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about 1100 words

## Developing an Internet of Things

By Yvonne V. Richardson

The Internet of Things is mostly sensors that tell you information about the thing to which they are connected. There is a difference between sensors that record a state (input) and sensors that perform a task (output) that includes sound or motion. Different devices may accomplish the same task, and they may or may not have the same names. For example, the IoT thing that indicates whether a door is open may be named a door sensor, a contact sensor, or a motion sensor. In addition, some sensors also contain temperature sensors, and battery indicators for their radios.

Some sensors that are available on the market are for temperature, contact, vibration, motion, and tampering. There are also buttons, switches, and outlets that control other devices, in addition to sensors that report on water leakage, humidity, and remaining battery power. Then there are IoT devices that are not sensors, like coffee pots, clothes dryers, and dishwashers. A mobile phone is considered a presence sensor, especially for devices that need to know the location of the phone for a specific task. Finally, there are lock sensors that can be integrated with security systems that include audio and video, which are outside of the scope of a basic introduction.

Most initial IoT architectures are input sensors only. There is a difference between determining that a door has moved (input) and giving instructions to move the door (output). When you make a written plan for your Internet of Things, keep in mind the place in which you will be installing your IoT network. Eventually, information like square footage will be relevant, but not in the first stages of planning. A basic sketch or outline will help you determine what you should purchase, how to install it, how to monitor it, and how to upgrade it.

Basic elements will be a modem, a router, and your IoT device(s). Depending on the Internet service, the modem may be the same device as the router, or you may want to have two separate boxes. Some IoT devices may require a hub that connects to your router or modem. Others will directly connect to the internet within the IoT place.

Some IoT devices require a mobile phone, a computer, or both. There will be an app that you can use to monitor and control the device. The app that comes with the IoT device is usually your best bet. You can extend it with plug-ins and apps after you have a stable installation.

Some basic decisions will affect your sketch before you purchase anything. This list is just a few of them.

- How much of your IoT will be internet-accessible outside the place in which they will be installed?  
Some devices have a perimeter, and some will be available over the Internet by using an IP address.
- How much cloud support do you want?  
Some IoT places are completely self contained, other than the presence sensor that communicates with the apps. Some devices are tethered to the device manufacturer for cloud-based support, so your IoT place may be impacted by device upgrades that improve their client support for your entire continent. Whether you mix them is often dependent on the size of the IoT that you are building.
- How mobile is the phone on which the IoT apps are loaded?  
To a certain extent, the IoT mobile device works like your television remote control, but it also works like a network administrator console. The more IoT apps there are, the more vulnerable the IoT place is. Phones and tablets are easily lost, stolen, or damaged, and recovery may be more difficult if the broken tablet is also your IoT control. In some instances, one phone is your usual mobile phone, and a second phone, for the IoT, stays within the IoT place.
- How will you phase your installation?  
For example, you may have three doors that you want to monitor, but you should probably experiment with one door sensor first. Then when you are completely happy with how your IoT works, you can purchase and install the other door sensors. There is a good chance that the sensor will still be on the market.
- What backups are you building into the IoT system?  
Is the stability of an IoT system more complex than a typical Internet installation? What you do for backups, passwords, device or battery replacements, and other factors should be considered before purchasing or installing anything. You do not want new devices to open holes that previous devices had closed.
- How will you store your research?  
Factors in your purchasing decisions include the brand name, the app that controls the device, the look of the sensor, what radio network it uses, compatibility with the generic device or standard, and, of course, price. Keep a record of what you like about your choices, so you can get more devices later that are compatible with what you have already built. Web sites and online manuals may provide information that you can download and use.
- How will you store your sketch?  
For some IoT installers, the sketch is only a list of items that are in the net. Other installers keep spreadsheets that include installation dates, distances between repeaters, locations of concrete items that may block radio transmissions, in addition to IoT device makes, models, and MAC

addresses. There will most definitely be changes between the plan and the actual installation; do not allow the differences in devices to make you lose sight of your original plan.

- Where is the information on every device?  
All of the devices that you consider have their own instructions that may change with every update. Likewise, there is no guarantee that everything they do is explained, or works as described, in whatever documentation is available. Regardless, there are usually online manuals, chat groups, and communities when people are willing to write in, and answer, questions for other IoT installers.
- How do you test your IoT installation?  
How a device works with one hub may be different from how it works with another hub, so experimentation is a good idea. You may not be aware of bricks-and-mortar architecture that blocks IoT transmissions or reduces battery life until after the devices are in place.

The Internet of Things can be a complicated place, because it is not an extension of previous Plug-and-Play experiences. Even the selection of the communication protocol between devices – Z-Wave, Zigbee, or Wi-Fi – can make a difference to the IoT place that you construct. Remember that investments in IoT should make your life easier, and do a little research before you decide which manuals to read.