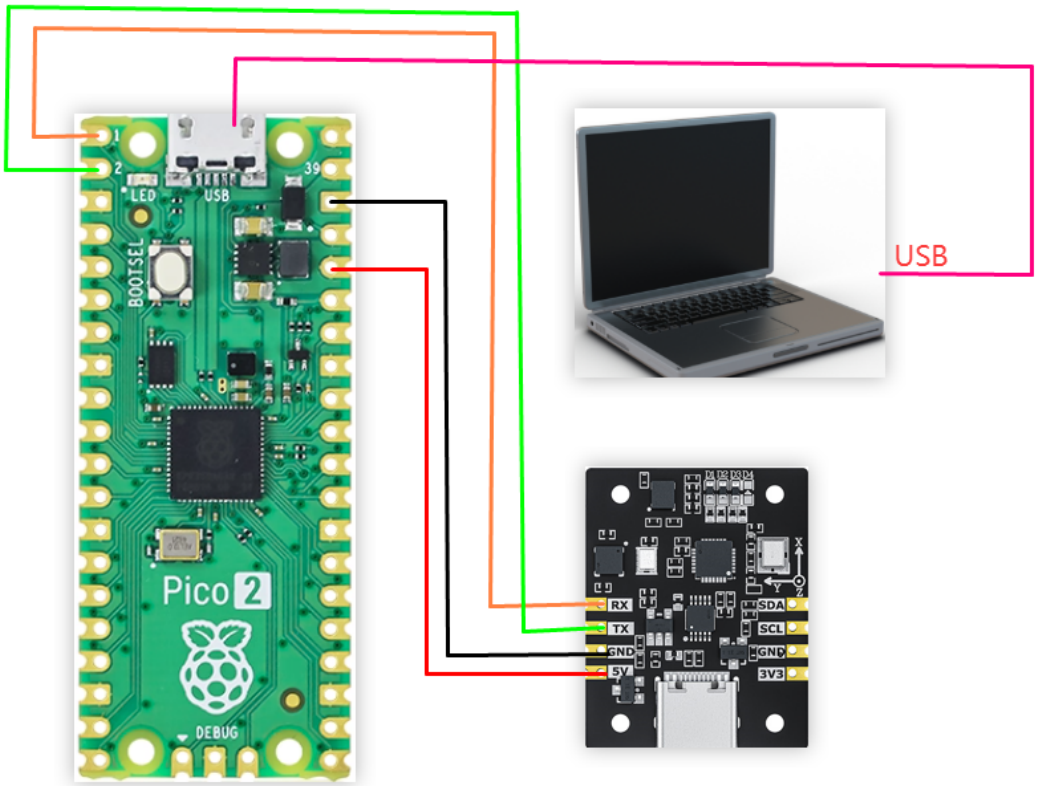
