

Do Do This at Home *In Control?*

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Goals and Constrains

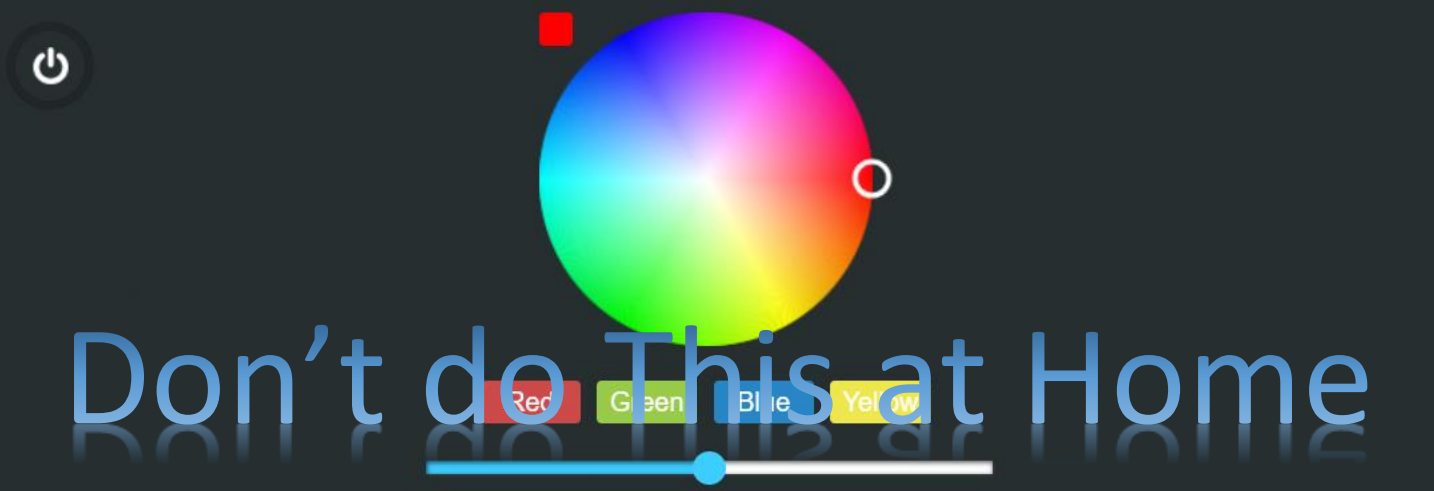
- Control, not “automation”
 - Dynamic vs carefully planned
 - IP vs wired logic
- Learn by Doing
- Consumer Electronics
 - Designed for everyday use
 - Users as participants
 - Users as Designers
- Not annoy my family
 - At least, not more then needed
- Two-Way signaling





COLOR WHITE

⏻



Don't do This at Home

Red Green Blue Yellow

Effects

- ⌚ Timer
- 📅 Weekly schedule
- 🌅 Sunrise / Sunset
- 🌐 Internet & Security
- ⓘ Settings

The control panel features a dark grey background. At the top, there are two tabs: 'COLOR' (selected) and 'WHITE'. Below the tabs is a power button icon (⏻). The main control area contains a large, multi-colored wheel (red, orange, yellow, green, cyan, blue, magenta) with a small white circle on its right edge. Below the wheel is a horizontal slider with a blue knob. Underneath the slider, the text 'Don't do This at Home' is displayed in a light blue, sans-serif font. Below this text are five colored boxes labeled 'Red', 'Green', 'Blue', and 'Yellow'. At the bottom of the panel, there is a section titled 'Effects' with a downward-pointing chevron. This section contains five icons and their corresponding labels: a clock for 'Timer', a calendar for 'Weekly schedule', a sun/moon for 'Sunrise / Sunset', a globe for 'Internet & Security', and an information icon for 'Settings'.

