Design and construction of ENP for Car : a novel Embedded System

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ABSTRACT: It is often experienced that many people are parking their car at no-parking place or at parking place of others. The other people can't easily contact the car owner and this will lead to some serious quarrel. To contact the car owner, installation of electronic name plate in a car is the simplest solution. The Electronic Name Plate (ENP) is an electronic embedded system in which the name and mobile number can be displayed on 16 x 2 LCD (Liquid Crystal Display) module. This type of electronic name plate can find various applications. The brain of this device is the microcontroller AT89S52. In addition to microcontroller this device uses 16 x 2 LCD module and few electronic components. This device can work by either 230V A.C. line voltage (for in house applications) or by +9V or greater D.C. power from battery (for outside or field application or in car).

KEYWORDS: Electronic name plate(ENP), parking problem, AT 89S52, Microcontroller, LCD, Mobile   number, embedded system

I. INTRODUCTION

In the country like INDIA, the number of mobile phones is more than a number of toilets. It means, all most all persons who are occupying either a car or a house is having at least one mobile. The person can be easily approached if his/her mobile number is known. In the present paper an ENP is designed and constructed to display name and mobile number. This ENP can be easily installed in either car or in house or in office or anywhere. This ENP is displaying name and mobile number on its display.

II. BASIC TERMINOLOGY

The micro controller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals where peripherals can be any electronic device. As the name suggests, the device is controlled by a microcontroller, AT89S52, from Atmel Corporation. AT89S52 (see Figure 1), is a 40 pin low-power, high-performance 8-bit microcontroller with 8 kilo bytes of in-system programmable Flash memory, 256 bytes of Random Access Memory, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. [1,2,3]

In systems where only a small amount of data is to be displayed, a simple digital type displays are used. Liquid crystal displays are one such type of simple displays that are widely used in portable and battery operated instruments because of their low power consumption.[4]

III. FEATURES OF LCD MODULE JHD 162A[4,5]

1) Display construction -> 16 Characters * 2 Lines
2) Display mode -> Positive Transflective.
3) Display type -> TN\STN.
4) Backlight -> LED(B/5.0V)
5) Viewing direction -> 6 o'clock.
6) Operating temperature -> Indoor.
7) Driving voltage -> single power.
8) Driving method ->1/16 duty,1/5 bias.

9) Type-> COB (Chip On Board).
10) Number of data line-> 8-bit parallel.
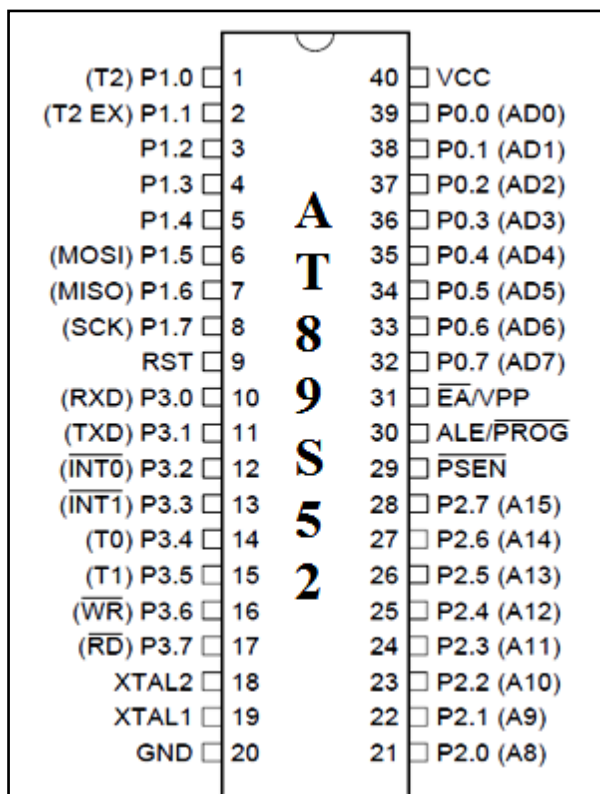**11)** Connector -> pin type.

