Rat Probe 4.0 Data Acquisition Pseudo code

	//Setup 1) Include files 2) Configure Blutooth 3) Configure ADCs 4) Configure other required peripherals 5) Global variable declarations 6) Function prototypes 7) Other required initialization 8) Initialize all LEDs = off and scope trigger = low 1) int PD1_Ch1_730nm // PD1 measured with 730nm LED on channel 1 illuminated 2) int PD2_Ch1_730nm // PD2 measured with 730nm LED on channel 1 illuminated 3) int PD1_Ch1_850nm // PD1 measured with 850nm LED on channel 1 illuminated 4) int PD2_Ch1_850nm // etc. 5) int PD2_Ch2_730nm // etc. 6) int PD1_Ch2_730nm // etc. 7) int PD2_Ch2_850nm // etc. 8) int PD1_Ch2_850nm // etc.
	// Make the Measurements 9) Loop forever 10) i = 0 11) PD1_Ch1_730nm = 0 //Initialize the photodiode measurement variables 12) PD2_Ch1_730nm = 0 13) PD1_Ch1_850nm = 0 14) PD2_Ch1_850nm = 0 15) PD2_Ch2_730nm = 0 16) PD1_Ch2_730nm = 0 17) PD2_Ch2_850nm = 0 18) PD1_Ch2_850nm = 0

19) Loop as many times as possible in < 1s

    20) Scope trigger pin = high // Trigger scope
    21) Scope trigger pin = low

    22) Call Read_Photodiodes(Ch1_730nm_LED, PD1, PD2)
    23) PD1_Ch1_730nm += PD1
    24) PD2_Ch1_730nm += PD2

    25) Call Read_Photodiodes(Ch1_850nm_LED, PD1, PD2)
    26) PD1_Ch1_850nm += PD1
    27) PD2_Ch1_850nm += PD2

    28) Call Read_Photodiodes(Ch2_730nm_LED, PD1, PD2)
    29) PD2_Ch2_730nm += PD2
    30) PD1_Ch2_730nm += PD1

    31) Call Read_Photodiodes(Ch2_850nm_LED, PD1, PD2)
    32) PD2_Ch2_850nm += PD2
    33) PD1_Ch2_850nm += PD1

    34) i++

35) End Loop

36) PD1_Ch1_730nm = PD1_Ch1_730nm/I // Calculate averages
37) PD2_Ch1_730nm = PD2_Ch1_730nm/i
38) PD1_Ch1_850nm = PD1_Ch1_850nm/i
39) PD2_Ch1_850nm = PD2_Ch1_850nm/i
40) PD1_Ch2_730nm = PD1_Ch2_730nm/i
41) PD2_Ch2_730nm = PD2_Ch2_730nm/i
42) PD1_Ch2_850nm = PD1_Ch2_850nm/i
43) PD2_Ch1_850nm = PD2_Ch1_850nm/i

44) Transmit data to laptop via Bluetooth
45) Delay such that the outer loop executes in precisely 1s.

46) End Loop

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                //
                //     Read_Photodiodes Subroutine   (24ms execution time)
                //

Read_Photodiodes(Selected_LED input parameter, P_Diode_1 output parameter,
                        P_Diode_2 output parameter)

        // Read the Dark Signals Before Making any Measurement

    1)      int D_Pdiode_1, D_Pdiode_2          // Dark PD measurement variables
    2)      int I_Pdiode_1, I_Pdiode_2          // Illuminated PD measurement variables

    3)      All LEDs = off
    4)      D_Pdiode_1 = 0, D_Pdiode_2 = 0
    5)      k = 0
    6)      Delay for 10ms                      //Ensure the preamps have settled to 0.25V
    7)
    8)      Loop as many times as possible in < 2ms
    9)          D_Pdiode_1 += New ADC reading on channel 1
    10)         D_Pdiode_2 += New ADC reading on channel 2
    11)         k++
    12)     End

    13)     D_Pdiode_1 = D_Pdiode_1/k            // Average of Dark Photodiode 1
    14)     D_Pdiode_2 = D_Pdiode_2/k            //  Average of Dark Photodiode 2

        // Read the illuminated Signals

    15)     Selected_LED = on
    16)     I_Pdiode_1 = 0, I_Pdiode_2 = 0, k = 0
    17)     Delay for 10ms                       // Allow preamps to settle

    18)     Loop as many times as possible in < 2ms
    19)         I_Pdiode_1 += New ADC reading on channel 1
    20)         I_Pdiode_2 += New ADC reading on channel 2
    21)         k = k + 1
    22)     End

    23)     Selected_LED = off
    24)     I_Pdiode_1 = I_Pdiode_1/k            // Average of illuminated Photodiode 1
    25)     I_Pdiode_2 = I_Pdiode_2/k            // Average of illuminated Photodiode 2

    26)     P_Diode_1 = I_Pdiode_1 - D_Pdiode_1  // Subtract dark offset
    27)     P_Diode_2 = I_Pdiode_2 - D_Pdiode_2  // Subtract dark offset

    28)     Return (P_Diode_1, P_Diode_2)
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