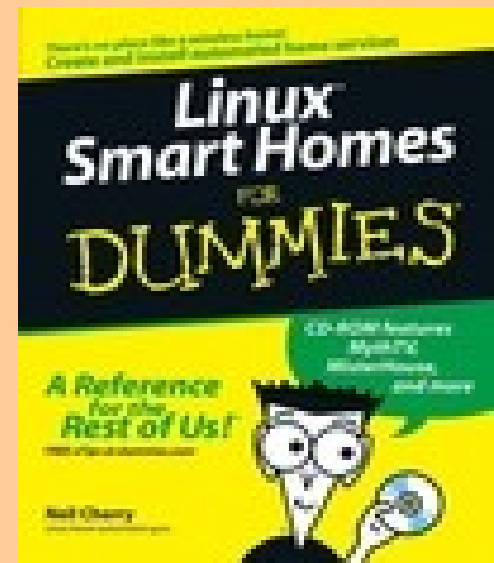
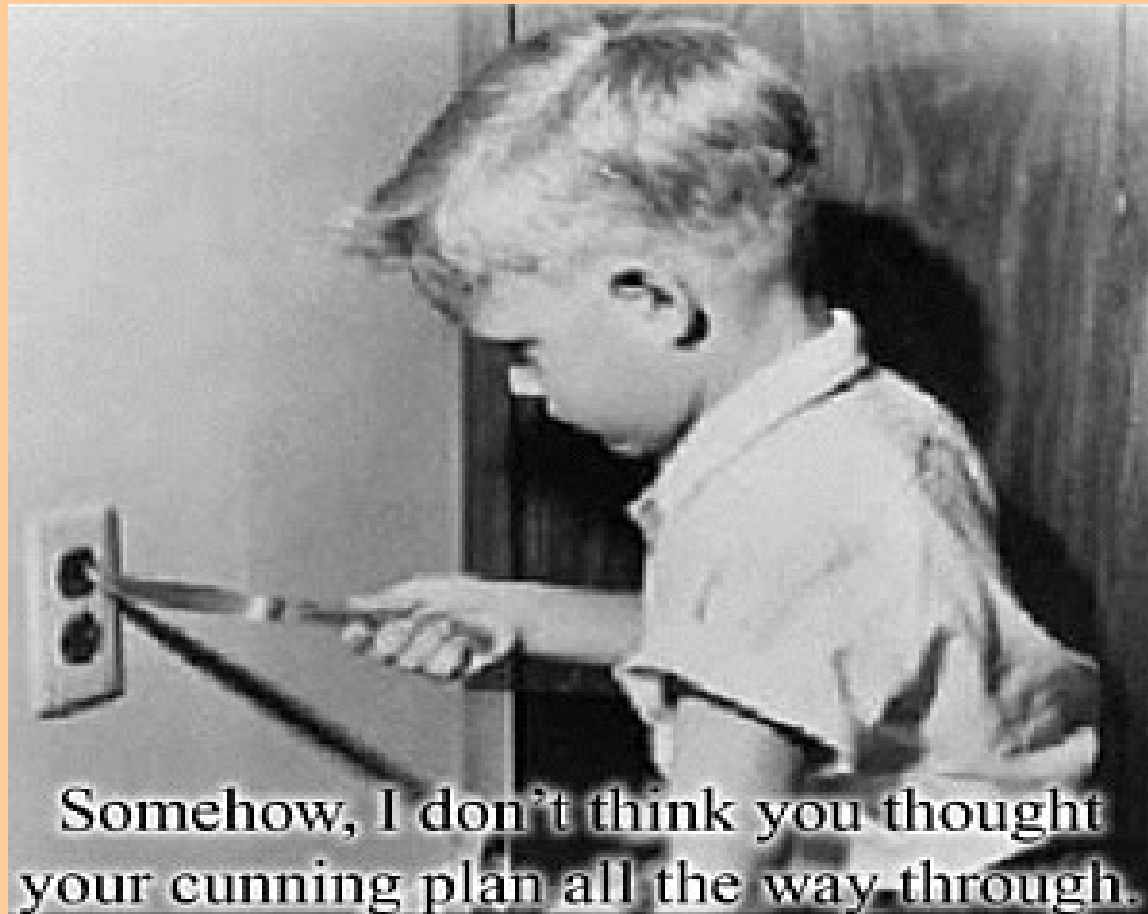


Presenting Home Automation



Safety



Somehow, I don't think you thought your cunning plan all the way through.

Disclaimer

- None of the opinions expressed on these pages are paid for. They are strictly my own and may not represent an endorsement of someone's project, product or service (unless otherwise stated so).