Fig 1: Pin Configuration of AT89S52.

IV. LIST OF COMPONENTS

1. AT89S52 with 40 pin DIP socket(1+1)
2. JHD 162A LCD module(1)
3. 1N4007 diode(4)
4. +9V D.C. chargeable Battery(1)(Optional but essential for car)
5. 9V/500mA transformer(1)
6. 470μF/25V Electrolytic Capacitor(1)
7. 7805 IC(1)
8. 0.1μF Box type capacitor(1)
9. 10μF/10V Electrolytic Capacitor(1)
10. 10KΩ/0.25W Carbon Resistor(1)
11. 12MHz Crystal(1)
12. 10KΩ Trim Potentiometer(1)
13. 10KΩ Resistor Ladder Network(1)
14. 100Ω/0.25W Carbon Resistor(1)
15. Two 16-pin single line male-female connectors(2)

V. CIRCUIT UNDERSTANDING

The Microcontroller based ENP required +5V/100mA regulated online UPS type power supply. This Power Supply is especially designed for low power applications with less than 100mA. [3,6] The list of all components is as given above with number of items in bracket.
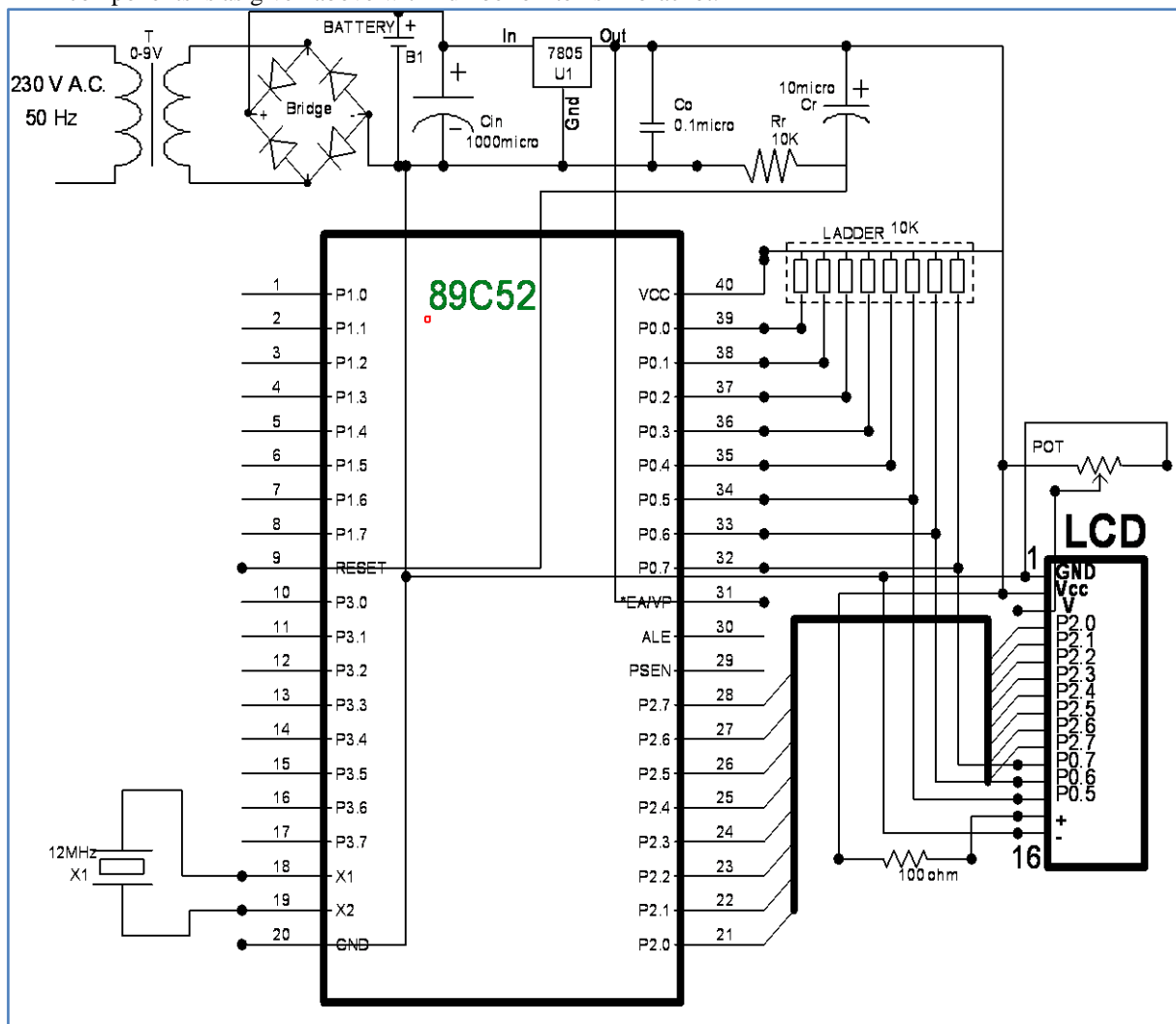

