

POV Display

Arpit Nema and Ankit Malhotra
Under the guidance of Arpit Mathur
Electronics Club, IIT Kanpur

Abstract – The project aims for the development of a simple display by utilization of the Persistence of Vision effect.

I. INTRODUCTION

Persistence of Vision is the ability of the eye to retain the impression of an image for a short time after the image has disappeared. This ability can be used to create an illusion of images/characters floating in the air, by rapidly flashing a column of LEDs while moving the display in air. Thus to make the display we have to do the following

1. Design a circuitry to control the flashing of LEDs in a LED column.
2. Program the circuit to flash in an appropriate pattern.
3. Synchronize the flashing with the motion of the display.

II. THE CIRCUIT

We used the Atmega16 microcontroller as the controller for our circuit. 16 LEDs were connected to it via 100K resistors and 2 buffers. The buffers were added as a precaution as well as to provide sufficient current to light all the LEDs simultaneously. The LEDs were connected to ports C & D of the Atmega.

III. CODING

To code a display pattern into the programmer we first have to make a bitmap of the pattern. For example, the character 'A' uses the following bitmap:

```
TIME,t = 0  1  2  3  4  5  6  7  8  9  10 11 12 13
PORTA =0x00, 0xE0, 0xF0, 0x18, 0x0C, 0x06, 0x03, 0x03, 0x06, 0x0C, 0x18, 0xF0, 0xE0, 0x00
000000##000000 A.0
00000####00000 A.1
0000##00##0000 A.2
000##0000##000 A.3
00##000000##00 A.4
0##00000000##0 A.5
0##00000000##0 A.6
0##00000000##0 A.7
0#####0 C.7
0#####0 C.6
0##00000000##0 C.5
0##00000000##0 C.4
0##00000000##0 C.3
0##00000000##0 C.2
0##00000000##0 C.1
0##00000000##0 C.0
PORTC=0x00, 0xFF, 0xFF, 0xC0, 0xC0, 0xC0, 0xC0, 0xC0, 0xC0, 0xC0, 0xC0, 0xFF, 0xFF, 0x00
```

Each column of the bitmap represents the state of the LED column for a fixed duration of time as decided by the synchronizing mechanism or as coded.

The bitmap can either be hard coded or be fed into the MCU in real time via UART communication.

IV. MOTION SYNCHRONIZATION

Two aspects of the motion of the display have to be properly synchronized: SPEED and DIRECTION.

Speed has to be synchronized so that the pattern does not appear to be bloated or compressed. This synchronization can be done by setting a fixed duration for a single state of LED column or ,in case of rotating display, by using some sensor to determine angular velocity.

Direction has to be synchronized to prevent reversing of the pattern. This can be done by using a simple 1-D accelerometer.

V. CONCLUSION

To date we have successfully assembled a simple form of the display in which both the pattern and the speed have to be hard coded. No hardware for direction synchronization has been added yet. We are currently writing a program for real-time pattern feeding.

ACKNOWLEDGEMENT

We would like to thank Mr. Arpit Mathur and all the members of Eclub for their help.

We would also like to give our heartiest thanks to Mr. Saurabh Sankule for his expert guidance.

REFERENCES

- [1] Limor's MiniPOV project [www.ladyada.net]