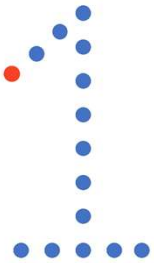
SEMTRON

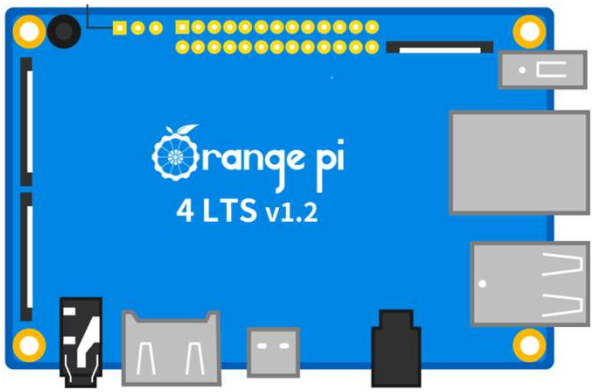
ONE

Robot Controller

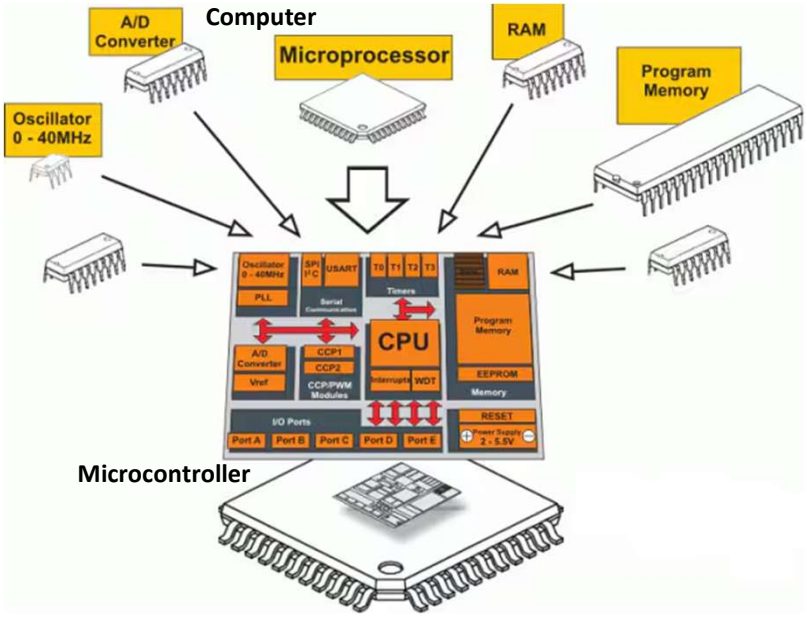


SEMTRON

Orange Pi 4
Single Board Computer (SBC)



https://drive.usercontent.google.com/download?id=1YaltDXzO7pPBJ0BSmT3iMr6phdwMxg4j
http://www.orangepi.cn/orangepiwiki/index.php/Orange_Pi_4_LTS



Computer and microcontroller

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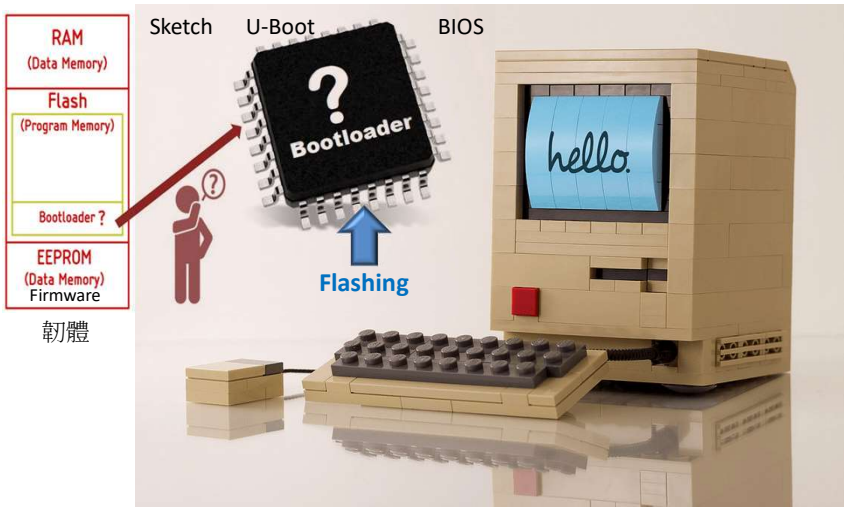
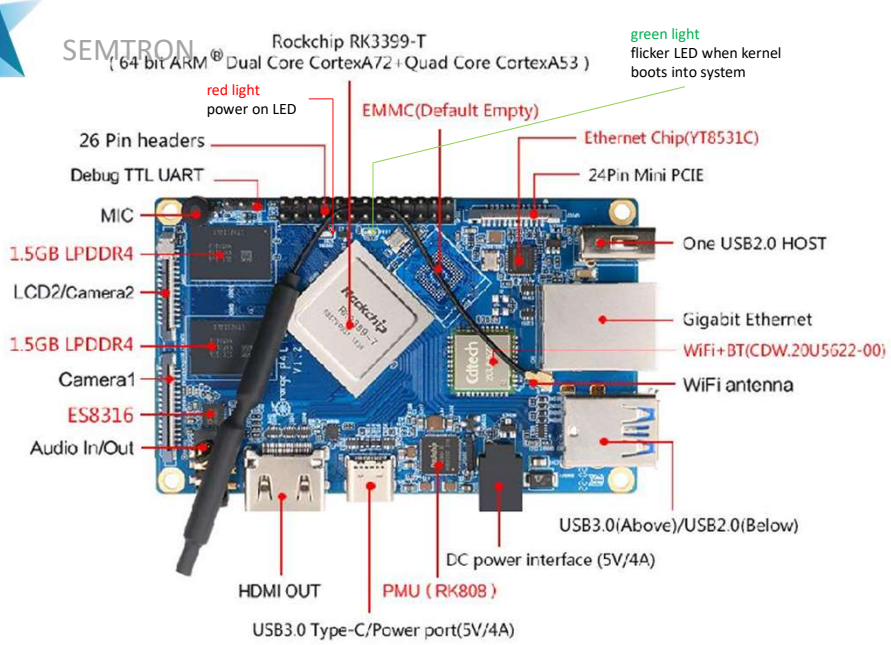
SEMTRON