Figure-2: Circuit diagram of ENP

The Fig.-2 shows the circuit diagram of ENP. In this circuit the function of the UPS can be easily understood. When the mains are on, the ENP gets power from mains and some part of mains are used to charge the battery. When the mains power is off, the ENP gets power from the battery. The ENP remains on during both the conditions of mains power.[3,6] The battery is optional in ENP if it is installed in house. The battery is important when it is installed in car. The car battery will supply power to this device. In the car the transformer and diodes are optional.

In Fig.-2, The 12MHz quartz crystal is connected between pins X1 and X2 of microcontroller AT89S52. The power on reset is provided by Cr and Rr of 10µF and 10KΩ respectively.[3] The connections of JHD 162A in circuit is given in Table-1. These connections are as per user manual of JHD 162A.[5]

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(An ISO 3297: 2007 Certified Organization)
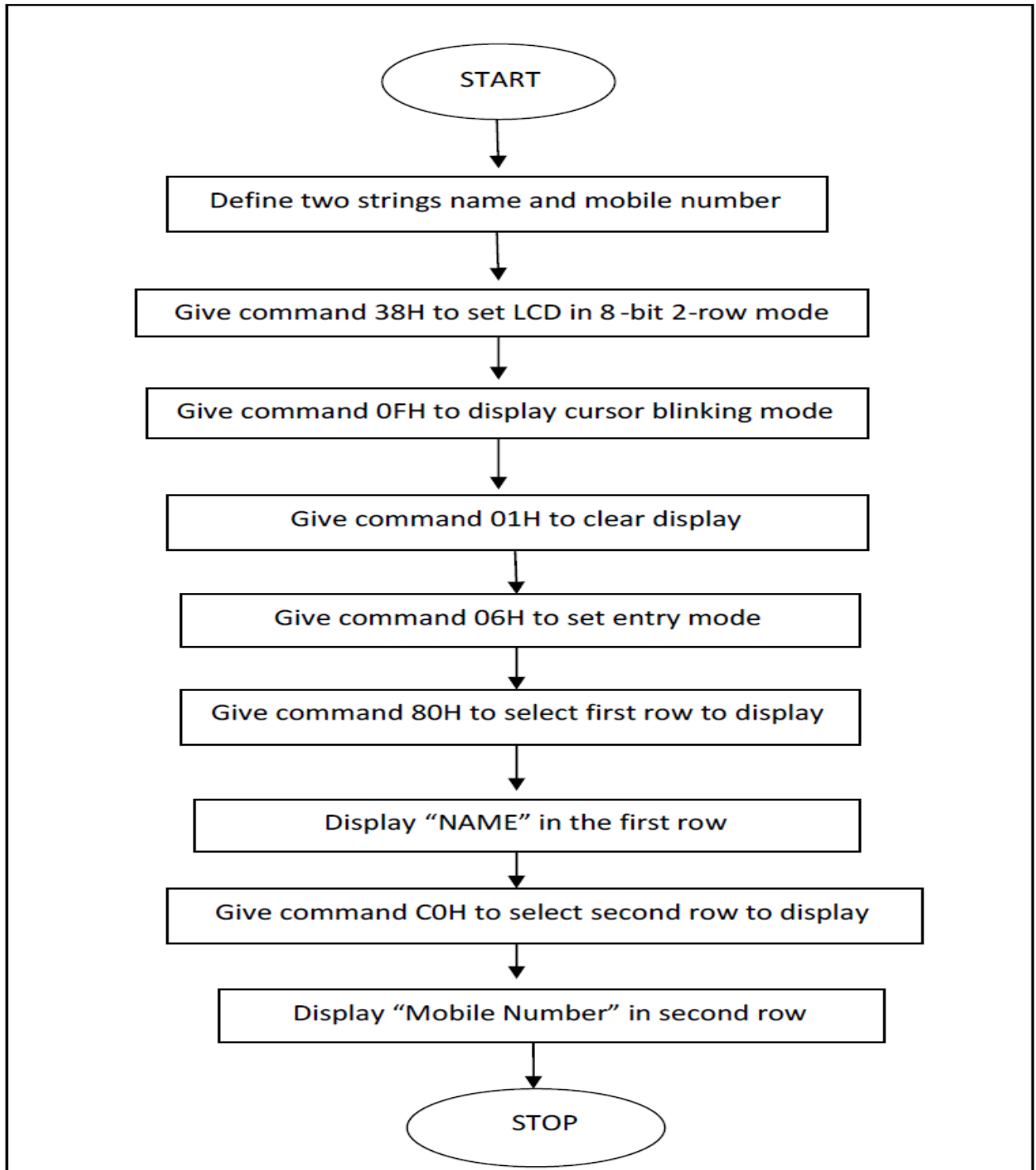
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Figure-3: Flow chart of the software of ENP

Table-1: JHD 162A LCD module connections with microcontroller

Pin no.	Name of the pin	connection
1	GND	With Ground
2.	Vcc	With +5V
3.	V	Through pin 2 of 10KΩ Trim pot
4	RS	Port pin P2.0 of microcontroller
5	R/W	Port pin P2.1 of microcontroller
6	E	Port pin P2.2 of microcontroller
7	DB0	Port pin P2.3 of microcontroller
8	DB1	Port pin P2.4 of microcontroller
9	DB2	Port pin P2.5 of microcontroller
