Paranormal Sensor Station

(Firmware Version 1.16)
Compact Computerized Wireless Sensor Data Recorder and Environmental Anomaly Detection Ecosystem

This device simplifies the process of identifying and cataloging high-sensitivity sensor data that may be influenced by unseen entities in response to questions or commands. Multiple external sensors are available, as well as a built-in accelerometer. A bright red LED blinks and the unit makes a beep sound when a sensor reading exceeds the alert threshold. Sensor history is continuously reflected in real-time on-screen histograms. Data from multiple units can be gathered via one mobile device with a free bluetooth app. Firmware updatable over WiFi web interface. USB-C charging.

Buttons

B1. (left button) Power on. Reset / zero calibration.
Hold 6 seconds to power off.

B2. (middle button) Set Alert **Sensitivity** Threshold**.** Higher numbers mean higher levels of change are required to trigger Alerts. **(Higher number = less sensitive)**
Press quickly to set the Accelerometer threshold. (zero = no alerts)
Hold 1 second to set the threshold for the current external sensor.

B3. (right button) Turn on **beep** sounds for Alerts, or increase the pitch of the beeps by one octave.
Hold 1 second to enter the settings menu.
In the settings menu, press B3 to choose a parameter, and press B2 to change the value.

Interfaces

S1. Speaker for the *beep* sound. Control with the **Voice** setting, using button **B3**.

M1. Magnet for attaching the unit to ferrous metal surfaces. (not visible, behind casing)
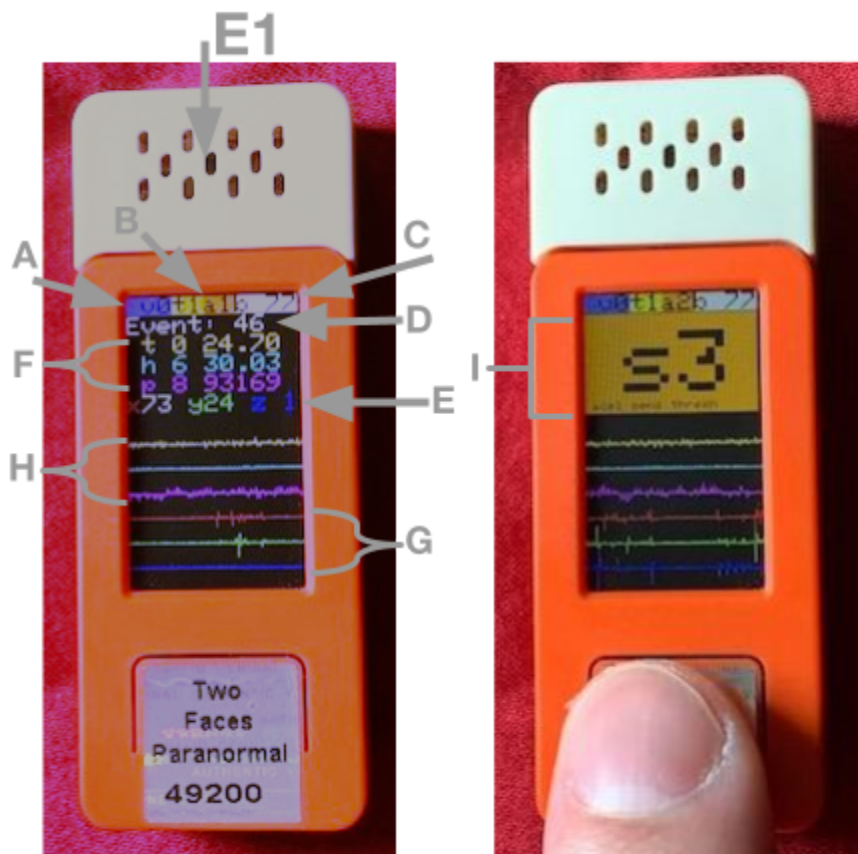
P1. Top Port. The main port for external sensors. 4-pin sensors use the black section.

P2. Bottom Port. This is the secondary port for external sensors.