Computer and microcontroller

4

SEMTRON



Orange Pi 4 LTS Model 4

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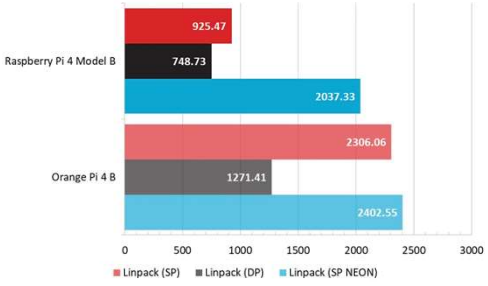
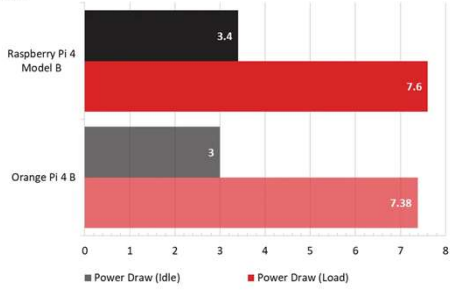
SEMTRON

Linpack CPU Benchmark
MIPS

tom's HARDWARE



Power Draw
Watts



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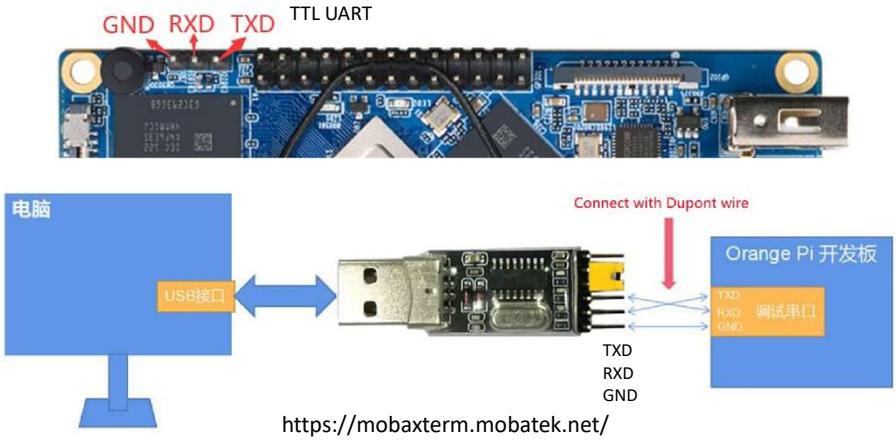
SEMTRON

