

Slow control for measurements

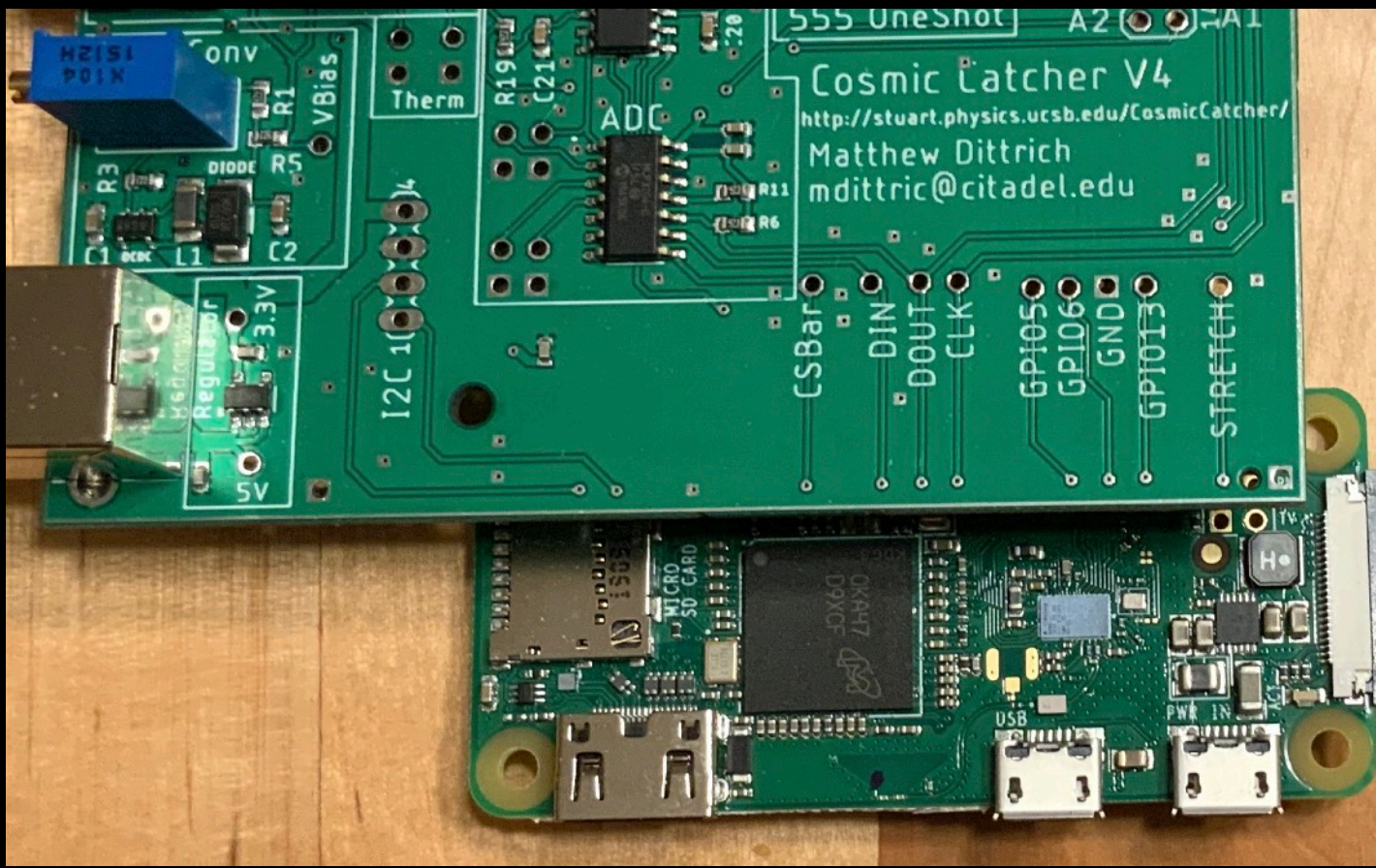
Phys150 Special topics

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```
curl -s http://dstuart.physics.ucsb.edu/Lgbk/pub/E40915.dir/CosmicSoftwareUpdate > /home/pi/150/bin/CosmicSoftwareUpdate  
chmod +x /home/pi/150/bin/CosmicSoftwareUpdate  
/home/pi/150/bin/CosmicSoftwareUpdate
```

Adding sensors to the readout board with I2C

Pi Model B/B+		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Pi Model B+
3V3 Power	GPIO2 SDA1 I2C	GPIO3 SCL1 I2C	GPIO4	Ground	GPIO17	GPIO27	GPIO22	3V3 Power	GPIO10 SPI0_MOSI	GPIO9 SPI0_MISO	GPIO11 SPI0_SCLK	Ground	ID_SD I2C ID EEPROM	GPIO5	GPIO6	GPIO13	GPIO19	GPIO26	Ground	GPIO14 UART0_TXD	GPIO15 UART0_RXD	GPIO18 PCM_CLK	Ground	GPIO23	GPIO24	Ground	GPIO25	GPIO8 SPI0_CE0_N	GPIO7 SPI0_CE1_N	ID_SC I2C ID EEPROM	Ground	GPIO12	Ground	GPIO16	GPIO20	GPIO21						



GPIO2 & 3 are reserved for I2C communication

Measuring altitude, angle, temperature, pulse height, ...