U1. USB-C port for charging and firmware updates. Firmware can also be updated over WiFi

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Display

A. Voice. The octave of the beep sounds (1-5). 0 = Beep sound deactivated.

B. Sensor Sensitivity Thresholds (1-5). Higher numbers mean less sensitivity, meaning less alerts are triggered when this number is higher. This is the threshold the sensor has to exceed in order to trigger an alert.

"a" is the Accelerometer.
"t" (for temperature) is the Environmental Sensor.
"s" is the Sensor Bar.
"r" is the Rem Duo

The Accelerometer background is orange.
The Environmental Sensor background is yellow.
The Sensor Bar background is light green.
The Rem Duo background is mint green.

C. Battery Level. Approximate percentage. Attached external sensors will lower the battery life.

D. Event Counter. Increments 1-99 for each Alert that occurs. Press **B1** (left button) to reset.

E. X Y Z axis Accelerometer Alert Counters.

F. Environment Alert Counters (Temperature, Humidity, Barometric Pressure) if the Environmental sensor is attached. Sensor Bar Alert Counters (Current Force and Yes/No Max Force readings) if the Sensor Bar is attached.

G. X Y Z axis Accelerometer Histogram Timeline Chart.

H. External Sensor Histogram Timeline Chart (for Environmental Sensor, Sensor Bar, or other External Sensors).

I. Alert Messages:

Events:
XYZ +/- = Accelerometer
T = Temperature, H = Humidity, P = Barometric Pressure +/-
YES/NO = response from Sensor Bar or Rem Duo

Sensitivity Threshold Adjustment:
a = Accelerometer / t = Thermometer / s = Sensor Bar / r = Rem Duo

The Settings Menu

Id = ID Number. This number uniquely identifies each Data Collector connected to the iOS/Android app.

Blue2th = Bluetooth power.

Bright = Display Brightness. 0 is the absolute minimum. 1-2 is perfect for indoor video of the display. 2-3 is a balanced standard brightness. 5 is the absolute maximum. Do not leave the unit in direct sunlight.

Mhz = CPU Speed. Lower speeds save battery power. This also changes the sample rate of the sensors.

Sleep = Sleep time of the display in seconds. The display is still dimly visible during sleep. If Sleep is set to "no" (or "0" if set via bluetooth) the display stays on.

Firmware = Wifi firmware update mode. Wifi uses battery power quickly. Be sure to update with a full battery or while plugged into USB power.

Reset All = Restore factory settings.

EXIT/SAVE = Save all settings and reboot.

Bluetooth Apps

Multiple PSS units can be monitored and controlled using a multipurpose BLE app for iOS or Android. Our favorite apps are "[Bluetooth Assistant](#)" by *Hangzhou OrangeJuice* or "[nRF Connect](#)" by *Nordic Semiconductor*.

Security

Once your PSS has connected to your mobile device, no one else can connect until the unit is rebooted. If you will not be connecting with Bluetooth, be sure to set "Blue2th" to "no" in Settings, to avoid tampering by strangers.

General BLE App Instructions:
1. Choose a bluetooth device that starts with "**PSS**" followed by the unit's **Id number**
   a. These apps let you enter "PSS" in a Search or Filter, so you see only the PSS units
   b. Reboot the unit if you do not see it listed (also make sure "Blue2th" is *ON* in Settings)
2. Find the **New Alert** characteristic (**2A46**) and turn on "Notify"
   a. in the "Bluetooth Assistant" app, select the service, then tap "Notify"
   b. in "nRF Connect" tap the "Client" tab. tap the "Quotation Marks" icon and select "UTF-8" then tap the "Down Arrow with a line under it"
3. Go to the **Log**, and see new Alerts come in
   a. in "Bluetooth Assistant" the Log tab is on the bottom of the main screen
   b. in "nRF Connect" the Log tab is at the top after selecting the device
   c. Alert messages are in "Ascii" or "UTF-8" format
   d. See "Bluetooth Alert Messages" below for an explanation of the message
4. Change **Settings** by sending Ascii or UTF-8 text message data to the **2A3D** characteristic
   a. Use the "Bluetooth Settings Messages" table below for specific examples
   b. in "Bluetooth Assistant" tap "Write" and then tap "Ascii"
   c. in "nRF Connect" tap the "Client" tab. tap the "Up Arrow" next to the **2A3D** characteristic. Tap "UTF8"
   d. Put the message in the box and tap "Write"