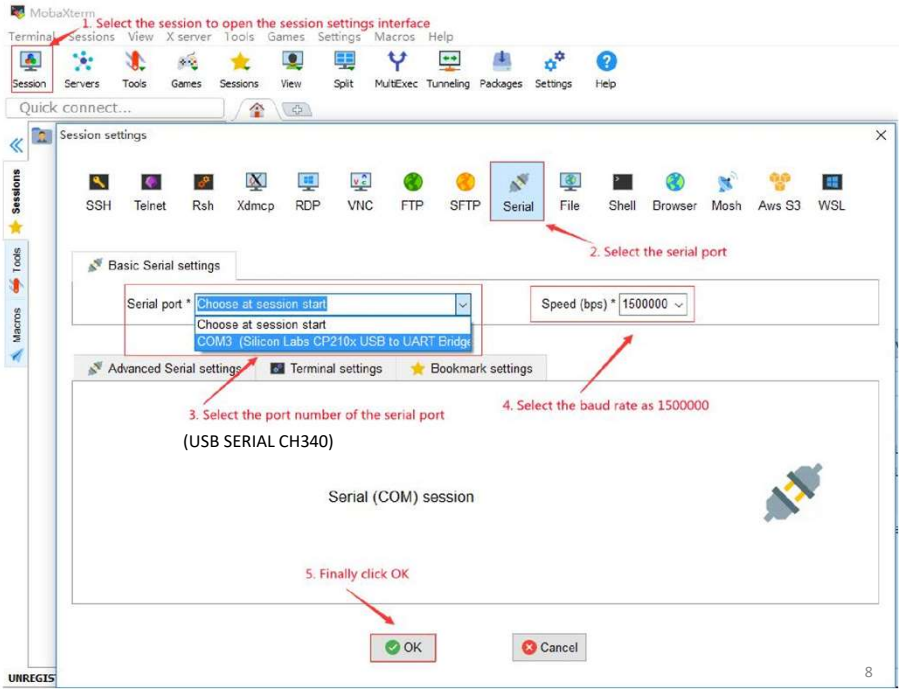


https://mobaxterm.mobatek.net/

Schematic diagram of connecting the USB to TTL module to the computer and the Orange Pi development board

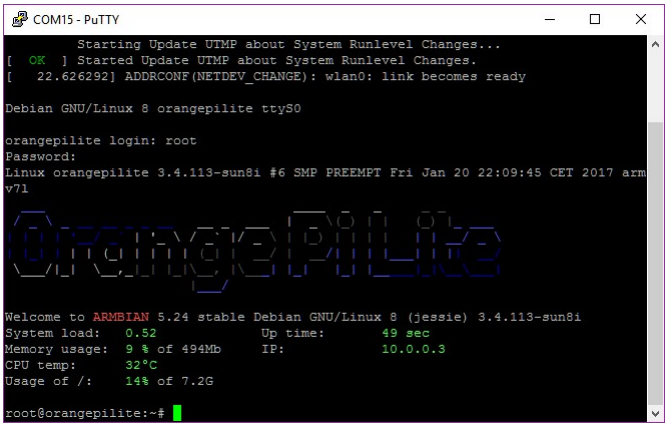
Connecting SBC via terminal access

7



SEMTRON

orangepi4-lts login: orangepi
Password: orangepi



Connecting SBC via terminal access

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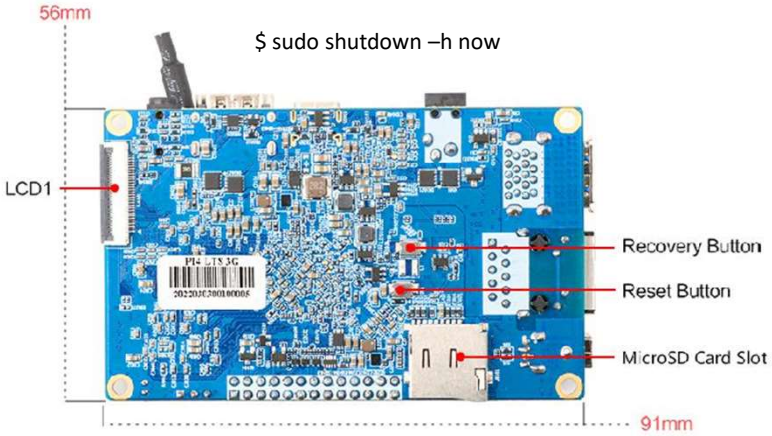
SEMTRON

$ nmcli dev wifi
$ nmcli dev wifi connect *wifi_name* password *wifi_passwd*
$ ip addr show wlan0
$ exit

