

project documentation

Project title: POV animation

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Basic aim:

To implement a display unit for a microcontroller capable of displaying an animation. For this we used a set of LED's and a motor to rotate these.

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.

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.

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 0X06 0X0C 0X03 0X03 0X06 0X0C 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.0 PORTC=0X00 0XF0 0XE0 0X03 0X03 0X6 0X06 0X0C 0X03 0X04 0X05 0X0C
0#####0 C.1
0##00000000##0 C.2
0##00000000##0 C.3
0##00000000##0 C.4
0##00000000##0 C.5
0##00000000##0 C.6
0##00000000##0 C.7
```

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.

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.

Phases of work:

Phase I: To get an image on the screen formed by the rotating LED's.

Phase II : To get a static image on the screen.

Phase III : To show two images consecutively on the screen.

Phase IV : We did show a dance (major part is programming)

Phase V : We created a user interface so that user can give a command to see the image that he want to see.

Phase VI : We created a game that can be controlled dynamically by the user.

Instruments used:

Motor,Atmega-16,Tsop,Transistors,Voltage regulator.

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