You can buy components to measure these for a few dollars:

Altimeter (pressure sensor)

<https://www.newark.com/nxp/mp13115a2/pressure-sensor-110kpa-40-to-85deg/dp/48T4344>

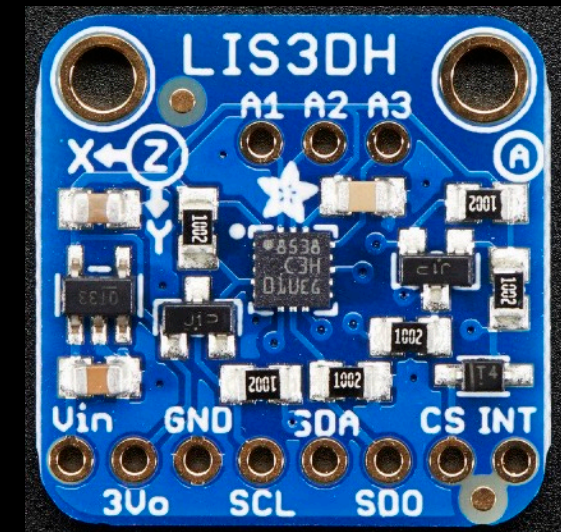
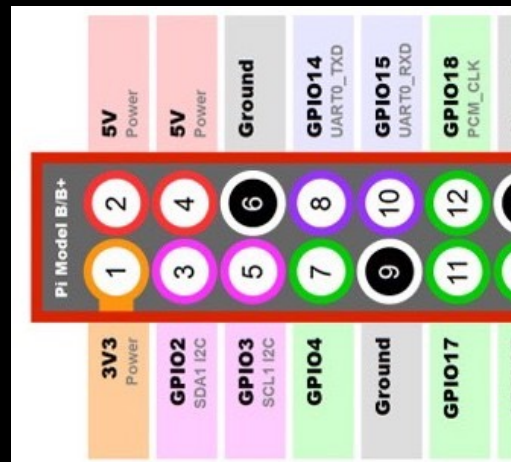
3-axis accelerometer

