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Propeller Display Based on Persistence of Vision

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Abstract: Persistence of vision is the occurrence of the eye by which an afterimage is thought to persist for approximately one twenty-fifth of a second on the retina and believed to be the explanation for action perception; conversely it only talks about why the black spaces that come between each existent movie frame are not perceived. The theory of persistence of vision is the belief that human perception of motion is the result of persistence of vision. In this particular project, the LEDs are connected to I/O ports of the microcontroller. These LEDs are positioned in vertical order. This microcontroller along with the LEDs is placed on one motor mechanism. As the motor rotates the required message will be displayed .We can see this message in 360 degrees angle.

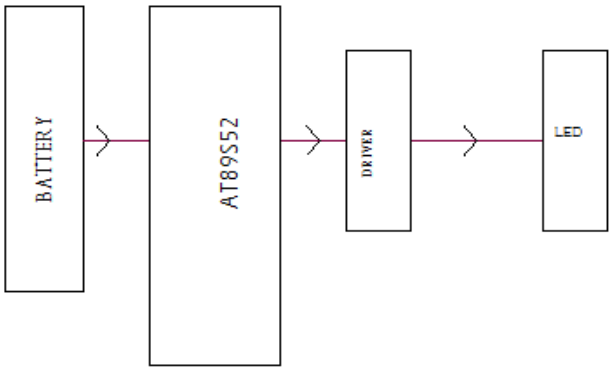
Keywords: E-Contracting, Multi-Party Contract Signing Protocol, Fairness, Abuse-Freeness and Timeliness.

I. INTRODUCTION

When we go to the movies, we see that a motion picture creates an illusion of a continually lit screen by flashing individual photographs in quick sequence. It is in fact dark part of the time. It was the flickering image on the screen that gave rise to the term flicks in the early days of movies. Today's motion pictures flash images on the screen at 24 frames per second (or 48, in that each frame is flashed twice) for a flicker-free picture. You may remember making little "flipbooks" as a child. They worked on this same principle: the more images per second, the smoother the picture. Television, too, uses a complicated form of intermittent light impulses to literally build the picture we see. If an image can be built up quickly enough, the eye will be unaware that this process is even occurring. American television actually transmits and recreates 30 complete images per second to give the illusion of a single continuous picture.

In deciding on a project we looked for a challenge that would have a good mix of hardware and software problems. We ended up primarily concentrating on looking at unusual display technologies and decided that a persistence of vision (POV) display would be a good balance of hardware and software. A POV display is a display created by rotating an array of LEDs rapidly. Due to the fact that human eyes can only render about 10 images per second, the fast spinning LEDS seem like a solid display. While many POV projects have been designed before, they tend to be similar, in the sense that the LED"s are mounted perpendicular to the plane of the circuit. This may cause limitations to the characters and figures which can be displayed due to few number of LED. Our original milestone was to make a multi colored LED display by using RGB (red-green-blue) LEDs. But the high cost of the RGB LEDs and the associated LED drivers prevented us from doing so. While we have made a monochrome (green) display, our design makes it easy for the user to swap the LED array for a different one and put in suitable LED driver's. Thus, one can customize the display as per the need.

II. BLOCK DIAGRAM



III. KEYWORDS

- AT89S52 MICROCONTROLLER
- KEIL COMPILER
- LEDS
- BATTERY
- MOTOR

IV. AT89S52

Here we are using AT89S52 microcontroller controller. Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical.

A. Features of AT89s52:

- 8K Bytes of Re-programmable Flash Memory
- RAM is 256 bytes.
- 4.0V to 5.5V Operating Range.
- Fully Static Operation: 0 Hz to 33 MHz's
- Three-level Program Memory Lock.
- 256 x 8-bit Internal RAM.
- 32 Programmable I/O Lines.
- Three 16-bit Timer/Counters.
- Eight Interrupt Sources.
- Full Duplex UART Serial Channel.
- Low-power Idle and Power-down Modes.
- Interrupt recovery from power down mode.

V. AC MOTOR

An AC motor is an electric motor that is driven by an alternating current. It consists of two basic parts, an outside stationary stator having coils supplied with alternating current to produce a rotating magnetic field, and an inside rotor attached to the output shaft that is given a torque by the rotating field.