Bluetooth Alert Messages

Example Alert Message:

```
Environmental Sensor
X+ 49201,e28, t+5,t-4,t:23.44, h+7,h-6,h:31.48, p+0,p-0,p:92947,ts3,
x3,y2,z1,as5, br2,mh8,sl0,vo0,bat:100
```

```
No Peripheral Attached
Y- 49202,e6, x3,y2,z1,as3, br4,mh16,sl5,vo2,bat:75
```

```
Environmental Sensor
T- 49203,e18, t+4,t-5,t:24.64, h+2,h-1,h:21.18, p+0,p-0,p:92957,ts1,
x3,y2,z1,as5, br0,mh8,sl0,vo0,bat:80
```

```
Sensor Bar
Yes49201,e4, Now0.03,Y3,hi0.03,N1,lo-0.02,ss2, x0,y0,z0,as0,
br3,mh24,sl2,vo1,bat:79
```

```
Rem Duo
Yes49201,e1, Now56%,Y1,79%,5328Hz,N0,96%,6477Hz,rs1, x0,y0,z0,as0,
br2,mh24,sl0,vo0,bat:8
```

Example Message Part	Setting
First Part X+ Y- T- Yes	 Accelerometer X + direction Accelerometer Y - direction Temperature Decrease Sensor Bar Yes Direction
Second Part 49201 e28	 Unique ID Number of PSS Total count of all Events (28 in this example)
Environmental Sensor t+5 t-4 t:23.44 h+2 h-1 h:21.18 p+0 p-0 p:92957 ts1	 Temperature Rapid Increase Events Temperature Rapid Decrease Events Temperature in Degrees Celsius Humidity Rapid Increase Events Humidity Rapid Decrease Events Humidity Percentage Barometric Pressure Rapid Increase Events Barometric Pressure Rapid Decrease Events Barometric Pressure in Pascals Environmental Sensor Alert Sensitivity Threshold (1 in this example)
Sensor Bar Now0.03 Y3 hi0.03	 Force Now Grams "Yes" Direction Threshold Exceeded Events "Yes" Direction Force Max Grams

Example Message Part	Setting
N1 lo-0.02 ss2	"No" Direction Threshold Exceeded Events "No" Direction Force Max in Negative Grams Sensor Bar Sensitivity, Threshold for Alerts (2 in this example)
Rem Duo Now56% Y1 79% 5328Hz N0 96% 6477Hz rs1	 Confidence Percentage (% capacitance of reference human finger) "Yes" Direction Threshold Exceeded Events "Yes" Stability "Yes" Parasitic Oscillator Raw Frequency "No" Direction Threshold Exceeded Events "No" Stability "No" Parasitic Oscillator Raw Frequency Stability Difference Threshold for Alerts (1 in this example)
Accelerometer x3 y2 z1 as5 as0	 Accelerometer X Events - Sides Accelerometer Y Events - Top/Bottom (Ports) Accelerometer Z Events - Front/Back (Screen) Accelerometer Alert Sensitivity Threshold (5 in this example) A *higher* Sensitivity Threshold setting makes Alerts *less* sensitive. Accelerometer Alert Off (0 in this example)
General br2 mh8 sl0 vo0 bat:100 br3 mh24 sl2 vo1 bat:79	 LCD Screen Brightness: 2 CPU Speed: 80 Mhz Sleep: no Voice: 0 (no beeps) Battery: 100% LCD Screen Brightness: 3 CPU Speed: 240 Mhz Sleep: Screen dims after 2 seconds Voice: beep in octave 1 (lowest pitch) Battery: 79%

Bluetooth Settings Messages

Send these messages (Write Value) to the **2A3D** characteristic, as Ascii or UTF-8 text, to change settings.

All messages can be formatted with *two letters, sometimes followed by a number.*
Some have a single-letter variation option.