<https://www.newark.com/nxp/mma8452qr1/accelerometer-mems-3-axis-digital/dp/28X3704>

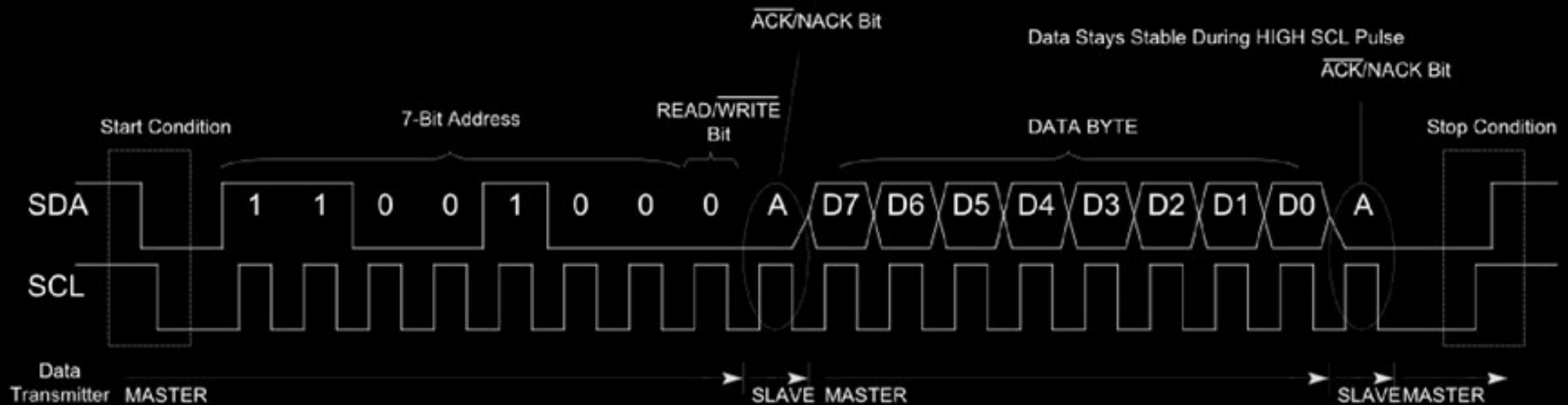
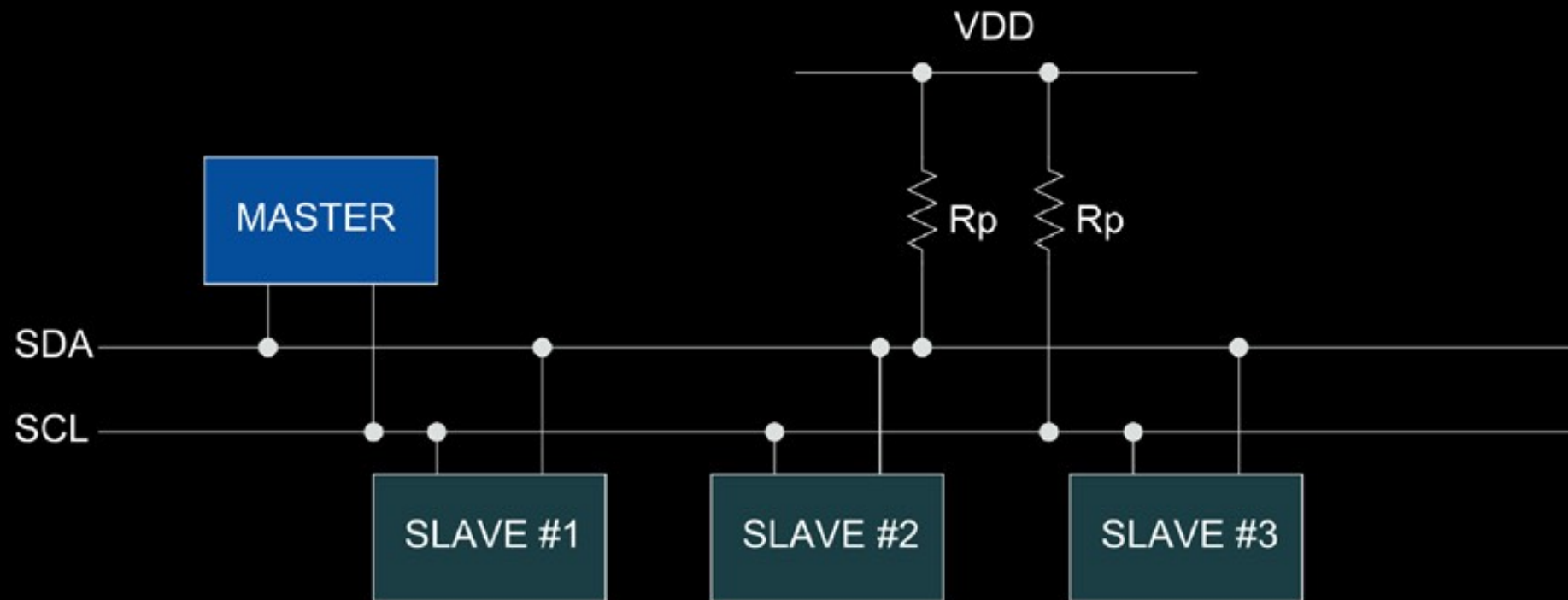
1 MSPS SAR ADC

<https://www.newark.com/texas-instruments/ads7886sdbvt/ic-adc-12bit-1mmps-sar-sot23-6/dp/28AH1865>