A. Motor Torque Calculations

Now that we have a finalized design for the POV display motor, we will need to estimate the torque requirements. This will only be an estimate to help decide the size of motor we will require and not an exact calculation. To help simplify the problem we broke the rotating mechanism into several pieces for which we can calculated the moment of inertia for each piece. Adding together the moment of inertia for each piece gave uses a total inertia of 0.757 kg-m2. Using a frequency of rotation of 44Hz, we calculated the angular acceleration. Multiplying the total moment of inertia by the angular acceleration gave us an estimated torque value of 0.876 N-m. Therefore, the motor must be capable of providing 1 N-m of torque at 2,640RPMs.

VI. ABOUT DRIVER (74HC245)

The 74HC245 is identical in pin out to the LS245. The device inputs are compatible with standard CMOS outputs; with pull-up resistors, they are compatible with LSTTL outputs. The HC245 is a 3-state no inverting transceiver that is used for 2-way asynchronous communication between data buses. The device has an active-low Output Enable pin, which is used to place the I/O ports into high-impedance states. The Direction control determines whether data flows from A to B or from B to A.

A. General Description

The 74HC245; 74HCT245 is a high-speed Si-gate CMOS device and is pin compatible. With Low-Power Schottky TTL (LSTTL).The 74HC245; 74HCT245 is an octal transceiver featuring non-inverting 3-state bus Compatible outputs in both send and receive directions. The 74HC245; 74HCT245 Features an output enable input (OE) for easy cascading and a send/receive input (DIR) For direction control. OE controls the outputs so that the buses are effectively isolated. The 74HC245; 74HCT245 is similar to the 74HC640; 74HCT640 but has true (non-inverting) outputs.

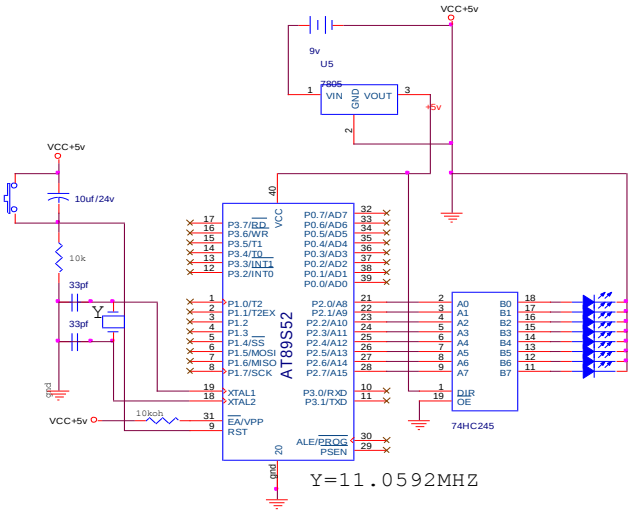
B. Features

- Octal bidirectional bus interface.
- Non-inverting 3-state outputs.
- Multiple package options.

VII. LED ARRAY HARDWARE DESIGN

LEDs we use locally available surface mounted LEDs. They are in 1206 package. We use monochromatic led (green in our case) as they are much cheaper than the RGB (red-green-blue) LEDs. Each Led driver (74HC245) can drive 8 LEDs. We use an array of 8 LEDs in our rotating display. The Anode of each LED is connected to 74HC245 while the cathode end is connected to the output pins of ground. Also, the disadvantage of using RGB led is that they need 3 LED drivers for driving 8 Leds. This is three times the number required for regular monochrome LED. This increases the cost of the circuit beyond justification. Also, the current being drawn by RGB LEDs is very high as compared to the Green LED (which we are using).The LED array is always placed radial outward direction, starting at the axis of rotation of the board. This is done in order to create a horizontal circular plane on which we can display the output. These LEDs are soldered close to each other in order to increase resolution of the image created when the motor is rotated at suitable speeds. The LEDs are operated at 5 volts.

A. Circuit Diagram



B. Applications

- Film system
- Computer monitors
- Printed media
- For the 3d appearance applications.

VIII. CONCLUSION

Since our display is designed to work without any predetermined spin speed, upgrading our motor and display module would allow us to improve the display with minimal changes. On the design side, we independently developed all our hardware and software. We also made sure that our project would not cause ethical concerns. While there is a slight chance of injury from the spinning board, we keep the speed low enough to prevent the chance of injury.

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