Sensact Functional Specification

1. **Introduction**

The Sensact is an interface between analog sensors and a device. It can take three generic sensors and convert the signals into fully configurable functions, set by the user. As the signal passes a threshold set by the user, the event will trigger.

1. **Inputs**

* 3 analog audio jacks (TRRS)
  + One can do I2C
    - U$1 on the schematic
    - T – VCC
    - R – IO3
    - R – IO2
    - S – GND
  + One is regular
    - U$2 on the schematic
    - T – VCC
    - R – A2
    - R – nothing
    - S – GND
  + One can do Tash Buttons
    - U$3 on the schematic
    - T – VCC
    - R – nothing
    - R – A1
    - S – nothing

1. **Outputs:**

* Relay x2
* Bluetooth HID
  + Bluetooth v2
* HID Computer
* Buzzer

1. **Trigger and Threshold**

* Each sensor has one Threshold
* The event is triggered when the signal is ABOVE the threshold
* If the signal is held above the threshold, the event will continue to occur.
* Each sensor can have multiple responses per threshold (ie. Type ‘A’, move the mouse, and send Bluetooth HID whenever the signal is above threshold)
* The signal can be inverted, making it only trigger when the signal is below the threshold

1. **Events**

* Relay A
  + Send a digital pulse
* Relay B
  + Digital pulse like A
* Bluetooth HID
  + Requires an ASCII character
  + Sends the ASCII character to the connected Bluetooth device as a keyboard HID
* USB Keyboard
  + Requires ASCII character
  + Sends the ASCII character to the connected computer as a keyboard HID
* Click
  + Mouse left click
* Joystick
  + 4 Options
    - Arrow Left/Right
    - Arrow Up/Down
    - Mouse Left/Right
    - Mouse Up/Down
  + The movement is triggered when the signal is below 20, or above 80 (ie. For vertical movement, the mouse will move up when signal is above 80, and move down when the signal is below 20)
  + The threshold of the joystick cannot be set by the user
* Buzzer

1. **Communication Protocol**

The Configuration software and the Arduino use the following commands:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **‘0’** | This sets the Sensact in Configuration Mode. The 0 must be followed by the data for the sensact sensors. All data is sent separated by commas.  The following data is all binary data and is sent as a 0 or a 1, and repeated for every sensor.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Invert | Relay A | Relay B | Bluetooth HID | USB Keyboard | Click | Joystick | Buzzer |   (ie.’ 0,1,0,0,0,1,0,0’ to make the relay pulse, and mouse click)  After the above data, the threshold and other details are added for each sensor   |  |  |  |  | | --- | --- | --- | --- | | Threshold level  (0-100) | Bluetooth HID ASCII Character | Keyboard ASCII Character | Joystick option  0 – Arrow L/R  1 – Arrow U/D  2 – Mouse L/R  3 – Mouse U/D |   (i.e ‘70,65,65,0’ to set the threshold to 70, both ASCII characters to ‘A’, and joystick to Arrow L/R)  The full string sent over Serial would be:  0,Sensor1 binary, Sensor2 binary, … , Sensor1 details, Sensor2 details, … |
| **‘8’** | Displays the current configuration data stored in the Sensact. Also sets the Sensact to Configuration Mode.  The data will be sent over the serial port in the same pattern as described above, but instead of a leading ‘0’, the data will be proceeded by ‘9999’.  9999, Sensor1 binary, Sensor2 binary, … , Sensor1 details, Sensor2 details, … |
| **‘9’** | Sets the Sensact to Run Mode. |

Each command must be sent with a new line ‘\n’ at the end.

1. Arduino Code

When the Arduino is in Configuration Mode, it will not activate any of the responses to triggers. It will also report the raw sensor signals (ie. 0-1024 instead of 0-100).