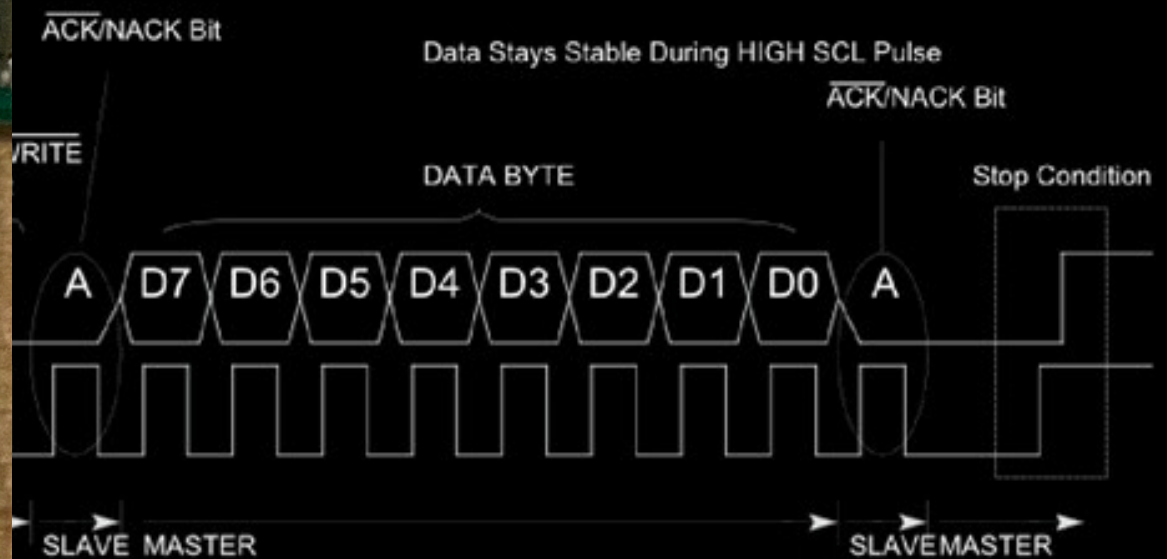
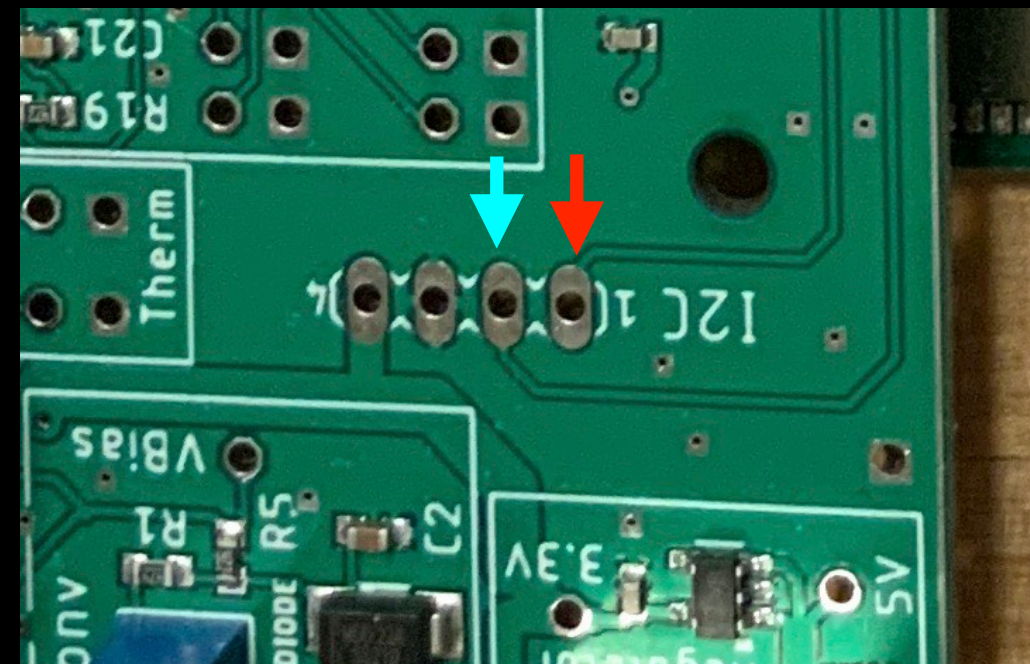
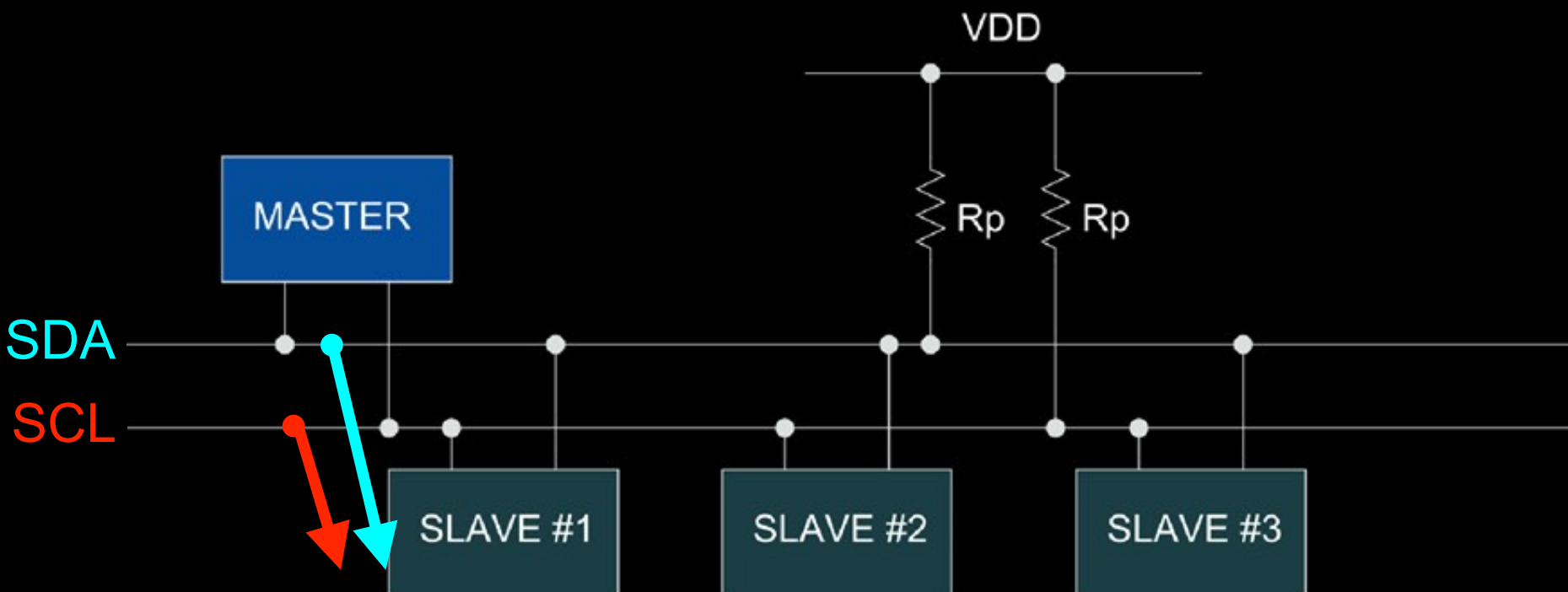
These all use the standard I2C communication protocol allowing the Pi to read them with just two wires plus power and ground.



