

Twinkling LED Christmas Wreath

Hardware and Software design by Cliff Leitch

A Christmas wreath with 24 individually twinkling LED's

An Atmel AVR ATtiny44 microcontroller is used.

The microcontroller individually modulates the intensity of each of the 24 LED's to give a more gentle and pleasing twinkling effect than just blinking on and off.

The ZIP file includes the code, schematic diagram and photos.

Principle of Operation

The microcontroller is programmed to generate a pseudorandom sequence of numbers to control the twinkling effect. The 24 LED's are arranged in a 6 X 4 pattern and multiplexed by the microcontroller. The intensity of each LED is controlled individually by pulse width modulation. The result is that each LED gently twinkles independently of all other LED's.

Files included in this Package

Schematic.emf – Schematic diagram in Windows Metafile format

Schematic.sch – Schematic diagram in ExpressPCB format

TwinklingWreath.asm – Software for the ATtiny44 microcontroller in AVR Studio 4 assembly language.

TwinklingWreath.hex – Software for the microcontroller in binary format, ready to program into the microcontroller's flash memory.

Note: The Attiny44 clock should be set to 8 MHz by unprogramming the CKDIV8 Fuse.

TwinklingWreath.jpg – A photo of the completed project

WreathConstuction.jpg – Details of construction. I cut apart a string of LED Christmas lights to obtain the lights. The wires are spliced together into a 6 X 4 matrix on the back of the wreath. The circuit is constructed on proto board and placed in a 2" X 3" Radio Shack project enclosure mounted on the back of the wreath.