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Avatar EEG Protocol Specification

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Notes

Big endian (network) byte order is used in data frame formats and structures.
MSB - most significant bit
LSB - least significant bit

Data Frame Format

The Avatar EEG recorder listens for a Bluetooth rfcomm serial port profile (SPP) connection. Once a SPP connection is made from a master device to the Avatar EEG recorder, data will be streamed continuously. The format is as follows:

Field	Size (Bytes)	Description
Sync	1	Sync byte, always = 0xAA
Sample_rate / Version	1	2 MSBs sample rate Hz, 0=250, 1=500 or 2=1000, 6 LSBs protocol version
Framesize	2	Number of bytes in this frame
Frame_type	1	1=data frame
Frame_count	4	increments with each frame available to be transmitted
Number_of_channels	1	MSB set if trigger channel enabled, 7 LSBs number of EEG channels
Samples	2	number of samples in this frame
Range	2	range in mVpp
SOC	4	seconds since Jan 1, 1970 (unix time) at first sample
Fractional seconds	2	4096Hz fractional second count at first sample
Data	-	Raw values from ADC, size depends on number of channels and samples
CRC	2	CRC-16-CCIT calculated on the entire frame not including CRC

Data Frame Example

Field	Size (Bytes)	Example	Description
Sync	1	0xAA	Sync byte
Sample_rate / Version	1	0x43	500Hz, protocol version is 3
Framesize	2	0x0196	samples*channels*3bytes+header_size (16*8*3+22)
Frame_type	1	0x01	Data frame
Frame_count	4	0x00001234	Frame count
Number_of_channels	1	0x08	Trigger channel not enabled, 8 EEG channels
Samples	2	0x0010	16 samples in this frame
Range	2	0x2ee	Range is 750mVpp,
SOC	4	0x5101ae97	2013-Jan-24 21:58:47
Fractional seconds	2	0x0800	0.5 seconds
Data	384	-	384 bytes of data not shown
CRC	2	-	CRC depends on data and header

Data Structure

The data structure format is as follows:

Data Structure	Size (Bytes)	
Trigger Channel	3	Only if enabled
Channel 1	3	Raw sample from ADC in big endian (network) byte order
Channel 2	3	Only if enabled
Channel 3	3	Only if enabled
Channel 4	3	Only if enabled
Channel 5	3	Only if enabled
Channel 6	3	Only if enabled
Channel 7	3	Only if enabled
Channel 8	3	Only if enabled
Total	*	3 byte minimum size; 27 byte maximum size depending on number of channels enabled and trigger channel enabled

Digital Channel Structure

As is the case for each channel sample for the ADC, the trigger channel is a 24-bit sample. However only two bits are used. The trigger inputs are sampled at the same time as the other ADC channels. If the trigger channel is enabled, it will be the first piece of data in the data structure. The LSB of the trigger value represents the state of the optical input (inverted) and the next bit represents the state of the keypad switch.

Commands

Command frames can be sent to the Avatar EEG recorder. An example of the set time command frame follows:

Set time Command Frame

Field	Size (Bytes)	Example	Description
Sync	1	0xAA	Sync byte
Version	1	0x01	Protocol version is 1
Framesize	2	0x0a	Length of frame is 10
Frame Type	1	0x03	Command frame
Command	1	0x01	Set time
Seconds	4	0x5101ae97	Seconds since Jan 1, 1970 (unix time)