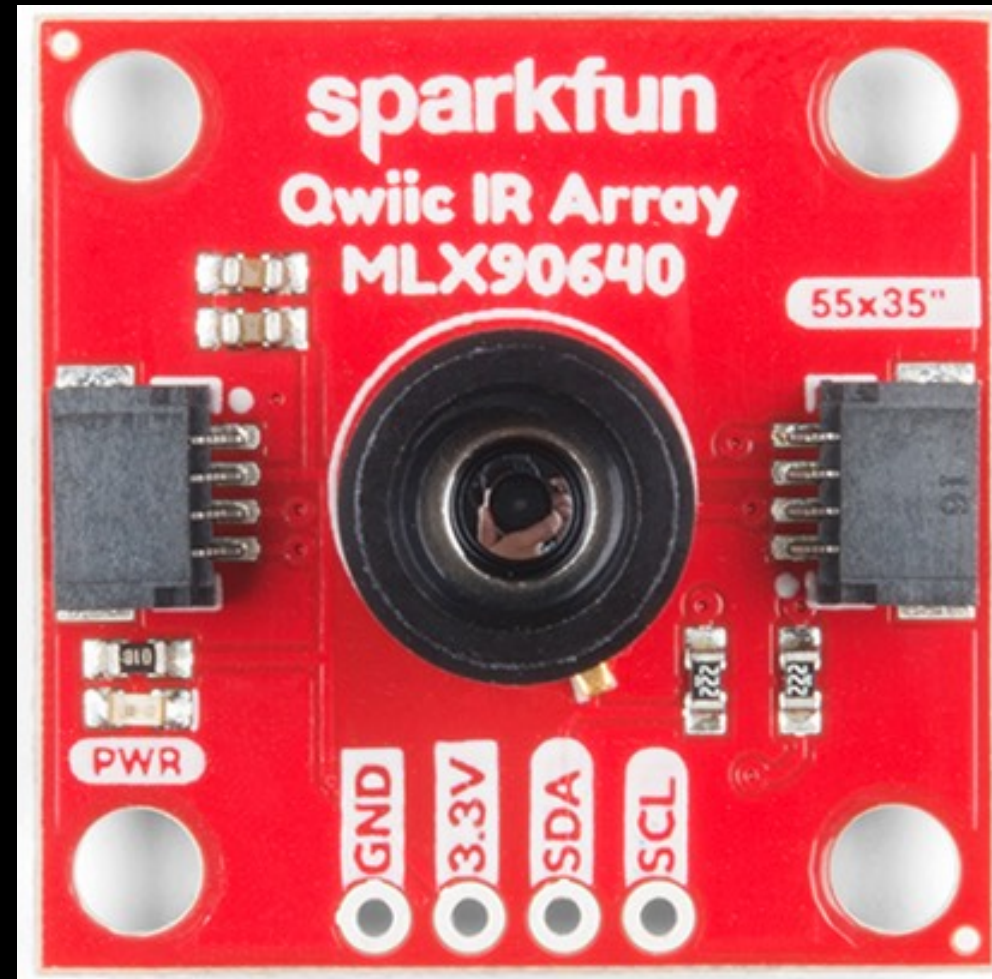
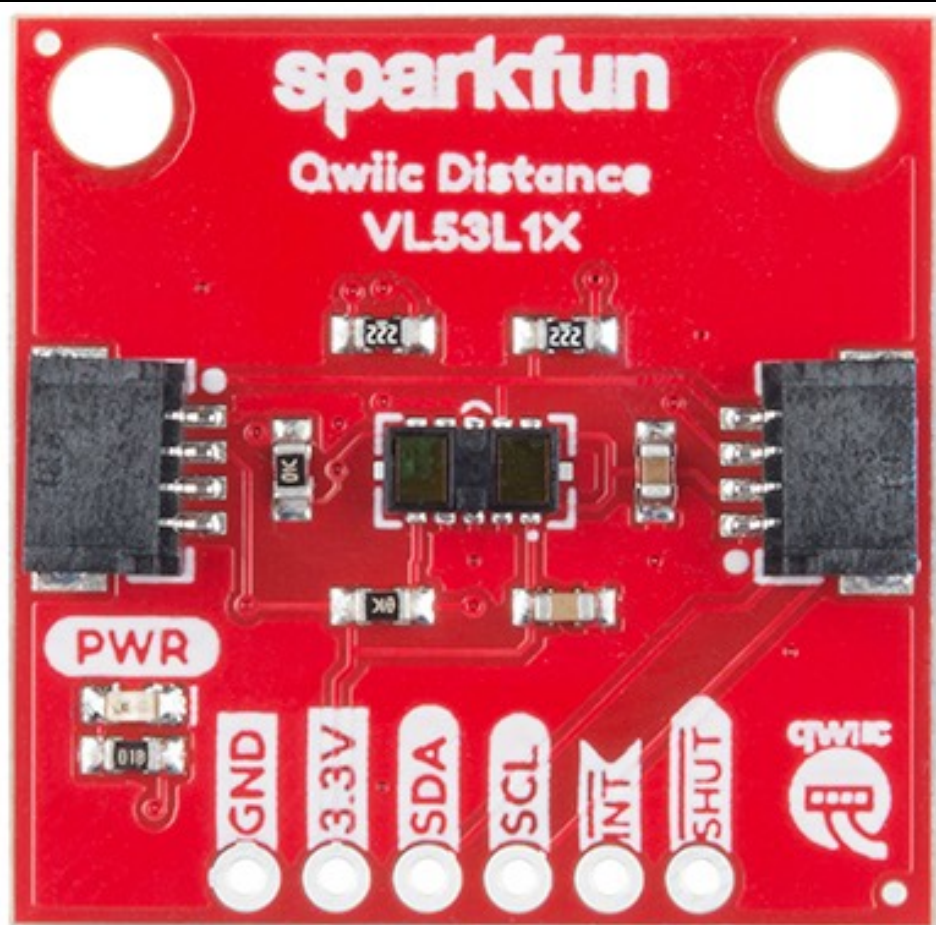
I2C = IIC = I²C = Inter Integrated Circuit



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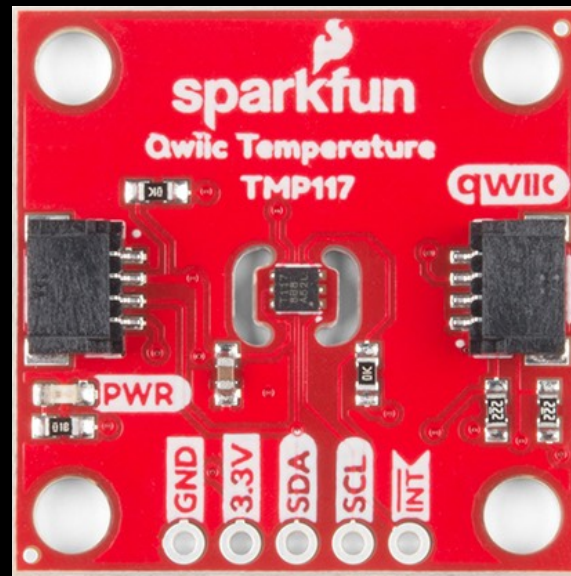
32x24 pixel IR camera

IR reflector to measure distance to objects

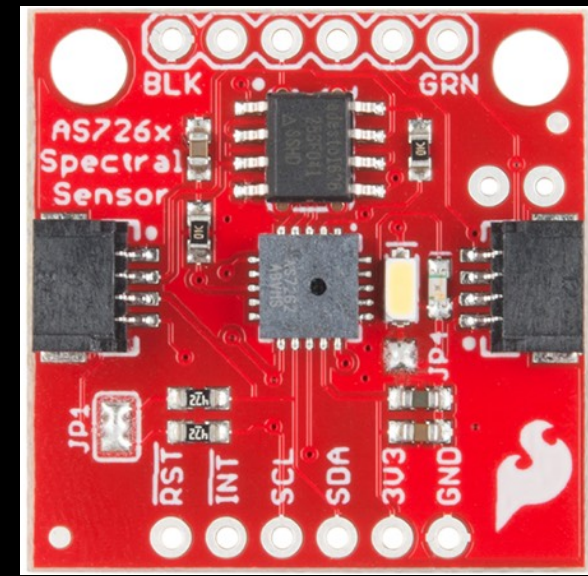