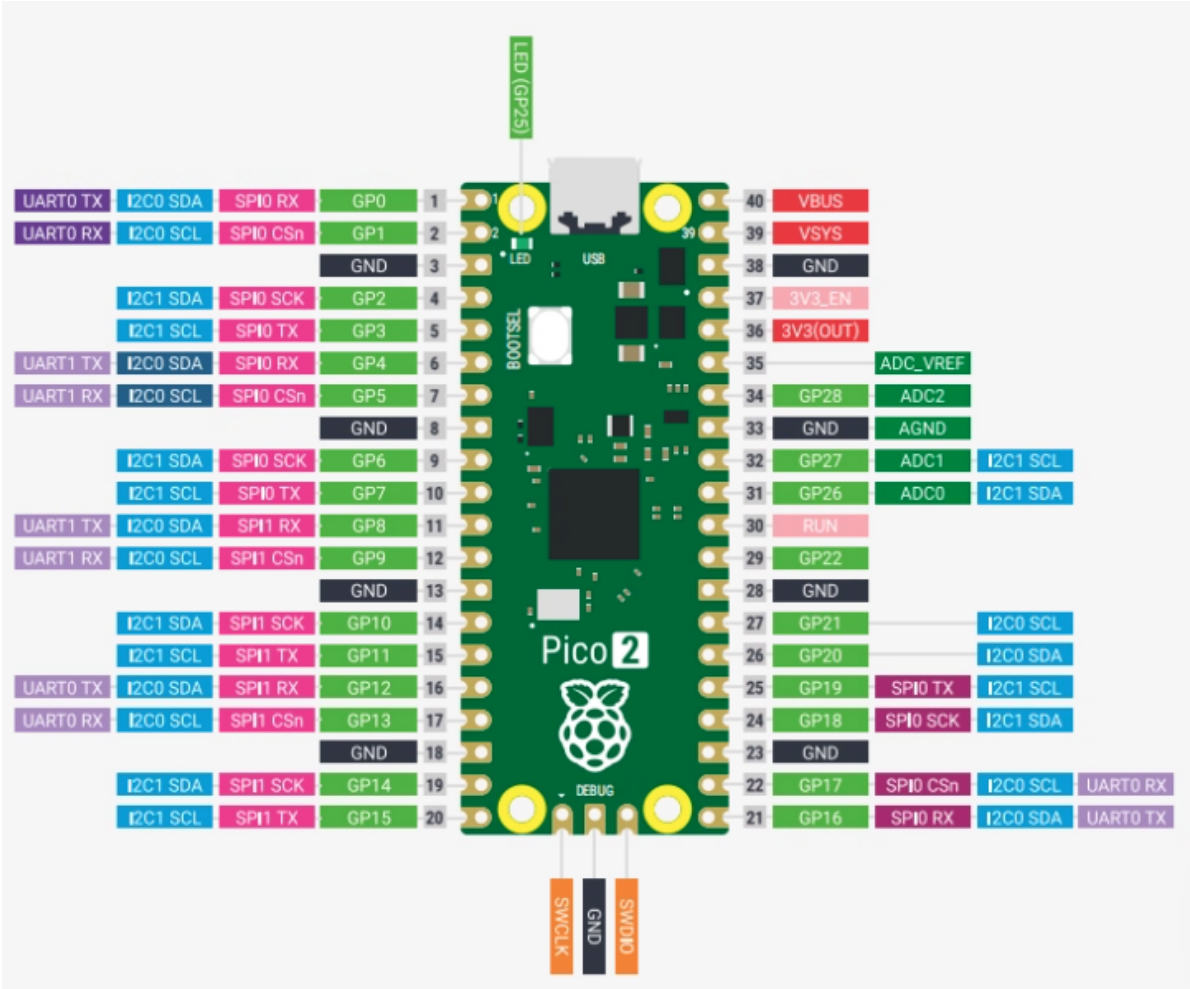
Pico Serial Port Data Reading