My Introduction

- Neil Cherry (ncherry@linuxha.com)
- my web site: <http://www.linuxha.com/>
- Author: Linux Smart Homes For Dummies
- Linux *HA* stands for Linux *Home Automation* not Linux *ha*!
- The term Linux HA could also mean High Availability

History

- 1950's Popular Science article
- 1970's Internet Coke machine
- 1978 BSR X10, CP290 RS232 transmitter, TW523.
- 1980's -Steve Ciarcia, Byte magazine
 - Jan 1980 - Computerize a Home
 - Apr - June 1985 - Home Run Control System
 - 1988 - HCS II, HCS DX, Spectrasense 2000
- 1990's - CM11A, CM17A, MR26A, CM19A
- 2000's - CM15A, Insteon, UPB & Z-Wave

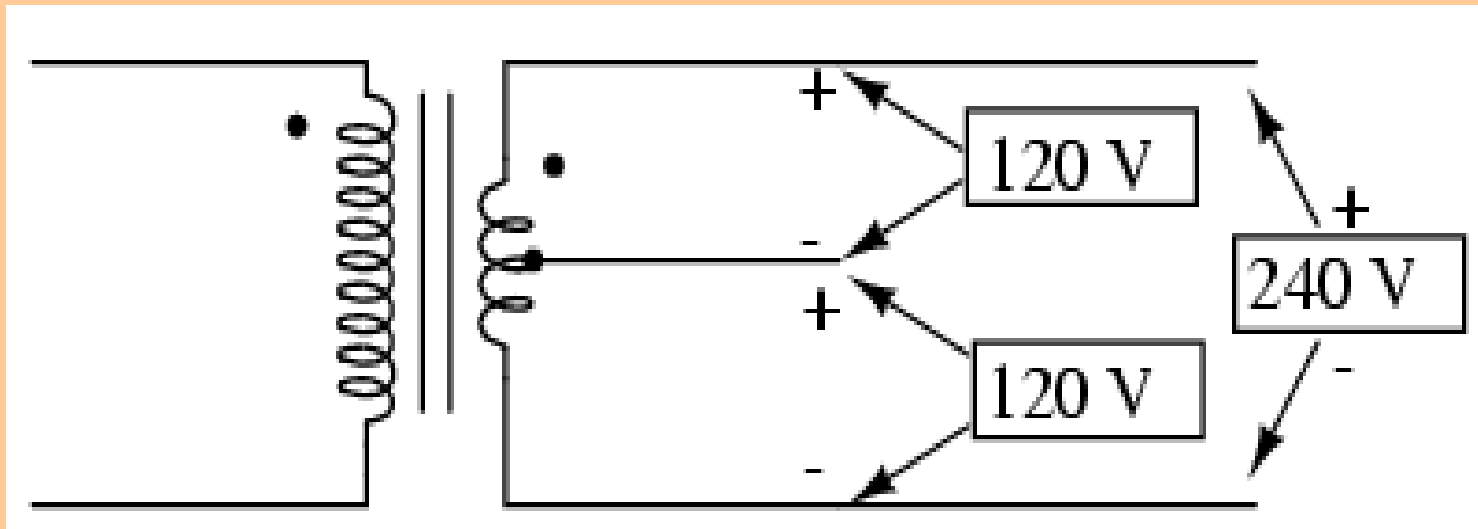
What is home automation (HA)?

- Home Automation (or Domotics) is automation specific to the requirements of private residences. It applies techniques for the comfort, security, entertainment and communications needs of it's residents.
- In simplest terms it is control and monitoring of devices and information.