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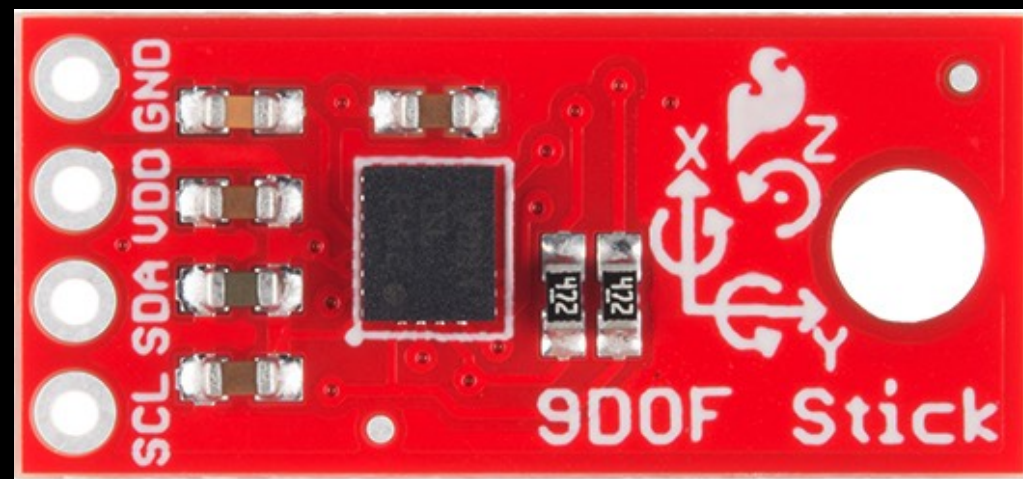
Small LCD screen



Temperature sensor



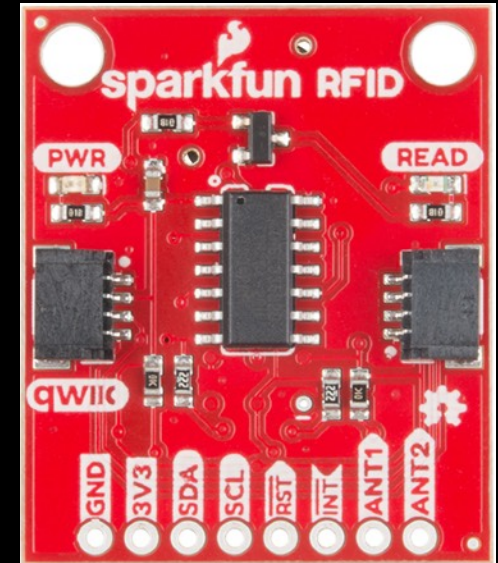
NIR spectrometer
Also a visible version



Accelerometer, gyroscope, magnetometer



CO₂ sensor

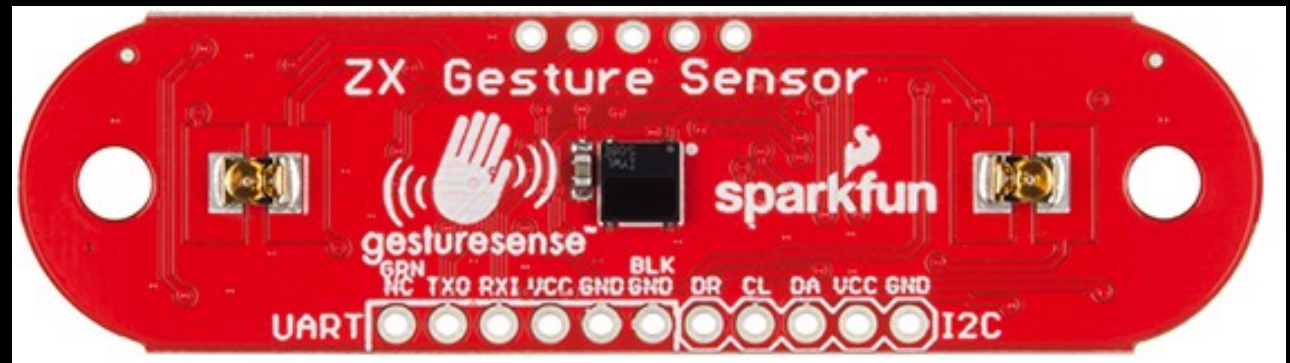


RFID reader

