-

Hence we can conclude that the required goals and objectives of our project have been achieved.

This project has built in us confidence that any problem can be solved with sheer determination, hard work and optimism. We feel that our product serves something good to this world and we like to present it

before this prosperous world. By doing this project, we were better able to understand the various facets of doing an embedded system project which is emerging as one of the most 'in demand' technologies right now.

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