Introduction
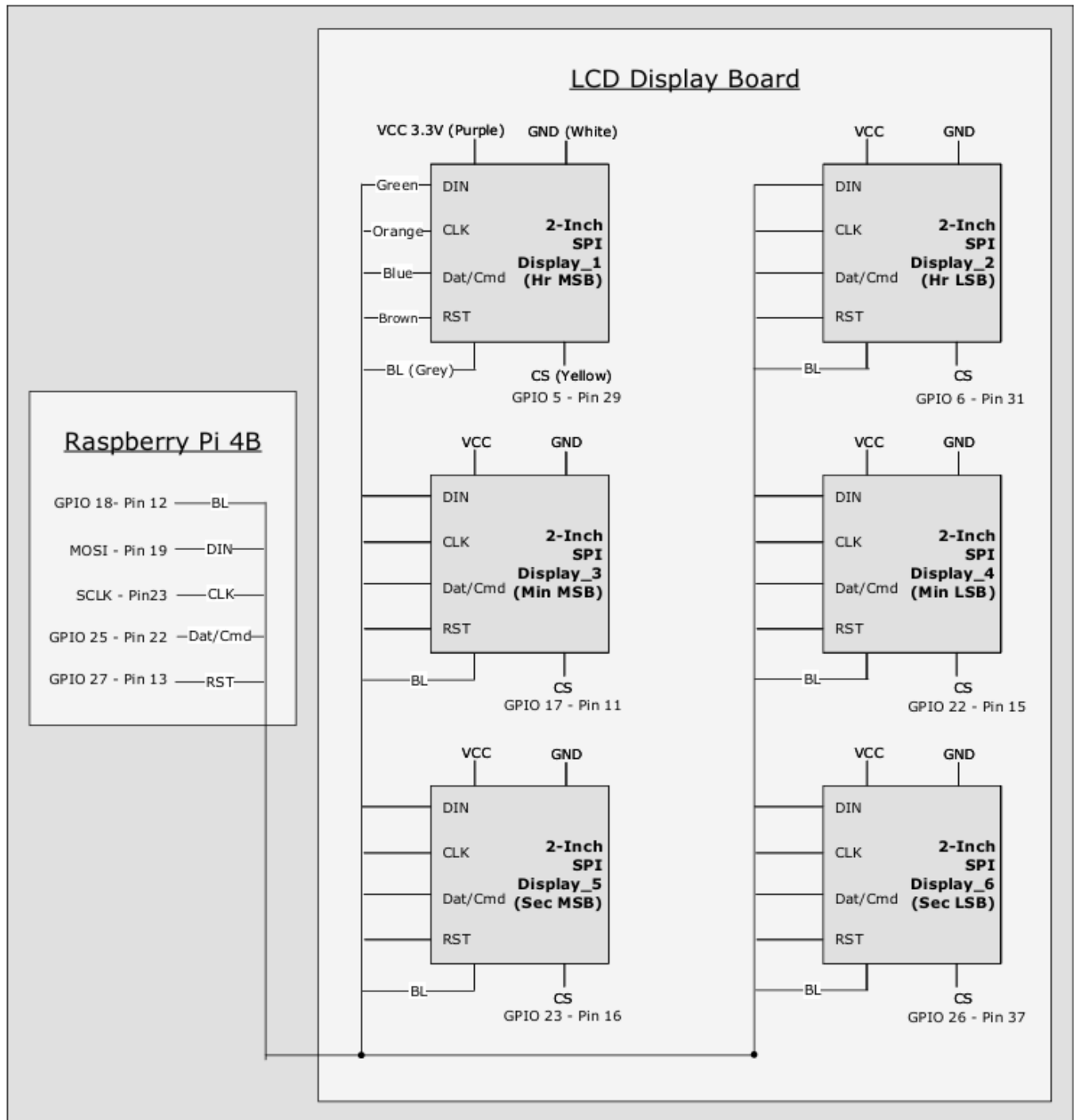
The clock uses six Waveshare 2-inch 240×320 LCD Display Modules each with their own ST7789 driver. They are about $15 each. The clock also uses a Raspberry Pi 4B single board computer which is about $60. Additionally, there is a solderless bread board, a 40-pin ribbon cable and various jumper wires all 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:

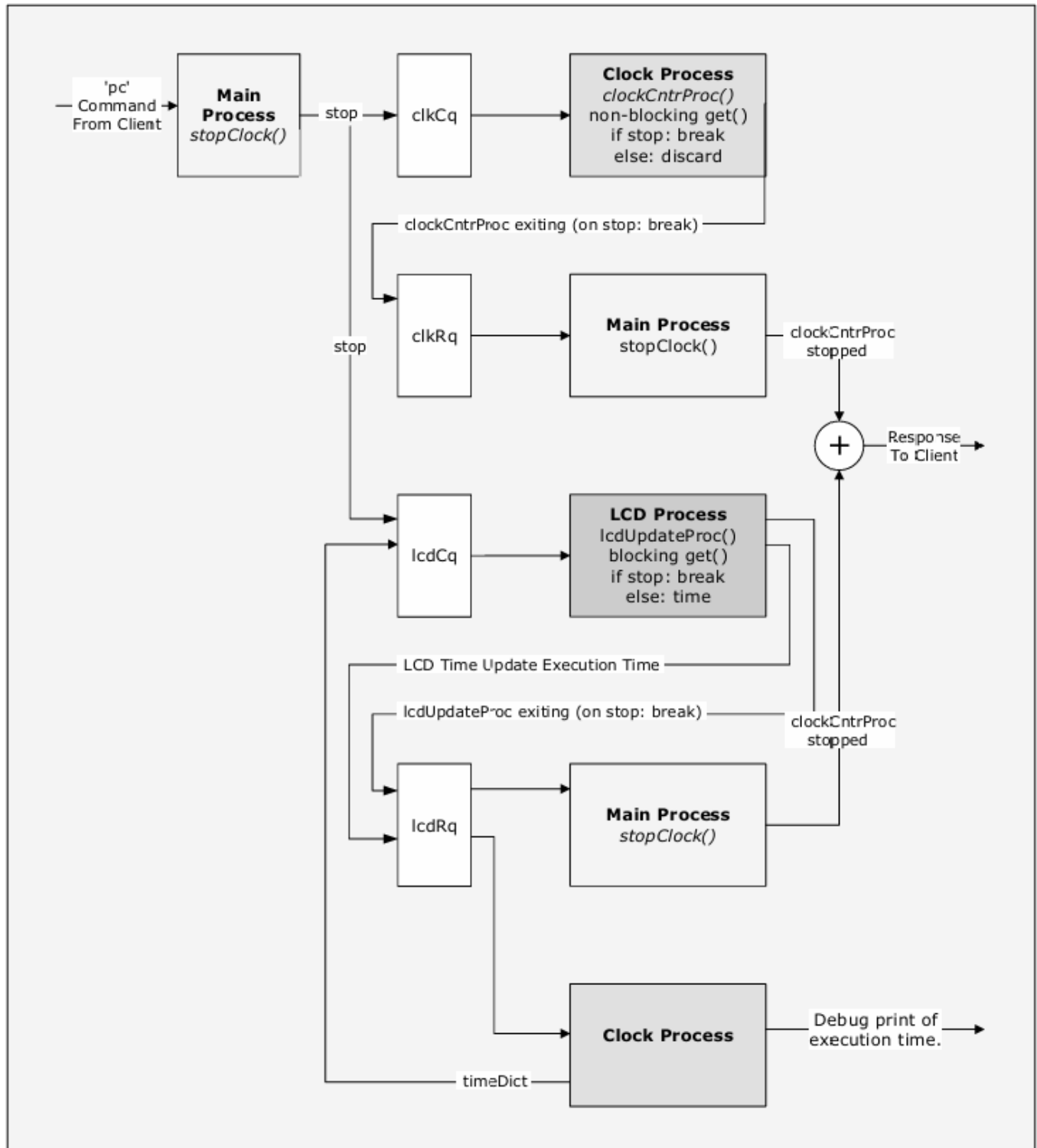https://github.com/sgarrow/sockets/blob/main/docs/clientServer.pdf

SPI Wiring

A simplified SPI wiring diagram is presented below.

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.

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.

```
PS C:\01-home\14-python\spiClock> python .\client.py
 sndBufSize 65536
 rcvBufSize 65536

 Accepted connection from: ('192.168.1.110', 54858)

 Choice (m=menu, q=quit) -> m

 CLOCK COMMANDS
 sc  - Start Clock
 pc  - stoP  Clock

 STYLE COMMANDS
 gas - Get    Active Style
 gds - Get    Day    Style
 gns - Get    Night  Style
 gAs - Get    ALL    Styles
 sas - Set    Active Style
 sds - Set    Day    Style
 sns - Set    Night  Style
 mus - Make   User   Style
 dp  - Disp   Pics
 us  - Update SW

 MISC  COMMANDS
 gvn - Get    Version Number
 tm  - Test   Menu


 Choice (m=menu, q=quit) -> gvn

 v1.2.8 - 13-May-2025

 Choice (m=menu, q=quit) ->
```