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Capacitive touch slider



Gesture sensor with IR distance sensing



Key pad

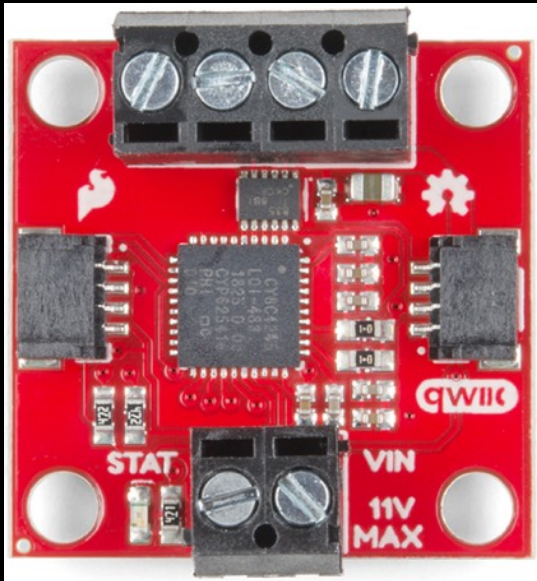


Thumb controller

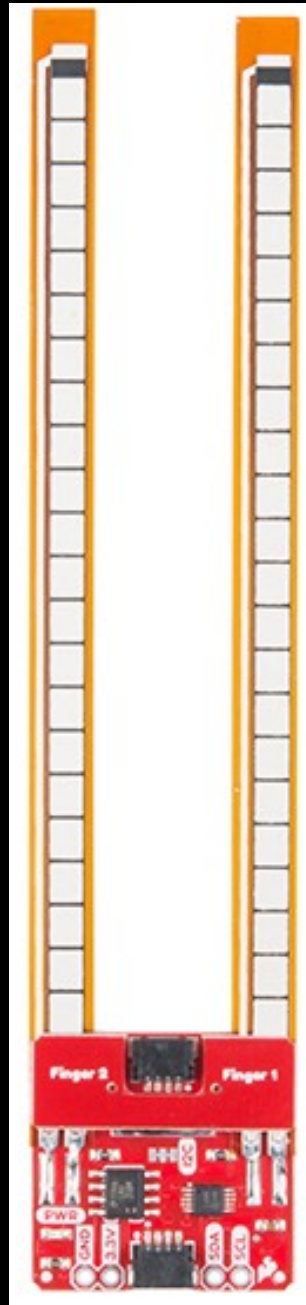


LIDAR

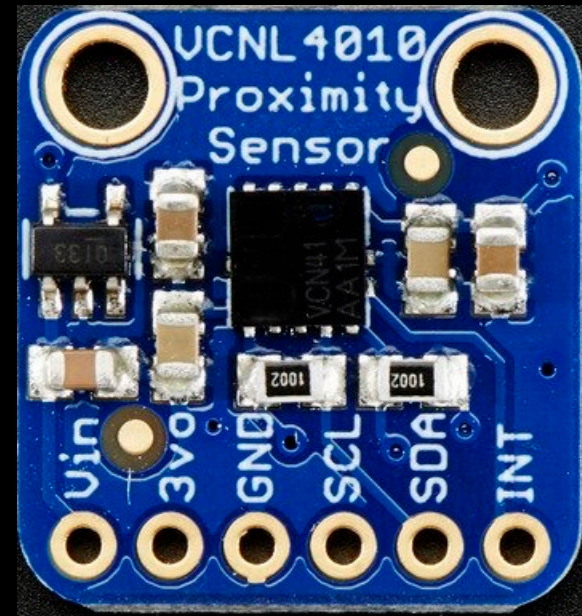
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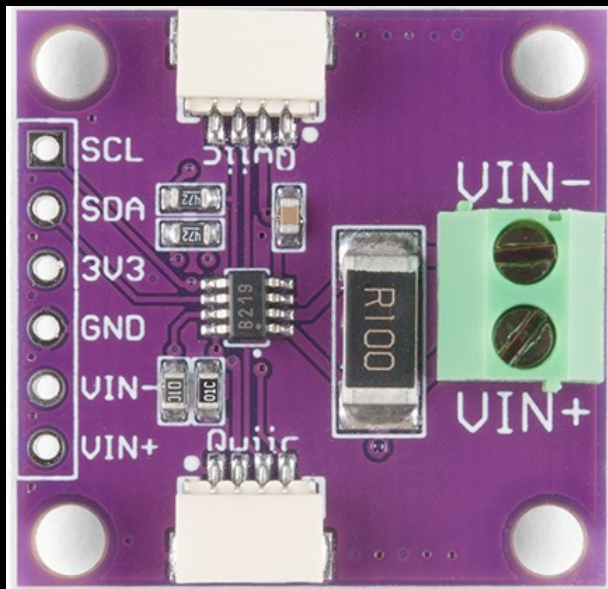