Preface

- The Jetsons is winning → Alexa
- It's not just about light but we learn from 0's and 1's

In The Beginning there was X10

- *At least the beginning of the journey*
- 1970's – power line signaling
- Simply Turn Things on/off
- 16 Devices, 16 Houses (A-P) => 256 Devices
- Keyed on AC 60Hz powerline
- One way signaling
- Wild cards for all and for lights

X10 Evolves

- Computer interface (serial port)
 - Could listen as well as transmit
- Additional codes for querying
- Smart Home and others improved technology
- Motion detection and wireless
- Challenges
 - Unreliable signaling
 - Slow signaling
 - Limited Devices

Initial software

- Module on PC
 - Operations queue
 - Trigger and rules
 - Rules => Groups!
 - Serialization
- Multithreaded
 - Use of queues
 - And database
- Also explore programming paradigms

Home Control 0

Floors

Sunrise 6
SunSet 17

Stop Activity Min! Panic Stop Exit

PLM Scan Reload Web Insteon Assist Refresh Status

Zip Code 02461

Ports 9998 Telnet

Connector

7% 83075.64

Telnet to localhost 9998 for commands

17:52.12

Total CPU 5963.25

18:48:10.530	Using a direct IP Address
18:48:15.252	Finished ManageAllLinkRecords
18:48:32.990	Requesting Insteon Statuses
18:48:42.583	Requested Insteon Statuses
18:53:45.258	Requesting Insteon Statuses
18:53:47.907	Requested Insteon Statuses

Verbose Trace Serial Talking Out Loud Talk to Log PLM Enabled Really Halt Status on Start Don't Init All Links Show Echoes Packet History No Dark Honor Daylight Show Progress UseTaskBar

Send Count 0

Action 0

Infos

- Solution 'hc' (17 projects)
 - C# FamilyHandlers
 - VB hcdb
 - VB HCListener
 - VB HCSupport
 - VB **hn**
 - VB InsteonAssist
 - VB InsteonDefs
 - VB InsteonSupport
 - C# LifxHC
 - C# RmfADOUtills
 - C# rmfAppUtills
 - C# RmfCommon
 - C# RMFControlWrappers
 - VB rmfpopinfo
 - VB rmftrivialmail
 - VB **runhn**
 - C# TrylotDefs

Initial Control Program

- Written in Visual Basic 6
- Oriented to X-10 challenges and hacks
- Database with scripting
- Serialized actions and simple rules/triggers
- Lessons
 - Automated scripts have limited utility
- Distinguished desired response vs reported state
- Trying to tame complexity

Chance to try language features

- Dynamic object creation
- Dynamic scripting in C# and VB and ..
- Rule Engine
- Database
 - Now with LINQ!
- Structure values for Action and State/Status
 - (oops)
 - Distinguish “intent” vs “state”

Improving X10 / CEBus

- Much smarter
- A special “turn on” for each device
- Automagical configuration
- Macro Language
- Structure Wiring
 - Powerline, coax and radio signaling
- TDS – Too Damn Smart

Other fancy protocols

- Protocols that embed their limits
 - IEEE-1394 / Firewire
 - Bluetooth (and now, Bluetooth Mesh)
 - Zigbee, Z-Wave
 - Thread? (So close but ...)
- Limitations
 - Separate physical facilities and distance limits
 - Impose policies
 - Need separate relaying
 - Presume scarcity

Other Protocol

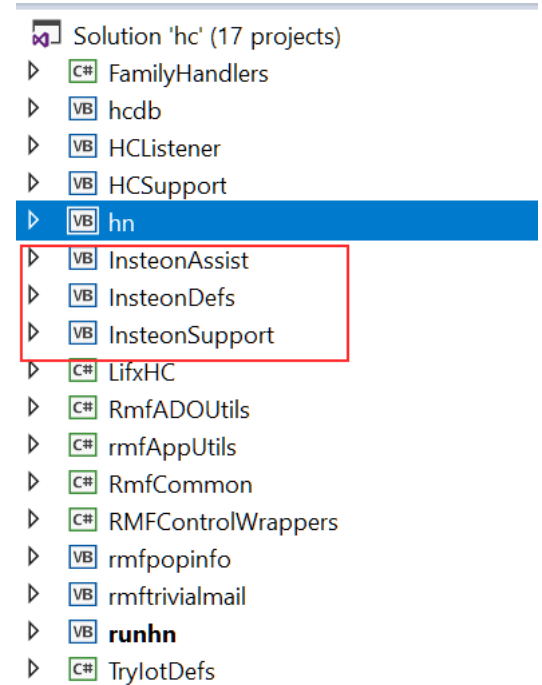
- Lutron
 - Proprietary
 - Patented Feedback!
- Universal Power Line – UPB
 - Noble attempt
 - Still exists but niche