This example uses the Pico2 development board, a Windows computer, several DuPont wires, and an IMU attitude sensor.

1. Connecting the Device



IMU Attitude sensor	Pico2
RX	GP0
TX	GP1
GND	GND
5V	3V3(OUT)



2. Key Code Analysis

Please refer to the source code in the documentation for specific code examples.

```
# According to the type of data frame to make the corresponding parsing
    def _parse_data(self, ext_type, ext_data):
        # print("parse_data:", ext_data, ext_type)


        # the original gyroscope, accelerometer, magnetometer data
        if ext_type == self.FUNC_REPORT_IMU_RAW:
           # Convert unit to g
            accel_ratio = 16 / 32767.0
            self._ax = struct.unpack('h', bytearray(ext_data[0:2]))
[0]*accel_ratio
            self._ay = struct.unpack('h', bytearray(ext_data[2:4]))
[0]*accel_ratio
            self._az = struct.unpack('h', bytearray(ext_data[4:6]))
[0]*accel_ratio

            # Convert units to rad/s
            AtoR = math.pi / 180.0
            gyro_ratio = (2000 / 32767.0) * AtoR
            self._gx = struct.unpack('h', bytearray(ext_data[6:8]))
[0]*gyro_ratio
            self._gy = struct.unpack('h', bytearray(ext_data[8:10]))
[0]*gyro_ratio
            self._gz = struct.unpack('h', bytearray(ext_data[10:12]))
[0]*gyro_ratio
```

```
            # # Convert units to uT
            mag_ratio = 800.0 / 32767.0
            self._mx = struct.unpack('h', bytearray(ext_data[12:14]))
[0]*mag_ratio
            self._my = struct.unpack('h', bytearray(ext_data[14:16]))
[0]*mag_ratio
            self._mz = struct.unpack('h', bytearray(ext_data[16:18]))
[0]*mag_ratio

        # the attitude Angle of the board
        elif ext_type == self.FUNC_REPORT_IMU_EULER:
            self._roll = struct.unpack('f', bytearray(ext_data[0:4]))[0]
            self._pitch = struct.unpack('f', bytearray(ext_data[4:8]))[0]
            self._yaw = struct.unpack('f', bytearray(ext_data[8:12]))[0]

        # the quaternion of IMU
        elif ext_type == self.FUNC_REPORT_IMU_QUAT:
            self._q0 = struct.unpack('f', bytearray(ext_data[0:4]))[0]
            self._q1 = struct.unpack('f', bytearray(ext_data[4:8]))[0]
            self._q2 = struct.unpack('f', bytearray(ext_data[8:12]))[0]
            self._q3 = struct.unpack('f', bytearray(ext_data[12:16]))[0]
        # Analyzing barometer data
        elif ext_type == self.FUNC_REPORT_BARO:
            self._height = round(struct.unpack('f', bytearray(ext_data[0:4]))
[0], 2)
            self._temperature = round(struct.unpack('f',
bytearray(ext_data[4:8]))[0], 2)
            self._pressure = round(struct.unpack('f', bytearray(ext_data[8:12]))
[0], 5)
            self._pressure_contrast = round(struct.unpack('f',
bytearray(ext_data[12:16]))[0], 5)
        elif ext_type == self.FUNC_VERSION:
            self._version_H = struct.unpack('B', bytearray(ext_data[0:1]))[0]
            self._version_M = struct.unpack('B', bytearray(ext_data[1:2]))[0]
            self._version_L = struct.unpack('B', bytearray(ext_data[2:3]))[0]
        elif ext_type == self.FUNC_RETURN_STATE:
            self._rx_func = struct.unpack('B', bytearray(ext_data[0:1]))[0]
            self._rx_state = struct.unpack('B', bytearray(ext_data[1:2]))[0]
#  receive data
    def _receive_data(self, data):
        if self.rx_flag == 0:
            if data == self._HEAD1:
                self.rx_flag = 1
        elif self.rx_flag == 1:
            if data == self._HEAD2:
                self.rx_flag = 2
            else:
                self.rx_flag = 0
        elif self.rx_flag == 2:
            self.data_len = data
            if self.data_len <= self._RX_MAX_LEN:
                self.rx_flag = 3
            else:
                self.data_len = 0
                self.rx_flag = 0
        elif self.rx_flag == 3:
            self.data_func = data
```

```
            self.rx_data = []
            self.rx_count = 4
            self.rx_flag = 4
        elif self.rx_flag == 4:
            self.rx_data.append(data)
            self.rx_count = self.rx_count + 1
            if self.rx_count >= self.data_len - 1:
                self.rx_flag = 5
        elif self.rx_flag == 5:
            self.rx_flag = 0
            rx_check_num = data
            check_sum = self._HEAD1 + self._HEAD2 + self.data_len +
self.data_func
            for a in self.rx_data:
                check_sum = a + check_sum
            check_sum = check_sum % 256
            if rx_check_num == check_sum:
                # print("parse_data", self.data_func, self.rx_data)
                self._parse_data(self.data_func, self.rx_data)
            else:
                if self._debug:
                    print("check sum error:", rx_check_num, check_sum)
                    print("data:", self.data_len, self.data_func, self.rx_data)
```

`_receive_data`: Receives data and calls `parse_frame_data` to parse data conforming to the communication protocol.

`_parse_frame_data()`: Parses the data.

3. Reading IMU Data

After the program runs, the IMU data can be displayed in the terminal below.

Note: The above data is for a 10-axis IMU; 6-axis data is without a magnetometer and barometer; 9-axis data is without a barometer.