Example Message	Setting
rd re aa a	Request last alert and current settings - wake up display *same* *same* *same*

bl fl f	Blink LED Flash LED *(same)* *same*
be bp b	Beep now, even if v is set to 0. (½ second sweep low to high pitch) *same* *same*
zz z	Reset Events Counters *same*
rb	Reboot PSS (settings stay, bluetooth will disconnect)
fw wi wf	Firmware Update Wifi On (turns back off on next reboot) *same* *same*
fr	Factory Reset All Settings to Defaults (Including ID number)
as1 a5 as0 a0	Accelerometer Sensitivity Alert Threshold 0-5 (1 in this example) (5 in this example) *A **higher** Sensitivity Threshold setting makes Alerts **less** sensitive.* Accelerometer Sensitivity Alert Off (0 in this example) *same*
ts2 t5	Temperature Sensitivity Environmental Alert Threshold (2 in this example) (5 in this example)
ss3 s1	Sensor Bar Sensitivity Alert Threshold (3 in this example) (1 in this example)
rs2 r4	Rem Duo Sensitivity Alert Threshold (2 in this example) (4 in this example)
vo1 v5 vo0 v0	Voice Octave (lowest pitch beeps in this example) Voice Octave (highest pitch beeps in this example) Voice Off (zero = no beeps) *same*
id12345	Set Device Unique ID (to 12345 in this example)
mh24 cp16	Set CPU Speed (to 240Mhz in this example) (160Mhz in this example)
br0 br5	Set LCD screen to minimum brightness, still barely visible Set LCD screen to maximum brightness
sl5 sl0	Sleep 5 seconds, display will dim to br0 after 5 seconds Sleep "no" - display will not dim automatically
tc400	Temperature Calibration Factor. This number, divided by 100, is subtracted from the sensor's raw temperature value to give the temperature reading in Celsius. The factory default is "400" like this example. (400 = subtract 4.00º)

External Sensors

(Optional, Not Included)

E1. The **External Environmental Sensor** is an optional add-on that detects changes in Temperature, Humidity and Barometric Pressure. It can be hot-swapped, meaning it can be removed or added at any time while the device is on or off.

E2. The **Sensor Bar** is an optional add-on which features a strain gauge load cell force sensor that can detect sub-milligram forces physically exerted on the bar in two directions. **Force on one side indicates a "Yes" response, force against the other side indicates a "No" response.**

The Sensor Bar must be connected and disconnected while the device is off. It will be automatically detected during power-on. Be extremely careful to connect it to the black section of **P1** only to prevent damage.

Keep the Sensor Bar as vertically upright as possible. It will automatically reset the current position as the new center zero every time the Histogram Timeline Chart reaches the right side of the display and starts over on the left. This also automatically compensates for temperature-induced drift which can occur in strain gauge load cell force sensors like these. Our variation is particularly sensitive. (Prototype unit shown)

E3. (not shown) **REM Duo** - Our take on the Radiating Electromagnetic Field Proximity Detector, times two. It's like having one REM Pod for Yes and another for No. Signals are compared using fancy math to detect an interaction with the Yes or No side, ignoring interference that affects both sides, and continuously self-recalibrating. (Coming Soon, Prototype Available Upon Request)

The **Rem Duo** is basically two REM Pods, and custom code that processes the output pulses. They are compared as rates logged as percentages of the mode of the last several readings, to determine if there has been a significant interaction on one side that is further from the mode than the other. This would indicate either a Yes or No depending on the affected side.

Tips and Notes

Alerts

Alerts only occur when a sensor value changes rapidly. The device auto-zeros and auto-calibrates so that gradual sensor changes are ignored, and natural drift is compensated for.

Events

Sometimes two or three Events will happen nearly-simultaneously and only count as one Event on the Total Events counter. The Alert seen on-screen and in Bluetooth messages is the FIRST sensor to be triggered during the alerting period. The alerting period is the duration that the Alert is displayed, and it must end before another Event can trigger a new Alert. The alerting period changes based on the CPU Mhz speed, but it is near 1 second.

Sensitivity

Electromagnetic interference, radiation or vibration from other devices or natural sources in proximity to this device may trigger an undesired increase in alerts.

This device is specifically designed to measure the smallest possible changes that the sensor hardware is capable of. As a consequence of measuring extremely weak analog signals, there may be slight inconsistencies in the noise floor of each sensor which may cause accidental alerts when the sensitivity threshold is set to a low value.

In either of the above cases, increase the sensitivity threshold to decrease the number of alerts.