Smart Home Insteon

- In the spirit of X10 but better
 - Higher speed powerline
 - Fixed end point addresses – 24 bit
- Original business model – OEM
- Protocol by hardware people
 - Limited number of hops and echo required
 - Manual-inspired linking protocol
 - Buggy initial implementation with very slow work-around
- Did a very deep dive and built lots of tools

Embracing Insteon

- Generalized the program
 - Additional device type
- Lots of complex support
 - Didn't realize how dumb protocol is
 - Had to program around hardware-designed protocols
- Deployed devices more widely
- Limited scale and devices



SmartThings

- Gateway to
 - Z-Wave
 - Zigbee etc..
 - *And more*
- Also
 - Apps and virtual devices
 - IFTTT
 - Alexa etc..

SmartThings

- Working around the rule engine
 - Wrote Groovy to program around
 - Support own http(s) protocols
 - Used IOTDB to work around OAuth
- Cloud First
- Zigbee/Z-Wave
 - Having to pair (and unpair) devices
 - Lots of hex codes

Coexisting

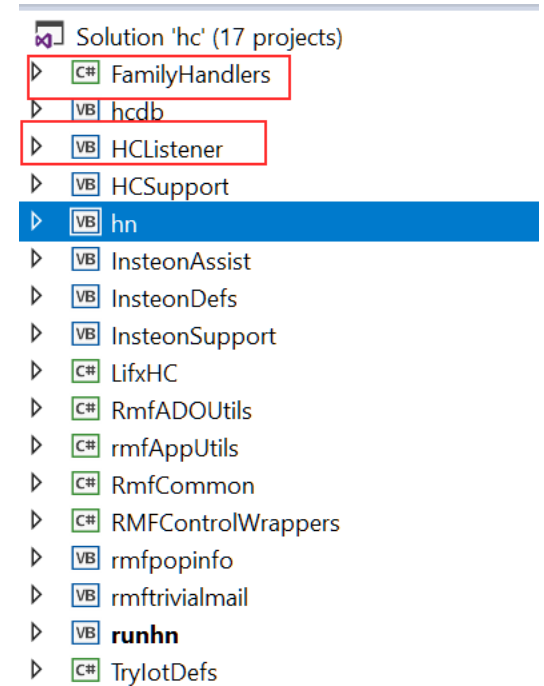
- My system
 - Controls On/Off
 - Controls Brightness
 - Color etc.. is “To Do”
- Coexist wit native apps
 - Control colors etc..
 - Option to change only some parameters

FiOS

- Upgrading to 150mbps forced me to cleanup Wi-Fi
 - Speed itself is not that important above threshold
- Ubiquiti
 - Managing access points
 - Robust coverage
 - Managing static addresses
- FiOS
 - Uses MOCA
 - STBs can use IP ... but not with my own DHCP Server!

Embracing the Web

- Web App V1
 - TypeScript Visual Studio
 - Presented floor map w/editing
 - Turns out buttons are more useful
 - Event driven
 - Widgets ...
- (My) server side
 - http(s) listener
 - Act as a nexus for state reporting
 - Provides floor maps and device info



