“Smart door chime”

Functions:

- Chime if someone enters through office front door
- Do not chime on exit
- Only chime during business hours
- Send email alert if entry detected outside business hours

By:A.Rehnvall
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About the ezeio

The ezeio is a programmable, communicating controller suitable for many applications. The ezeio is integrated with a Internet based service to facilitate easy set up, programming, monitoring, data logging and alarm functionality via secure and robust IP communications over Ethernet or GSM Cellular.

The ezeio controller has four discrete inputs for digital or analog sensors and two relay outputs. It can be expanded with digital temperature sensors or additional I/O over a MicroLAN low-speed sensor bus. The ezeio may also control ModBus slave devices through its built-in RS485 connection.

The ezeio is very suitable for data collection and supervision applications. The data from any input may be recorded and automatically sent to the cloud servers for storage and presentation. Each input can also be programmed with multiple alarm thresholds to send emails, control outputs or perform other actions via the easy to use web user interface.

Communications is very secure and is completely bidirectional. Control commands can be send directly from the user interface, from email, other web pages or systems.

Multiple ezeio controllers may be managed from a single login, and multiple users can access the controllers – even at the same time. Centralized user management also allow easy addition/removal of access rights.

Physical: 6.0 x 3.9 x 1.5 in
153 x 100 x 38 mm
Approx 0.5lb (220g)

Power: 8-25VDC, <1W avg
12VDC adapter included

Environment: 32-120F / 0-50C, non condensing

Inputs: 4 inputs on screw terminal configurable for voltage, switches or current loop
0-10V, 10mV resolution
0-30mA, 32uA resolution

Outputs: 2 relay outputs on screw terminal
Form C (1 pole switching)
Max 2A / 50V

Expandability: Up to 40 inputs, 40 outputs.

Network: Standard Ethernet, TP 10/100, RJ45
DHCP address, preconfigured to communicate with cloud servers.
Tri-band GSM/GPRS modem (optional)
128 bit encryption, typical <5MByte/month

Modbus: RS485 @ 19200bps, Modbus RTU master. Compatible with wattmeters, thermostats, relay modules, VFD's.

Sensor network: MicroLAN, up to 20 sensors, RJ12 jack
Max 150ft/50m network length

Data logging: Individual log interval per input. 5s - 4h. Automatically transferred to servers for access & backup.

Input triggers: Up to 4 alarms per input with alarm/restore thresholds and holdoff timers.
Each alarm can activate up to four actions (sending messages, controlling outputs or other local functions)

Schedules: Up to 20 schedules each with four intervals and weekday flags.

Timers: Up to 20 timers, hourly, daily or monthly with repeat counters.

Scripts: C-like syntax. Support for events, floating point math, string manipulation and communication. Up to 64kB compiled code. Compiler/editor in web UI.

Objective

The ezeio will monitor traffic through a door, and by combining information from two different sensors determine the direction of the traffic. A chime/door bell sounder will be triggered only if the person is entering, and only during business hours.

NOTE: Although fully functional, using the ezeio as a door bell is a bit like using a Rolex watch as a paperweight – it does the job very well, but there are better things you can do with it. The purpose of this writeup is just to illustrate some of the functionality and to inspire the reader to come up with new applications.

Theory

We will use two sensors in close proximity of the door: a magnet contact that triggers immediately when the door is opened, and a motion detector inside the door that monitors movement in the area immediately inside the door. When a person opens the door from the outside, the magnet contact will immediately trigger, and the motion detector will trigger as soon as the person walks through the door.
If the person opens the door from the inside, the motion detector will already be triggered when the magnet contact detects that the door opens. This way, the ezeio can easily detect the direction of the traffic.

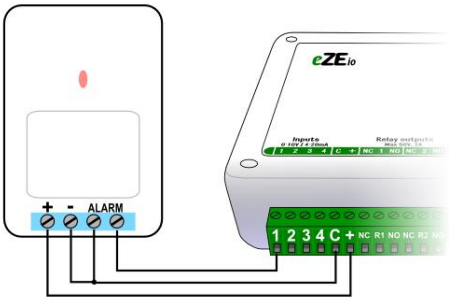
Parts required

- ezeio controller
- Motion sensor
  we're using a standard PIR, Passive Infra Red, detector typically used for burglar alarms
- Magnet contact with magnet
  this is also a common part in burglar systems. Some doors are pre-wired with a contact in the frame.
- Sounder, Chime, Buzzer or Door bell
  may need a separate power supply if it require something else than 12VDC