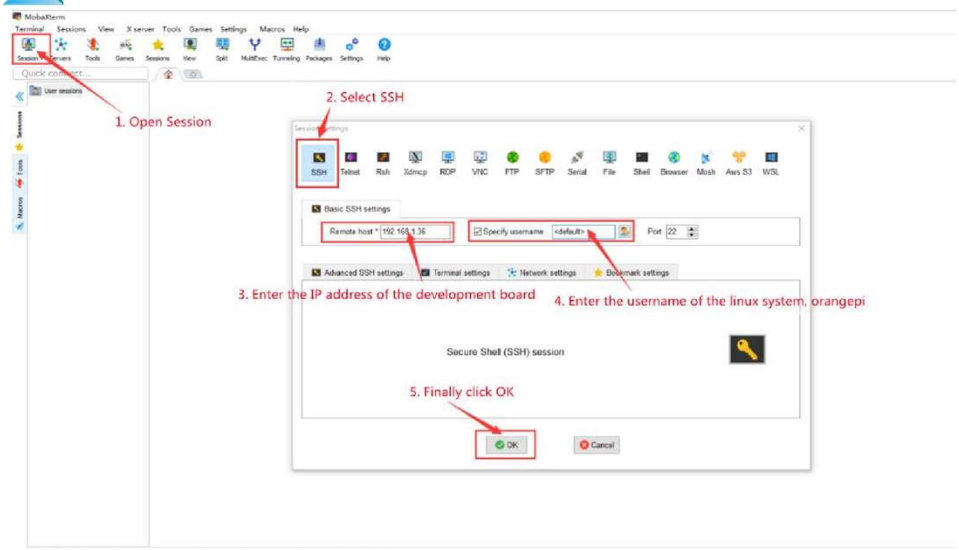
$ sudo shutdown –h now



Connecting SBC via WiFi

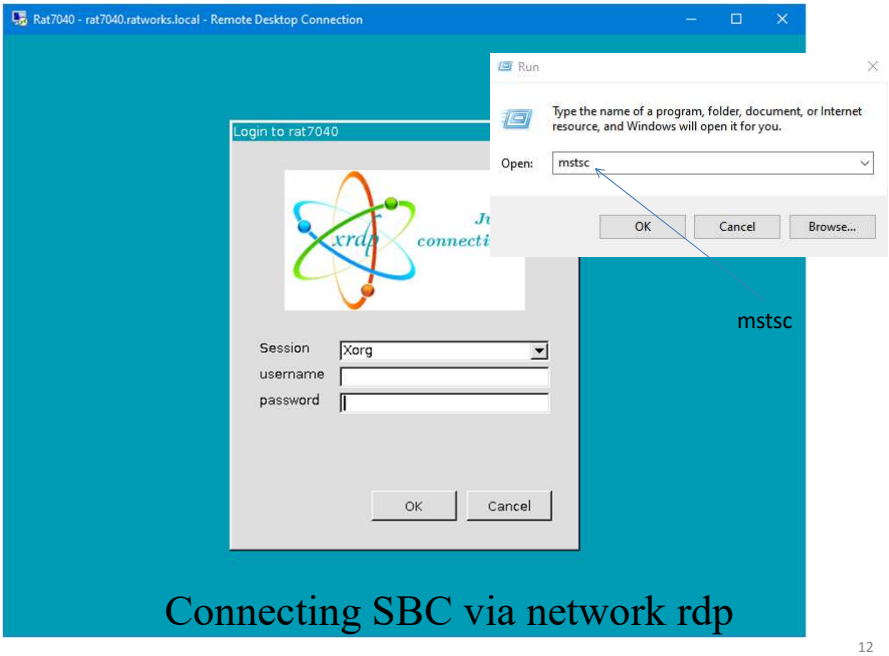
10

SEMTRON



Connecting SBC via network ssh

11



Connecting SBC via network rdp

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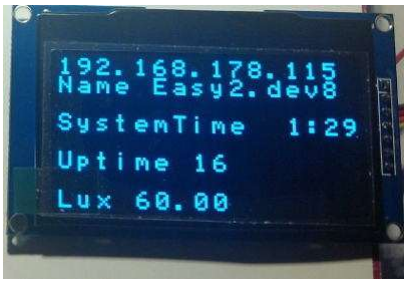
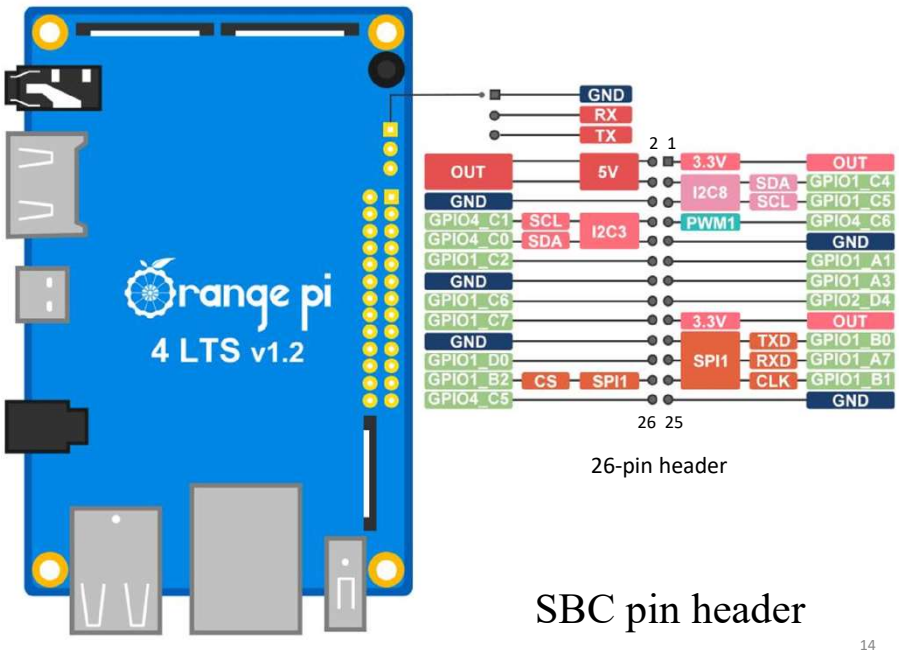
SEMTRON