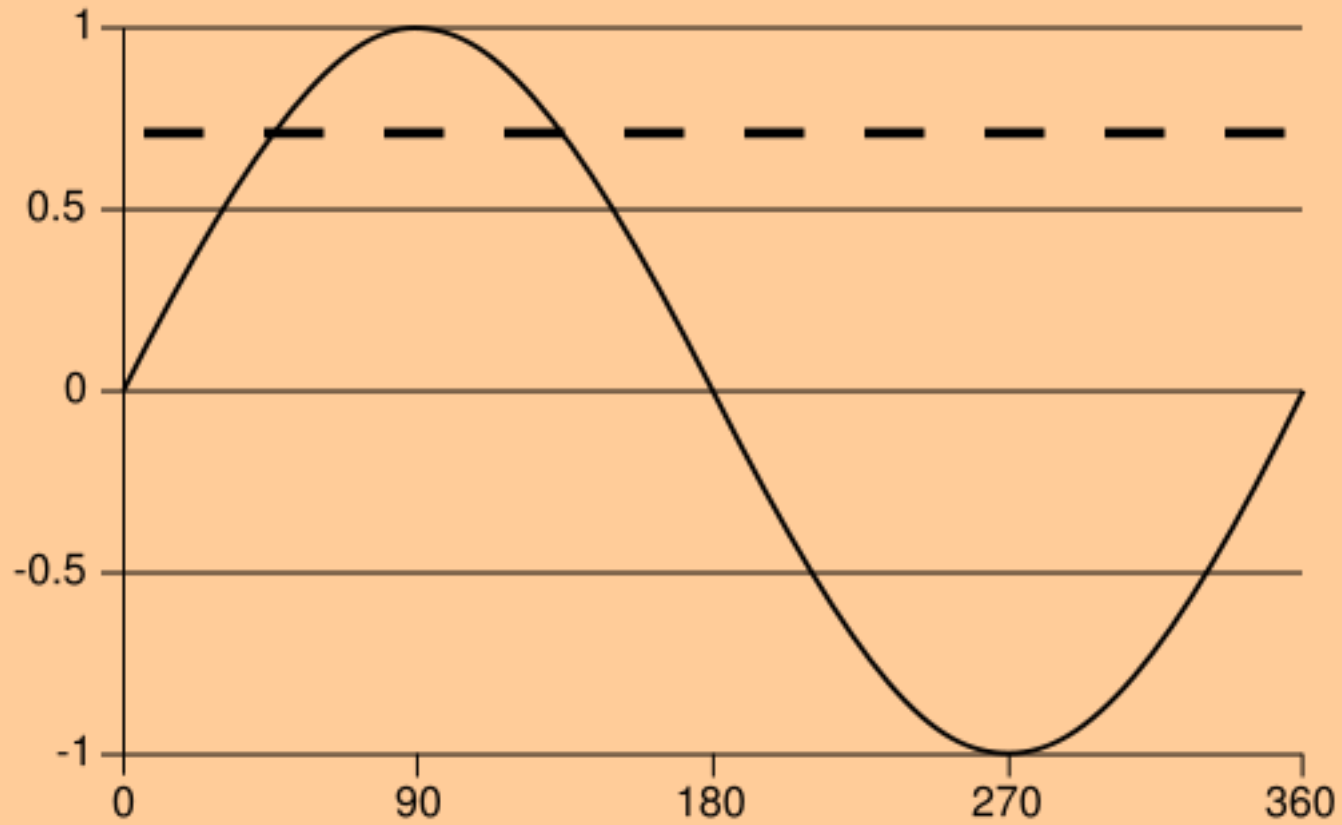
Terms

- 120 (single phase)/220 (split phase)/Three Phase
- X10
- Insteon
- Misterhouse

Split Phase

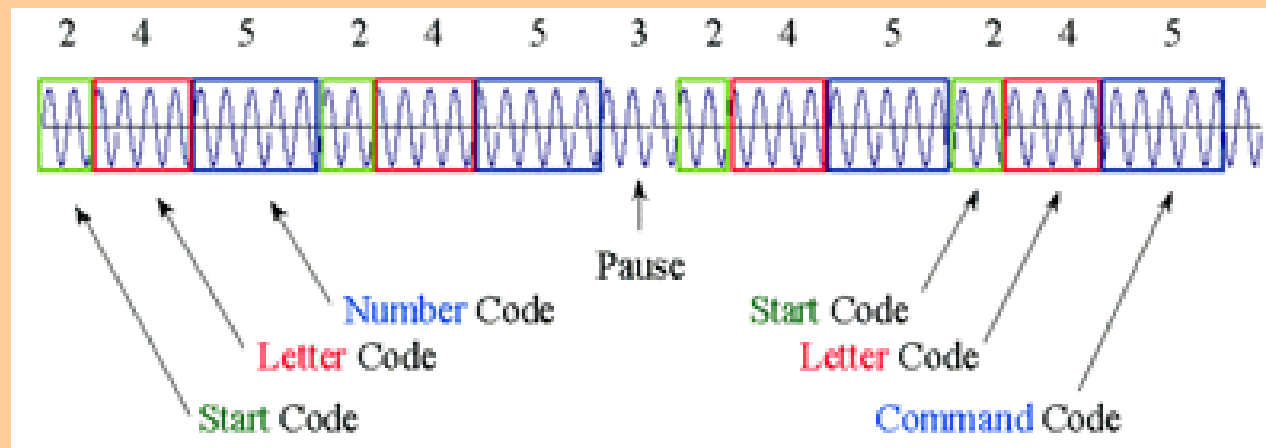


120v AC



X10 Signals

- X10
- Insteon



X10 Addressing



Home Automation Introduction

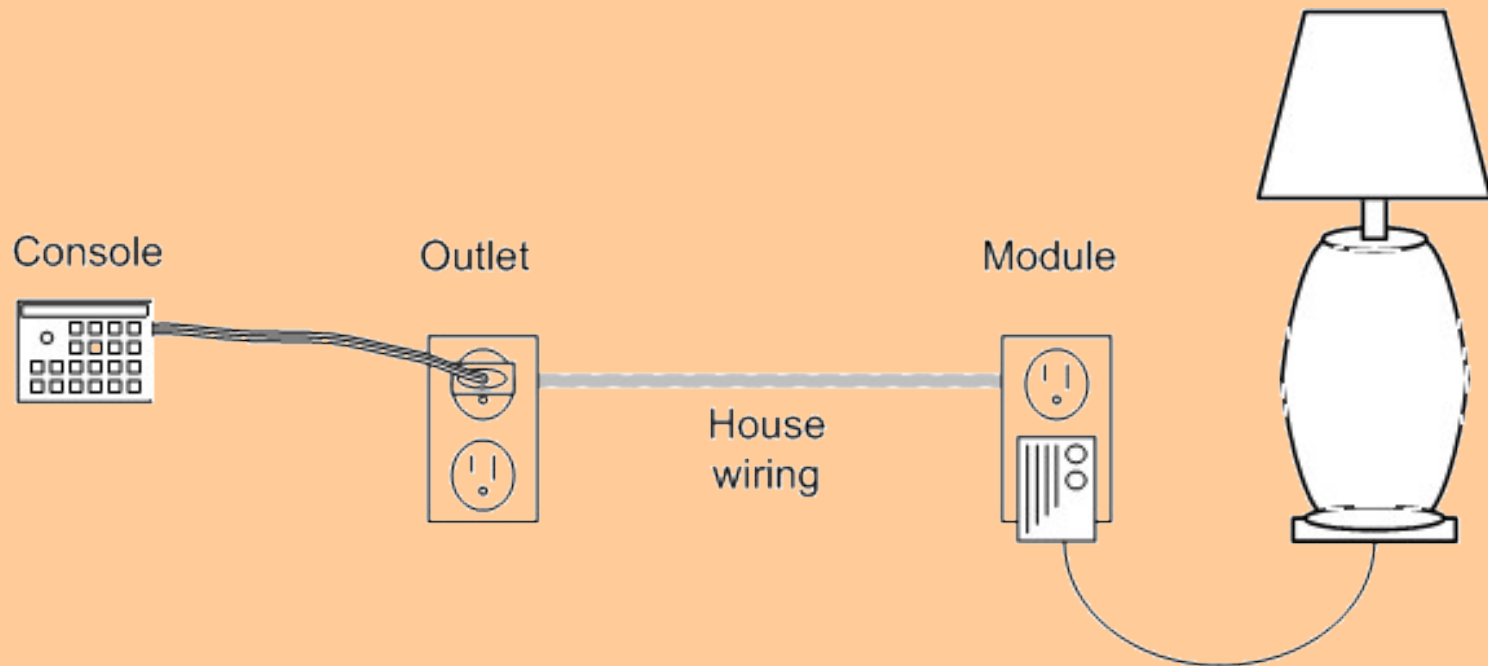
- Home automation,
It often starts with
holiday lights
- You don't need a
computer for this
- A simple remote
and some modules
will do ...
- *... but where's the
fun in that?!*



HA Introduction

- Typical hardware you'll start with:
 - Lamps modules
 - Computer interfaces
 - A desktop control is not a bad idea also
- You expand to control other appliances typically lights
- Has a very high 'Geek factor'
- Wild ideas begin to fill your head
- Reality sets in when gremlins strike
- SAF is **very** important!

Simple X10 Setup (cont'd)

