



Hub

API Manual



Table of contents

- Overview..... 3**
- Power/UART Communication..... 4**
- Data Frame..... 5**
 - Data Structure.....5**
 - Total Target Pad Score Count.....6**
 - Score.....6**
 - Raw value to Score conversion table7
- Wiring..... 7**
 - Matting connector7**

Overview

The PATpad Hub is a device designed to act as an intermediary between different PATpad devices. It facilitates communication and data transfer, ensuring seamless integration and coordination among the devices.

Connectivity:

The Hub can connect to the Target Pad via a Bluetooth connection, like the Display.

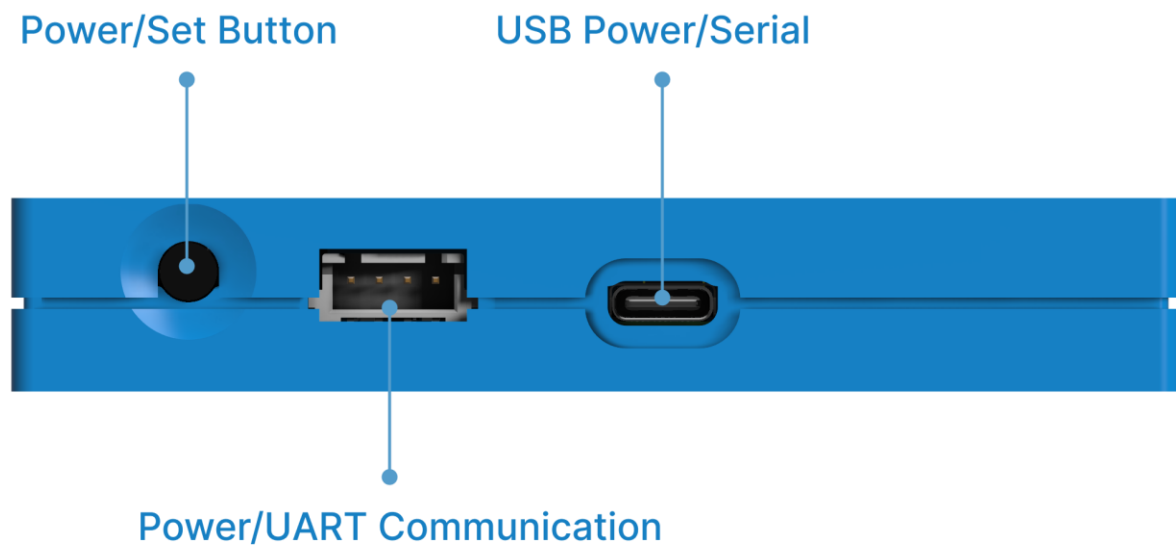
Data Transfer:

The Hub receives score values from the Target Pad. These values are then forwarded to the UART (Universal Asynchronous Receiver-Transmitter) via a 4-pin connector.

USB-C Connector:

Currently, the USB-C connector is used for debugging purposes. Further implementation of USB connectivity is in progress. Once completed, it will enable additional extension possibilities.