Connections

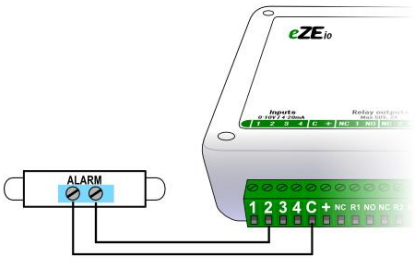
Motion detector

Motion sensors for burglar alarm systems typically require 12VDC. The ezeio provides a suitable output on the terminal strip. When motion is detected, the sensor will activate a small internal relay that is usually wired as “nomally closed”. Thus, the contacts will break the connection between the relay terminals on the sensor.
This kind of output is directly compatible with the ezeio inputs. Normally (when no motion is detected) the ezeio input will be connected to 0V. When the motion detector relay opens, the pull-up resistor internal to the ezeio will make the voltage on the terminal rise to about 2.8Volts.



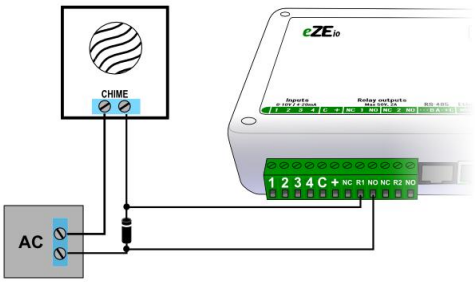
Magnet contact

The magnet contact do not require a supply voltage. The contacts can be directly wired to the ezeio 0V and one of the inputs. The ezeio internal pull-up resistor will ensure that when the magnet contact is open, a voltage is applied to the input just as for the motion detector.



Chime/Sounder

For our setup we used a $10 door bell from Home Depot. It requires 16VAC to work, and a transformer was included in the package, as was a pushbutton (that we won't use) and a diode. We use one of the relay outputs on the ezeio to replace the push button. Other than that we followed the instructions for the door bell.



Verify connections

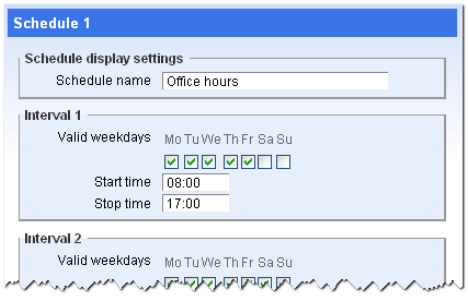
To make sure all the connections work as they should, navigate to the status page at ezecontrol.com and check the inputs.

- Input 1 (the motion detector) should show close to zero Volt when there is no motion, and about 2800mV when it detects a human.
- Input 2 (the magnet contact) should show close to zero Volt when the door is closed, and about 2800mV when the door is open.
- Also try clicking the ON/OFF buttons for output 1 to make sure the sounder reacts.

Programming

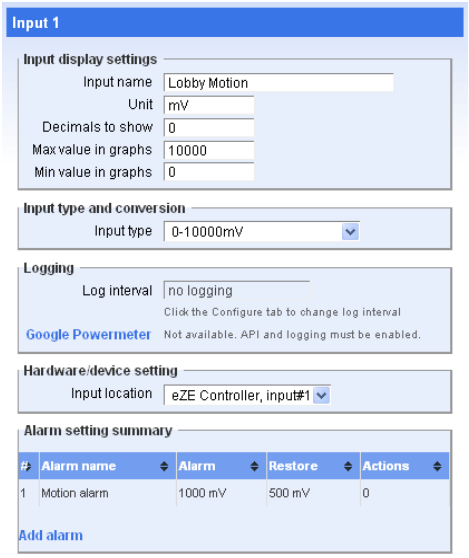
Schedule – Office hours

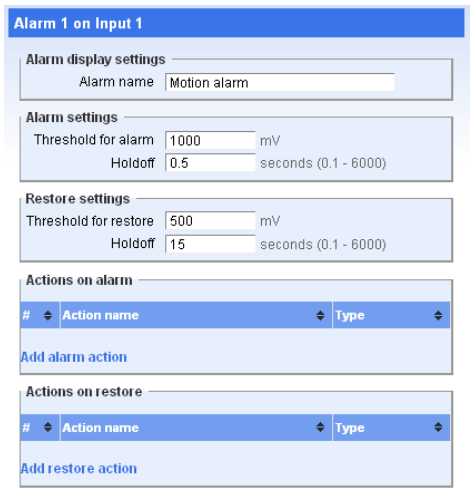
First we need a schedule that is active during office hours. No actions are required on this schdeule as we're only going to use it as a filter for the input actions on input 2 (see below).



