# Using Digital Input Modules in Distributed Systems to Detect Switch State

By Martin Hsu

Distributed System monitoring applications often need to use digital input modules

(DI modules) to monitor the state of the switch used in the control logic. The procedure described in this article will be based on the two most typically seen general switched states for electrical signals in order to illustrate how to use the DI module to detect a switching action.

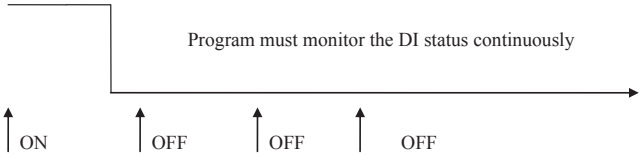
## Switch button

A common switch is shown below.


When one toggles the switch from "Off" to "On," the electric current will change, as shown below.

There are a few points to note about such switches:

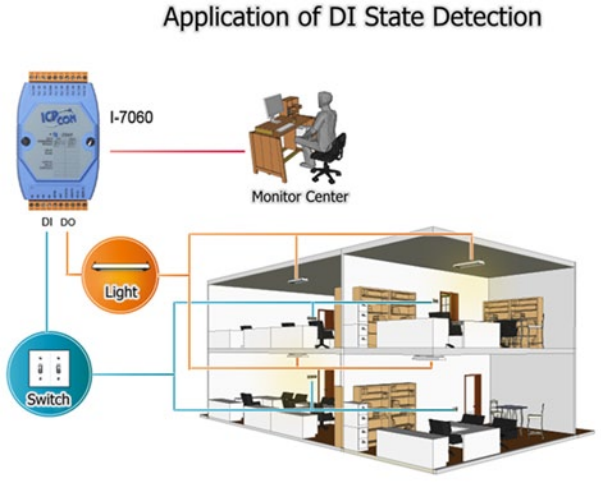
1. The position is physically apparent
2. The switch state will probably remain constant for minutes or even hours




Typical applications of such a setup are seen in general programs that constantly poll the DI state, acting accordingly depending on the status of the DI.

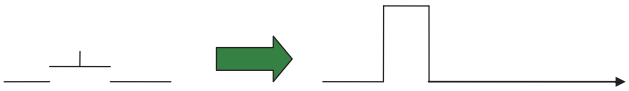
### Reading DI as a Switch Control

If a change is detected in the switch output for the DI module, as in general indoor lighting, the switch maintains its state for a considerable time. This type of application is typical of using DI readings for logic control.



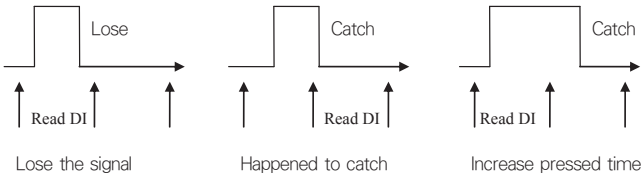
## Push Button


Another typical switch is the push-button, as illustrated below.



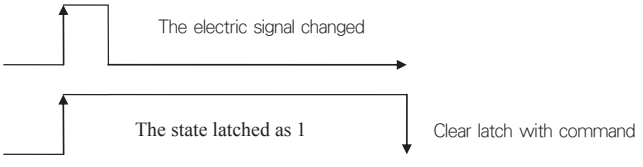
These switches have some particulars, too:

1. The position is also physically apparent
2. State changes only persist for a few (milli)seconds




In a distributed system, large, module-heavy networks contain hundreds of inputs, each only sending signals in bursts of a few milliseconds. Many users will complain that their systems are not reacting or are not sensitive to quick changes, requiring buttons to be pressed for a long time before eliciting any response.

In these (unfortunate) situations, ensuring that the switch properly sends a signal either requires some luck, or some familiarity with the system(i.e., knowing how long to press the button).




Accelerating communication is not a solution to such a situation – something that is a common misconception. In fact, the desired approach is to apply the module's DI Latch function.

The following describes how to utilize the DI Latch function to sense switch state changes.

The DI Latch has both "High" and "Low" states; as the illustrated in the example, when the DI receives a change in the external signal from zero to one, the module will "latch" the signal “up” to its position, and the latched state is maintained until it is cleared by either a command or power cycle.

### Application of the DI Latch to Switch Control

Sensors situated in staircases generally rely on the presence of a person in the stairwell in order to trigger the lights. As with the push-button example, any change is transient, so the DI Latch approach is well-employed here to detect changes in the signal to switch on the stairwell lighting.

Application of DI Latch Detection