Spinning LED Display Using GSM Interface

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Abstract— **Now a days there are so many ways of attractively displaying and advertising about various products and one of the ways is by using LED's. In this paper we will let you know a brief idea about one of the advertising methods i.e. Spinning LED using GSM Interface. In this interfacing we can display our messages by using 7 LEDs which have very less power consumption as compared to the conventional methods and can be accessed remotely. The spinning LED display system displays message programmed in Microcontroller by using the interface of a remote DTMF module. The code is written using embedded C language in kiel software. The circuit needs to be mounted on to the mechanical structure (rotating shaft) where it displays the messages that are stored in a Microcontroller as indicated by the DTMF module. The shaft is rotated using a single phase DC motor. The speed of motor is kept constant for the effect of Persistence of vision. The complete display system circuit is run by a battery which is provided externally.**

Keywords — **LED, DTMF, CMOS.**

I. INTRODUCTION

The goal of our project is to design a prototype of an enlarged version of the Spinning LED display for displaying message. After studying various techniques like matrix led's, rolling displays ,etc which are also techniques of displaying message at the high cost, therefore we choose spinning led display, an emerging technology applied for displaying message. The display consists of 7 LEDs only in a vertical row. By moving them fast enough on a circular path with the help of a DC motor, message can be displayed which appears to be generated by a 7*n matrix of LEDs and not a single column of LEDs, where n is the no. of columns of the display matrix. . A quickly moving light source appears to be in many places at one time. If it's continuously ON, we see a solid line. If it's flashing, we see a line of dots. This phenomenon can be thought of as the brain having a limited "frame rate". We only think we're seeing fluid motion around us because the brain is so good at piecing bits of data into continuous images and stories. This is the basic principle of 'Spinning LED Display'. To accomplish this, we first have to design and build the hardware components. The hardware mostly consists of a spinning wood platform, a DC motor, LEDs, any other circuitry (including the microcontroller). The code itself uses a modified version of the 7x5 ASCII character set included in a prior lab to create a message across the spinning wood Platform. With precise timing of the angular velocity of the platform, an individual byte of data (containing either ON or OFF for each LED) can be sent at the appropriate time so that a visible message appears. Also included in the code is the ability for the user to decide the color of the message (red, blue, green or any combination of these three) and the characters included in the message controlled by a remote DTMF device.

II. COMPONENTS USED

A. 8051 Micro Controller

The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high - density non volatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.
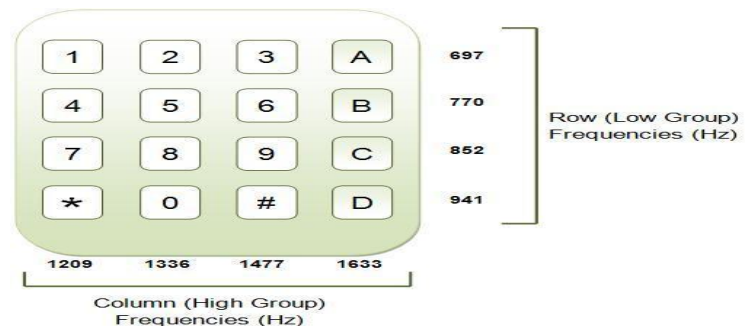
DTMFMODULE

Fig. 1 DTMF Module

Here is a handy circuit for implementing all 16 DTMF tone for repeater auto patches, etc. Of course it could be used for remote control projects too. If you omit the TCM5089, you could use it for any device that requires 2 of 16 input. The keypad used here is a matrix switch, where the pressed key forms a connection to its associated row to column. To make this work, you have to scan either the row or column lines. I've utilized a 7490 decade counter connected to a 74LS138 3 to 8 line decoder. The counter is clocked using a simple oscillator comprised of 2 logic gates of a quad NAND IC. The remaining 2 gates are used for logic functions. The end result is that pins 12, 13, 14 & 15 of the 74LS138 continuously scan columns 1 through 4. When a key is pressed, the corresponding row and columns will go to a logic low when the scan appears at the associated column. When this occurs, the clock is disabled via IC 1-C, locking the scan until the button is released. If an "any key pressed" signal is require in your design, a logic low is available at the anode junction of the 4 diodes.