Accelerometer

The included internal accelerometer is much more sensitive than the accelerometer built into smartphones because the Sensor Station is extremely lightweight, requiring very little inertial energy to be jostled or moved. Alerts can be triggered by extremely light touch or microscopic movements. The X axis is triggered by force against the long sides of the device (left and right). The Y axis refers to the top and bottom (smallest sides with ports). The Z axis refers to the front and back (the side with the screen and the opposite side with the speaker).

Firmware Updates

1. Download new firmware here: https://twofacesparanormal.com/paranormal-sensor-station/
2. Turn on the unit by pressing the **left button**
3. **Hold down** the **right button** to go to *The Settings Menu*
4. Press the **right button** until *Firmware* is selected
5. Press the **middle button**

6. On the computer where the firmware is downloaded, connect to the **wifi** network with an **SSID** that begins "**PSS**"
7. Open a web browser and go to this website: "**192.168.4.1**"
8. **Select** and **Upload** the new firmware on this PSS website

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Warnings

Do not leave the unit in direct sunlight.

Do not expose the unit to moisture. The ports, which are designed for factory and scientific measurement devices, are not water resistant.

Do not expose the unit to hot or cold conditions outside the operating temperature range of 0°C to 60°C. Sensor damage may occur in extreme temperatures.

The display is not a touch screen. It requires the same protection and care as any other LCD display.

Do not press the buttons any harder than necessary.

Do not exert more mechanical force on the connectors than is necessary to connect or disconnect devices.

Do not store the unit for long periods of time with the battery below 20%.

Disclaimers

Two Faces Paranormal makes no claims as to the presence, validity or origin of any sensor reading. Sensor data interpretation is at the sole discretion of the user. Amusement purposes only. Specifications subject to change without notice.

Software/Firmware Designed in Las Vegas, NV USA. Sensor Bar made in Las Vegas, NV USA. PSS Main Unit and Environmental Sensor made in Shenzhen, China.

The PSS and accessories are sold without any expectation, and to be considered experimental. No claim is made to the validity of the data received by these devices. Suggested use cases do not constitute a claim that any result is guaranteed. No claim is made as to Spirit communications, Aliens, Ghosts or any other type of phenomena. The user agrees not to expose children to this device, or any person who may be harmed or damaged by exposure to this device. You must be over 18 and in sound mental condition to use this device. As the owner of this device you are responsible for the device's use and responsible for the safety of others who may come in contact with this device. This device should not be used by children under the age of 18 or anyone with a history of mental illness.

Main Unit Hardware Specifications

Processor: ESP32 240MHz dual core, 600 DMIPS
Ram: 520 KB SRAM
Flash Memory: 4MB
Radios: WiFi & Bluetooth
Power: 5V, 500mA USB C
Display: 1.14 inch, 135 x 240 Color TFT LCD
Battery: 3.7V, 120 mAh
Operating Temperature: 0°C to 60°C
Net weight: 15g
Enclosure Size: 48.2 x 25.5 x 13.7mm
Case Material: Plastic (PC)

Warranty

The manufacturer warrants this product to be free from defects in workmanship and materials, under normal recommended residential consumer use and conditions, for a period of one (1) year for the original purchase date. Shipping and handling fees are to be paid for by the customer. The manufacturer agrees, at its option during the warranty period, to repair any defect in material or workmanship or to furnish a repaired or refurbished product of equal value in exchange without charge (except for a fee for shipping, handling, packing, return postage, and insurance which will be incurred by the customer). Such repair or replacement is subject to verification of the defect or malfunction and proof of purchase as confirmed by showing the original dated sales documentation. Evidence of access to the internals of the device, or tampering with any labels on the device will void the warranty. Proper recommended usage will not cause damage to the display, speaker, case, buttons, connector pins, sockets, or any other component, and is therefore not covered by the warranty. Software and Firmware corruption are not covered by the warranty. Replacement Firmware is available for the device at no charge for a minimum of one year from the purchase date, for as long as the device is available for sale. User is responsible for updating Firmware and Software. Slight variations in the sensitivity or noise floor of each sensor are an unavoidable aspect of analog measurement and therefore not covered under this warranty unless they are out of the range of the specifications of the OEM sensor hardware manufacturer.