Project 3 - 32x32 Image/GIF Viewer

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Device Behavior

This project consists of a 32x32 LED matrix, in which the user can interface with the given python script to upload either an image or a gif to be displayed on the LED matrix. The user can press the blue user button on the microcontroller board to power the matrix on or off. Once powered back on, the matrix will display the most recently uploaded image or gif.

The project utilizes an STM32L476RGT3 microcontroller board and a 32x32 LED Matrix Panel. To write data to the LEDs, the program uses Direct Memory Access (DMA) with SPI (Serial Peripheral Interface), as well as GPIO pins to toggle which rows of the matrix are currently displaying. The python script converts an input image into a 32x32 pixel format, then sends the RGB data of each pixel to the MCU via UART.

System Specifications

Table 1. System Specifications Table

32x32 Image/GIF Viewer	
Image/GIF resolution	32x32 pixels
STM32L476RG Board	
Operating voltage	-0.3–4.0 V (min. – max.)
Total current draw	150 mA (max.)
Power consumption	0.6 W
Power connection	USB to Mini-B cable
32x32 LED Panel	
LED count	1024
Operating Voltage	5 V
Current Draw	4 A (max.), all 1024 LEDs at full brightness
Power connection	2.1mm X 5.5mm Power Adapter

Users Manual

To use the 32x32 Image/GIF Viewer application, you will need a computer with a USB port. First, plug the MCU into your computer. Then, open your terminal and navigate to the directory of the associated python script 'send_image.py.' Locate the connected MCU device with the command **ls /dev/cu.***. This may require unplugging the device and re-typing the command to see which device disappears from the list. On my computer, the device appeared as **/dev/cu.usbmodemXXXX**.

Finally, in the directory of the python script, type **python3 send_image.py <image_path> /dev/cu.usbmodemXXXX** then press enter. The image or gif should display on the 32x32 led matrix!

If you want to power the device off and retain the last image/gif you displayed on the device, simply press the blue button on the MCU. Pressing the blue button again will turn the device back on, displaying your most recent image or gif.

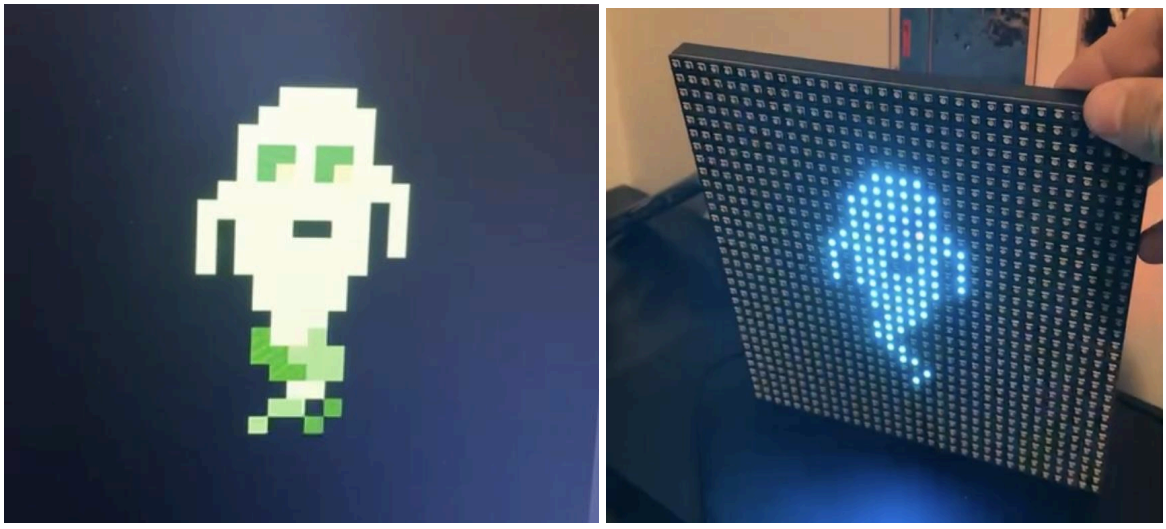

Figure 1. Original Image (left) and 32x32 Matrix Image (right)