Summary Data Protocol and Structure

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Part #: PG-RESBIT-GEN2,GEN3,GEN4

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Revision History

Revision Date 01-OCT-2021

Description 01: Initial Release

Summary Data Structure

Name	Description	Size (Bytes)	Data Type
Event Id	The identifier for the event	2	uint16_t
Timestamp	The timestamp of the summary event. Unix Timestamp.	4	uint32_t
Size	The total size of the summary data	1	uint8_t
Data	A block of that that can be used for whatever the summary event needs.	20	uint8_t[20]

Event Types

The existing Resbit event types are documented below.

Name	Description	ID	Total Data Size (Bytes)
ResBit Awake	Resbit Awakes	0x0000	4
Generic Trigger	Count generalized events	0x0001	4
Tilt Angle (Legacy)	Tilt angle (Legacy)	0x0002	16
Blob Uint32 Data	Variable length blob of uint32 data.	0x0003	4-252
Blob Float Data	Variable length blob of float data.	0x0004	4-252

ResBit Awake Event (0x0000)

This event is generated every time a resbit device goes to sleep. It contains how long the device was awake.

Data

Name	Description	Size (Bytes)	Data Type
Time Awake	The amount of time (in seconds) the resbit device was awake	4	uint32_t

Generalized Trigger Event (0x0001)

This event is generated each time the ResBit device goes to sleep. It reports the number of trigger events that occurred during the prior wake period.

A trigger event is defined as the sensor or generalized model exceeding the "Threshold Value" parameter in the Resbit device.cfg file. (Example: Classifier predicts ...)

{"Events":[{"studyId":","participantId":"e00fce6813aaf698e3186a44","deviceID":"69002f000f50535252313920","data": {"eventFields":[{"name":"Awake Time","value":5}],"eventType":0,"eventDataSize":4,"eventWakeupTime":1631656289}},

{"studyId":' participantId":"e00fce6813aaf698e3186a44","deviceID":"69002f000f50535252313920","data":{"eventFields": [{"name":' value":0}],"eventType":1,"eventDataSize":4,"eventWakeupTime":1631656289}}}}

Data

Name	Description	Size (Bytes)	Data Type
Number of	Number of times a event was counted	4	uint32_t

Tilt Angle Event (0x0002) (LEGACY - DO NOT USE)

This event is generated every time a resbit device goes to sleep. It reports the start, stop, min, and max tilt angle values during the prior wake period.

Data

Name	Description	Size (Bytes)	Data Type
Start Tilt Angle	The tilt angle (in radians) at the beginning of the wake event.	4	float (single)
Stop Tilt Angle	The tilt angle (in radians) at the end of the wake event.	4	float (single)
Min Tilt Angle	The minimum tilt angle (in radians) measured during the wake event.	4	float (single)
Max Tilt Angle	The maximum tilt angle (in radians) measured during the wake event.	4	float (single)

Blob Uint32 Data Event (0x0003)

This event is generated every time a resbit device goes to sleep. It transfers a variable-length blob of uint32 data.



Data

Name	Description	Size (Bytes)	Data Type
Blob data	Blob data	4 - 252	uint32_t [1] - uint32_t [63]

Blob Float Data Event (0x0004)

This event is generated every time a resbit device goes to sleep. It transfers a variable-length blob of float data.

Data

Name	Description	Size (Bytes)	Data Type
Blob data	Blob data	4 - 252	float [1] - float [63]

Summary Transfer Protocol

Summary data will be transferred using the <u>ResBit Summary Service</u>. Data will be sent in chunks with syncing communication between each chunk. Each chunk will be broken down into individual tagged packets that will be streamed to the client device through BLE characteristic notification. No syncing will occur between packet sending.

Chunks will not contain incomplete summary event data. Any dummy bytes at the end of a chunk (due to packets' fixed-length) will be set to '0'. Chunks should be parsed individually into summary event data rather than concatenating (unless dummy bytes are removed prior to concatenation).

Workflow

- 1. Client connects to device
- 2. Client reads "ResBit Serial Number" characteristic for the ResBit serial number from the "ResBit Summary Service"
- 3. Client subscribes to the "Data" characteristic notifications
- 4. Client subscribes to the "Transfering" characteristic notifications
- 5. (Optional) Client subscribes to the "Transfer Error" characteristic notifications
- 6. (Optional) Client subscribes to the "Transfer Summary Data" characteristic notifications
- 7. Client writes a 1 into the "Transfer Summary Data" characteristic to begin data transfer
- 8. Client Begins Transfering all stored summary data (described below):
 - a. "Transfering" now has a value of 1
 - b. Device will burst write a number of <u>packets</u> through the Data characteristic.
 - Client will be given these values through the characteristic notification.
 Data from notification will need to be quickly read and cached to be reconstructed later.
 - c. "Transfering" now has a value of 0
 - d. After sending all the packets, the device will wait up to 2 seconds for a response written to the "Ack/Nack" characteristic.
 - Client will check all cached packets to make sure all packets were received.
 - This can be done by checking the Packet Index field on the packets. If packets 0-(X-1) are all cached all packets have been received
 - 2. The total number of packets can be determined by reading the "Total Packets" field on any of the packets
 - ii. If all packets have been received Client writes a 1 into "Ack/Nack"

- iii. If some packets are missing, Client writes a "Resend Packets" response with the missing packets into "Response" then writes a 2 into "Ack/Nack" (refer to "Response Structure" and "Resend Packets").
 - 1. Device will resend missing packets
 - a. "Transfering" will be 1 while sending packets and 0 when done.
 - b. This will repeat until all packets in the chunk are received successfully.
- e. If summary data remains, the device will move on to transferring the next chunk (repeat steps 8.a through 8.d).
- 9. "Transfer Summary Data" value will become 0

Packet Structure

Name	Description	Size (Bytes)	Data Type
Total Packets	The total number of packets in the chunk	1	uint8_t
Packet Index	The index of the packet relative to the start of the chunk	1	uint8_t
Data	The data within the packet	18 ^{1,2}	uint8_t[18]

Notes:

- [1] Packets may contain incomplete summary events. Every packet in a chunk should be read and concatenated (based on Packet Index) prior to parsing into summary event data.
- [2] Any 'dummy' bytes at the end of a packet (i.e. if there are 11 bytes of summary data in the packet, there will be 7 dummy bytes) will be set to 0. This will only occur in the last packet of a chunk.

Response Structure

Name	Description	Size (Bytes)	Data Type
Response Type	The response type. Identifies what kind of	1	uint8_t

	response is being returned (see Response Types).		
Response Data	The data of the response.	19	uint8_t[19]

Response Types

Resend Packets (0x00)

Name	Description	Size (Bytes)	Data Type
Number of Packets	The number of packets that need to be resent	1	uint8_t
Packet Indices	The indices of the packet to resend. Up to 18 packets. Don't have to write the entire array (dummy bytes will be ignored).	18	uint8_t[18]

Example:

<u>=/(a///p/o</u> /																				
	Response Packet																			
Field	Response Type								Re	espo	onse	: Da	ta							
Byte Value	0	3	0	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Byte Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend:

Response type: Resend Packets
Number of packets: 3
Packet indices: 0, 4, 9
Ignored