Novateur Publication's
International Journal of Research Publications in Engineering and Technology (ISSN No: 2454-7875)
Conference Proceedings of A National Conference on "Modern Trends in Electrical Engineering"
(NCMTEE-2K17) 27th March 2017

POWER MODELLING OF L.C.D. DISPLAY

SHELAKE SANDHYARANI S.
EED-AMGOI-Vathar Kolhapur- Maharashtra, sandhyashelake15@gmail.com

DESAI ATUL R.
EED-AMGOI-Vathar Kolhapur- Maharashtra, atuldesai107@gmail.com

PATIL ATUL J.
EED-AMGOI-Vathar Kolhapur- Maharashtra,atulpatil2322@gmail.com

DHARME MEGHARANI B.
EED-AMGOI-Vathar Kolhapur- Maharashtra, meghadhareme2@gmail.com

KHANDEKAR NIKHIL B.
EED-AMGOI-Vathar Kolhapur- Maharashtra

ABSTRACT
Now days most of embedded system used are battery operated. To predict the battery life, power consumption at various levels, like software and power taken by peripheral devices should be known in advance. The components of total power consumption are software power & power taken by peripheral devices these should be known to the designer. In this paper for prediction the modelling of L.C.D. by using statistical tools i.e. regression analysis. Here we must understand how much power required to display a particular character
INDEX TERMS: Embedded System, Peripheral devices, Battery consumption, Predict Battery Life

I. INTRODUCTION

To improve a communication between human world and machines world, display units play an important role. And so they are an important part of embedded systems. Display units it may be a big or small, work on the same basic principle. From these, complex display units like graphic displays and 3D displays. we must know working and power required by simple displays like 20x1 and 20x4 units. The 20x1 display unit will have 20 characters and are in one line. The 20x2 will have 40 characters in total 20 in 1st line and another 20 in 2nd line. Here we must understand how much power required to display a particular character.

The components of total power consumption are software power & power taken by peripheral devices these should be known to the designer. Our project is aimed, to calculate power taken by output device that is LCD display and modelling of LCD display.

In this paper to power consumption are software power & power taken by peripheral devices. It has advantages of in advance we calculate how much power required to display a character and In advance we analyze battery consumption for particular character displayed in LCD and also suitable for designing of LCD.

The LCD is connected to the arduino kit and arduino kit is connected to the computer and with the DC source.LCD display output is controlled by using Proteus Program. This software requires program data for displaying data. According whatever we want to display in LCD, according that we write a program.

A] BLOCK DIAGRAM

LCD interfacing is divided in 1.DC source. 2.Arduino 3.LCD Display. 4.Program Input From Computer.

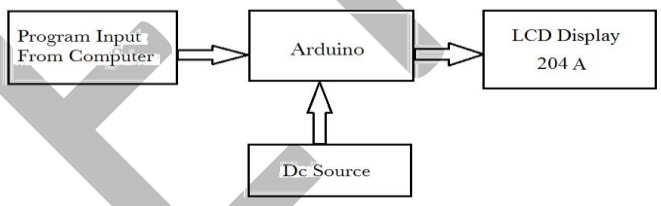


Fig. 1- Block Diagram

In 20x4 LCD, there are 16 pins over all if there is a back light, if there is no back light there will be 14 pins. One can power or leave the back light pins. Now in the 14 pins there are 8 data pins D0-D7 i.e. 7-14, 2 power supply pins VSS&VDD or GND & +5v i.e. 1-2, 3rd pin for contrast control which VEE-controls how thick the characters should be shown, and 3 control pins i.e. RS & RW & E.

In this paper, the LCD module and arduino are interfaced in the 4-bit mode. it means only four of the digital input lines ie.DB4 to DB7 of the LCD are used. This method is very simple. it requires less connections and we can almost utilize the full potential of the LCD module. The arduino can be powered through the external power provided on the board. +5V required in some other parts of the circuit can be tapped from the 5V source on the arduino board.

The contrast bit and READ/WRITE are not often used so they can be shorted to ground. This gives LCD in highest contrast and read mode. We need to control ENABLE and RS pins to send characters .

B] SCHEMATIC DIAGRAM

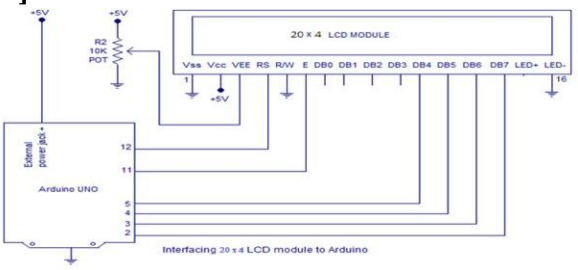


Fig 2- schematic diagram

The LCD module and the arduino are interfaced in the 4-bit mode. it means only four of the digital input lines(DB4 to DB7) of the LCD are used. This method is very simple and requires less connections and we can t utilize the full potential of the LCD module. Digital lines are db4, db5, db6 and db7 are interfaced to digital pins 5, 4, 3 and 2 of the arduino. The 10k potentiometer is used for conformity the contrast of the display. 560 ohm resistor r1 limits the current through the back light led. The arduino can be powered through the external power which is provided on the board. +5v required in some other parts of the circuit can be tapped from the 5v source on the arduino board.