SPI/IIC Robotic Displays



13



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SEMTRON

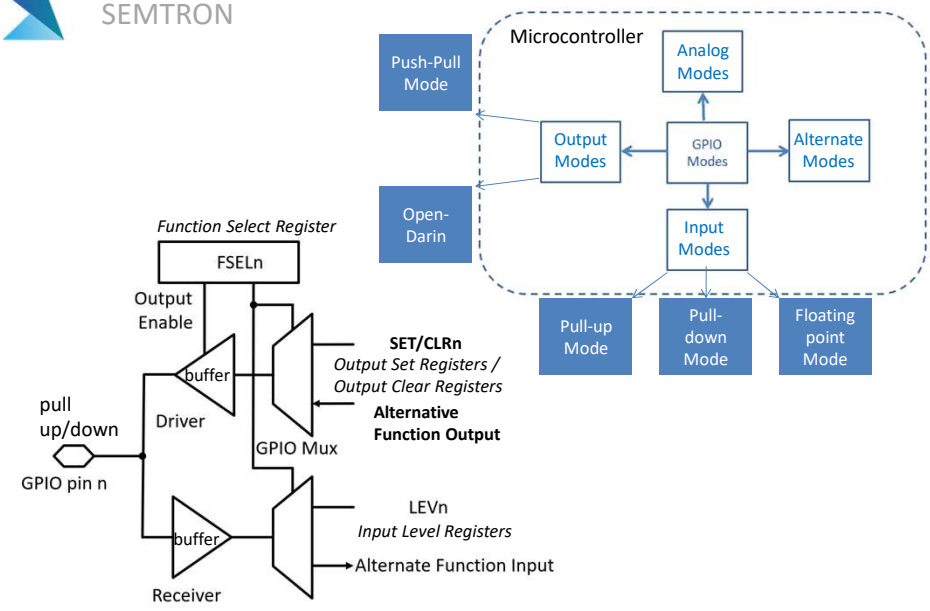
$ gpio readall

```
+------+-----+----------+--------+---+ OPi 4 LTS+---+--------+----------+-----+------+
| GPIO | wPi |   Name   |  Mode  | V | Physical | V |  Mode  | Name     | wPi | GPIO |
+------+-----+----------+--------+---+----++----+---+--------+----------+-----+------+
|      |     |     3.3V |        |   |  1 || 2  |   |        | 5V       |     |      |
|   64 |   0 | I2C8_SDA |   ALT2 | 1 |  3 || 4  |   |        | 5V       |     |      |
|   65 |   1 | I2C8_SCL |   ALT2 | 1 |  5 || 6  |   |        | GND      |     |      |
|  150 |   2 |     PWM1 |     IN | 0 |  7 || 8  | 1 | ALT2   | I2C3_SCL | 3   | 145  |
|      |     |      GND |        |   |  9 || 10 | 1 | ALT2   | I2C3_SDA | 4   | 144  |
|   33 |   5 | GPIO1_A1 |     IN | 0 | 11 || 12 | 1 | IN     | GPIO1_C2 | 6   | 50   |
|   35 |   7 | GPIO1_A3 |    OUT | 1 | 13 || 14 |   |        | GND      |     |      |
|   92 |   8 | GPIO2_D4 |     IN | 0 | 15 || 16 | 0 | IN     | GPIO1_C6 | 9   | 54   |
|      |     |     3.3V |        |   | 17 || 18 | 0 | IN     | GPIO1_C7 | 10  | 55   |
|   40 |  11 | SPI1_TXD |   ALT3 | 0 | 19 || 20 |   |        | GND      |     |      |
|   39 |  12 | SPI1_RXD |   ALT3 | 1 | 21 || 22 | 0 | IN     | GPIO1_D0 | 13  | 56   |
|   41 |  14 | SPI1_CLK |   ALT3 | 1 | 23 || 24 | 1 | ALT3   | SPI1_CS  | 15  | 42   |
|      |     |      GND |        |   | 25 || 26 | 0 | IN     | GPIO4_C5 | 16  | 149  |
+------+-----+----------+--------+---+----++----+---+--------+----------+-----+------+
| GPIO | wPi |   Name   |  Mode  | V | Physical | V |  Mode  | Name     | wPi | GPIO |
+------+-----+----------+--------+---+ OPi 4 LTS+---+--------+----------+-----+------+
```

