Popular Science Summary

Using your smartphone to blink secrets into sensor nodes

Have you ever wondered what would happen if somebody could access your refrigerator? Might seem silly, but how about your front door's lock? With the ever increasing connected society, you might have to think about these questions sooner rather than later. The establishment of our connected society is heavily dependent on sensor nodes. There is currently no rigid way of loading the necessary cryptographic keys into these sensor nodes. Now, to enable these sensor nodes to communicate securely, we have studied alternative ways of using your smartphone to transmit these keys to the sensor nodes.

In this thesis, we have shown alternative ways of using a smartphone to transmit cryptographic keys into sensor nodes. These alternative ways were achieved by using components not otherwise thought to be used for communication. For instance, we built prototypes that used the flashlight; the screen and the loudspeaker to successfully transmit the keys. Doing this we were able to make the transmission easy to use while at the same time upholding a high level of security.

Currently, the sensor nodes have many protocols available to use for secure communications. However, these protocols often lack information about how one should load the sensor nodes with the keys, to begin with. In essence, they provide you with the car but not the key to start it. This is a problem that needs a concrete solution.

The result of this thesis can be used as a guideline for further development of this type of solution. Our prototypes indicate that this type of solution is not only viable but can be secure as well. Using nothing more than a smartphone and small additions to the sensor nodes hardware.

Briefly, the prototypes are built using an Android-powered smartphone as "key-transmitting device" while the receivering "sensor node" is equipped with a microphone or a photo-transistor. The additions to the receiver enable detection of both light and sound waves sent from the smartphone. Then, using the smartphone, the user is able to transmit data by blinking with the flashlight or screen; or sending tones with the loudspeaker, which the receiver interprets.