The arduino can be powered from the pc through USB port. As per requirement we firstly write a program in proteous software after that we download program on arduino. Then LCD will display a character whatever we written in program. But at time writing program we must ensure that whatever connection made in the software according that we have to maintain program data then only LCD will display a character.

Then we obtain our output on LCD display. Then we take micro-ammeter and connects in between arduino & LCD and measure current for each character. Then we obtain different current for different character. And according that we draw a curve and matching with curve fitting method. And whatever we had graph of v-i curve from simulation, matches with standard graph of curve fitting method and that power equation is nothing but a LCD power equation according that by using power equation we can calculate power required to display a character. And also we calculate in advance how much power required to display a character on LCD.

II] HARDWARE REQUIREMENT

1 .LCD Display 2.Arduino 3.Dc adaptor

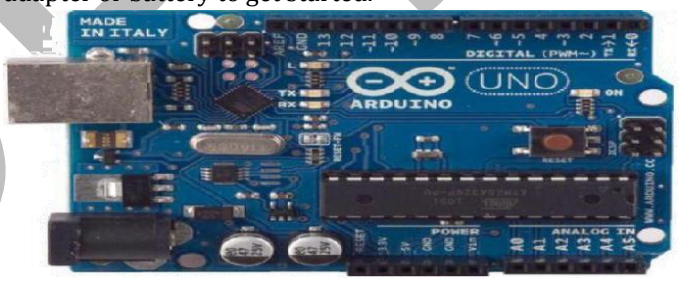
1.LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smart phones. LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks.[5] LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to huge, big-screen television set.

Fig.3. LCD Display

Whereas, LCD screens do not use phosphors, they do not suffer when a static image is displayed on a screen for a long time (e.g., the table frame for an aircraft schedule on an indoor sign). LCDs are, susceptible to image persistence. The LCD screen is more energy-efficient , it can be disposed of more safely than the CRT can. Its low electrical power consumption enables it to be used in battery-powered electronic equipment more efficiently than CRTs can be. It is an electronically modulated optical device and it is made up of any number of segments controlling a layer of liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in colour or monochrome. Liquid crystals were first discovered in 1888. By 2008, annual sales of televisions with LCD screens exceeded sales of CRT units worldwide, and the CRT became obsolete for most purposes[6]

2.ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328.It has 14 digital input/output pins (of which 6 can used as PWM outputs), analog inputs, a 16 MHz ceramic resonator, a USB connection , a power jack, an ICSP header, and a rest button .It contains everything needed to support the microcontroller; simply connect it to a computer with a UBS cable or power it with a AC to DC adapter or battery to get started.



Pin no.	Symbol	External connection	Function
1	Vss	Power supply	Signal ground for LCM
2	V_{DD}		Power supply for logic for LCM
3	V_0		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

Fig.4.Arduino its pin description

Uno means the one in Italian and it is named to mark the upcoming release of Arduino1.0.The Uno and version 1.0 will be the reference version of Arduino moving forward.

3. DC ADOPTER

This design note describes a simple 2.5 watt, universal Ac input, constant voltage power supply intended for AC adapter, industrial equipment, or white goods where isolation from the AC main is required, and low cost, high efficiency, low standby power are essential. This adapter used for obtaining constant output. And this can be achieved by using rectifier and voltage regulator.

This design note describes a simple 2.5 watt, universal Ac input, constant voltage power supply intended for AC

adapter, industrial equipment, or white goods where isolation from the AC main is required, and low cost, high efficiency, low standby power are essential. This adapter used for obtaining constant output. And this can be achieved by using rectifier and voltage regulator.

Fig.5.DC source Adapter.

IV] MODELLING

A]CURVE FITTING

From hardware result the relationship between variable shown by using this method. Is the process of constructing a curve, or mathematical function, that has the best fit to a series of data points, possibly subject to constraints Curve fitting can involve the exact fit to the data is required and the smoothing, in which a "smooth" function is constructed that approximately fits the data. A related topic is analysis, which regression focuses more on questions of statistical inference such as how much uncertainty is present in a curve that is fit to data observed with random errors. Fitted curves can be used as aid for data visualization, values of a function where no data are available, and to summarize the relationships among two or more variables. Extrapolation refers to the use of a fitted curve beyond the of the observed data, and is subject to a degree of uncertainty since it may reflect the method used to construct the curve as much as it reflects the observed data.