Pin header GPIO

15

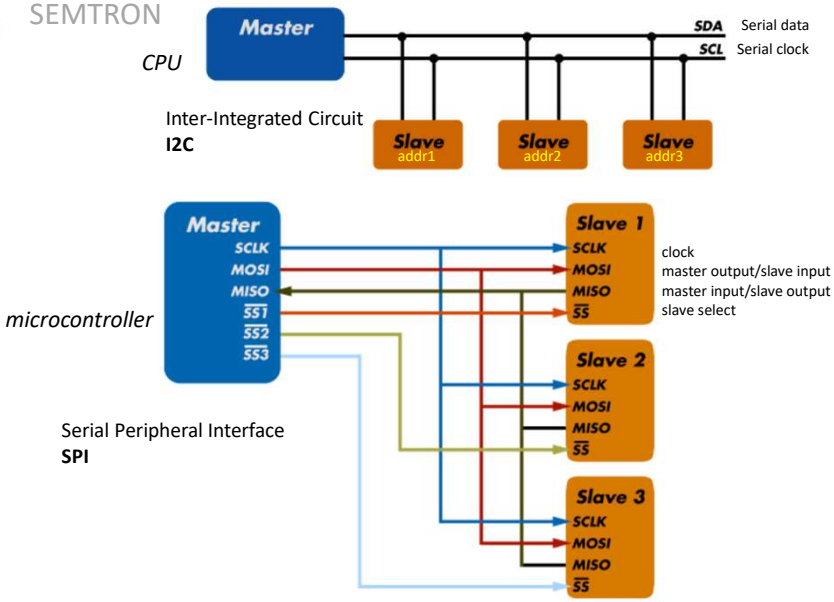
SEMTRON



Pin header GPIO

16

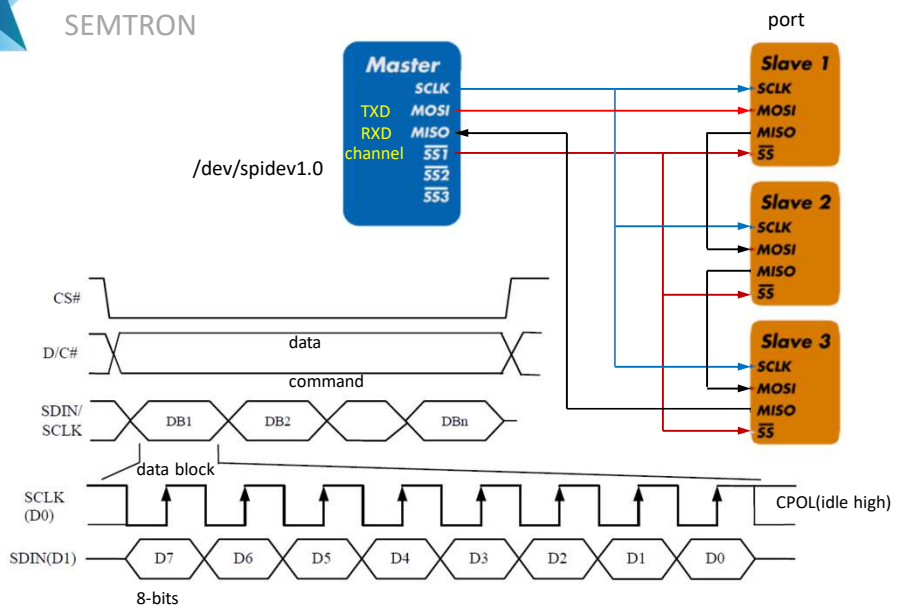
SEMTRON



GPIO emulate IIC and SPI

17

SEMTRON



SPI daisy chain

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SEMTRON

M242-12864	wPi	OPI 4 LTS (BOARD)
GND		PIN20 GND
VCC		PIN17 3.3V
SCK	14	PIN23 SPI1_CLK
SDA (MOSI)	12	PIN19 SPI1_TXD
RES	9	PIN16 GPIO1_C6
DC (Data/Command)	7	PIN13 GPIO1_A3
CS	15	PIN24 SPI1_CS