Motor controller



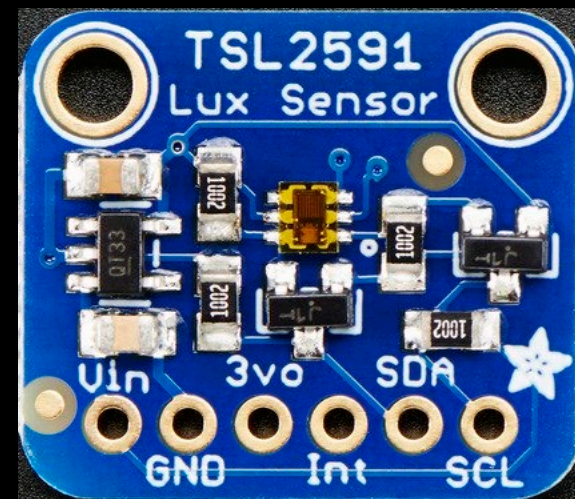
Flex sensor



Light-based
proximity sensor

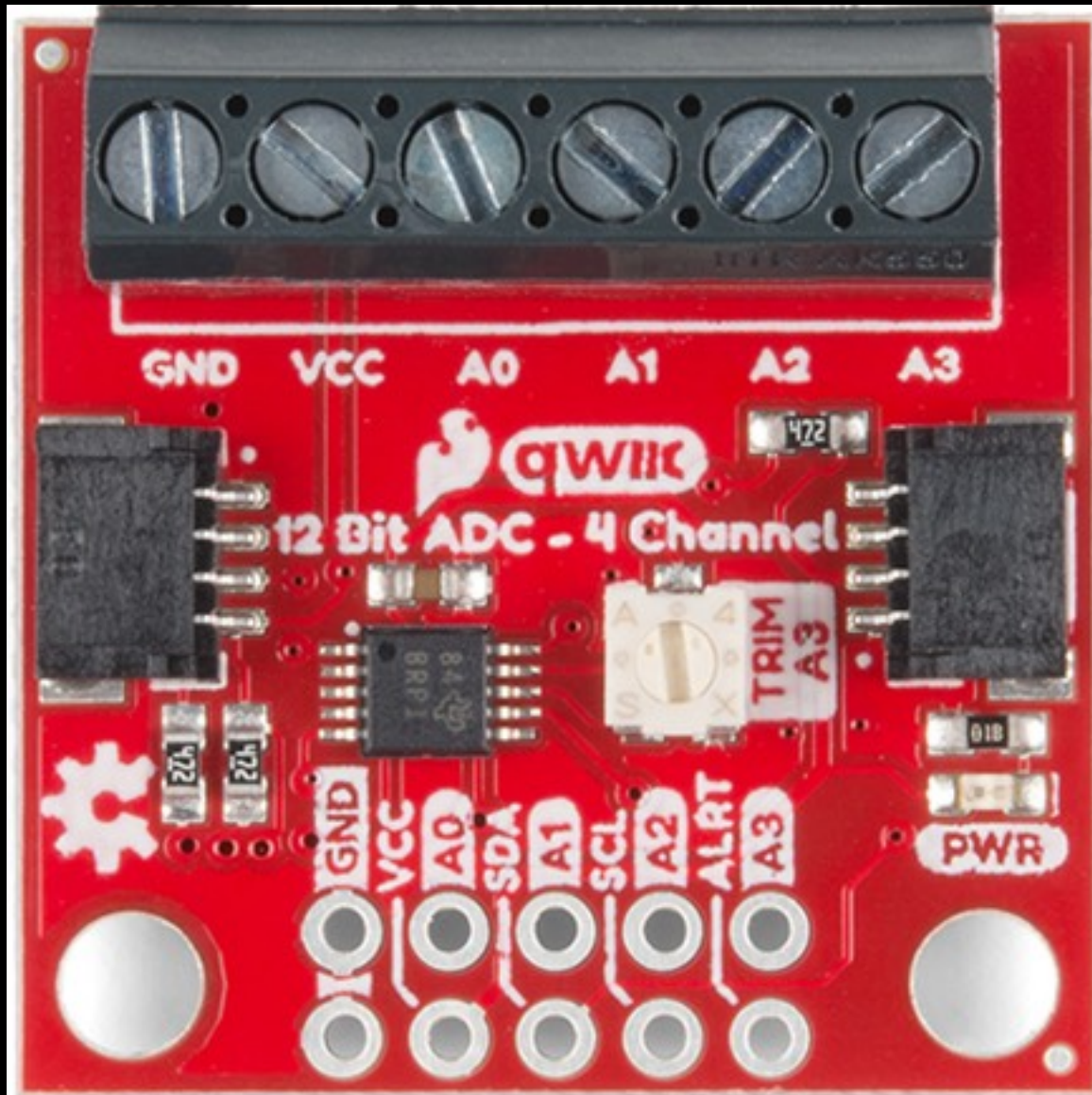


Voltage & current monitor



Light sensor

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Analog to Digital Converter to monitor output of any analog sensor.