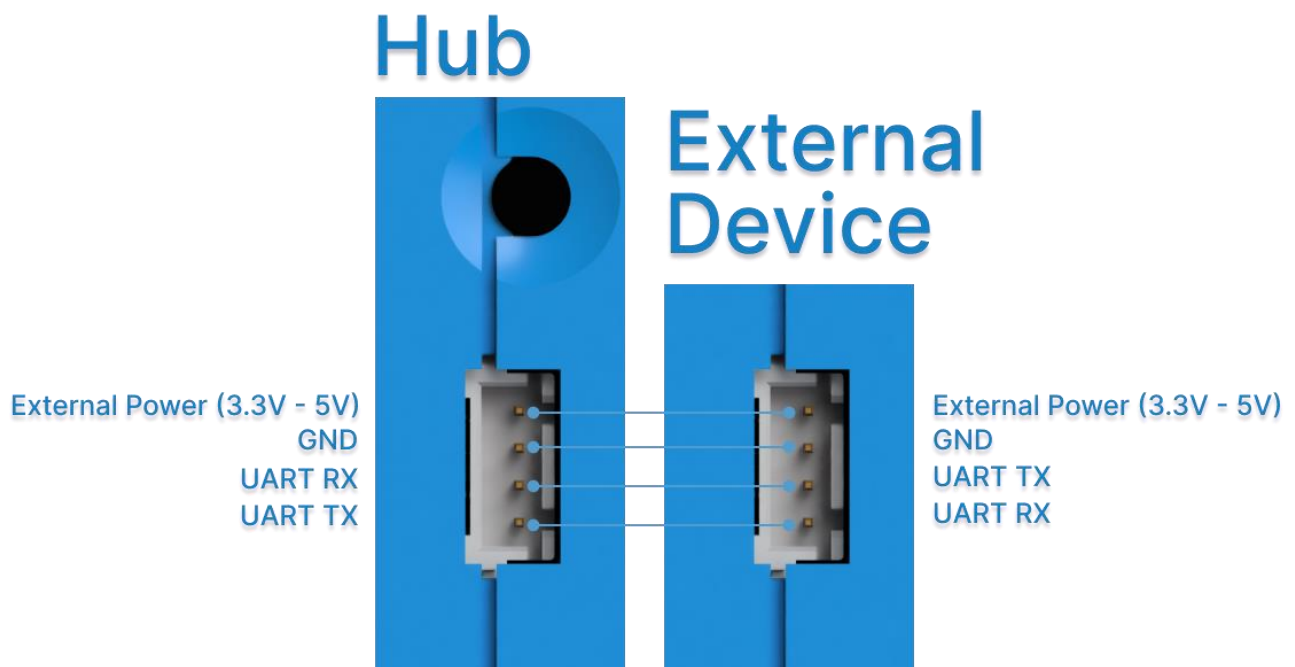
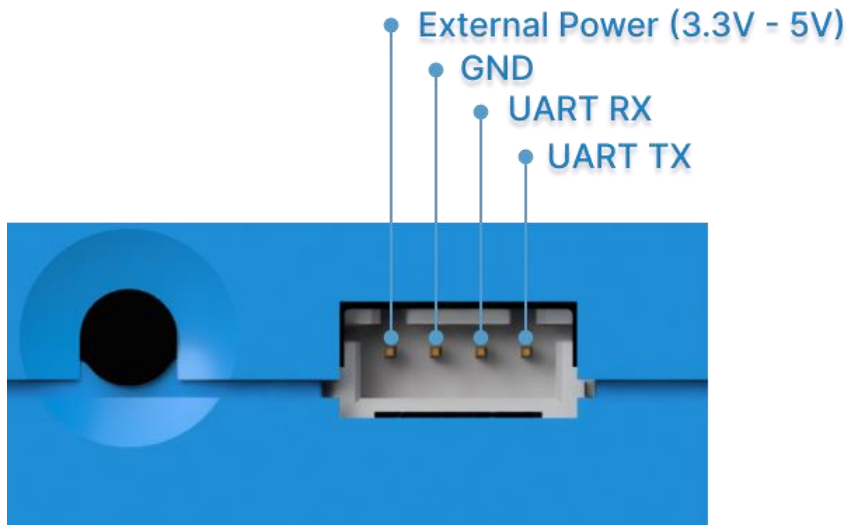
The PATpad Hub is an essential component for enhancing the functionality and communication between PATpad devices. Future updates will expand its capabilities, making it even more versatile.



Power/UART Communication

When using the 4-pin connector for UART communication with an external device (custom display, etc.), please provide a power supply of at least 3.3V and no more than 5V. The UART RX is the Hub input pin, so connect it to the TX on the external device. The UART TX is the Hub output pin in an open-drain configuration, so connect it to the RX on the external device.

The Hub does not implement any pull-up or pull-down resistors on the UART pins to support signal voltage levels from 3.3V to 5V. If you intend to use the TX pin on the external device in an open-drain configuration, please add an additional pull-up resistor ranging from 2K to 10K or use a push-pull configuration for the TX pin. A pull-up resistor of 2K to 10K is mandatory on the RX pin of the external device.



UART on the external device should be configured with a baud rate of 115200, 8 data bits, no parity, and one stop bit.

To simplify communication, when the Hub is used solely as a bridge from the Target Pad to the Custom Display, a data frame is automatically broadcasted every two seconds via the UART TX pin on the Hub device.

When a new result is transferred from the Target Pad to the Hub, the data frame is immediately broadcasted once more to ensure a fast response time. There is a minimum 200ms delay between frames to allow for correct data frame synchronization on the external device.

If a data frame transfer is already in progress when a new result is received, there will be a 200ms delay after the current data frame is transferred. Following this delay, a new data frame containing the updated result will be sent.

Data Frame

First byte transferred is Byte 0 and last byte transferred is Byte 7.

Data Structure

```
struct data_frame_pad_count_score
{
    union
    {
        struct
        {
            uint8_t score_count_total_0;
            uint8_t score_count_total_1;
            uint8_t score_count_total_2;
            uint8_t score_count_total_3;
        };
        uint32_t score_count_total;
    };
    uint8_t score_value;
    uint8_t reserved_1;
    uint8_t reserved_2;
    uint8_t reserved_3;
};
```

