Electronics

DATA ACQUISITION SYSTEM

The Data Acquisition System is a self-designed system that logs data for 18 sensors. It uses its own battery and is independent from the car. The data is logged through analog channels and then converted into digital data using the internal 12 bit ADC of the microcontroller. The sensor is then calibrated using equations which are acquired through Matlab. The resolution is 0.8mV. The sensor readings are logged into USB through V-drive 2 in ".xls" format which can be easily viewed on Microsoft Excel. The logging rate for the USB is 25 Hz. The data is also logged live through telemetry using X-bee. The data is read through HyperTerminal. The outdoor RF line of sight range of transmission is 1600m and urban range is up to 90m.

DRIVER INTERFACE

The LCD System was designed using a pic18f controller board. The system has 4 line system and we used the internal EEPROM the LCD board to design a 3 line gear positioning system. The system also displays speed, odometer, lap distance, battery voltage sensor and engine temperature. This controller has a 13 channel ADC interfacing with a single multiplexed ADC module working at 100ns. This module has four 8/16 bit timers for speed calculation. Every sensor has been calibrated using Matlab and guard bands have been created to prevent uncertainty within the controller.

RPM Shift Lights

RPM Shift Lights lets the driver know when to shift gear through the lighting of the LEDs giving him a rough idea of the engine rpm. The circuit was supposed to be small and have two parallel lines of LEDs so that they can be seen clearly by the driver.
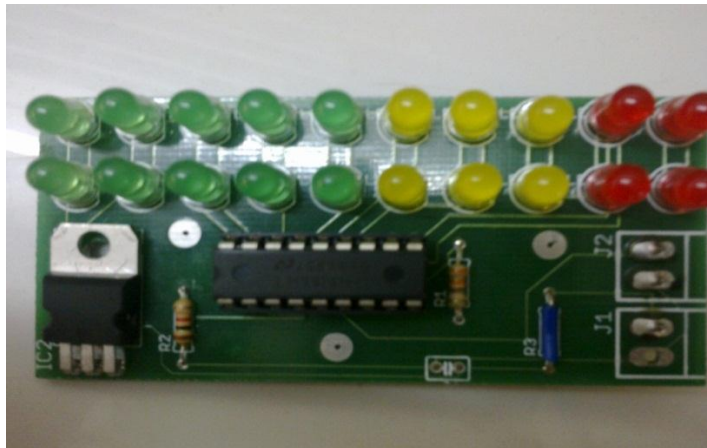
The circuit consists of LM 3914 which is a bar/dot display driver. A maximum of 10 LEDs can be driven. The LEDs are driven according to the voltage variation at the signal pin of the IC which is pin no.5. The signal from the ECU for engine revolution was a varying frequency signal. We are using IC LM 2907 which is a frequency to voltage convertor. This IC converts the frequency from the signal and converts it into analog voltage at 1V/67Hz.