Revised Bluetooth commands for electrolyte and metabolite boards

Eric Wu

June 27, 2016

- By default, the board is in sensing mode, and dumps out sensor readings and current values continuously in the format

  Sensor Ch1,Sensor Ch2,Current delivered,Current register

  corresponding to the C formatting string "`%f,%f,%f,%d\n`". In sensing mode all of the sensor readings are valid, the current delivered should be very small, and the current register should be 0. The iontophoresis switches are open in sensing mode for safety.

- Increasing the current register beyond 0 automatically puts the board into current monitoring mode. In this mode, the board dumps out sensor readings in the following format

  x,x,Current delivered,Current register

  corresponding to the C formatting string "`x,x,%f,%d\n`". In current monitoring mode, the x's signify an invalid reading.

- Lowering the current register to 0 or below 0 automatically puts the board back into sensing mode. Alternatively the command `0x40` will disable iontophoresis and puts the board back into sensing mode.

- Each Bluetooth command is 8 bits, and is broken up in the following way:

opcode, 4 bits	payload, 4 bits

- The payload bits (ranging from `0x0` to `0xF`) are unsigned 4-bit integers

- There is one 8-bit unsigned "register" containing the iontophoresis PWM value, which corresponds to the 8-bit number used to set the iontophoresis current. `0` corresponds to no current, and `255` corresponds to maximum current. The current register-to-current transfer function is

$$I_{\text{out}} = \frac{5\text{r}}{255 \cdot 2085.31}$$

- The 4-bit opcodes are

Name	Hex	Function
DISABLE_IONTOPHORESIS	0x4	Disables iontophoresis, puts the board back into sensing mode.
ENABLE_IONTOPHORESIS_INCREMENT_BY	0x5	Adds the payload bits to the iontophoresis PWM value. Has overflow protection. Puts the board into iontophoresis mode automatically.
ENABLE_IONTOPHORESIS_DECREMENT_BY	0x6	Subtracts the payload from the iontophoresis PWM value. Has underflow protection. Takes the board into sensing mode automatically if PWM value reaches 0.