Connecting SBC to SPI OLED display

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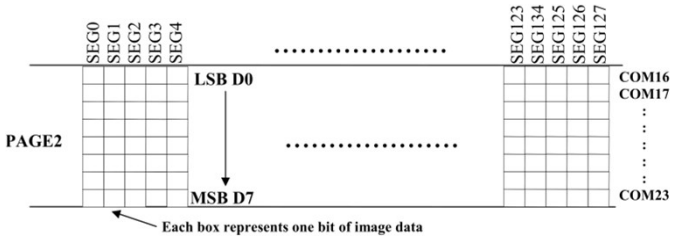
		Row re-mapping
PAGE0 (COM0-COM7)	Page 0	PAGE0 (COM 63-COM56)
PAGE1 (COM8-COM15)	Page 1	PAGE1 (COM 55-COM48)
PAGE2 (COM16-COM23)	Page 2	PAGE2 (COM47-COM40)
PAGE3 (COM24-COM31)	Page 3	PAGE3 (COM39-COM32)
PAGE4 (COM32-COM39)	Page 4	PAGE4 (COM31-COM24)
PAGE5 (COM40-COM47)	Page 5	PAGE5 (COM23-COM16)
PAGE6 (COM48–COM55)	Page 6	PAGE6 (COM15-COM8)
PAGE7 (COM56-COM63)	Page 7	PAGE7 (COM 7-COM0)
	SEG0 ----------SEG127	
Column re-mapping	SEG127 ----------SEG0	



Graphic Display Data RAM (GDDRAM)

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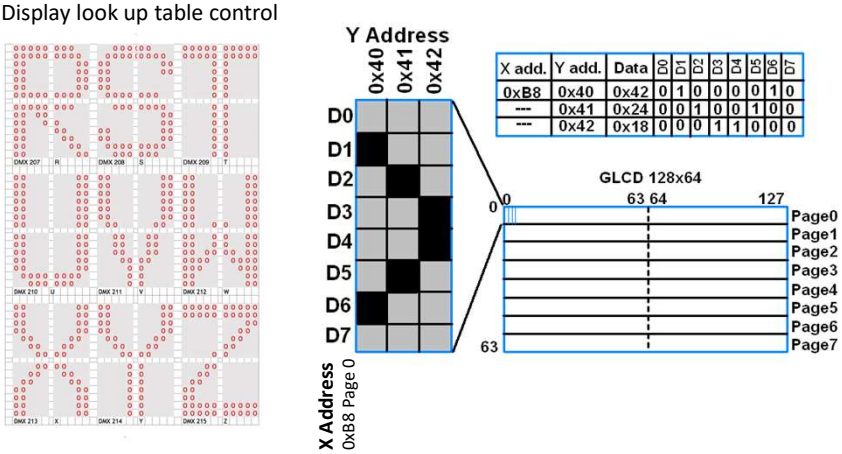
SEMTRON

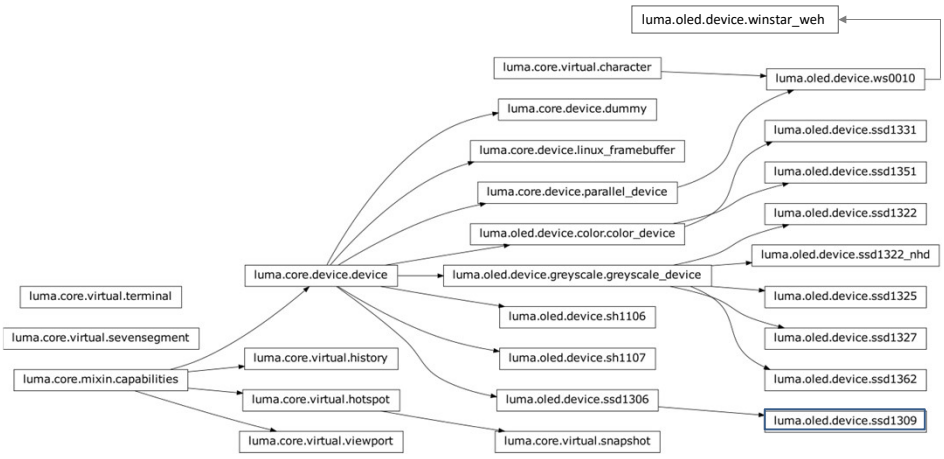
Dot Matrix panel Alphanumeric
Display look up table control



X add.	Y add.	Data	D0	D1	D2	D3	D4	D5	D6	D7
0xB8	0x40	0x42	0	1	0	0	0	0	1	0
---	0x41	0x24	0	0	1	0	0	1	0	0
---	0x42	0x18	0	0	0	1	1	0	0	0

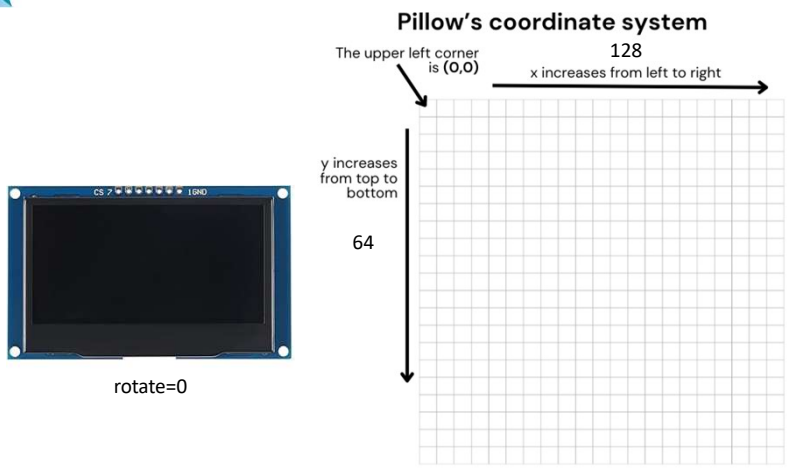
Display alphanumeric data on OLED

SEMTRON



luma.oled device driver

SEMTRON



`luma.oled.device.ssd1306`(*serial_interface=None, width=128, height=64, rotate=0, **kwargs*)

