OLED & Other Displays: Waveshare 2.13 inch e-Paper HAT (c)

What is it?
A serial interface display module.

serial port in computing is a serial communication interface between two digital systems where information transfers in or out sequentially one bit at a time. Data are transmitted as a series of voltages that pulse through a wire, or as a single stream of bits. Transmits in a series as the bits are encoded based on their temporal location as opposed to…

parallel interface where multiple bits are transmitted simultaneously and data bits are encoded by their spatial location.

Challenges to serial communication:
There are only two logical levels – 0/LOW and 1/HIGH. If the channel of communication is idle, and suddenly 0s are sent through the channel, how does the computer know to detect them and begin communicating?

- How does the receiver know when to start looking for information?
- When should the receiver look at the channel for the bits?
- What is the bit order? (MSB or “most significant bit” first, or LSB “least significant bit” first?)
- How does the receiver know when the transmission is complete?

How to address these challenges:

- **synchronous serial interfaces** (SPI)

In this form of data sharing, the transmitter and the receiver must share a clock. The receiver does not have its own internal clock to regulate it, so it needs the shared clock to act as a control line that tells it when to start reading the incoming data. This means that the two parties must synchronize for data to successfully be transmitted. This type of information requires a minimum of 2 lines (wires) to be successful: a data line (for sending the data) and a clock line (for carrying the pulses needed to tell the receiver when to read/write the data).

- **asynchronous serial interfaces** (SCI)

Data are transmitted in defined *frames,* which is a set of complete and non divisible bits. Beginning with the start bit the receiver reads the data line in time with intervals determined by its clock. The two devices don’t have to wait for each other because the receiver knows to look for a start bit and begin reading data there on its own time. The transmitter can send data whenever it wants or needs.

*In general, the device with the clock = master and device without the clock = slave