SIS FAQ

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1. OVERVIEW.

1.1. What is SIS?

SIS is the Standalone Intelligent Sensor Platform. SIS utilizes low cost wireless sensors and a custom built "hub" to monitor and log the daily activities of a person living alone. The SIS log can be read out by a family member or caregiver to monitor an elderly or chronically ill person's activities for abnormal behaviors that may indicate a change in the person's ability to live alone. The SIS log is available to the caregiver on any Internet connected device that supports a Javascript-enabled web browser.

SIS has additional capabilities to host an "alert" button that can send a text message to a caregiver or family member. SIS can also be configured to record log information on a Google Drive spreadsheet or other "cloud" application.

SIS is relatively cheap and easy to deploy without any recurring monthly charges.

1.2. What does SIS stand for?

SIS stands for "Standalone Intelligent Sensor" Platform. SIS is "standalone" in the sense that it connects to the Internet via WiFi, requiring only the free Particle Cloud (*particle.io*) service to enable the SIS to communicate with any Internet connected device. SIS is "Intelligent" because it contains an advanced 32 bit microcontroller that is programmed to draw inferences from a number of sensors that are connected to SIS. SIS is a "sensor platform" because it integrates multiple, inexpensive wireless sensors and can be extended by a computer hobbyist.

1.3. What problem(s) is SIS intended to solve?

SIS allows a caregiver or family member to remotely monitor the activities of an elderly or chronically ill person who is living alone. The person's activities (as indicated by movement throughout the home) are logged and available for real time review by the caregiver over the Internet. The caregiver can thereby ascertain whether the resident continues their normal and routine activity pattern, or has a change in their activity pattern than might indicate a decline in their physical or mental condition.

1.4. Aren't there many solutions already on the market to address these problems?

SIS is intended to fill a market gap between standalone, single function Internet of Things (IoT) devices and complex, expensive, multi-sensor services. SIS is intended to be used in and around the home to sense and record events and to be capable of drawing inferences from multiple sensor events. Single function IoT sensors and multi-sensor services that currently exist in the marketplace all require expensive cloud services to fuse data from multiple sensors into useful information. SIS can perform the sensor data fusion internally and provide access to both raw and processed information to any Internet connected device. No services involving recurring costs are needed except for a WiFi internet connection.

1.5.   What is the current status of SIS?

SIS is released and available to anyone under an open source, non-commercial license. SIS is not a commercial product. The user must purchase and install the equipment and must build the SIS hub from a set of instructions involving simple through-hole soldering and hand tool assembly. The SIS release package contains detailed instructions for assembling the SIS, loading firmware into the SIS hub, installing sensors and configuring SIS, and using SIS to monitor the resident's activities.

SIS is an open source project. We expect that additional uses can be found for the SIS through hardware and software enhancements. We are interested in any enhancements to this basic system that people may find useful.

1.6.   What kinds of sensors can SIS accommodate?

SIS is designed to use inexpensive, battery powered, wireless sensors that transmit "trip codes" over the 315 MHz and 433.92 MHz RF bands. These bands are available internationally for use with low power, unlicensed transmitters.

SIS sensors utilize on-off keying (OOK) modulation and transmit codes compatible with PT2262 and EV1527 chip sets. Compatible sensors can be purchased over the Internet from EBay and Amazon.com for under $10 each. Sensors that we have tested include: proximity infrared (PIR) motion sensors, magnetic door/window separation sensors, water level sensors, vibration sensors, and keyfob pushbuttons. Other types of compatible sensors are available for purchase: e.g. smoke and fire detectors.

It is possible to attach all manner of wired sensors to the SIS hub's internal microcontroller digital and analog ports, albeit the firmware would need to be modified to support these. The SIS firmware is open source and we encourage people to make or suggest enhancements to the current design. Additionally, we have developed Arduino software that produces SIS compatible wireless signals, so that people can invent their own wireless sensors if they wish to do so.

1.7.   What is the cost of a fully functional SIS product?

SIS hardware is costs $100 to $200, depending upon the number and types of sensors used. Parts cost for the SIS hub is under $50 and sensors cost between $3 for a wireless magnetic separation sensor to under $8 for a wireless PIR motion sensor.

1.8.   What is the next step?

Please look at our open source documentation at:

https://github.com/TeamPracticalProjects/SISProject

2. Technical FAQ.

2.1.   What is the technical status of SIS?

SIS is released under open source, non-commercial license. Complete documentation can be found at:

https://github.com/TeamPracticalProjects/SISProject

2.2.   What are the specifications for wireless sensors that are compatible with SIS?

SIS is currently designed and tested with sensors using On-Off Keying (OOK) modulation operating in the 315 MHz and 433.92 MHz bands. These bands are popular because they are available worldwide for unlicensed low power transmission. SIS can decode signals from sensors that use the PT2262/2272 protocol and the EV1527 protocol for encoding sensor address and data information. Typical wireless sensors in attractive packaging that conform to these specifications can be purchased on ebay for under $10 each. Since SIS contains an advanced microcontroller, it could be extended to decode additional wireless protocols, as needed.

2.3.   What are the requirements for using wired sensors with SIS?

The SIS hub printed circuit board has been designed to provide access to some of the internal microcontroller's analog and digital I/O ports. External signal conditioning and/or level shifting circuitry may be required between sensors and the SIS microcontroller. Additionally, the SIS firmware needs to be modified to properly support additional types of sensors and different or altered SIS applications. We are interested in additional applications for SIS, whether the ideas are for us to implement or modifications made by other people to our open source design.

2.4.   How does SIS communicate over the Internet?

SIS requires access to WiFi to communicate over the Internet. SIS currently supports IEEE 802.11 a, b, g and n. SIS supports WPA2, WPA, WEP and no encryption. SIS works on WiFi home networks and can communicate through NAT and firewalls common to home and small office WiFi routers. A free account with *particle.io* is needed to provide the cloud services that connect SIS to the public Internet. Additional services, such as Android and iOS notification, SMS texting and voice notification can be provided via the free IFTTT service.

3. OTHER FAQ.

3.1.   Who are the developers of SIS?

The developers of SIS are Bob Glicksman and Jim Schrempp. Bob is a retired electrical engineer with 42 years of experience in electronic system development. Jim is a software developer, entrepreneur, web master and product designer/builder. Bob and Jim have developed many products independently and have co-developed the "Pill Reminder". See https://github.com/TeamPracticalProjects/PillReminder for details about the Pill Reminder.