

Pi Based Scoreboard Featuring Individually Addressable LED's

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Abstract

This software demonstration comes from a student project that involved the conversion to modern technology of an 80's model portable scoreboard built by Daktronics. In addition to the scoreboard, this demonstration incorporates a raspberry pi model B+, a collection of Altivoe WS2811 individually addressable LED pixels and a tablet computer.

Code was developed to send the signals that control each pixel with 24-bit color options. The coding started off with the Raspberry Pi PWM library for WS281X LEDs which is freely available on github and described as follows: "The Raspberry Pi System on Chip is a Broadcom BCM2825. The BCM2835 in the Raspberry Pi has both a pulse width modulator (PWM) and a pulse code modulator (PCM) module that can be used for driving individually controllable WS281X LEDs. Using the Direct memory access controller (DMA), PWM or PCM first in, first out (FIFO), and serial mode in the PWM, it's possible to control almost any number of WS281X LEDs in a chain connected to the appropriate general-purpose input/output (GPIO) pin." The WS281X LEDs use a single combined clock and data line to ripple the instructions for each LED down the serial daisy chain bus which runs between each pixel. The LED's were placed inside the scoreboard sockets and then mapped to create numbers on the scoreboard. Once everything was mapped, code was developed to create the numbers via a series of on/off settings for the light chain.

A web interface was created to control the settings for each LED and create scoreboard functionality. In addition to keeping scores for two teams, this scoreboard can also be used as a clock or countdown timer. The code utilizes PHP system calls that set the LED strings as described above. The code also uses JavaScript, HTML and CSS to create a touch friendly interface that mimics the look of the actual scoreboard and can easily be used on a tablet or smart phone.