10	DB3	Port pin P2.6 of microcontroller
11	DB4	Port pin P2.7 of microcontroller
12	DB5	Port pin P0.7 of microcontroller
13	DB6	Port pin P0.6 of microcontroller
14	DB7	Port pin P0.5 of microcontroller
15	LED+	+5V through 100Ω Resistor
16	LED-	With ground

VI. SOFTWARE UNDERSTANDING

The software of this ENP is developed using embedded-C of KEIL uVision3 V3.62c.[7] The execution of the program in ENP can be easily understood with help of flowchart-1.

How various commands and data need to issue to the LCD module is explained in flow chart of Figure-3. When this software will execute properly in the given hardware of ENP then the name and mobile number will be displayed. The first row of LCD will display name and second row will display mobile number.

VII. WORKING AND RESULT

The ENP is designed and constructed and its display is shown in Figure-4. This Figure-4 is actual photograph of ENP. This photograph is showing the name and mobile number of car owner on the display of ENP. This ENP can be easily installed inside the car, as a result of this the mobile number and name can be seen very easily. This mobile number helps anybody to contact the car owner.

Figure-4 : Photgraph of ENP

VIII.   APPLICATIONS

This ENP can be used at various places, like in the car, in house at main door, in offices on the desk etcetera. It can be used wherever the name and mobile number needs to display.

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BIOGRAPHY

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