luma.oled device driver

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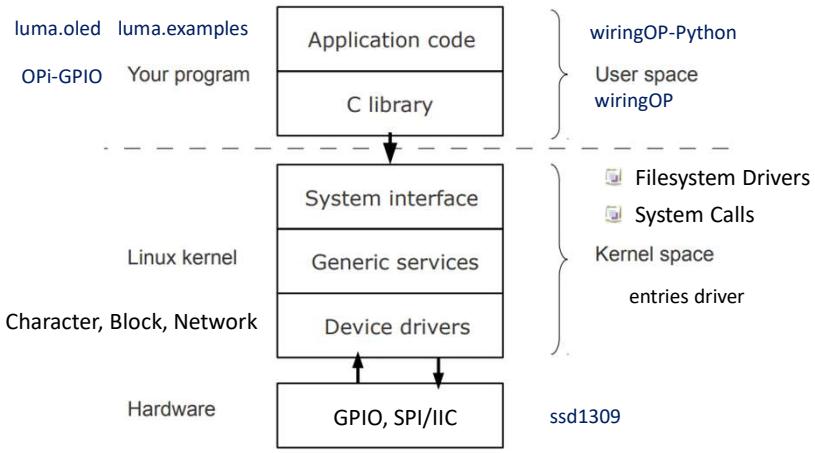
SEMTRON

Kernel vs user space



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SEMTRON

```
$ sudo mv 90-gpio-spi.rules 99-gpio.rules /etc/udev/rules.d/
$ sudo groupadd -f --system spi gpio
$ sudo usermod -a -G spi orangepi
$ sudo groupadd -f --system gpio
$ sudo usermod -aG gpio orangepi
$ sudo shutdown -r now

$ cd Downloads
$ ln -s wiringOP-Python/wiringOP wiringOP
$ cd wiringOP
$ ./build clean && ./build

$ pip install pytest OPi.GPIO-ex
$ pip install pillow==9.2.0
```

```
$ cd ~/notebooks
$ git clone https://github.com/rm-hull/luma.examples.git
$ mv luma.examples luma && cd luma
$ sudo -H pip install -e .
$ pip install psutil==5.9.7

$ scp orangepi@: pin_mappings.py /home/orangepi/.local/lib/python3.8/site-packages/OPi
```

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SEMTRON

```
$ python3 examples/demo.py --help usage: demo.py [-h] [--config CONFIG] [--display DISPLAY]
                        [--width WIDTH] [--height HEIGHT] [--rotate ROTATION]
                        [--interface INTERFACE] [--i2c-port I2C_PORT] [--i2c-address I2C_ADDRESS]
                        [--spi-port SPI_PORT] [--spi-device SPI_DEVICE]
                        [--spi-bus-speed SPI_BUS_SPEED]
                        [--spi-transfer-size SPI_TRANSFER_SIZE]
                        [--spi-cs-high SPI_CS_HIGH] [--ftdi-device FTDI_DEVICE]
                        [--framebuffer-device FRAMEBUFFER_DEVICE]
                        [--gpio GPIO] [--gpio-mode GPIO_MODE]
                        [--gpio-data-command GPIO_DATA_COMMAND]
                        [--gpio-chip-select GPIO_CHIP_SELECT]
                        [--gpio-reset GPIO_RESET] [--gpio-backlight GPIO_BACKLIGHT]
                        [--gpio-reset-hold-time GPIO_RESET_HOLD_TIME]
                        [--gpio-reset-release-time GPIO_RESET_RELEASE_TIME]
                        [--block-orientation ORIENTATION] [--mode MODE]
                        [--framebuffer FRAMEBUFFER] [--num-segments NUM_SEGMENTS]
                        [--bgr] [--inverse] [--h-offset H_OFFSET]
                        [--v-offset V_OFFSET] [--backlight-active VALUE] [--debug]
                        [--transform TRANSFORM] [--scale SCALE] [--duration DURATION]
                        [--loop LOOP] [--max-frames MAX_FRAMES]
```

```
$ python examples/sys_info.py -d ssd1309 -i spi --spi-port 1 --spi-device 0 --gpio OPi.GPIO --gpio-mode OPi.GPIO.BOARD --gpio-data-command 13 --gpio-reset 11
```

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