Actimetre V5

**Overview**

Please refer to the V2 documents for background information.

V5 is a simplification of previous Actimetre boards

* Only support the ESP32-S3 (either Zero or Mini): remove support for ESP32-S2 and C3
* Only support one MPU-6500: remove support for MPU-6050
* Add support for up to 3 external digital signals
* No display
* Provision support for a synchronization signal
* Add support for SPI interface to MPU

The protocol is also modified

* Only support 3-axis accelerometer data
* Support up to 3 external binary signals
* Support 1, 2, and 4kHz acquisition rates

**Pin assignment**

Note that the following pins are commonly available on the Zero and Mini modules. The software doesn’t need to distinguish between the two module types.

|  |  |
| --- | --- |
| **GPIO #** | **Function** |
| 13 | SDA |
| 11 | SCL |
| 12 | GND (0V) for sensor module |
| 10 | VCC (3.3V) for sensor module |
| 7 | Camera 1 |
| 6 | Camera 2 |
| 8 | Recording signal |
| 5V | Power supply |
| GND | Power supply  Also common ground for 6/7/8 |
| 21 | GRB LED (S3 Zero) |
| 47 | RGB LED (S3 Mini) |
| 1 | Reserved for Synchronization |

**Protocols**

The server assignment protocol on port 2882 is unchanged. The initial communication handshake is also unchanged, except the version string, which starts with ‘5’.

The data payload format is mostly unchanged, but some fields are fixed due to the limited configuration.

| Byte no. | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | Seconds since boot, bits 16-23, see [Note3] | | | | | | | |
| 1 | Seconds since boot, bits 8-15 | | | | | | | |
| 2 | Seconds since boot, bits 0-7 | | | | | | | |
| 3 | I2C port (0) | I2C address (0) | Number of samples in payload | | | | | |
| 4 | RSSI (0~7) | | | Sampling mode (00) **[Note 6]** | | Frequency code | | |
| 5 | is 6500 (1) | Heartbeat [Note5] |  | [Note4] | Microseconds, bits 16-19 | | | |
| 6 | Microseconds, bits 8-15 | | | | | | | |
| 7 | Microseconds, bits 0-7 | | | | | | | |

**[Note6]** The sampling mode 0b00 now signifies that the payload contains 3 accelerometer readings (6 bytes) and 3 GPIO readings (1 byte). This is only true if the software version is equal or greater than 5. In prior versions, 0b00 was taken to be equivalent to 0b11.

The 1-byte payload data for GPIO readings is organized as follows. A bit “1” signifies high (3.3V) and “0” is low (0V).

* Bit 0 : Recording signal (GPIO 8)
* Bit 1 : Camera 1 signal (GPIO 7)
* Bit 2 : Camera 2 signal (GPIO 6)

Note that the data will also appear in that order (8, 7, 6) on the Actiserver’s CSV file. Actiserver must be configured to output the signal data (OUTPUT\_SIGNALS option in actiserver.conf). See the latest version of the document “Actimetre System V2.pdf”.