Multi-Sensor Breakout Board – Software Specification

Requirements

* Standalone Mode (No PC usage):
  + Before, we had 1 sensor; thus, it was easy to tie the sensor output to the standalone LEDs.  However, now since we have more sensors, the usage will be a little trickier in standalone mode
  + How to have a “jumper configuration” show the standalone output settings
    - We can do this! We can do this by using the upper two bits as indicators for the multisensor board, and then use the remaining 4 bits to indicate the different sensor outputs
    - Alternate plan: we can add an LED driver to the board and have an LED turn on when the sensor output is being shown. Then, we can add a push button to quickly change the sensor output or hold to wait at a value.
      * Cons - Need additional code… also need additional cost to put the LED driver on the board
  + Dual Output Sensors (not shown in picture above)
    - We will want two LEDs for the Accel+MAG Sensor; one to show accel operation, one to show mag operation
    - We will want two LEDs for the ALS+Prox Sensor; one to show ALS operation, one to show Prox operation
* High Precision Output Mode (UART Output to PC):
  + This mode will be very similar to the single sensor mode as we can add lines to the output stream corresponding to each of the sensor outputs

Software Flow

* Start-up (to be run when first powered on or when the sensor ID changes)
  + No need to Initialize Temp, Hall Sensor, or UV Sensor
  + Initialize ALS/Prox Sensor
  + Initialize Gyro Sensor
  + Initialize Accel/Mag Sensor
  + Initialize Humidity Sensor
  + Initialize Pressure Sensor
* Main Loop
  + Global Actions
    - Read and Convert Data from all sensors
      * Temperature Sensor
      * Hall Sensor
      * UV
      * ALS/Prox
      * Gyro
      * Accel/Mag
      * Humidity
      * Pressure
  + PC connection Actions
    - Format Output to show all sensor data returned via UART/FTDI
      * Each Sensor should get one line; return converted values only?
  + Standalone Actions
    - Check the Cap Touch Switch Sensor
      * If any “is pressed has been triggered, then change the “active sensor” to that value.
      * Changing the active sensor will also require a change in the LED that is being illuminated (controlled by the cap-touch switch sensor)
    - Take the “active” sensor and convert the output to 8bit. This will then indicate the “stand-alone” leds on the main board
      * Temperature Sensor
        + 8bit temp reading showing ADC values
      * Hall Sensor
        + Binary 0 or 1 on either side of the base board showing omni polar output
      * UV
        + 8 bit UV Intensity Value
      * ALS/Prox
        + Show ALS Only… 8bit light intensity value
      * Gyro
        + Show which direction a device is moving
      * Accel/Mag
        + Show only Accel Sensor… ball follows where the accel is
      * Humidity
        + 8bit RH value
      * Pressure
        + 8bit pressure value