

Article from OSNews.com

[Building the Wired Home: Elk M1 Home Security System](#)

posted by [David Adams](#) on Tue 22nd Sep 2009 02:01 UTC

In some sense, home security systems suffer the same fate as mobile phone handsets. Most people, if they have one, have the one that a security monitoring company installed, and their only interaction with it is to turn it on or off. But some people want more than just a security system. Some people want a security system that can be expanded to perform almost any kind of home monitoring and automation task. You know, lunatics. Lunatic geeks. Enter the Elk M1.

At their heart, security systems are relatively simple circuit board with a lot of inputs and outputs for various sensors and accessories, and some kind of programmable, scriptable capability. When a sensor detects a condition that the installer has determined to indicate a break-in (door opens, motion sensor activates, etc), then the system initiates a series of events, according to the scripts: alarm sounds, police is called, etc. For most security systems, this is the end of the story. But there's no reason you need to restrict the inputs to only intrusion sensors, and there's no reason you need to restrict the outputs to alarms and dialers. If you make the programming and scripting capabilities sophisticated enough, there's no limit to what a system like this could do.



As part of OSNews' ongoing series on home technologies, we worked with a homebuilder to install an [Elk M1 system](#) in a new home in Park City, UT. Like all of the stories in this series, our goal was to take generally-available computing devices and bring them together in a way to solve problems that homeowners face, without spending a lot of money. In this case, we wanted to centralize all of the home's monitoring and automation tasks into one reliable device. Even though we had put [a lot of thought](#) into ways that a commodity PC could be used as a home's "nerve center," we didn't want to have to depend on a PC for such mission-critical monitoring, and wanted to be able to turn off or hibernate the home server when it's not needed, etc.

This article will cover the home security and monitoring aspects of our M1 installation, and we'll cover more home automation in a future article once we have completed more of that work.

We started way back when the house was still bare studs, right after the main electrical wiring had been installed, by specifying where wire needed to be run. Though many security systems are installed in existing homes using wireless sensors, for [various reasons](#), not least of which is the necessity for wireless sensors to have batteries replaced, it's always better to hard-wire when possible. We chose to wire every door and window (including garage doors) for contact sensors, motion sensors covering the home's main thoroughfares, and a glass break sensor in an area in the back with lots of windows. Most importantly, we installed wire for monitored smoke and CO detectors in every area of the home that's required by building code. Lastly, we wired for the

alarm sounders, strobes, and speakers that were to be part of the system's alert and notification outputs. All of these cables were coiled up into a metal wiring box in the utility room, until much later in the construction process.



After the wallboard and painting was done, it was time to install the various sensors and outputs. Doors and windows generally use a magnetic contact that breaks (or completes) a circuit when a magnet is pulled too far from the sensors. The various other sensors and detectors are all more sophisticated, but work on the same principle, breaking or completing an electrical circuit. And there are other sensors you can install: water sensors, heat sensors to detect fires, temperature sensors which can trigger events at a temperature threshold, doorbell and phone ring detectors, vibration sensors, pressure sensors, rain sensors that can be used to trigger sprinklers to be disabled, car detectors that can sense a car passing the driveway, etc.

At the most basic, the first priority was for intruders and fires to be detected, and the appropriate alarm to be sounded. Let's just say that the Elk M1 handled these issues with aplomb. Because there are sensors on all the doors and windows, the system can also report which of them is open when you try to arm it, and you can make your decision whether you want to go close an upstairs window or just set the alarm anyway. The smoke alarms are set so that if one goes off, they all sound the alarm, and since there's one in each bedroom, it makes it much more likely that sleeping home occupants will evacuate before the fire gets too big. One of my favorite features are the RFID proximity keyfobs that can be used to arm and disarm the alarm, so you don't have to key in a code. The system can also be configured to be armed and disarmed with a radio frequency keyfob, like a car alarm. The alarm install technician who helped us with the install mentioned that he had even set the external alarm horn on his house to chirp when he hit the alarm button, just like a car, until his wife got annoyed and made him deactivate that feature.

Normally, programming of the M1 can be done either by navigating through the menus in the keypad (which can be pretty daunting unless you just have a few things to configure) or by hooking up the panel to a computer with a serial connection and using Elk's Remote Programming software. We installed Elk's Ethernet module, which not only allowed me to program it from a computer anywhere in the house, but if I were to get my router configured correctly, from anywhere on the internet. I could, for example, remotely deactivate the alarm if a friend needed to get into the house while I was away, and not have to give them my code.

And of course, no lunatic geek would be satisfied unless this kind of remote management could be done through a mobile device. Thanks to an intrepid iPhone developer named Jayson Callaway, there's an app for that! The Elk network module relies on Java for its web interface, so that's no go on the iPhone and many other mobile platforms, but [eKeypad M1](#) is an iPhone app that provides an interface to the networked Elk M1 system. It lets me arm and disarm the system,

check the status of the zones, monitor status of inputs, such as temperature sensors, adjust networked thermostats, and even control lighting and other home automation functions.



For people still living in the 20th century, the M1 can be configured to answer the phone, enabling control of the system with the phone keypad. One related feature that I wired for that I haven't configured yet is the "listen in" feature, that would enable someone to call into the system and speak to the inhabitants of the house over a loudspeaker, and hear what they have to say through a microphone. This is would be used to allow the monitoring company to speak to whoever's in the building before they call the police, or just listen for commotion, or for someone to check in on children or an elderly relative.

One fun feature of the Elk M1 is its voice status indicators. When an alarm goes off, a voice announces the particulars over a loudspeaker, such as "Fire! Fire!" or "Zone Violated: Motion Sensor Living Room!" so it gives you some kind of idea of what's going on.

The one big home automation task that I have set up is an automatic water cut-off feature. I had the plumber install a [motorized water valve](#) on the home's main water line. We then ran cable to the utility and storage rooms, where an appliance might leak or a burst pipe would spray water. We put inexpensive water sensors in those areas, and programmed the Elk M1 to cut off the main water whenever those sensors went off. It is also set to speak an alert: "Water alarm, water valve off" when the script trips. The F6 button on the keypad turns the water back on. This way, the homeowner can have peace of mind that even in the event of a burst water heater or wintertime heating system failure, damage will be minimized, even during vacations.

My future plans for this system, which will be covered in a subsequent article are to complete the lighting control setup, with support for one-touch lighting themes, and integration with the alarm system that will turn all lights on during an alarm and even use the security sensors to turn on lights, such as turning on exterior lights when the garage door opens or the hall lights when a motion sensor is tripped. Also, I plan to integrate the home's nine thermostats with the Elk M1, allowing a vacation setback, wherein the house could be set to a cool-but-not-freezing temperature while you're away, but you could call up the house the day before you return and tell it to be all warmed up when you get home. Stay tuned.