B] REGRESSION ANALYSIS

In statistical modelling, regression analysis is a statistical process for observing the relationships between variables. It includes many techniques for modelling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or predictors').[3]

More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed.

In regression analysis, it is interest to characterize the variation of the dependent variable around the regression function which can be described by a probability distribution. Many techniques are for carrying out regression analysis having been developed. Various methods such as linear regression and ordinary least regression. These are parametric, in that the regression function is defined in terms of a finite number of unknown parameters that are estimated from the data. Nonparametric regression refers to techniques that allow the regression function to lie in a specified set of functions, which may be infinite-dimensional. The performance of regression analysis methods in practice depends on the form of the data generating process, and how it relates to the regression approach being used. wheras the true form of the data-generating process is generally not known, regression analysis often depends to some extent on making assumptions about this process. These assumptions are sometimes trilled if a sufficient quantity of data is available. Regression models for prediction are often useful even when the assumptions are moderately violated, although they may not perform optimally. However in many applications, mostly with small effects or Which based on observational data, regression methods can give misleading results.

C] REGRESSION MODELS

Regression models involve the following variables:

1.The unknown parameters, denoted as β, which may represent a scalar or a vector. 2.The independent variables, X. 3.The dependent variable, Y. In various application, different terminologies are used in place of dependent and independent variables .A regression model relates Y to a function of X and β. The approximation is usually formalized as $E(Y \mid X) = f(X, \beta)$. To carry out regression analysis, the form of the function f must be specified. The form of this function is based on knowledge about the relationship between Y and X that does not related to the data.If no such knowledge is available, a flexible or convenient form for f is chosen[1]. Assume the vector of unknown parameters β is of length k. In order to perform a regression analysis the user must provide information about the dependent variable Y:

1.If N data points of the form (Y, X) are observed, where $N < k$, most classical approaches to regression analysis cannot be performed: since the system of equations defining the regression model is underdetermined, there are not enough data to recover β.

2.If exactly $N = k$ then data points are observed, from the function f is linear, the equations give as $Y = f(X, \beta)$ it can be solved exactly rather than approximately. This reduces to solving a set of N equations with N unknowns (the elements of β), which has a unique solution as long as the X are linearly independent. If f is nonlinear, a solution may not exist, or many solutions may exist.

The most common situation is where $N > k$ data points are observed. In this case, there is enough information in the data to estimate a unique value for β that best fits the data in some sense, and the regression model when applied to the data can be viewed as an over determined system in β.[2]

In the last case, the regression analysis provides the tools for: 1.Finding a solution for unknown parameters β that will, for example, minimize the distance between the measured and predicted values of the dependent variable Y (also known as method of least squares). 2. Under certain the statistical assumptions, the regression analysis uses the surplus of information to provide statistical the information about the unknown parameters β and predicted values of the dependent variable Y.

D] POWER AND SAMPLE SIZE CALCULATIONS

There are no generally agreed methods for relating the number of observations versus the number of independent variables in the model. One rule of thumb suggested by Good and Hardin is where is the sample size, is the number of independent variables and is the number of observations needed to reach the desired precision if the model had only one independent variable.[4]

V] FUTURE SCOPE

Most of embedded system used is battery operated. To forecasting the battery life, power consumption at various levels, Like Software and power taken by Peripheral devices should be known in advance. In that we calculate power taken by output device that is LCD display and modeling of LCD display.

VI] CONCLUSION

In Advance we calculate how much power required to display a character is achieved. In advance we analyze battery consumption for particular character displayed in LCD is possible. It has advantages of in advance we calculate how much power required to display a character and In advance we analyze battery consumption for particular character displayed in LCD and also suitable for designing of LCD.

VII] REFERANCES

1) An Introduction to Regression Analysis Alan O. Sykes
2) Applied Regression Analysis: A Research Tool, Second Edition John O. Rawlings Sastry G. Pantula David A. Dickey
3) Modeling of liquid crystal display and photonic Devices By Zhibing ge B.s. in electrical engineering, zhejiang university, 2002, M.s. in electrical engineering, university of central florida, 2004.
4) Mathematical Regression Model for the Prediction of Concrete Strength M. F. M. Zain1, Suhad M. Abd1, K. Sopian2, M. Jamil1 , Che-Ani A.I1.Faculty of Engineering and Built Environment, 2.Solar Energy Research Institute, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia
5) http://www.circuitstoday.com/interfacing-lcd-to-arduino
6) https://en.wikipedia.org/wiki/Liquid-crystal_display