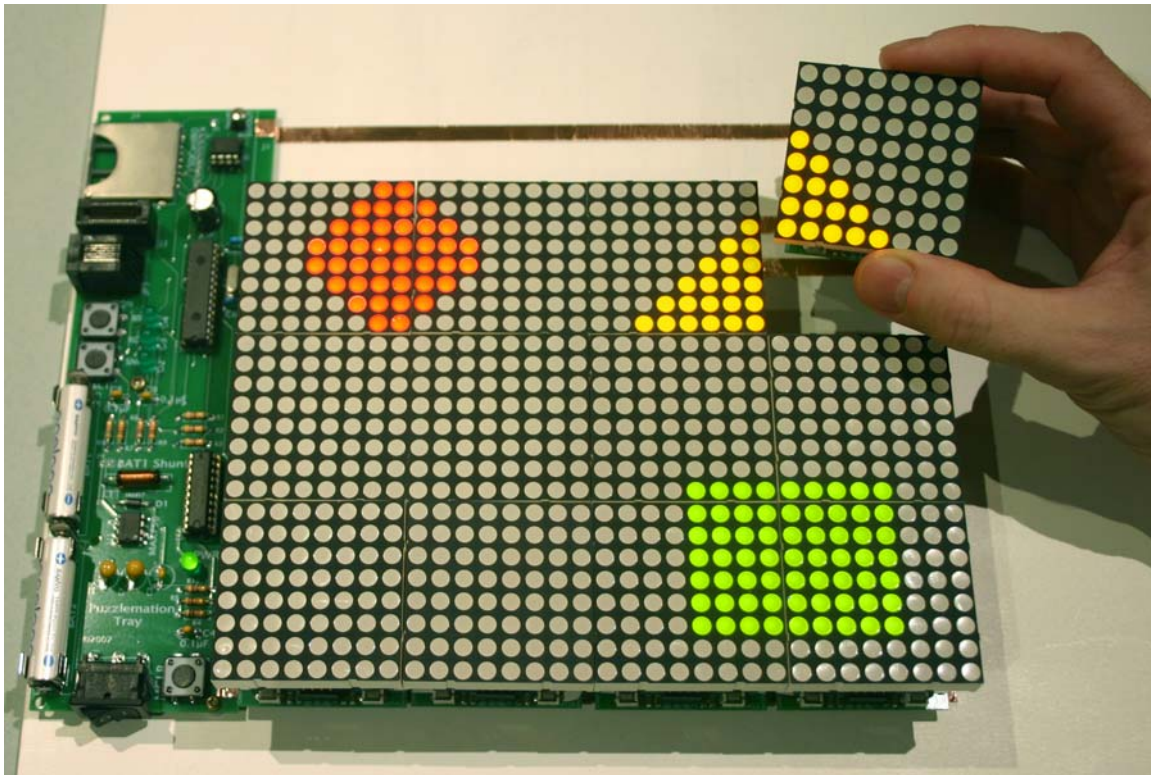


Puzzlemation - A Dynamic Tile Display

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October, 2007



Overview

Every time we turn on a computer screen or look at an animated sign, millions of pixels of light disappear into our work, our correspondence, or our entertainment. Imagine if you could capture those dots of light and scoop them up as you would grains of sand on the beach.

Puzzlemation is an expandable platform of light and animation. It can be used to create things as diverse as modular animated signs that can be changed by rearranging its tiles, to a uniquely challenging animated puzzle. First and foremost, it is a tool that lets you create animated light displays of any size and shape for whatever applications you can dream up.

This project's display is made of a number of **tiles**, about 2" square with an 8 x 8 array of color LED pixels. Each tile is *individually* powered and animated, so you can freely pick them up and re-arrange them. To set up a display, the tiles

are placed in a special **tray**. Animations are downloaded into the tray via Ethernet and stored locally on an EEPROM, or loaded via an SD card. The tray broadcasts the animation to each of the tiles, and then synchronizes them.

If the pieces are left in the tray, the animation can be updated continuously over the Ethernet connection. If the tiles are removed from the tray, they'll display the animation for several hours with their own re-chargeable battery power.

Once the animation is synchronized and running on the tiles, you can pick them up and place them anywhere. The display is completely reconfigurable. Need a tall thin display, a square one, or a long skinny one? No problem - re-arrange the tiles as you please.