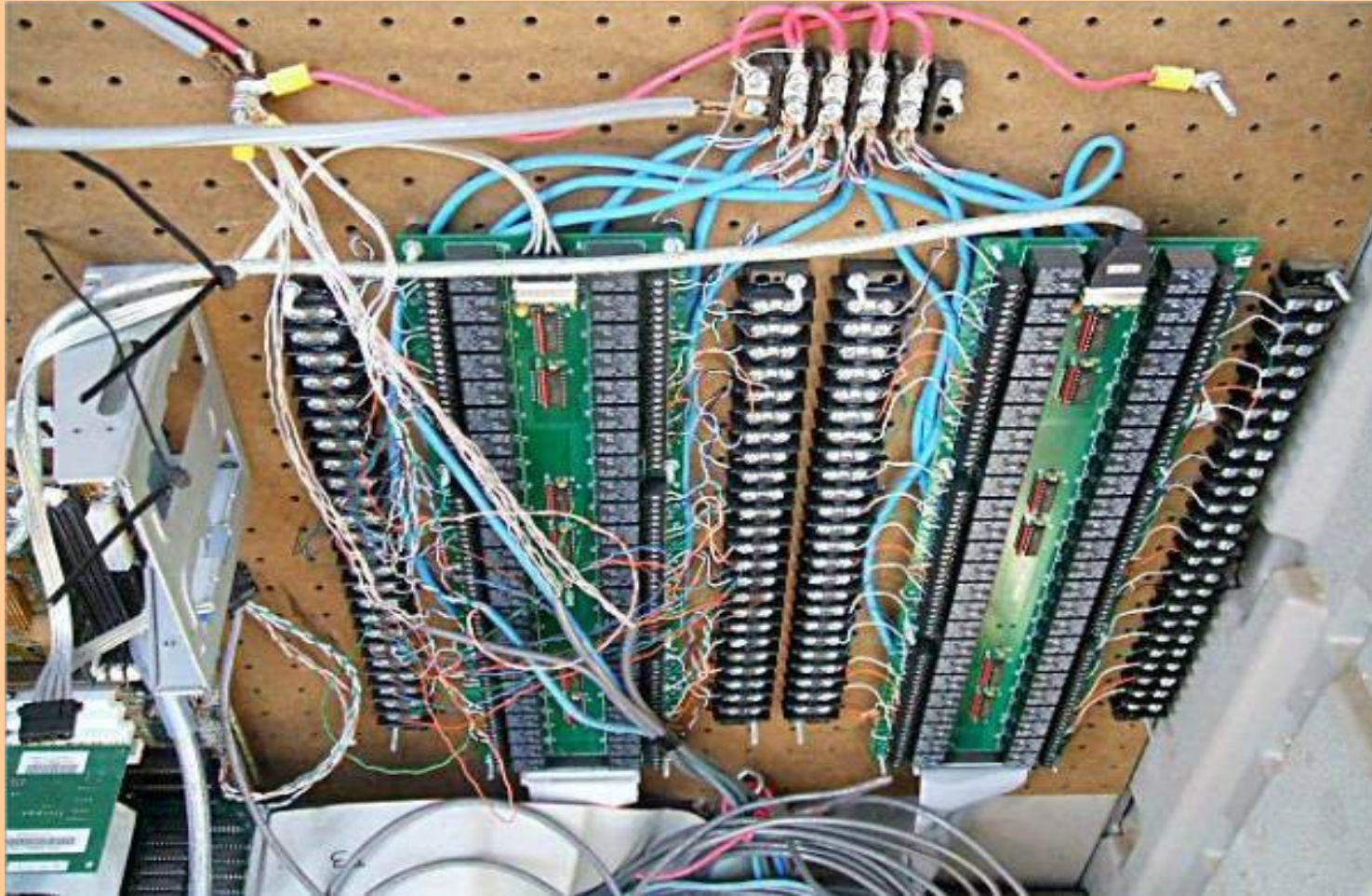


HA gone overboard! ;-)



<http://www.komar.org/>

Christmas lighting from hell



Misterhouse (MH)



<http://www.misterhouse.net/>

Misterhouse (MH)

- MH is written entirely in Perl.
- It has a rather strange Object Oriented method of coding because MH writes some of it's Perl code at startup
- Very flexible because it's able to take advantage of the existing library of Perl Modules.
- Starting out is not terrible complex but some knowledge of Perl is required.
- Plenty of examples exist
- Mail lists are very friendly and supportive.

Misterhouse (MH)

- Control
 - X10
 - Appliance control
 - Sensor monitoring (Motion/PIR)
 - KNX/EIB
 - Direct I/O
 - 1-wire/IButton
 - Insteon
 - UPB
 - Z-Wave
 - IP

Misterhouse (MH)

- IR
 - transmit
 - receive
- Wireless remotes (non X10/Insteon)
- Macros
- Triggers
- Tables (.mht ->.mhp)

Misterhouse (MH)

- Speech – TTS
- Listen – STT
- Weather
- News
- On this day, fortune etc.
- Comics
- TV Guide
- Home Layout

Misterhouse (MH)

- Grocery list
- Organizer/Calendar
- Stocks
- email
- Home Security
- custom Perl code
- custom web pages

Web Interface

The screenshot shows a Mozilla Firefox browser window titled "MrHouse - Mozilla Firefox" with the address bar displaying "http://www.mh.uucp:8080/ia5/". The browser's menu bar includes File, Edit, View, History, Bookmarks, Tools, and Help. The address bar contains navigation icons and a search field with "Google". The browser's bookmark bar shows various links like "Getting Started", "Latest BBC Headlines", "WIP", "School", "Zin", "Zout", "Presentation", "PHPBB Admin ToolK...", and "LSHFD Admin". The browser's tab bar shows several tabs, including "5 alternativ...", "Imagery | T...", "http://...e.net/", "Tips for pla...", "MrHouse", "MythTV LIR...", "MisterHouse", and "MrHouse".

The main content area features the "MisterHouse" logo in a stylized font. Below the logo is a grid of navigation buttons: "Back", "My MH", "Menus", "Search", and "Admin". The main content area is organized into a grid of functional buttons:

- MrHouse Home
- Mail Headlines News
- MrHouse Modes
- Lights Appliances
- HVAC Weather
- Security Cameras
- Phone Calls VoiceMail Msgs
- TV/Radio Guide MP3 Music
- Speech
- Comics Pictures
- Events Calendar Clock
- Statistics Logged Data

At the bottom of the page, there is a status bar with the text: "When all else is lost, the future still remains. 21:37:35 up 24 days, 9:55, 9 users, load average: 0.00, 0.00, 0.00 Page Views: 556".

The system tray at the bottom of the browser window displays: "Rise 7:13 AM Set 6:12 PM tv_time (%) 71.4°F (87.8) 100% no wind Fri, Oct 19 9:37 PM". The taskbar shows "Downloads" with files "electronics_tes..." and "DigitalHome.pdf". The system tray also includes "Clear" and "S M" icons.

MH .mht file

#	Type	Address	Name	Groups
#				
X10A,	01,	Holiday_Lights,	Holiday O,	
X10A,	01,	x01,	Holiday Test O,	
X10A,	01,	Backup_Lights,	Holiday O,	
X10A,	02,	x02,	Holiday Test O,	
X10A,	03,	x03,	Holiday Test O,	
X10A,	04,	x04,	Holiday Test O,	
X10A,	05,	x05,	Holiday Test O,	

MH .mhp file

- MH generates this code from the .mht file:

```
$Holiday_Lights = new X10_Appliance('01', );
```

```
$Holiday      = new Group;
```

```
$Holiday      -> add($Holiday_Lights);
```

```
$O            = new Group;
```

```
$O            -> add($Holiday_Lights);
```

User code

```
# Need to add Christmas time here
# Actually any Holiday.

if(state_now $Holiday_LightsOn) { # 0100n was just
sent
  # Holiday lights
    set $xO1 ON;
  Timer->new->set(1, sub { set $xO2 ON; });
  Timer->new->set(2, sub { set $xO3 ON; });
  Timer->new->set(3, sub { set $xO4 ON; });
  Timer->new->set(4, sub { set $xO5 ON; });

  run_after_delay 2, "print_log 'Ending delay test 1'";
}
```