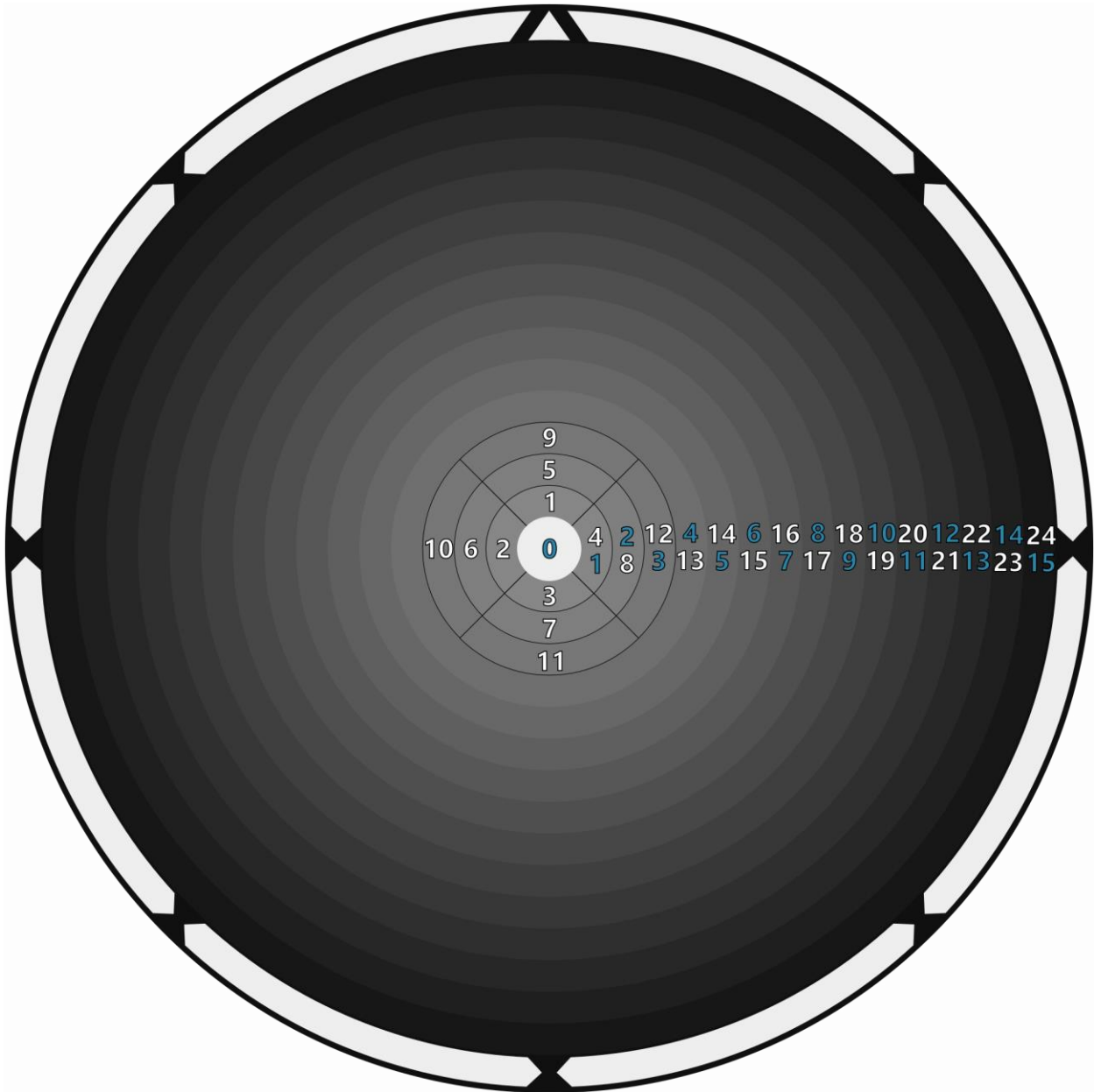
Total Target Pad Score Count				Score	Reserved		
Byte 0 - LSB	Byte 1	Byte 2	Byte 3 - MSB	Byte 0	Byte 0	Byte 1	Byte 2
0	1	2	3	4	5	6	7
0xXX	0xXX	0xXX	0xXX	0xXX	0xXX	0xXX	0xXX

Total Target Pad Score Count

Represents the total sequential result count value of the target pad as an unsigned 32-bit integer. The value needs to be combined from the first four bytes, starting with the least significant byte.

Score

As the target pad has more sensors at the center, the score number does not represent the actual distance from the center dot but instead needs to be converted. White numbers represent the actual raw value in decimal, which is sent in the data frame. Blue numbers represent the actual score, which is then shown on the display. The value is sent as an unsigned 8-bit integer.



Raw value to Score conversion table

Raw Value	Score
0	0
1	1
2	1
3	1
4	1
5	2
6	2
7	2
8	2
9	3
10	3
11	3
12	3
13	4
14	5
15	6
16	7
17	8
18	9
19	10
20	11
21	12
22	13
23	14
24	15

Wiring

The hub utilizes a JST XH 4-pin connector (PN: S4B-XH-SM4-TB) for both UART and power supply connections

Matting connector

For wire-to-board connections, the hub uses a JST XHP-4 connector paired with SXH-001T-P0.6 socket contacts.