Technical Description

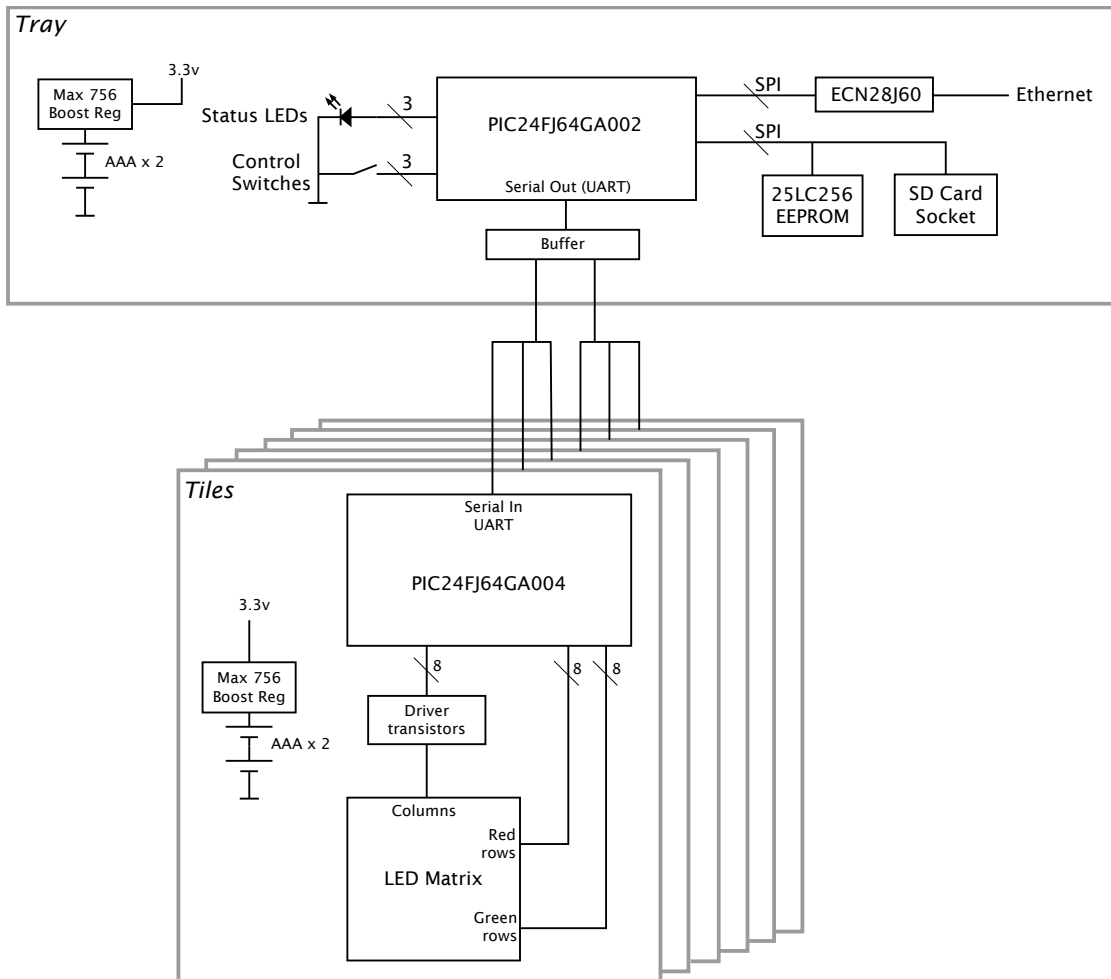


Figure 1 - Block Diagram

The system has two main components, the tray and the tiles. The tiles are based on 2" square 8x8 LED displays. Underneath each display, a PIC24FJ64GA004

MCU drives the LEDs. Power for each tile is supplied by two AAA batteries, which is fed through a boost regulator to get the 3.3V required. At the bottom of each tile, spring loaded connectors make contact with signal connections in the tray. The tile listens for these signals to download and synchronize animations.