User code (continued)

```
if(state_now $Holiday_LightsOff) { # 010Iff was just
sent
  # Holiday lights
                                set $x01 OFF;
Timer->new->set(1, sub { set $x02 OFF; });
Timer->new->set(2, sub { set $x03 OFF; });
Timer->new->set(3, sub { set $x04 OFF; });
Timer->new->set(4, sub { set $x05 OFF; });
run_after_delay 5, "print_log 'Ending delay test 1'";
}
```

Macro code (Perl)

```
# LRicon is actually a LampLinc V2
# manually turned on - sends out E4EON ($LR_ON)
# manually turned off - sends out E4EOFF
# ($LR_OFF)
if(state_now $LR_ON) {
    Timer->new->set(1, sub{ $LRiLamp->set(ON)});
    Timer->new->set(1, sub{ $LRicon->set(ON)});
}
if(state_now $LR_OFF) {
    Timer->new->set(1, sub{ $LRiLamp->set(OFF)});
    Timer->new->set(1, sub{ $LRicon->set(OFF)});
}
```

What can you do with it?

- Lights and appliances (direct, power line or wireless)
- TV, VCR, DVD, Tivo (IR)
- Tivo Series I (IP network)
- Monitor weather
- Temperature
- Thermostats
- Internet Information

The dream since 1985!



Automating the Coffee Maker

- RFC2324 - HTCPCP
- RFC2325
- Simply task
- We turn on the coffee maker every morning at 5:30 AM
- ... or do we?



When we make coffee ...

- we fill the maker with water
- we add a new filter
- we fill it with coffee
- we turn it on
- we let it brew
- Sometimes we set it up the night before with the timer so it goes off before we get up.

Simple automation

- We can just add an appliance module and program the computer to turn on the coffee maker
- but we still have to setup the machine and make sure it's on
- this is no easier than setting the timer

What we'd like it to do ...

- Fill the coffee maker with water
- turn on the machine
- brew the coffee
- turn off when there is no coffee

- *It would really be nice if it refilled water, coffee and filter as necessary.*
- *Reading my mind ould be a good idea too! ;-)*

What we have to do ...

- Safely brew a pot of coffee
 - make sure the pot is on the burner
 - check the status of the pot (empty? full?)
 - Check the machine for water, fill as needed but not if there's a pot brewing
 - don't overfill the machine
 - turn off when empty or there's no pot (for n amount of time).

What if devices could communicate?



What if devices could communicate?

- If we had one standard device communications protocol it would be easier (CEBUS)
- Do you set your coffee pot and alarm clock for about the same time?
- If devices could communicate we could set our alarm in one place
- and have the coffee ready in another

What if devices could communicate?

- and a little code:

```
if(time_now($Wake_Up - 0:20) &&  
  $Alarm_OK) {
```

```
  $CoffeePot->set(ON);
```

```
}
```

```
if(time_now($Wake_Up) && $Alarm_OK) {
```

```
  $AlarmClock->ramp(GENTLE);
```

