Introduction

The clock uses six Waveshare 2-inch 240×320 LCD Display Modules each with their own ST7789 driver. They are about $15 each. The clock also uses a Raspberry Pi 4B single board computer which is about $60. Additionally, there is a solderless bread board, a 40-pin ribbon cable and various jumper wires all of which come to about $30. The RPi talks to the LCDs over an SPI interface – the wiring for this is provided later in this document.

Control of the clock is accomplished by running a python script (client.py) on a remote machine (PC, Phone). The clock on the Rpi runs within a server on the Rpi and the server will communicate with a remote machine running a client. Information on this client/server implementation can be found here:

<https://github.com/sgarrow/sockets/blob/main/docs/clientServer.pdf>

SPI Wiring

A simplified SPI wiring diagram is presented below.

A computer screen shot of a display board

AI-generated content may be incorrect.

Communication Queues

The clock runs on three separate cores. One core runs the server (Main Process), another runs the clock counter (Clock Process) and the third controls the displays (LCD Process). These three processes communicate with each other using four of Python’s awesome multiprocessing-communication-queues. Two queues are used for sending commands and the other two are used for receiving responses. A simplified communication diagram is presented below.

A diagram of a computer

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Running the client

Below is an example client session. After the client is started and a connection is accepted by the server (the clock) a prompt is presented. When ‘m’ is entered at the prompt a list of available commands is presented. When the gAs is entered a list of available font styles is presented.

A screenshot of a computer program

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