B. LED - RGB Clear Common Cathode

Ever hear of a thing called RGB? Red, Green, Blue? How about an RGB LED? These 5mm units have four pins - Cathode is the longest pin. One pin for each color and a common cathode. Use this one LED for three status indicators or pulse width modulate all three and get mixed colors!
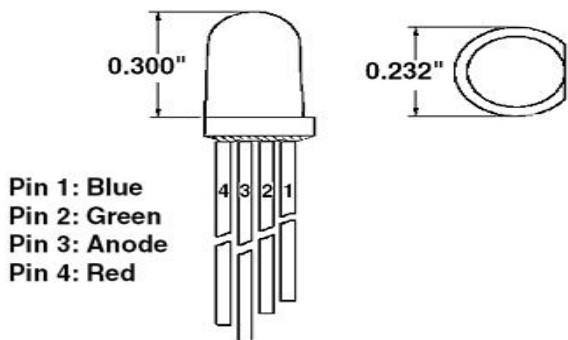

Fig. 2: LED-RGB Cathode

C. DC motor

A DC motor is an electric motor that runs on direct current (DC) electricity. DC motors were used to run machinery, often eliminating the need for a local steam engine or internal combustion engine. DC motors can operate directly from rechargeable batteries, providing the motive power for the first electric vehicles. Today DC motors are still found in applications as small as toys and disk drives, or in large sizes to operate steel rolling mills and paper machines. Modern DC motors are nearly always operated in conjunction with power electronic devices

Fig. 3: DC Motor

III. Working
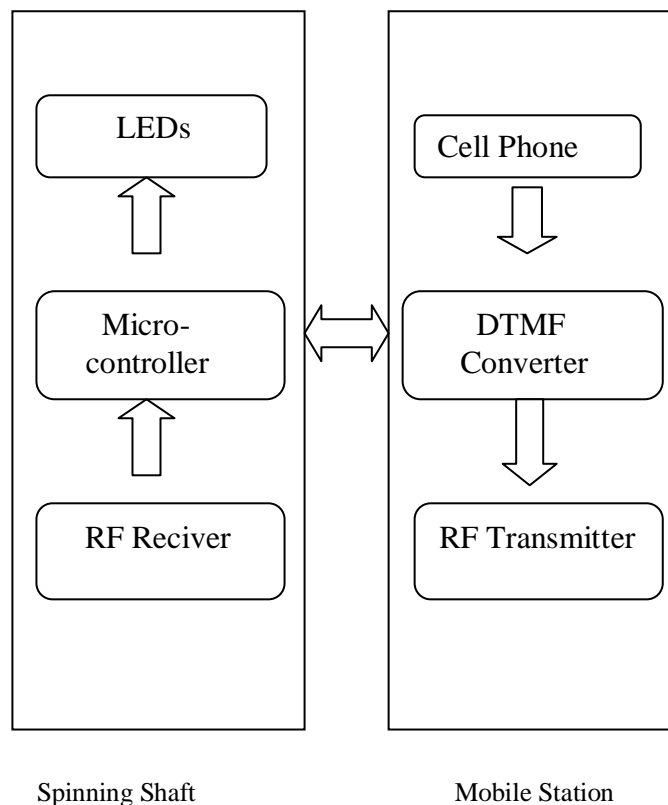
The basic principle of Persistence of vision is used in our Project named as 'Spinning LED Display'. The project is a rotating LED display message display system which displays messages Programmed in microcontroller IC 89V51RD2 or Wireless communication (RF) using parallel port is the transfer of information over a distance without the use of electrical conductors or "wires". In RF there is user input for the system. We display the message using 7 led's .this is done by building 2 diff. parts first is mechanical part (use for rotating whole circuit.) and second is Electrical part (deals with microcontroller and other electronics). In this the different messages will scroll, with respective intervals or delay by the microcontroller itself which is already

programmed by the user. The code is written in using Visual Basic software. This circuit needs to be mounted on the mechanical structure (rotating disc) where it displays the messages .The disc is rotating using DC motor with the speed of 1000rpm; the motor speed is kept constant. The message can be changed as per user needs by rewriting the microcontroller in built memory or through RF via sending wireless data through pc. The complete display system circuit is battery- run on 5v, Dc motor works on 12V and current of 5 ampere. This unique way of displaying messages is a very eye catching, for it is use in many fields like advertising.

IV. APPLICATION

Fig. 4: Spinning LED showing Hello Message

It is used to display ADVERTISEMENTS at public places in digital format with low power consumption and easy to handle.
Messages can be changed dynamically from anywhere in the world using GSM interface

The similar principle is been used with the LCD and used for the display purpose in public places at US and UK & has a large market in India Conveyer belts can be used to display the messages in rectangular shaped displays using 2 dc motors with high RPM.

Fig. 5: Application of LED Display used by Indian Railway

- By increasing the size and the number of LED's we can get better and bigger display.
- By using AC motor instead of DC motor we can get smoother, clear and more continuous display.
- Along with wireless RF communication we can also use GSM and Bluetooth technology for transmitting data wirelessly.
- By using processor having larger memory we can increase the length of message displayed one after other and by increasing the diameter of rotation we can increase the number of characters displayed at a time.

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