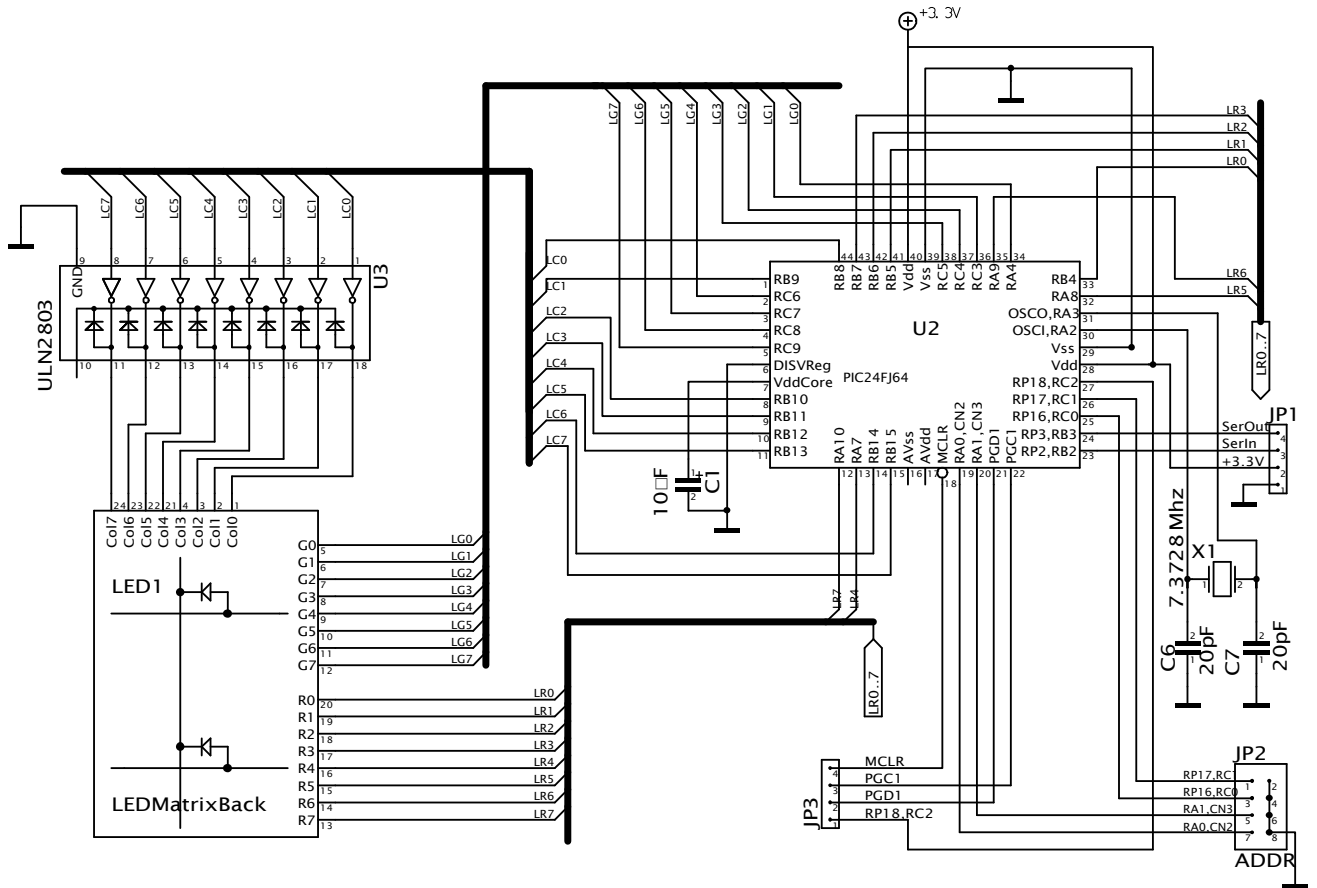
The tray is based on a PIC24FJ64GA002 MCU. This MCU listens for commands from the Ethernet using the ENC28J60 Ethernet controller. Animations downloaded from the net are stored locally on a 25LC256 EEPROM. Or, alternatively, they may be loaded from an SD card, which shares the same SPI interface as the EEPROM. The tray broadcasts animation data and commands to the tiles over a single serial line (UART). Each tile has a unique ID, and listens for its own animation data, ignoring data sent for other tiles. The tray also features some switches and status LEDs to locally control and synchronize the tiles.

Additional software running on a host computer performs higher level operations, such as taking an animated GIF image and breaking it down into individual animations for each tile.



Figure 2 - Prototype tile boards

Schematics



Puzzlemation - Tile