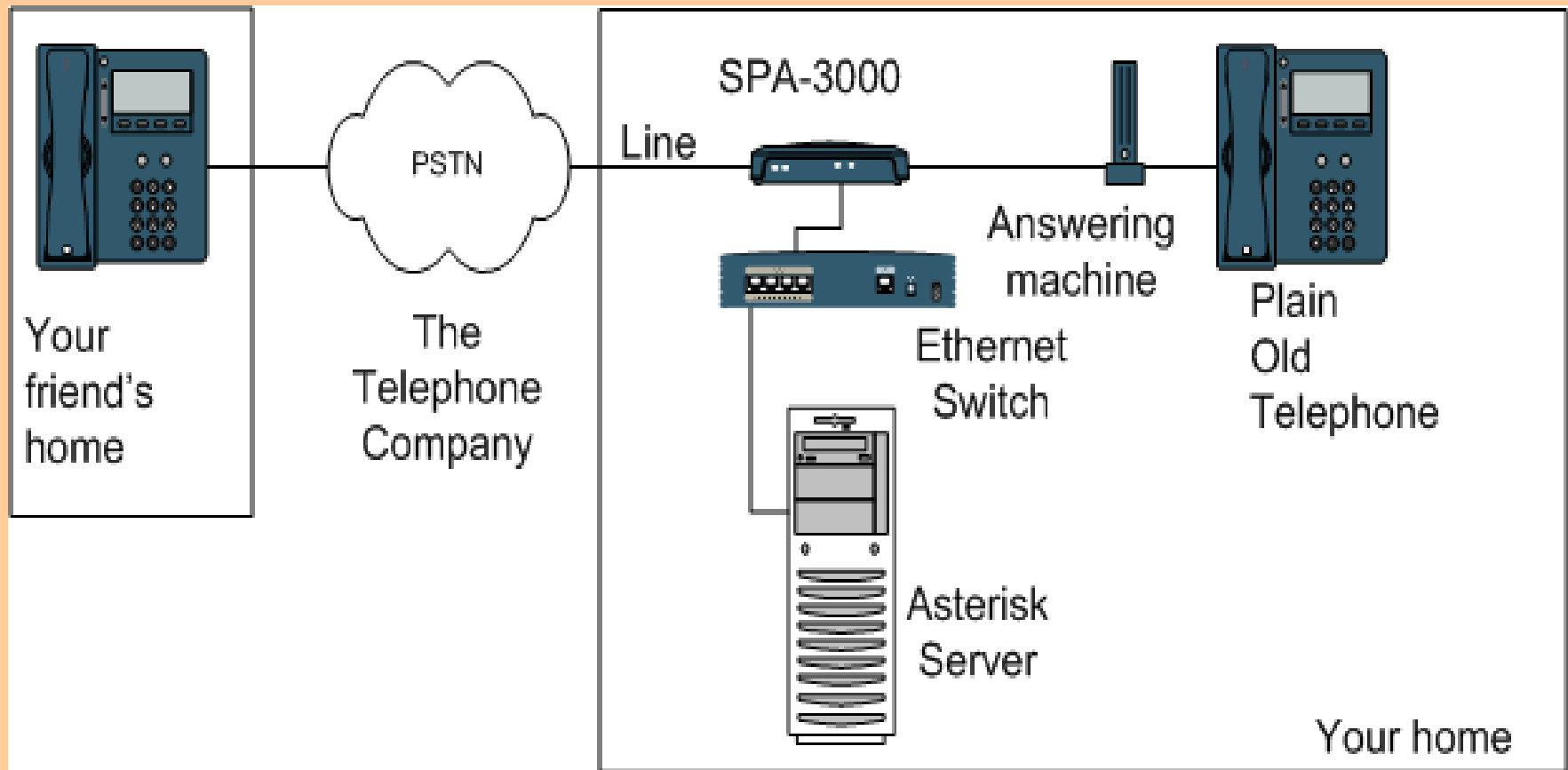
```
  $AlarmClock->set(ON);
```

```
}
```

NSLU w/Twonkyvision



Asterisk (VoIP)



Asterisk (VOIP)

- Very cool application, high geek factor
- build you own PBX at home
- soft DSPs (codecs) are problematic
- network traffic can cause problems
- with the proper board (more expensive hardware DSPs) it works properly.
- Simpler, cheap, wireless phones work just as well.
- Difficulties depend on complexity

Asterisk (VoIP)

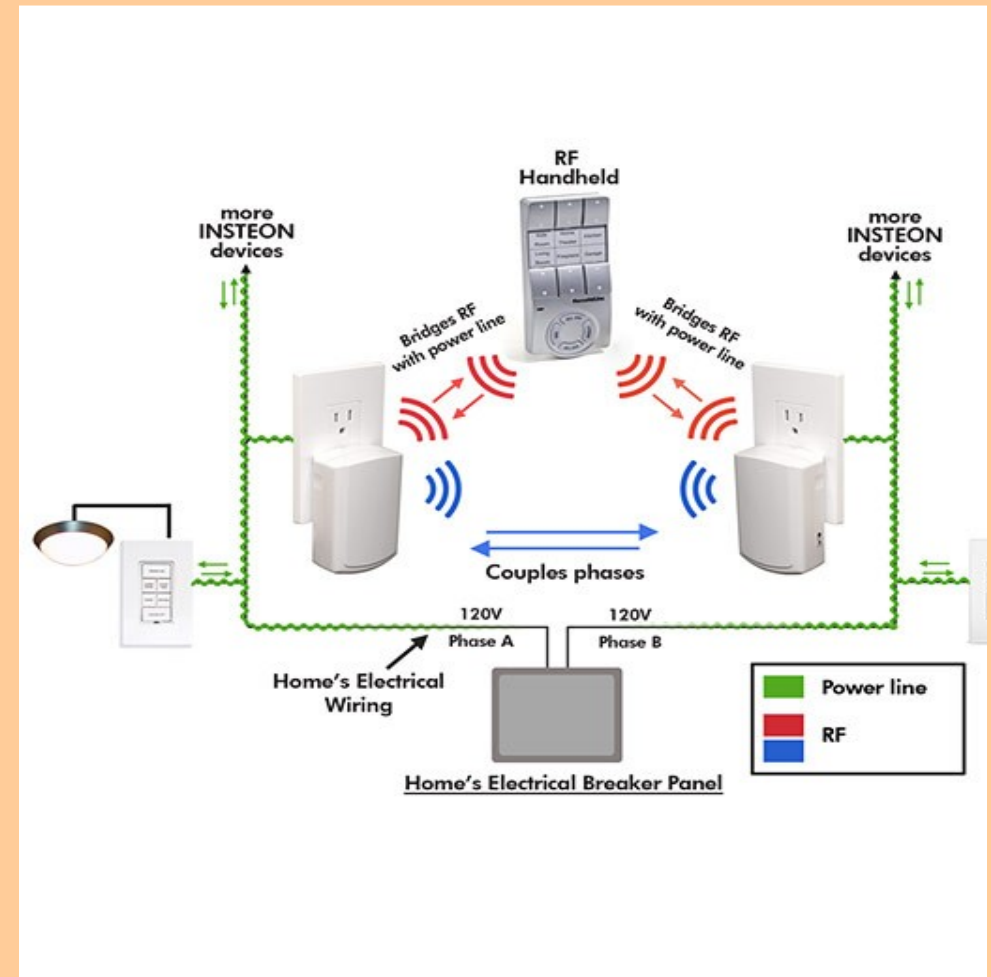
- Many type of cards can be used
- x100 is cheap but will eat up your CPU (interrupts @ 64K/s)
- More expensive cards work better
- IVR - Interactive Voice Response
- Can be integrated with MH (among other things)