LIFX



Everywhere



Whole Room



Security

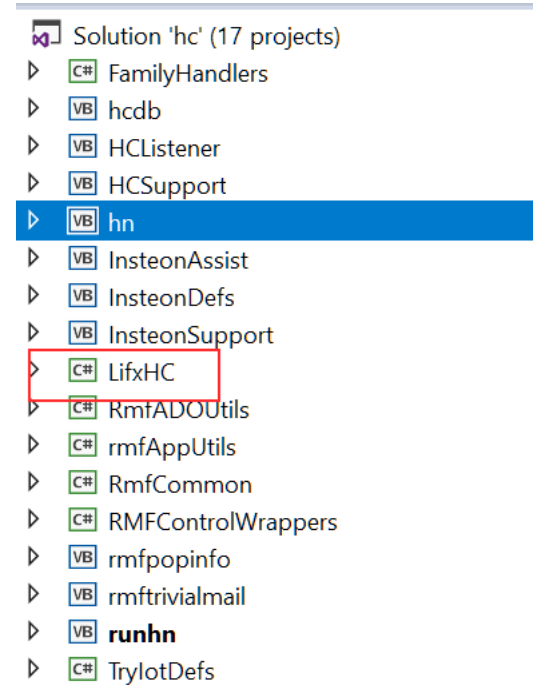


Outdoor



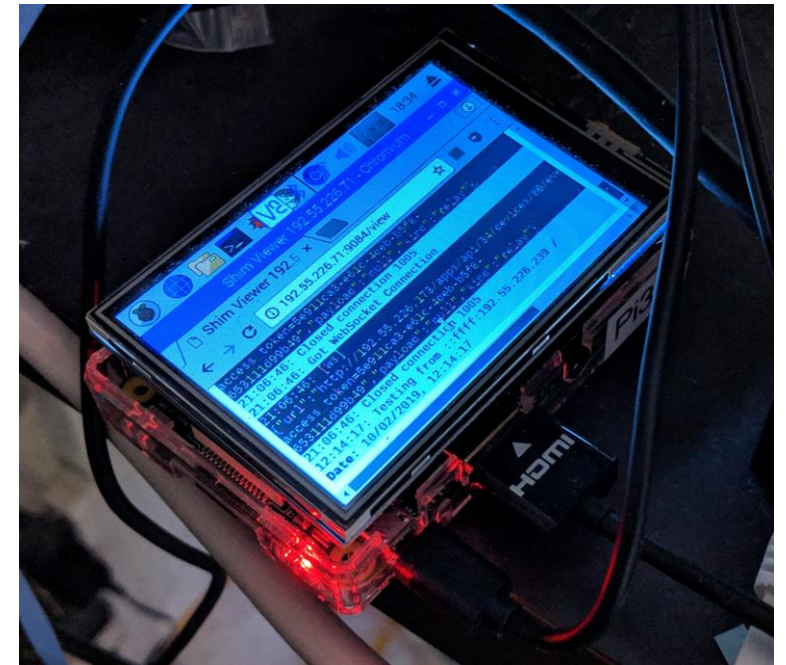
Feature Lighting

- IP!!
 - Bulbs as the end point
 - Local and Cloud protocols
 - App
- Features
 - Discovered color temperature and more
 - Up to 1100 lumens, BR30, IR etc.
 - But not outdoor
- Teething problems
 - Onboarding issues
 - DHCP Issues



Resilience and NodeJS and npm

- Direct control from WebApp!
 - Removes dependency on main system
 - CORS → Need shim running on multiple machines (NodeJS)
 - Still report status to central module
 - Central module is still an option
- Improved programming skills w/Async
- IIS dispatch
 - Was C# /name
 - Now IISNode



Embracing NodeJS

- Scripting → NodeJS
 - Nightlights
 - Keep-ons
- Visual Studio Code and TypeScript
- Plan to shift functions to NodeJS
 - Mañana
- Programming C# vs TypeScript
 - Flexibility of objects
 - Vs. Linc

Services

- IFTTT – scaling
- Alexa
- Google Home
- Apple Homekit
- DIY – HomeAssistant, OpenHab etc.

Hubitat

- Box vs. DIY Pi
- SmartThings emulation
 - Added “MakerAPI” for me!
 - Support for Hue, Yeelights, Nanoleaf Etc.
- Runs in my house
- Shifting my devices (a pain with Z-Wave)



imgio

Dec '18

Thanks for the tip! I had already seen the warning about webCoRE. Only had my hubitat for an hour and I can already tell it is miles ahead of ST... Things actually work! And fast!



