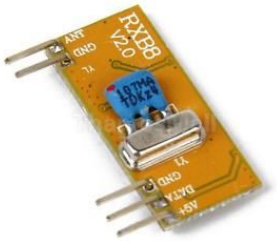
Wireless Reception Tips

November 2016

In working with our own SIS projects we were frustrated with the limited range of the wireless sensors we selected. Sometimes the sensors would be reliably detected from 100 feet and at other times the reception was unreliable at 20 feet. Working through these problems we have come up with a few tips that will be of use to anyone having reception problems. Using these tips you should be able to get reliable reception up to 100' away.

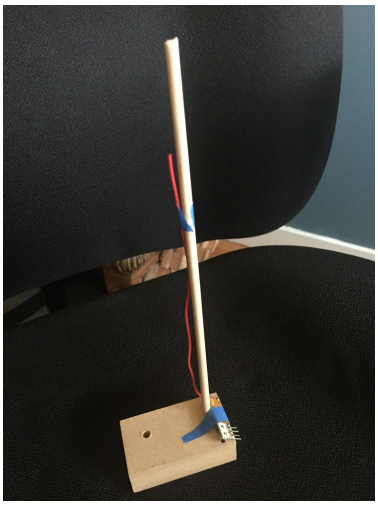
The Best Receiver



We found that receivers labeled RXB8 or RXB12 worked better than cheaper alternatives. The RX series of receivers cost us just $1 more, but they were worth it. The best way to purchase these is to google search "rxb8" and look for a reputable source; there are many.

Antennas Are Vital

We found that at a distance of 10 feet or less the sensors are always received. We believe the signal strength at that distance overcomes any limitations in the SIS receiver system.



At greater distances we found that a simple one quarter wave antenna attached to the receiver improved performance dramatically. The antenna can simply be a solid core wire that is the correct length (433MHz = 6.8 inches; 315MHz = 9.4 inches). It performs best in our tests when it is vertical. We drilled a hole in a small block of wood and inserted a dowel. The antenna wire is then taped to the dowel.

We found that some receivers came with small coiled antennas. In many cases that set up was very sensitive to the position of the receiver. Moving the receiver six inches in some direction could cause a large decrease in sensitivity. Conversely, we have found that a vertical, ¼ wave antenna is insensitive to receiver orientation or position.

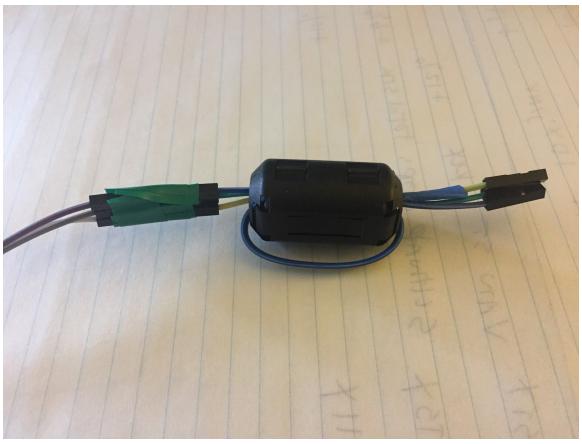
Photon Noise

We found that the Photon processor radiates enough noise to interfere with reception. You might experience this if the wires between the SIS PCB and your receiver pass over the Photon. We found several things help minimize this.

First is to make sure your receiver is not mounted on the SIS PCB itself. We found that this mounting can cause poor reception.

Second, keep some distance between the SIS PCB and the receiver. If you mount your SIS in a small enclosure, be sure to put the receivers at the ends of the box and route the cables so they do not cross over or under the PCB.

A third method is to use a ferrite core. The photo at the right shows a core on the three cables. Note that the cables loop through the ferrite core. The ferrite core should be placed on the end of the cable that is near the receiver. We found that the specified 6-inch cable is not long enough for this use; you can see in the photo that one 6-inch length barely wraps once through the core. In this case we used a second 6-inch cable. We attached them together by pulling some long pins from a “through header” commonly used in the Arduino world. We put the pins into the ends of one set of cables and pressed the other onto them, and then secured it with a bit of tape. Of course soldering is a better solution.



The Environment

In testing our wireless set up we found that the particular environment makes a difference.

We found that a modern house with 2x4 framing and sheet rock gave easy reception. An older house with lathe and plaster walls required the ¼ wave antenna in almost all configurations.

We found that one location would have short periods where reception was terrible. A minute later the reception would be fine. This location is across the street from a police station with its heavy duty broadcast antenna. While not proven, we feel that these occasional periods of poor reception might be caused by interference from the police and fire radios.

We also found that movement of people between the wireless sensor and the receiver can degrade receiver sensitivity. This would not normally be an issue for an SIS installation because SIS is designed to monitor persons living alone.