ELK M1 Gold



Insteon Wireless AP and Remote

- Drawing is a bit mis-leading
- An Insteon module is either a PLC or wireless module (w/ exceptions)



Mid-range Automation

- Elk products
 - ELK M1EZ8
 - ELM M1 Gold
- HCS II
- Ocelot
- Homevision
- OnQ

Mid-range Automation

- HAI products <http://www.homeauto.com/>
 - Omni family – fire and alarm
 - Omni Lumina – control
 - Omni LT
 - Omni Pro II
 - Omni touch
 - Web Link
 - HAI control for Windows MCE
- JDS Stargate <http://www.jdstechtechnologies.com/>

Linux

- x10d
- Heyu
- Misterhouse
- ECS
- cpuxad

MS Windows

- Misterhouse <http://www.misterhouse.net/>
- X10's AHP (Active Home Pro)
- Homeseer
 - supports plug-ins
- Charmed Quark
- Smarthome Manager Essential Software
- Smarthome Manager Plus Software
- HouseLinc Desktop Software
- Mcontrol Software

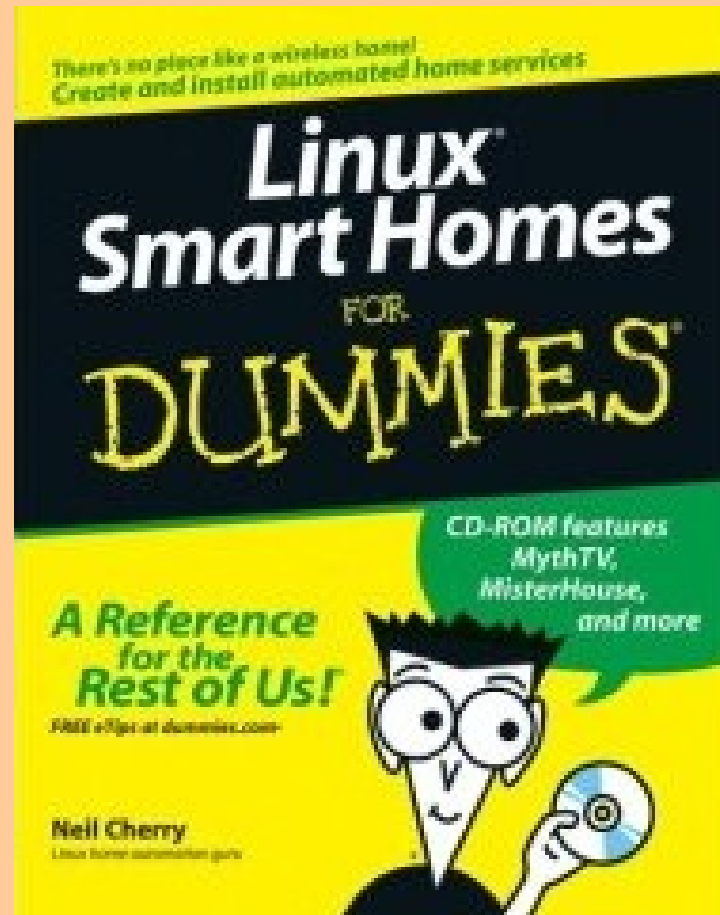
MS Windows (cont.)

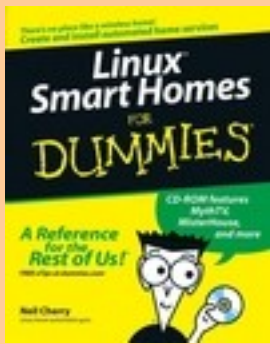
- Thinkessentials Software
- HAL 2000 Voice control
- Light Show Master
- Girder Pro
- Thinking Home
- Central Home Automation Director (CHAD)
- ECS
- cpuxad

Apple Mac OS X

- Misterhouse <http://www.misterhouse.net/>
- Indigo
<http://www.perceptiveautomation.com/indigo/index.html>
- Xtension <http://www.shed.com/> (OS X and Macs all the way back to Mac OS 7.5)

Linux Smart Homes For Dummies





Linux Smart Homes For Dummies

- Bringing The Future Home
- Connecting Multiple Computers w/o wires
- Entertaining Your Brain with a Little Help from Linux
- Keeping a Linux Eye on the Sky
- X10-ding Your Environment w/Home Automation
- Controlling and Securing Your Automation Network
- The Part of Tens

Questions & Answers

- You can ask any questions here that you haven't asked so far.