More IP Devices

- *Discover on Aliexpress and elsewhere*
 - Sonoff – Alexa etc.
 - But can be reflashed with effort
 - 小米 (米家) / Ewelink
 - Shelly – simplest API
 - Also designed for reflashing

Supporting


- My own interfaces
 - Insteon
 - Lix (using cloud but have local code in Node)
 - Shelly
- Via Hubitat
 - Nanoleaf
 - Yeelights
 - Hue
 - Zigbee and Z-Wave
- Native apps for full capabilities and on-boarding

IP Support


- Using Ubiquity Unifi
 - Managing naming and finding devices
 - Static Addresses when necessary
 - VLAN for guests
 - Port mapping and Dynamic DNS
- Issues
 - Fall-over isn't working automatically
 - Dyn DNS support limited
 - No API (Exploring using Puppeteer)

Shelly¹



Switch 


Timer


Weekly
schedule

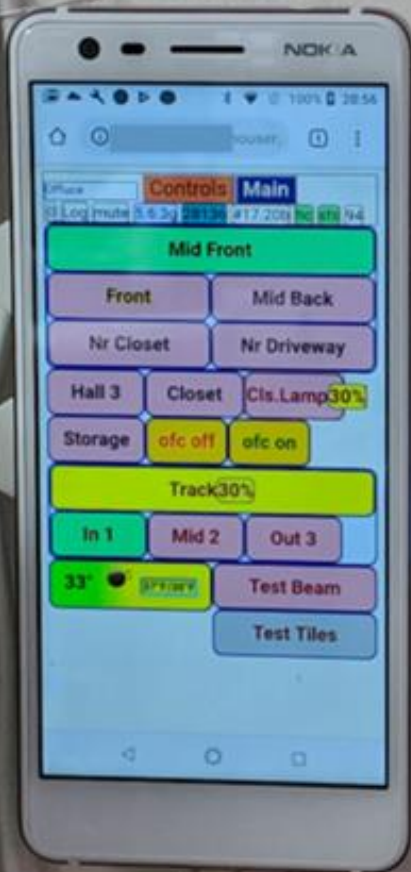

Sunrise /
Sunset


Internet &
Security

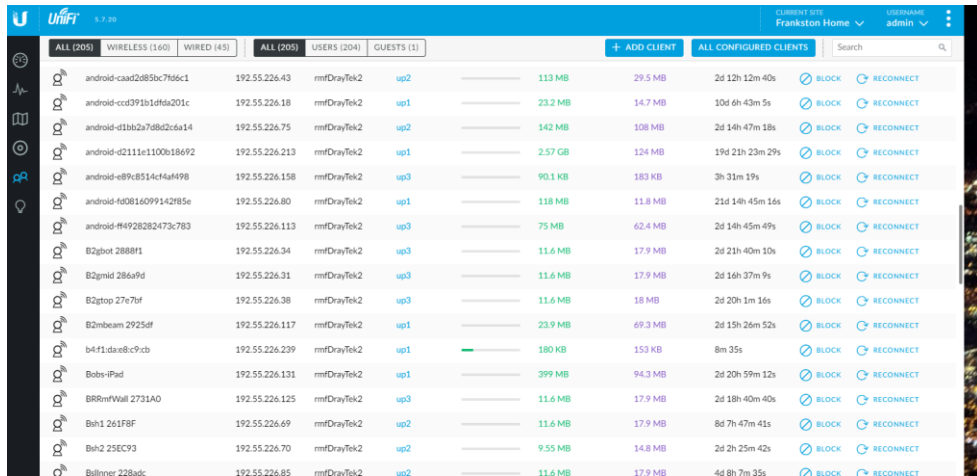

Settings

Shelly Bulb
Smart WiFi RGB+W Light





Managing the networking



The screenshot shows the UniFi network management interface. At the top, it displays 'CURRENT SITE: Frankston Home' and 'USERNAME: admin'. Below this, there are tabs for 'ALL (205)', 'WIRELESS (160)', 'WIRED (45)', 'USERS (204)', and 'GUESTS (1)'. A search bar is also present. The main area contains a table of connected clients with the following columns: Client Name, IP Address, Access Point, Port, Signal Strength, CPU Usage, Memory Usage, Uptime, and Action (BLOCK/RECONNECT).