Input 1 – Lobby Motion

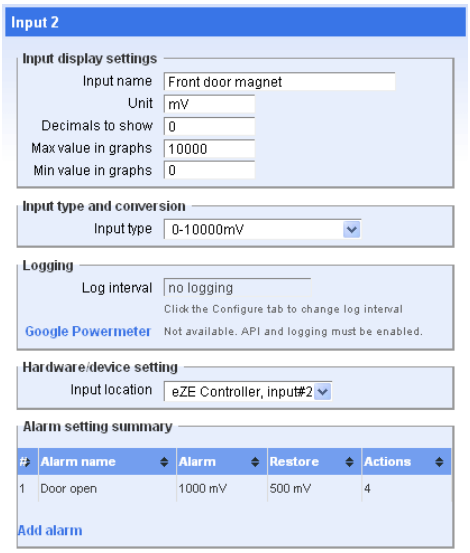
All we need on this input is to set it in alarmed state when the motion detector trips. We also want to hold the alarm for a few seconds. This is easily set up with a holdoff time on restore, in this case 15 seconds.

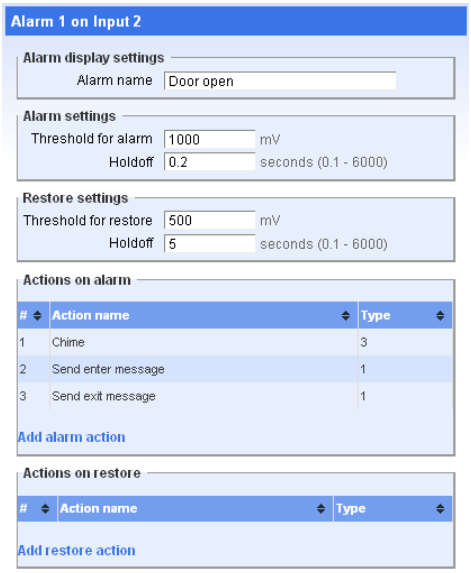




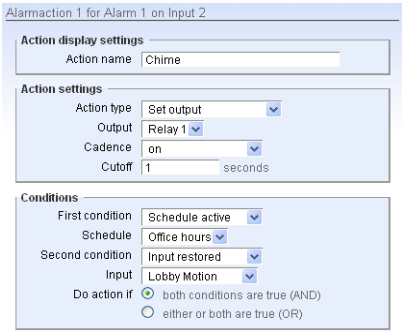
Input 2 – Front door magnet

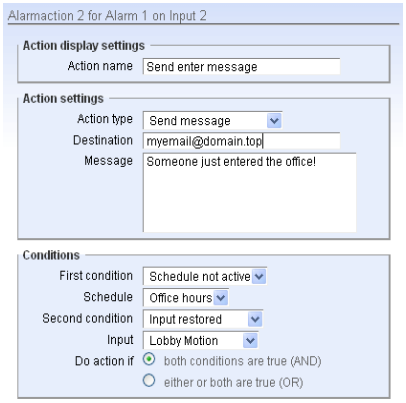
The magnet contact is the input that will trip the chime or the message. Start by setting up the input and one alarm with suitable thresholds. A 5 second holdoff on restore ensures there is no double trip if the door bounces.

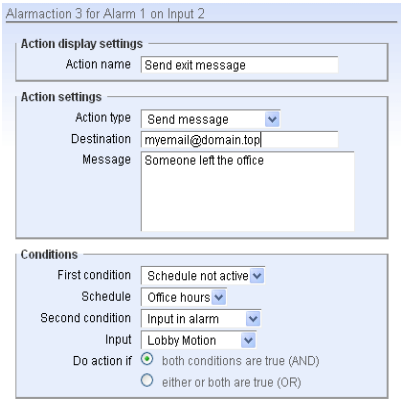




Finally we need actions on this alarm to trip the chime, and to send messages on entry/exit.







Notice the condition fields. For alarm action 1, the output will only be activated if the schedule is active (during business hours) and the motion input is not in alarm – which means we'll get a chime only if the door opens before the motion detector sees any motion.

Results

We have implemented a simple door chime system with email alarming capability. The chime is a bit unique in that it detects the direction of the person passing through the door, thus avoiding annoying extra chime signals. The system also automatically reverts to alarming mode during non-office hours, and alerts the owner if there is unexpected entries.