Client Name	IP Address	Access Point	Port	Signal Strength	CPU Usage	Memory Usage	Uptime	Action
android-caad20850c7f66c1	192.55.226.43	mfDrayTek2	up2	-----	113 MB	29.5 MB	2d 12h 12m 40s	BLOCK RECONNECT
android-ccd391b1df69a201c	192.55.226.18	mfDrayTek2	up1	-----	23.2 MB	14.7 MB	10d 6h 43m 5s	BLOCK RECONNECT
android-d1bb2a708d2c6a14	192.55.226.75	mfDrayTek2	up2	-----	142 MB	108 MB	2d 14h 47m 18s	BLOCK RECONNECT
android-d2111e1100b18692	192.55.226.213	mfDrayTek2	up1	-----	2.57 GB	124 MB	19d 21h 23m 29s	BLOCK RECONNECT
android-e89c8514c4f4f98	192.55.226.158	mfDrayTek2	up3	-----	90.1 KB	183 KB	3h 31m 19s	BLOCK RECONNECT
android-fd0816099142f85e	192.55.226.80	mfDrayTek2	up1	-----	118 MB	11.8 MB	21d 14h 45m 16s	BLOCK RECONNECT
android-f4928282473c783	192.55.226.113	mfDrayTek2	up3	-----	75 MB	62.4 MB	2d 14h 45m 49s	BLOCK RECONNECT
B2gbot 2888f1	192.55.226.34	mfDrayTek2	up3	-----	11.6 MB	17.9 MB	2d 21h 40m 10s	BLOCK RECONNECT
B2gmid 286a9d	192.55.226.31	mfDrayTek2	up3	-----	11.6 MB	17.9 MB	2d 16h 37m 9s	BLOCK RECONNECT
B2gtop 27e7df	192.55.226.38	mfDrayTek2	up3	-----	11.6 MB	18 MB	2d 20h 1m 16s	BLOCK RECONNECT
B2mbeam 2925df	192.55.226.117	mfDrayTek2	up1	-----	23.9 MB	69.3 MB	2d 15h 26m 52s	BLOCK RECONNECT
b4f1daebc9cb	192.55.226.239	mfDrayTek2	up1	-----	180 KB	153 KB	8m 35s	BLOCK RECONNECT
Bob's iPad	192.55.226.131	mfDrayTek2	up1	-----	399 MB	94.3 MB	2d 20h 59m 12s	BLOCK RECONNECT
BRRmVWall 2731AO	192.55.226.125	mfDrayTek2	up3	-----	11.6 MB	17.9 MB	2d 18h 40m 40s	BLOCK RECONNECT
Bth1 261F8F	192.55.226.69	mfDrayTek2	up2	-----	11.6 MB	17.9 MB	8d 7h 47m 41s	BLOCK RECONNECT
Bth2 25EC93	192.55.226.70	mfDrayTek2	up2	-----	9.55 MB	14.8 MB	2d 2h 25m 42s	BLOCK RECONNECT
Balinner 228adc	192.55.226.85	mfDrayTek2	up2	-----	11.6 MB	17.9 MB	4d 8h 7m 35s	BLOCK RECONNECT



Lots of lessons and questions

- Need a peer internet
 - Network of networks is the wrong model
- Haven't fully addresses trust/security issues
 - Inherently ambiguous
- Rules (IFTTT etc.) don't scale and cannot be consistent
- Where is knowledge of scenes
- How do you I say "I want to read.

Beyond light

- Entertainment and ambiance
 - Music and smart speakers
 - Video and TV and home theater and the old STB
- Doorbells, cameras
- HVAC: Nest and thermostats and Rethinking HVAC
- Baby monitoring and all that
- Stepford Families and smart homes and cities
- Computing and Alexa and the Jetsons

Need more APIs

- To control more of the home capabilities
- But learn by doing
- Escaping silos ...

Notes

- Native vs. normalized
- What does on/off do?
- Where is a scene known?
- Rules vs. Groups
- Npm
- Nest
Y:\photos\ByDate\2018x\201804\20180413\IMG_20180413_121034.jpg